Determining Financial Performance: Evidence from UK and USA Firms

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Abstract

This paper tests the Residual Income model empirically using data from both USA and UK. The results show that the Residual Income model can, to a significant degree, capture cross-sectional variation in stock market price of the sample over a significant period of time. However, the model is considered a valuation model. Therefore we propose two ways to determine firm performance. The first is use the first difference from the Residual Income model with correction for dividend namely first difference between Vt and Vt-1 (adding back dividend at time t) represents firm performance. The second is based on the argument that the actual value created in a certain period of time consists of earnings (including dividend) over and above the cost of capital employed, which is the Residual Income Component (RIC) of the Residual income model. These two performance models were empirically tested and compared. The results revealed that the RIC model is able to capture stock price returns performance.

Keywords: Residual Income model; Discount Cash Flow; Financial Performance

1. Introduction

Corporate managers now face a period in which a new economic framework that better reflects value and profitability must be implemented in their companies. Many managers, sometimes, are confounded by the conflicting messages the markets appear to send them, improvements in the reported financial performance of a company can be followed by a sharp fall in the price of its shares. By contrast, results that moderately exceed consensus forecasts can propel its share price to new heights, leaving managers to wonder how they can possibly achieve the superhuman feats the market expects from them. Looking at the academics and practitioners working in the field of financial performance measurement, there is little agreement about which methods or models are the important in this field.

It can be seen from the literature that the continually growing criticism of traditional performance measures, which ignore the cost of capital, motivate dysfunctional behaviour causing managers to pay attention to the wrong things. Back in 1979, Lev and Sunder commented that in using such traditional measures, i.e. ratio analysis, it appears that the extensive use of financial ratios by both practitioners and researchers is often motivated by tradition and convenience rather than resulting from theoretical considerations or from careful statistical analysis.

Consulting firms are developing and marketing alternative financial measures of performance such as economic value added, cash value added, shareholder value, etc. They claim that they provide "superior" measures of performance and better incentives in motivating managers to take the right actions. It has been found that the most attractive model among them is the economic value added since it is based on the strong economic argument that the "profit" should be calculated after the cost of capital is deducted. However, empirical research carried out shows that EVA may be a good proxy for economic profits, but may not outperform the current realisations of other performance measures (Biddle et al, 1997).

On the other hand, Residual Income models (RI) such as those of Ohlson (1995) and Frankel and Lee (1998), the Economic Profit model (EP) presented in Copeland et al (1994, 2000) and the Discounted Cash Flow model (DCF) presented in many practical valuation handbooks such as Copeland et al (2000, 1994) are the most competitive models in many of the recent academic books and research papers. Although each model can be used as a performance measure, DCF looks at the valuation of firms more explicitly than performance, while RI and EP can be used for performance more explicitly than DCF.

On the other hand, as can be seen from the literature, an obvious limitation concerns the absence of a leverage concept in the Ohlson (1995) model. His model has been based on risk neutrality, and this does not permit the required return to reflect any compensation for the inherent risk in equity securities or firm specific risk. In addition, it should be noted that certain difficulties would be encountered in implementing the linear information dynamics in the Ohlson (1995) model, which frames the stochastic time series behaviour of abnormal earnings. The difficulty is in setting parameter values such as vt which represent other information in the model. Frankel and Lee (1998) operationalised the residual income model in which the cost of capital is risk-adjusted by using an overall assessment of the perceived risk of the investment as a whole. This leads to a more easily implemented model and therefore, leads to preference for the operationalised RI in Frankel and Lee (1998) model over the Ohlson (1995) model.

The EP model, from both a mathematical and theoretical point of view, looks very similar to RI (Frankel and Lee version)[1]. The main difference between these two models is the choice of forecast horizon. Copeland et al (2000) stated that the explicit forecast should be long enough so that the business will have reached a steady state of operations by the end of the period. Similarly, Frankel and Lee (1998) pointed out that in theory the explicit forecast period should be set long enough for firms to reach their competitive equilibrium. However, Frankel and Lee (1998) argued that the ability to forecast future ROEs diminishes quickly over time due to the difficulties in estimating future ROE for more than three years, and forecasting errors are therefore compounded in longer expansions. Henceforth, they estimated only three years of RI, which is also consistent with the consensus forecasts, which give projections for 3 years.

In this paper, there are several important features of our analysis, which we believe extend the literature on the empirical aspects of Firms' financial performance. Firstly, whereas most studies investigate US firms our sample comprises both US and UK firms. Secondly, we will use a performance measure with a solid theoretical underpinning and empirically test and account for the cost of capital. Thirdly, we will show the possibilities of using the Residual Income Components (RIC) as a performance measure. The RIC, derived from the Frankel and Lee (1998) model, represents the residual income components of that model and accounts for the cost of capital.

The reminder of the paper is organized as follows. Section two reviews the literature. Section three presents the objectives. Section three describes methodology. Section Four presents the empirical results, and the last section concludes with recommendations.

