Marco Papa

EVA, RESIDUAL INCOME AND MANAGERIAL PERFORMANCE

FrancoAngeli

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EVA, RESIDUAL INCOME AND MANAGERIAL PERFORMANCE

FrancoAngeli

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PREFACE

The residual income (RI) and related economic concepts, such as the Economic Value Added EVA, are worldwide viewed as the measures that capture value creation better than other accounting number: EPS, ROI, ROCE and so on. Accounting researchers have increasingly focused their efforts on investigating the claim that EVA is a better predictor of stock returns than established earnings (e.g. Biddle *et al*., 1997). Moreover, RI has been widely applied in capital market-based research to model share price in terms of book value and earnings (e.g. Ohlson, 1995) and in external analyst's valuation model for forecasting stock prices. Despite RI popularity in the value relevance literature, there is still limited research that has examined RI as a performance measure and the effects of Value Based Management System. Ittner and Larcker (1998: 213) recognise this *paucity* and call for further research about the long-term performance benefits from the adoption of economic value measures.

This study aims at covering this gap in two principal ways. Firstly, it examines the properties, the values, as well as, the critical aspects of residual income and EVA as a tool for measuring managerial performance. Namely, our focus will be on the accounting adjustments proposed by Stern Stewart & Co. The basic idea for them is that, in order to come to a meaningful measure of performance, the main distortions of the accounting model should be reversed, for example the investment in intangibles should be added back to the capital invested. As O'Hanlon and Peasnell (1996: 52) have precisely pointed out, it is meaningless to use single-period economic profits as a measure of performance without considering the conservative appraisals that are present in the accounting model.

The second major objective, once we have shown shareholder accounting as a tool to reconcile the accounting profit with economic income, is to examine the effectiveness of a remuneration system based on EVA. Actually, executive compensation is a highly controversial topic. Critics point to the high levels of pay received by Chief Executive Officers (CEOs) at publicly traded firms as evidence that top mangers pay is bust. Moreover, some studies have shown that executive pay is not correlated to company performance. EVA literature, on the other hand, advocates that EVA is a critical tool for boards to design compensation packages that reward success and recruit talents.

The analysis is organised in four chapters. In the former, we examine the main literature on the role of residual income and EVA as single-period measures of performance. After highlighting the economic foundations of the residual income and the main advantages and limitations of residual income as a managerial performance measure we present, in chapter 2, the EVA Financial Management System and the most common adjustments proposed by Stern Stewart. In chapter 3 we assess the implications of using the EVA "bonus bank" to separate the award of managerial bonuses from their payment. In chapter 4 the conclusions are drawn of the present critical analysis.

Part of this work was carried out during the Master course in Accounting and Finance at the Lancaster University Management School under the supervision of Prof. John O'Hanlon.

Bari, October 2012 *Marco Papa*

1. THE RESIDUAL INCOME MODEL

1.1. Introduction

EVA (economic value added) is merely a variant of a measure that has been around for a very long time: the residual income (RI). Firstly, introduced by Solomons[1] (1965), residual income (RI) equals the annual accounting profit minus an interest charge on the book value of the net assets. Essentially, under this concept of profit, a business creates wealth only when the cost of capital, included the opportunity cost of shareholders' funds, has been covered. Formally, the RI for a period t can be defined as:

$$RI_t = P_t - kA_{t-1} \qquad (1)$$

where, P_t is the accounting profit of the entity for period t, assuming no outflows or inflows from the shareholders of the company, A is the accounting book value of the net assets at time t-1, and k is the cost of capital. For instance, if we assume that shareholders have invested a capital of € 1.000 in a project that earns € 100 of net income, and they require a return of 8 percent, then we can say that the investment has added value for € 20.

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[1] One of the earliest to mention the RI concept was Alfred Marshall when he defined economic profit as total net gains less the interest on invested capital at the current rate (Marshall, 1890). It first appeared in accounting writings in 1930s (e.g. Preinreich, 1938) and in management accounting literature in the 1960s. Indeed, Solomons in his monograph entitled *Divisional Performance*, written in 1965, considered that General Electric originated the term RI in the 1950s. RI has been suggested as an internal measure of business-unit performance (Solomons, 1965) and as an external performance measure for financial reporting (Anthony, 1982).