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[1] RI and EP as can be seen from the literature are just two names for the same concept

2. Literature Review

The dividend discount model (DDM) of Williams (1938) provides the basis for most equity valuation models. When investors buy stocks, they expect to receive two types of cash flow: dividend in the period during which the stock is owned, and the expected sale price at the end of the period. In the extreme example, the investor keeps the stock until the company is liquidated; in which case, the liquidating dividend becomes the sale price. Under the assumption of an infinite time horizon, the DDM can be expressed as:

$$V_o = \sum_{\tau=1}^{\infty} \frac{E_o(DIV_\tau)}{(1+r_e)} \quad (1)$$

Where V is equal to the present value of all expected future dividends; DIV discounted at the firm's cost of equity capital re, which is generally assumed constant through time. According to Herz et al (2001), the key ingredients necessary to apply the DDM are dividend forecasts and estimated re. Lee (1996) points out that more than 25% of firms listed on the New York Stock Exchange do not pay any dividends at all. When firms do pay dividends, the amount is discretionary and often does not reflect current firm prospects. Indeed, under the DDM, dividends are treated as the distribution rather than the creation of wealth. Penman (1992) describes it as the dividend conundrum; 'price is based on future dividends but observed dividends do not tell us anything about price'. These practical constraints greatly limit the usefulness of DDM. As a result, alternative forms of the DDM emerged with the goal of improved practical implementation. The most commonly used model is the DCF model because, as noted by Herz et al (2001), of its direct link to finance theories of Modigliani and Miller (1958). Further, Damdaran (2006) states that the DCF model is the main approach used in valuing companies.

The DCF model can be found in most financial management textbooks (Copeland et al (2000) for example). Most specifications of the DCF model require estimates of free cash flow (FCF). Free cash flow is the cash flow available for distribution to a defined set of capital providers after all operating and investing needs of the firm are met. Hence, FCF according to Copeland et al (2000) is equal to the Net Operating Profit Less Adjusted Taxes (NOPLAT) minus Net Investment. Although the DCF model has many variants, FCF in the most commonly applied version, is defined as the cash flow available for distribution to both debt and equity holders, and the discount rate is the weighted average cost of capital (WACC). This model estimates the value of the combined debt and equity of the firm; the market value of the firm's debt net of the firm's excess cash must be subtracted from the total value of the firm to obtain the value of the equity. Further, Copeland et al (2000) introduced the Economic Profit model[2] (EP), and defined as follows:

EP = Invested Capital *(ROIC – WACC) (2)

EP translates the value drivers, ROIC and growth, into a single dollar figure (growth is ultimately related to the amount of invested capital or size of the company). With the EP approach, continuing value does not represent value of the company after the explicit forecast period; instead, it represents incremental value over the company's invested capital at the end of the explicit forecast period. According to Copeland et al (1994), the total value of the company is as follows:

Value = Invested capital at beginning of forecast + present value of forecasted economic profit during explicit forecast period + present value of forecasted economic profit after explicit forecast period.

The claimed conceptual advantages of the DCF method are based on its corporate finance roots that emphasise cash flows Brealey and Myers (2000). Practical valuation "handbooks" such as Copeland et al, (2000, 1994) and Damodaran (2006) maintain that cash flows dominate accounting earnings for valuation purposes and thus advocate the DCF model over accounting-based models i.e. the RI model. Lee (1996) argues that valuation models based on discounted future earnings and cash

[2] EP model is another version of residual income model and conceptually is similar to EVA, Ohlson (1995) and Frankel and Lee (1998) model but under different name.

flows have shortcomings. They typically ignore much of the information contained in the balance sheet by ascribing all of a firm's value to its future earnings (cash flow) stream.

In effect, the DCF method pushes the portion of firm value in the balance sheet into future projections of cash flows (or earnings). This causes a much greater proportion of the firm value to appear in later periods of the forecast. As a result, DCF valuations tend to be plagued by significant practical problems associated with terminal value estimations. These terminal values are higher and more volatile than they need to be because a large portion of the projected cash flow pertains to the current capital base. Moreover, the concept of Economic Value Added (EVA) is well established in financial theory, but only recently has the term moved into the mainstream of corporate finance, it is becoming increasingly popular for measuring and maximizing shareholder wealth, as more and more firms adopt it as the base for business planning and performance monitoring. According to Stewart & Co. (2010), EVA is net operating profit minus an appropriate charge for the opportunity cost of all capital invested in an enterprise, it is defined as follows:

$$EVA = \text{Net Operating Profit After Taxes } (NOPAT) - [\text{Capital} \times \text{the Cost of Capital}] \qquad (3)$$

As such, EVA is an estimate of true "economic" profit, or the amount by which earnings exceed or fall short of the required minimum rate of return, which shareholders and lenders could get by investing in other securities of comparable risk. Accordingly, EVA is the after-tax cash flow generated by a business minus the cost of the capital it has deployed to generate that cash flow. Ferguson and Leistikow (1998), point that EVA is earnings net of a capital charge based on the firm's cost of capital and net asset value. Net asset value is the value of the firm's assets (book value), as opposed to the market value of the firm's business. The calculation of EVA usually involves a number of adjustments to accounting data. Bacidore et al (1997) point out that because of variety of accounting distortions, the total asset value on the typical balance sheet does not accurately represent either the liquidation value or the replacement-cost value of the assets in place. Therefore, it is of limited use for firm valuation purpose and must be transformed. EVA, like other residual income models, has an advantage over earnings in taking into account the cost of capital consumed. However, its major disadvantage when compared to free cash flow is that it is still based on historical asset values and only measures a single period in time. Despite adjusting the asset value, there is a serious danger that the adjustment fails to represent its fair value. This short-termism, according to O'Hanlon and Peasnell (1998), can manifest itself in earnings management games.

Aggarwal (2001) argues that any new performance measurement system must be able to balance the need for managerial compensation to reflect factors that managers can influence, with the need to respond to capital market signals. Although changes in market value theoretically equal changes in the present value of future EVA, in practice they can be quite noisy, as changes in stock prices often reflect market-wide changes that may have little to do with any given firm. Thus, it is often difficult to relate changes in EVA measured within the company to changes in the market value of equity. Moreover, EVA focuses on the efficient use of capital. This is certainly very important for manufacturing and many other traditional industries. However, most firms now operate in a new era dominated by service, high technology and knowledge-based work. Business success is generally determined less by physical capital and more by efficient development and deployment of intangible human and intellectual capital. It may be difficult to modify an EVA system based on traditional accounting data so that it is optimal for such firms.

Ohlson (1995) presented his valuation model which defines stock prices as a direct function of both earnings and book values. The model includes the bottom-line items in the balance sheet and income statement "book value and earnings", and its format requires the change in book value to equal earnings minus dividends (net of capital contributions). He refers to this relation as the "clean surplus relation" because all changes in net assets unrelated to dividends or new equity paid in must pass through the income statement. The analysis starts from the assumption that value equals the present value of expected dividends. Then the clean surplus relation can replace dividends with earnings and book values in the dividend discount formula. Assumptions about the stochastic behaviour of the accounting data then lead to a multiple-data uncertainty model such that earnings and book value act as complementary value indicators. Specifically, the core of the valuation function expresses value as a weighted average of (i) capitalised current earnings (adjusted for dividends) and (ii) current book value. Extreme parameterisations of the model yield either (i) or (ii) as the sole value indicators. The combination is of conceptual interest because it brings both the bottom-line items into valuation through the clean surplus relation.

Ohlson (1995) points out discounted abnormal earnings represent the difference between market and book values; they signify goodwill. In fact, a straightforward two-step procedure derives a particularly parsimonious expression for goodwill as it relates to abnormal earnings. Firstly, following Peasnell (1982) and others, the clean surplus relation implies that goodwill equals the present value of future expected abnormal earnings. Secondly, according to Ohlson, if one assumes that abnormal earnings obey an auto-regressive process, then it follows that goodwill equals the current abnormal earnings scaled by a (positive) constant. The result highlights that one can derive value by assuming abnormal earnings processes that do not refer to past or future expected dividends.

On the other hand, the valuation method that is used by Frankel and Lee (1998) uses a discounted residual income approach. They started by using a stock's fundamental value, defined as the present value of its expected future dividends based on all currently available information:

$$V_t^* \equiv \sum_{i=1}^{\infty} \frac{E_t(D_{t+i})}{(1+r_e)^i} \qquad (4)$$

In this definition, $_{t}$ is the stock's fundamental value at time t, $_{t}$ $_{t+i}$ is the expected future dividend for period $t+i$ conditional on information available at time t, r_e is the cost of equity capital based on the information set at time t. This definition assumes a flat term-structure of discount rates.

Frankel and Lee (1998) state that it is easy to show that, as long as a firm's earnings and book value are forecasted in a manner consistent with clean surplus accounting, Equation (1) can be rewritten as the reported book value, plus an infinite sum of discounted residual income:

$$V_t^* = B_t + \sum_{i=1}^{\infty} \frac{E_t[NI_{t+i} - (r_e B_{t+i-1})]}{(1+r_e)^i} \qquad (5)$$

If we substitute $NI = ROE_{t+i} * B_{t+i-1}$ in the Equation (5), then:

$$V_t^* = B_t + \sum_{i=1}^{\infty} \frac{E_t[(ROE_{t+i} - r_e)B_{t+i-1}]}{(1+r_e)^i} \qquad (6)$$

where B_t is the book value at time t, $E_t[.]$ is expectation function based on information available at time t, NI_{t+i} is the Net Income for period $t+i$, r_e is the cost of equity capital and ROE_{t+i} is the after-tax return on book equity for period $t+i$.