This basic principle has been largely ignored until a Wall Street consulting firm, Stern Stewart & Co, has rediscovered in the 1990s residual income and reshaped it into economic value added, or EVA. One purpose of this chapter is to show that many of the appealing features of EVA have been long known in the accounting literature on residual income. In fact the old debate on residual income can provide an essential basis for assessing the present claims that are made in support of EVA and other metrics based on economic principles.

We will start by showing, in section 2, the link between economic value and residual income. This basic relationship can be used for a variety of tasks: including valuation, financial planning, mergers and acquisition and to monitor and reward managers of business units.

Our main purpose will be to examine EVA's proprieties as internal performance measure and as compensation system. After showing the use of residual income for valuation purpose, in section 3, we will focus on the main strengthens and limitations of residual income as a managerial performance measure, in sections 4, 5 and 6.

1.2. Foundations

As we have already mentioned, EVA is a revised version of residual income (RI). RI is a measure introduced by Solomons (1965) to assess and reward the performance of a divisional manager on the basis of the annual accounting profit minus an interest charge on the book value of the net assets.

It seems worth focusing on the previous debate on RI, as this anticipates many of the properties and problematic issues of EVA, providing a useful framework to assess the underlying income model of Stewart's financial system. The most cited exposition of EVA, "*The Quest for Value*", contains, in fact, appealing arguments about the incentive properties of economic value added, without a formal demonstration. In contrast, the earlier debate offers formal analysis of RI proprieties. The following chapter will consider, therefore, the former studies not in a historical perspective but for the points relevant to the present use of RI.

The first main merit of EVA, cited by Stewart (1991: 3, 1994: 614), is that EVA is the only accounting measure that is *entirely* consistent with the discounted cash flow model, with the NPV rule[2]. As it has already been said Stewart does not provide a formal demonstration of this property, on the contrary the accounting literature on residual income has long been focused on the link between accounting numbers and economic values. Many academics[3] have proved that the present value of a stream of future cash flows (e.g., the dividends paid to shareholders) is equivalent to the current book value plus the present value of expected residual incomes. Since this relation is used to justify the application of residual income, both in valuing a business as well as in measuring managerial performance, its main features are presented below. Strictly, the Miller and Modigliani (1963) valuation model, quoted by Stewart as the source of this property, will be restated in a residual income version.

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[2] The *net present value* (NPV) of a project equals the present value of the future cash inflows, minus the initial investment. An investment is worth making if it has a positive NPV (Brigham and Gapenski, 1997: 399). According to Bromwich and Walker (1998), at the time of decision making, accepting projects with positive present value of residual incomes is equivalent to accepting investments with a positive NPV. Consequently the RI idea coincides with the NPV decision rule at the time of decision making.

[3] The first argument concerning the usefulness of RI as a performance measure appeared to be framed by Preinreich in the 1930s who primarily stated that the present value of expected residual incomes for an investment equals the net present value of the project. He was one of the first to make an attempt to link accounting numbers with capital values. He demonstrated that the capital value of a fixed asset is its accounting book value plus the present value of excess profits. Excess profits are defined as the difference between profit less interest. Many researchers have regularly refined the latter finding after the second half of this century, see for example: Edey (1957), Edwards and Bell (1961), Peasnell (1982), and more recently O’Hanlon and Rees (1995).

In order to demonstrate the value equivalence of accounting and cash flow measures we will follow the entity perspective, as strongly favoured by Stern (1991, 1994). In practice, the valuation of an entity can be done either from a *equity shareholders' perspective* or under an *entity perspective.* The former approach is focused on the direct valuation of shareholders' wealth, whereas the latter looks at the value of all investors' (shareholders and debtholders) claims on the business. In other words, under this approach we are interested in estimating the value of the entity as a whole, regardless of how it is financed. Exhibit 1 shows the various concepts that are employed, under the two perspectives, in order to value a business and it explicates how residual income can be calculated.