Note that this equation is equivalent to a dividend discount model, but expresses firm value in terms of accounting numbers. Therefore, it relies on the same theory and is subject to the same theoretical limitations as the dividend discount model. However, the model provides a framework for analysing the relation between accounting numbers and firm value and as will be explained later, relies on clean surplus relation (CSR).

Frankel and Lee (1998) pointed out that Equation (6) shows that equity value splits into two components, an accounting measure of the capital invested (B_t), and a measure of the present value of future residual income. If a firm earns future accounting income at a rate exactly equal to its cost of equity capital, then the present value of future residual income is zero, and $V_t = B_t$. In other words, firms that neither create nor destroy wealth relative to their accounting-based shareholders' equity will be worth only their current book value. However, firms whose expected ROEs are higher (lower) than r_e will have values greater (lesser) than their book values.

Many papers have tested the above mentioned theories, for instance, O'Byrne (1996) uses regression models to examine the association between market value and two performance measures: EVA and Net Operating Profit after Tax (NOPAT). Both measures have similar explanatory power when no control variables are included in the regression models, but a modified EVA model has greater explanatory power when industry indicator variables and the logarithm of capital for each firm are included as additional explanatory variables. However, O'Byrne does not make similar adjustments to the NOPAT model, making it impossible to compare results using the different measures.

Claims that economic value measures are superior to traditional accounting measures are not limited to consultants and the business press for instance Garvey and Milbourn (2000) claim that compared to such common performance measures as return on capital, return on equity, growth in earnings per share, and growth in cash flow, EVA has the highest statistical correlation with the creation of value for shareholders; EVA drives stock prices. Analytical studies by Anctil (1996), Rogerson (1997) and Reichelstein (1997) show how the use of residual income-based measures such as EVA can ensure goal congruence between the principal and agent. Evidence provided by Wallace (1997) suggests that managers compensation based on EVA (instead of earnings) take actions consistence with EVA-based incentives. Furthermore, Chen and Dodd (1997) examine the explanatory power of accounting measures (earnings per share, return on assets and return on equity), residual income and various EVA related measures. Although the EVA measures outperform accounting earnings in explaining stock returns, the earnings measures provide significant incremental explanatory power above EVA. The authors also find the explanatory power of the EVA measures to be far lower than claimed by proponents.

Wallace (1997) examines relative performance changes in 40 adopters of residual income-based compensation measures such as EVA, and a matched-pairs control sample of firms where incentive compensation continues to be based on traditional accounting earnings (e.g. EPS, operating profit). The results indicate significant increases noted in residual income for the firms adopting residual income-based compensation relative to the control firms. Compared to the control firms, residual income firms decrease new investments and increase dispositions of assets, increase payouts to shareholders through share purchases and utilise assets more intensively, leading to significantly greater change in residual income. He also finds weak evidence that stock market participants respond favourably to the adoption of residual income-based compensation plans as evidence by increased stock return. Wallace's (1997) study examines changes in performance rather than performance levels, and only examines performance changes over one year.

Hogan and Lewis (1999) investigate performance changes over a four-year period by matching control firms on past performance to control for possible mean reversion in performance levels. They find that adopters of residual income measures are relatively poor performers prior to the compensation plans' implementation and that the improved stock returns and operating performance reported by Wallace (1997) may not be unique to economic value adopters. After introducing past profitability as an additional matching criterion, they find no significant differences in the stock prices or operating performance of their two groups, and conclude that economic value plans are no better in their ability to create shareholder wealth than traditional plans blending earnings-based bonuses and stock-based compensation. Ittner and Larcker (2001) argue that perhaps the biggest limitation in the preceding studies is the use of publicly available data on EVA values and uses. Studies of EVA's predictive ability typically employ published EVA data estimated by the consulting firm Stern Stewart. However, these numbers are computed using public financial data, and contain relatively few of the accounting adjustments EVA proponents encourage companies to make to more closely approximate economic profits.

The RI and the DCF[3] have received considerable attention in the past decade. Despite the theoretical equivalence between the RI and DCF approaches, the finance literature has argued in favour of the DCF approach for firm valuation since it is unaffected by accounting methods (Copeland et al, 2000). However, as demonstrated by Ohlson (1995), the RI model is insensitive to different accounting methods if clean surplus accounting is applied. Penman and Sougiannis (1998) and Francis et al (2000) examined empirically the accuracy of the RI and DCF models. Both studies find that RI model yields more accurate firm value estimates than the DCF model. However, since both valuation models employ the same theoretical framework, a proper implementation, as reported by Plenborg (2002), would imply that both approaches yield similar firm value estimates. Moreover, Olsson (1998) argues that the introduction of simplifying assumptions[4] occurs when during the implementation of the different valuation approaches. Since simplifying assumptions introduce bias in the firm value estimates, they are likely to affect firm value estimates based on the RI and DCF approaches differently.

Bernard (1995), employing only the first 4 years of forecast data, finds that the RI approach explains 68 percent of a firm's stock price, while the Discount Dividend Model (DDM) explains only 29 percent. Plenborg (1999) finds similar results when comparing the information content of earnings and cash flows. Using Danish data, Plenborg (1999) finds that four years of RI earnings explains 22 percent of the stock price variation in the same measurement period. In comparison, accumulated free cash flows explain less than 1 percent of stock price variation in the same four-year period. The results of both Bernard and Plenborg indicate that the required forecast period is shorter for the RI approach than for both the DDM and DCF approach.

Penman and Sougiannis (1998) and Francis et al (2000) compare the reliability of firm estimates based on the DDM, RI and DCF approaches respectively. Although both studies use US data, a primary difference between them is that the forecast data are determined differently. Francis et al employ Value Line's forecast data while Penman and Sougiannis use realised data as estimates of historical forecasts. Although these two studies employ different sources of forecast data, both show that the RI approach yields less biased firm value estimates than the DDM and the DCF approaches. his result is insensitive to different methods for calculating the terminal value. However, according to Plenborg (2002) the RI approach did not perform particularly well when terminal value calculations are important. This is the case when the book value of equity is a bad indicator of firm value. The Penman and Sougiannis (1998) and Francis et al (2000) findings suggest that the RI approach yields more accurate firm estimates than the DDM and the DCF approaches. This was later supported by the study of Desrosiers et al (2007). However, their findings conflict with the finding in Plenborg (2002) that the RI and DCF approaches are both inherently based on the DDM and thus, from a theoretical perspective, should yield the same firm value estimates. Plenborg (2002) also finds that the three valuation approaches generate the same point estimate of firm value in practice, if the same assumptions are applied. This indicates that, as Plenborg (2002) argues, neither Penman and Sougiannis (1998) nor have Francis et al (2000) taken into consideration that the same assumptions must be applied. An examination of their test methods also indicates that this is the case. For example, the growth rates used to estimate the terminal value are arbitrarily set at 0 and 4 percent in both studies. Thus, the link between the forecasted financial statements and the input in the different valuation approaches is most likely inconsistent. Furthermore, according to Plenborg (2002), both studies seem to ignore that growth generally affects the free cash flow negatively. They adjust the growth rate without a corresponding adjustment of the free cash flow. They found in their study that the RI model is significant.

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[3] RI approach means models that are introduced by Ohlson (1995) and relative's studies such as Frankel and Lee (1998). This model was termed the Edwards-Bell-Ohlson (EBO) by Bernard (1994) and has been called the residual earnings model (Frankel and Lee, 1998). The DCF model can be found in the Copeland et al (1994) finance textbook

[4] The introduction of a simplifying assumption implies that the internal coherence between the forecasted financial statements and the valuation approach (including cost of capital) is not intact (Plenborg, 2002).

Bernard (1995) estimates intrinsic value for a large sample of firms during 1978-1993 using Value-Line earnings forecasts for four years, in part to demonstrate the validity of the model over short horizons. Bernard (1995) argues that the RI model explains, on average, 68 percent of the variation in share price. He advocates the RI model for its accuracy and for its reliance on earnings and book value predictions over relatively short time periods compared with the longer periods generally needed for the DCF model. On the other hand, Lee et al (1999) do not compare valuation models but use the RI to estimate the intrinsic value of the Dow over 1963-1996. They use security analysts' consensus earnings forecasts after 1979 when they became available and time-series projections of earnings before that. Their estimates of intrinsic value predict both the future value of the Dow and the future stock returns to the Dow. Based on these results, Lee et al (1999) advocate use of the RI over alternative valuation models.

Accordingly, if the valuation approaches are not properly employed (as with the growth rate used in the terminal value calculations), the approaches yield different firm value estimates. Thus, the studies of Penman and Sougiannis and Francis et al indicate that if the internal coherence between the three valuation approaches is violated, the RI approach should be preferred for firm valuation at the expense of DDM and DCF approaches. Levin and Olsson (2000) demonstrate that if the steady state condition is not reached when the terminal value is calculated, the RI approach yields more accurate firm value estimates than DCF. Penman and Sougiannis (1998) argue that an attractive valuation approach should be easy to use and understand and it should help the user to perform better firm value estimates. Thus, valuation approaches based on measures that show value creation rather than value distribution is easier to understand and interpret and consequently analytically attractive (Penman, 1992).

Plenborg (2002) demonstrates that simplifying assumptions affect firm value estimates differently. In some cases the RI approach yields more accurate firm value estimates, while in others the DCF approach yields more accurate estimates. His study also shows that each of the assumptions examined affects firm value estimates in a predictable manner. For example, applying the growth term in the forecasted financial statements, the RI approach yields more accurate firm value estimates than the DCF approach. His study also argues that since the framework for forecasting is based on accrual accounting and since budget control is generally based on accounting numbers rather than cash flow measures, it seems logical to estimate firm values based on concepts known from accrual accounting and financial statement analysis. According to this reasoning, the RI approach seems to be an attractive alternative to the DCF approach.