Exhibit 1 – Residual income calculation

Under a proprietorship approach, residual income can be found by restating formula (1) as follows:

$$RI_t = NI_t - kA_{t-1} \qquad (1)_a$$

where:

NI_t	Net income for period t after interest and tax, attributable to shareholders.
A_{t-1}	Net assets less debt (equity shareholders funds) at time t-1.
K	Cost of equity (required return of shareholders' investment). This is the discount rate applied to future dividends when valuing share capital under the dividend discount model.

Under an entity approach, residual income can defined as follows:

$$ORI_t = OP\,(1-t)_t - waccA_{t-1} \qquad (1)_b$$

where:

ORI_t	Operating residual income after tax for period t.
OP_t	Operating profit before interest but net of tax for period t.
A_{t-1}	Net assets before deducting debt (equity shareholders funds and debt) at time t-1.
wacc	Weighted average cost f capital for the entity (average of the cost equity and the cost of debt. This is the discount rate applied to operating cash flows, net of tax, when valuing the operating entity).

The first concept to consider is the clean surplus accounting or comprehensive income. According to FASB (Concepts Statements No. 6) comprehensive income is «the change in equity (net assets) of a business enterprise during a period from transactions and other events and circumstances from non-owner sources. It includes all changes in equity during a period except those resulting from investments by owners and distributions to owners». This implies that all the items that change book values should be reported as earnings, except the transactions with owners (Linsmeier *et al.*, 1997: 120). Algebraically we have[4]:

$$Op_1 = Ocf_1 + \left(A_1 - A_0\right) \qquad (2)$$

where, under the entity perspective, Op_1 is the accounting operating profit for period 1, Ocf_1 is the operating cash flow paid to owners for period 1 and A_1 is the accounting book value of the net assets at time 1(equity shareholders fund plus debt).

According to Modigliani and Miller (1963) the economic value of the entity can be derived, on the assumption that all operating cash flows after tax are capitalised as flat perpetuities, by:

$$V_0 = \frac{Ocf_1 - tax_1}{(1+wacc)} + \frac{Ocf_2 - tax_2}{(1+wacc)^2} + \text{..... (to infinity)} \qquad (3)$$

where the weighted average of capital (*wacc*) represents the opportunity cost to all the company's capital providers. It is computed by weighting the after-tax cost of debt and equity by the relative proportions employed in the firm's capital structure. Using (2) we can write:

$$Ocf_1 - tax_1 = Op_1 - tax_1 - (A_1 - A_0) \qquad (4)$$

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[4] The exposition is in discrete terms where all flows are assumed to occur at the and of each period.

where, *tax* is the tax charge on operating cash flows, and T is corporate tax rate.

Equation (4) is approximately equivalent to:

$$Ocf_1 - tax_1 = Op_1(1-T) - (A_1 - A_0) \qquad (5)$$

Defining the residual income for period 1, (the accounting operating profit after tax minus a charge for the cost of capital employed), as:

$$Ori_1 = Op_1\left(1-T\right) - A_0 wacc \qquad (6)$$

then (5) can be re-written as:

$$Ocf_1 - tax_1 = Ori_1 + (1+wacc)A_0 - A_1 \qquad (7)$$

Substituting (7) into (3), V_0, reduces to:

$$V_0 = \frac{Ori_1 + A_0(1+wacc) - A_1}{(1+wacc)} + \frac{Ori_2 + A_1(1+wacc) - A_2}{(1+wacc)^2} \qquad (8)$$
$$+ \ldots\ldots(\text{to infinity})$$

Provided that all book value terms other than *A₀* disappear, (8) collapses to the following:

$$V_0 = A_0 + \frac{Ori_1}{(1+wacc)} + \frac{Ori_2}{(1+wacc)^2} + \ldots.(\text{to infinity}) \qquad (9)$$

or

$$V_0 = A_0 + \sum_{t=1}^{\infty} \frac{Ori_t}{(1+wacc)^t} \qquad (10)$$

Equation (10) is a residual income version of Miller and Modigliani (1963) model that provides a framework to link accounting numbers to economic values. Here, the first main reason suggested by Stewart to adopt EVA is finally proved. The intrinsic market value of an operating entity can be explained as the sum of: a) the book value of net operating assets and b) the present value of expected clean surplus residual incomes. An essential property of this expression is that it holds for any accounting policies. We will return to this later, when addressing the effects of different accounting procedures on future residual incomes.