Dechow and Kothari (1998) pointed out that previous empirical applications of the RI model ignored Ohlson's information dynamics5. In many cases, the resulting valuation model is similar to past applications of dividend-discounting models that capitalise current or forecasted earnings, but make no appeal to book value or residual income. He argues that it is important to note that these empirical models are just a restatement of the DDM, which in no way depends on the properties of accounting numbers other than through the clean surplus relation. In their study, they find that residual income follows a mean reverting process. Their pricing tests indicate that stock prices partially reflect the mean reversion in residual income. An important implication of this result is that book value conveys additional information over earnings in explaining contemporaneous stock prices. However, they also find that book value provides very little additional information about stock prices beyond that contained in analysts' forecasts of next year's earnings. They conclude that Ohlson's formulation of the residual income valuation model provides a parsimonious framework for incorporating information in earnings, book value and earnings forecasts in empirical research.

In summary, EVA, DCF, DDM and RI are compared theoretically and empirically in order to highlight whether it is possible to infer a superior method among them. Although these models are preferable to ROA, they are measuring value rather than performance. However, the first difference

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[5] Example from these models: Frankel and Lee (1998), it can be seen from this model that the authors used the book value + present value of residual income without using the third assumption of Ohlson's (1995) model.

can be used as a performance measure but with a correction for dividend. It is difficult to infer from prior literature whether one valuation approach is superior to the other. Because of their theoretical equivalence, the four approaches, DDM, DCF and RI (including the Ohlson model, the Frankel and Lee model and the EVA model), all provide the same valuations when the flows are projected consistently to infinity and comparable discount rates are applied. However, horizons over which the flows can be reasonably projected in practice are limited, and estimated discount rates are subject to error. These practical considerations cause some academics and practitioners to prefer one valuation model to another. The claimed conceptual advantages of the DCF model are based on its corporate finance roots that emphasise cash flows (Brealey and Myers, 2000). Practical valuation 'handbooks' such as Copeland et al (2000, 1994) maintain that cash flows outperform accounting earnings for valuation purposes and thus advocate the DCF model. However, as reported by Herz et al (2001), the claimed practical advantages of the RI are explained by Penman and Sougiannis (1998). In their view, a shortcoming of the DCF model is the need to subtract long-term capital investment from operating cash flows to compute FCF. For growing firms, negative FCF often results for many years. RI adherents maintain that accrual accounting eliminates the distorting effect of capital investment expenditure by placing it on the balance sheet as an asset. Depreciation and amortisation then allocate this investment cost to expense over time; in principle matching it against the revenues that it generates. Penman and Sougiannis (1998) also demonstrate that the RI model's use of accrual accounting allows for more reasonable valuations than the DCF model for forecasted payoffs over relatively short horizons. On the other hand, the DCF model's reliance on FCF may require many more years of forecasts to attain steady state and positive FCF.

The main shortcoming of implementing the EVA model is due to the difficulties in obtaining the required information. In addition, DCF model looks at valuation more explicitly than performance, while RI models can be used for performance more explicitly than DCF. This gives preference for the RI models since the object of this paper is to determine performance rather than valuation. From the literature, we can see that certain difficulties would be encountered in implementing the linear information dynamics in Ohlson's model. Consequently, this gives preference in this paper to the Frankel and Lee (1998) model

3. Research Objectives

Measurement of financial performance represents a real challenge since implementing different performance measures would lead to different results. In this paper, the Residual Income model, presented by Frankel and Lee (1998), will be tested first then; the model will be adjusted (modified) and tested to prove that it can be used as a performance measure. The adjusted (modified) model will be called the Residual Income component model. Accordingly, the objectives of this paper are as follows:

Testing the full Residual Income model (Frankel and Lee, 1998 version) as a valuation model using non-financial companies from FTSE 500 and S&P 500. If the above null hypothesis is rejected, then firms' performance will be determined based on the Frankel and Lee (1998) (F&L) model in two ways: Firstly, by looking at first difference in the valuation model; as the F&L model is a valuation model the difference between the value at time t+1 and t will represent performance from an accounting point of view after adding back the dividends. In this case, the first difference of F&L will be tested against market stock price performance. Secondly, firm performance can be determined from the F&L valuation model by using the components of the residual income model (this is the modified F&L model) excluding beginning book value and continuing values. The book value at the beginning and the continuing value at the end of the model are important for valuation but not for performance as such the modified model (the residual income components that derived from F&L model) will also be tested against stock prices performance to find out if it can be used as a measure of firm performance. Lastly, examine country differences between UK and US, if any.