What is important to recognise, at this stage, is that the relationship (10) provides a basis for the many applications of residual income. First of all, it can assist external analysts to target residual income for valuation purposes; it has, also, been applied in a number of recent capital market-based accounting studies that model share price in term of book values and earnings; and *last, but not least,* it can be used to measure and reward managerial performance.

The purpose of this work is strictly related with this last application of residual income. What we will stress here is the use of residual income as a single-period performance measure. Can the concept of residual income be used as a reliable indicator of managerial success for a single period?

Before addressing this issue as well as the main merits and drawbacks of residual income for monitoring and rewarding managers, we will highlight, in the next section, some recent research that has strengthened the residual income based valuation framework, and more specifically the Olson model (1995).

1.3. Forecasting residual income

As indicated in the previous section, the residual income framework derives the economic value of an operating entity by adding to the book value of the net assets the present value of the projected residual income. First of all, it can be noted that this model presents an advantage over the traditional net present value model of discounted cash flows (DCF). The forecast of the amount and timing of expected future residual incomes represents only a part of the company's value, while the cash flow stream expresses the whole value in the DCF. Hence, the problem of prediction errors becomes less relevant. Nevertheless, in order to operationalise this model we still need to make a forecast of residual income.

An elegant solution to this problem has been provided by Ohlson (1995). A detailed derivation of Ohlson model is beyond the purpose of the present work. We will only highlight its underlying rationale.

Holding the two assumptions of the residual income valuation model – the clean surplus relationship as expressed in equation (2) and the correctness to define the economic value as the sum of book value and future residual income as described in equation (10) – Ohlson (1995: 668) introduces a third assumption about the time-series process generating residual income. Namely, he assumes that residual income is generated by the following process:

$$Ori_1 = \omega Ori_0 + v_0 + \varepsilon_{1,1} \qquad (11)$$

$$v_1 = \gamma v_o + \varepsilon_{2,1} \qquad (12)$$

where,

ω and γ are constrained to be non-negative and to be less than 1 and reflect, respectively, the extent to which the current level of residual income is likely to persist in the future and the extent to which *the other information available,* v_0, will affect future residual income; ε_1 and ε_2 are zero mean random disturbance terms.

Developing these two equations Ohlson derives to multipliers α_1 and α_2 defined as:

$$\alpha_1 = \omega/(R-\omega) \geq 0$$

$$\alpha_2 = R/(R-\omega)(R-\gamma) > 0$$

The first multiplier, α_1, says that each unit of current residual income will generate, to infinity, a series of future residual income with a present value of α_1. While the second expresses the present value of the effect of v_t on the future series of residual income. Finally, combining these multipliers with equation (9) Ohlson derives the following model:

$$V_0 = A_0 + \alpha_1 Ori_0 + \alpha_2 v_0 \tag{13}$$

This expression allows us to determine the company's value on the basis of: i) the current book value, ii) the current profitability as measured by residual income and iii) other information that modifies the prediction of future profitability.

It can be noted from the above equation that the value relevance of the earnings variable is positively related to the magnitude of the coefficient ω. A complete explanation of the effects of the persistent coefficient on the economic relevance of book value and earnings variables has been provided by Ohlson developing equation (13) in a model which expresses the economic value as a weighted average of book value and earnings. Two limiting cases are derived. When residual income is expected to revert, immediately, to zero (ω=0) the value of the company is expressed totally in term of the book value, while when residual income is expected to persist in the future, (ω=1), the economic value is given totally in terms of an earnings multiple.

On the whole, Ohlson has strengthened the basic residual income model. His approach, sometimes referred to as the Edwards-Bell-Ohlson model (EBO), shows us how residual income framework can be operationalised using earnings forecasts. Throughout the assumption of *linear information* about the time-series behaviour of residual income it is possible to estimate the value of the company on the basis of the current performance, mitigating the difficulties of forecasting over *infinite time horizon*.

Several recent studies have used this approach to derive precise estimate of equity value. For instance, R. Frankel and C. Lee (1998) have used earnings forecast provided by **I/B/E/S**, together with estimates of the cost of equity and book value growth, to operationalise the 'EBO model' and to examine its usefulness in predicting cross-sectional stock returns in the U.S. Detailed consideration of the research design employed in this study is beyond the scope of our analysis. It is useful to note at this juncture, the main results. The two Authors have found that equity estimates (V) based on **I/B/E/S** forecasts have high explanatory power for the cross sectional variation in stock prices. Also the value-to-price ratio (V/P) can be considered as a good anchor of value.

1.4. Residual income as a managerial performance measure

In the previous section, we have highlighted how the general framework that links accounting numbers to economic value can be operationalised for valuation purpose. However, as we have already stressed, our main concern is to evaluate the contribution of residual income as a measure of business performance and managerial success. Before moving on, it is worth examining the scope of this second purpose of RI.

Generally, performance measure indicates «any objective that is planned to be achieved, and the effective results attained» (D'Alessio and Antonelli, 2012: 884). Focusing on companies with diversified business, that serve different markets with distinct products, it is possible to identify two entities that may be the objective of performance valuation: i) the responsibility centres and ii) the market entities. In the former case, the focus of measurement is the performance of a manager in supervising a specific division or other organizational unit (e.g., a plant or a sale district office). In the latter case, it is the division itself, as a distinct entity from the person running it, the objective of evaluation (Solomons, 1965: 40).

Responsibility centres can take on three forms: cost, profit or investments centres. The manager of a cost centre has the responsibility to use efficiently the resources assigned to him in performing determined activities. For instance, a manager responsible for a plant makes decisions about the supply of raw materials, the management of direct labour, the logistic and the production schedule. His efficiency is assessed by comparing a target standard cost with the value of the inputs used. By contrast, a manager of a profit centre has a wider objective defined in terms of an overall profit, since he is responsible for both marketing and productions policies. This centre covers the divisions of a diversified company, bank branches, point of sales, insurance agencies and so on. Finally, investments centre are profit units with the additional responsibility for the cost of capital employed. It is fundamental to note that performance measurement must take into account only those activities that are under the power and control of the responsibility centre, otherwise it will reveal results that are not related with the manager's supervision.

One other important aspect of performance measurement is that it is but one stage of the management control system. The latter can be viewed as a process that goes through the following steps: i) the definition of the dimensions along which results are desired, in our case shareholder value maximisation; ii) the setting of standards, that is levels of performance expected by the organizational unit; iii) the evaluation of manger performance; iv) the provision of rewards associated with results[5]. The main difficulty that is met in developing a successful control system, is the definition of «an appropriate set of performance measures that when achieved, results in desired organisational performance» (Emmanuel, Otley, Merchant, 1997: 112). Under this consideration a second appeal of the economic metric proposed by Stern Stewart and Co is that it can motivate managers, who are evaluated and rewarded on this measure, to take actions consistent with increasing shareholder value.

Despite this claim, it must be recognised that EVA suffers from the same distortion as any of the traditional performance measures. Thus, in some cases it might inaccurately present the value creation to shareholders. As O'Hanlon and Peasnell (1998: 434) point out a positive EVA, in a single-period, «will not necessarily signal superior managerial performance, nor will negative EVA necessarily indicate that value has been destroyed. What constitute superior mana-

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[5] For further reading see also: Amigoni (1995), Marchi (2009), Simons (2005), Riccaboni (1999).