4. Data and Sample Description

Most of the data used in this study were gathered from secondary sources. The main source of information has been the DataStream database, which contains published accounts data as well as stock prices. In a few cases, copies of companies' annual reports were used in order to complete the set of data or to make certain clarifications. The original sample consists of both FTSE 500 and S&P 500 comprising both US and UK markets to allow a comparison between these two markets. In addition, companies from both markets were grouped based on the industry to which they belong. This sorting of companies will allow us to make a comparison between industries and to analyse the differences. The sample including industry classification and based on the above classification is presented below in two separate tables representing both FTSE 500 and S&P 500 respectively as follows:

Table 1: Description of FTSE 500 and S&P 500

Industry	**No. of Companies**	
	FTSE500	**S&P 500**
Financial Services	64	106
Utility	28	66
Business Support (Services)	45	11
Media & Publication	38	26
Engineering	41	16
Retail	47	40
Construction	38	5
Transportation	31	13
Real Estate Development	35	12
Chemical and Pharmaceutical	28	44
Computer	0	32
Electronic and Telecom Equip.	45	50
Hotels and Food	48	31
Miscellaneous	12	21
Health Care & equipment	0	27
Total	**500**	**500**

Financial companies have specific characteristics in their capital structure that may be affected by regulatory requirements such as capital adequacy. In addition, debt-like liabilities of financial firms such as banks and insurance companies are not strictly comparable to debt issued by non-financial firms (Rajan and Zingales, 1995). Due to the above-mentioned reasons, and the desirability of a homogenous sample, it has been decided to exclude financial firms from both FTSE 500 and S&P 500. Moreover, by examining the sample it has been observed that real estate development companies have some special characteristics and legislation that are different from the non-financial companies as well. For instance, such companies do not report sales figure in their trail balances and they are therefore excluded. As a result, FTSE 500 has decreased from 500 to 401 companies while S&P 500 has decreased from 500 to 382 companies, giving a total of 783 companies.

Only companies with a full set of data for the 15-years (1988-2002) period were selected. Furthermore, companies were required to have a one-year-ahead and a two-years-ahead earnings-per-share (EPS) forecast from I/ B/ E/ S in order to test the F&L (1998) model. Further, it was realised that many companies within the sample have different fiscal-year-ends. In order to have a comparable data within the companies, the sample was constrained to companies with fiscal-year-ends between September 30th and December 31st as well as between January 31st and March 31st. The number of companies was thus reduced from 783 to 317 comprising 185 companies from the US market and 132 companies from the UK. The initial number of firms was reduced so drastically because many companies had only a few years' data or have no reported EPS forecast. Some of them had "died", or were young companies, or were taken over. Some others were excluded because of their fiscal-year-ends. A few firms had negative book values and these firms were also excluded because according to F&L (1998) model, return on equity (ROE) for these firms cannot be interpreted in economic terms. Finally, it was clear that the F&L (1998) model does not work when the dividend pay-out ratio (K) exceeds 100% (see definition of the variables). Such firms with k above 100% were also eliminated.

The above common sense filters ensure the subsequent results are not driven by outliers. The tests are carried out on the overall sample of 185 US firms and 132 UK firms as well as on the specific portfolios created in order to see if there were any differences among them. These differences are expected because different firms belong to different industries as well as different markets and therefore may face different business risk. A careful investigation of firms' business line was made by looking at all the SIC classifications to which these firms belonged and ensuring that the grouped firms were as similar as possible as well as ensuring that the portfolios were large enough in order for them to contain the necessary number of observations for the statistical tests to be robust[6].

The year 1988 was selected as a cut-off year because 9 years of data were deemed necessary in order to draw sound statistical conclusions from the tests described later. This takes into consideration the fact that some of the variables are calculated by using two years' previous accounts; future return on equity at time t is calculated by using book value at time t-1 and t-2 respectively. Furthermore, some of the variables are also calculated as averages or standard deviations of three years. In addition, one more year was needed in order to obtain a variable (performance), which is calculated as the difference between two years. Therefore, an initial 15 year period of raw data was needed in order to produce a 9 year period for both dependent and independent variables.

5. The Hypothesis and the Regression

Based on the above discussion, the Residual Income valuation model (the F&L (1998) model) is expected to perform well against the market stock prices in our sample and therefore, it will be hypothesised that the defined Residual Income model (the F&L model) can, to a significant degree, capture cross-sectional variation in market stock prices of the sample over a significant period of time. The model to be tested is:

$$P_{it} = \alpha_i + \beta V_{it} + u_{it} \tag{7}$$

Where P is the market stock price and V is the valuation using the RI model (the F&L model). The definitions of these variables are presented in the following section.

6. Definition of the Variables

The dependent variable in the above model (P) is the closing market price. The current price on Datastream's equity program is the latest price available from the appropriate market in primary units of currency. P was calculated by taking the average of eight weeks (four prior to the publication of the firm's annual profit and 4 weeks after) in order to avoid as much as possible the effect of announcing a firms' annual result on its stock price.

The independent variable V as stated above is the RI model and is defined as in Frankel and Lee (1998) as well as in Lee, Myers and Swaminathan (1999) as follows:

$$\hat{V}_t = B_t + \frac{(FROE_t - r_e)}{(1+r_e)} B_t + \frac{(FROE_{t+1} - r_e)}{(1+r_e)^2} B_{t+1} + \frac{(FROE_{t+2} - r_e)}{(1+r_e)^2 r_e} B_{t+2} \tag{8}$$

B is the book value per share (Datastream Item 1308) calculated on an issued basis, using that portion of share capital and reserves (excluding preference capital) minus intangibles attributable to the

[6] The seven major sectors used by FT Actuaries/Goldman Sachs were also used in this study

issue, divided by the year-end number of shares in that issue. It is adjusted for subsequent rights and scrip issues. FROE is the future return on equity per share calculated as follows:[7]

$$FROE_t = \frac{FY1}{\frac{(B_{t-1} + B_{t-2})}{2}}$$

where, FY1 is the earnings-per-share forecasts one-year-ahead derived from the I/B/E/S mean[8] (also called consensus) forecast.[9] B_{t-1} and B_{t-2} are the book values at time t-1 and t-2 respectively, defined as stated above, where book value at time t is calculated as follows:

$$B_t = B_{t-1}\left[1 + FROE_t(1-K)\right]$$

K in the above equation is the dividend payout ratio. The dividend payout ratio is the percentage of net income paid out in the form of dividends each year. K is estimated by dividing the Dividends paid by Earnings (Earned for ordinary). Dividend paid (Datastream Item 434) is defined as the total amount of cash dividends listed for common shares. Dividend per share is defined as dividend per share declared during the fiscal year, including extra dividends declared during the year.

Earned for ordinary (Datastream item 625) is defined as the net profit arrived at after deducting tax, minority interest and preference dividends, but before any post-tax as reported extraordinary items, allocations to reserves other than untaxed reserves and post tax disclosed extraordinary items.

For firms with negative earnings, K was estimated by dividing the common stock dividends by six percent of total assets to derive an estimated payout ratio.[10] In estimating $FROE_{t+1}$ and B_{t+1} all companies in the sample were required to have a two-year-ahead consensus forecast (FY2). Then $FROE_{t+1}$ and B_{t+1} were computed analogously:

$$FROE_{t+1} = \frac{FY2}{\frac{(B_t + B_{t-1})}{2}}$$, and

$$B_{t+1} = B_t\left[1 + FROE_{t+1}(1-K)\right]$$

Estimating $FROE_{t+2}$ and B_{t+2} where a long-term earnings growth estimate (LTG) is available, then $FROE_{t+2}$ and B_{t+2} were computed as follows:

$$FROE_{t+2} = \frac{FY2(1+LTG)}{\frac{(B_{t+1} + B_t)}{2}}$$

$$B_{t+2} = B_{t+1}\left[1 + FROE_{t+2}(1-K)\right]$$

where LTG is not available, $FROE_{t+1}$ was used to proxy for $FROE_{t+2}$.

Finally r_e is the cost of equity. In theory, cost of equity should be firm specific, reflecting the premium demanded by equity investors to invest in a firm or project of comparable risk. In practice, however, there is little consensus on how this discount rate should be determined. For this paper, the

[7] The use of the average, rather than year-end, book value, as Frankel and Lee (1998) argue, reduces the chance of an extremely low denominator.

[8] Using median rather than mean forecasts is unlikely to affect results because the distribution of forecasted growth is quite symmetric.

[9] Use analysts forecast of ROE rather than the historic or actual ROE because the forecast ROE included analysts' earnings forecasts and evidently, analysts' earnings forecasts contain more value-relevant information then is reflected in historical simple residual income model.

[10] Six percent reflects the average long-run return-on-assets as in F&L this measure was used to proxy for normal earnings when reported earnings are negative

Capital Assets Pricing Model (CAPM)[11] will be used to estimate r_e. The definitions of the variables are summarised below:[12]

7. Panel Data Analysis

Data are analysed using panel data as well as cross-sectionally. 'PC-Give' is used as statistical software. The sample is initially analysed by grouping all data from FTSE 500 in UK market and all data from S&P 500 in US market separately. Then two separate regressions for both UK and US data were carried out using the criteria presented in the following table:

Table 2: Criteria Used in Analysing Panel Data

Criteria	Value	Description
Dependent Variable	P	Market Price
Independent Variable	V	Value calculated using Residual Income see definitions of the variables on this chapter.
Intercept	Fixed	The basic value (intercept) for each company depends on organisation-specific issues such as balance sheet size. As a result, the intercept is defined as fixed, whereby for each individual pool member the intercept is estimated.
White heteroskedasticity Covariance	Yes	Controls covariance matrix on the error term for heteroskedasticity.

Table 3 below provides the statistical properties of the dependent and independent variables:

Table 3: UK and US Descriptive Statistics in "Pence" and in "Dollars", "P" and "V" Respectively.

	UK descriptive data		US descriptive data	
	P (Pence)	**V (Pence)**	**P ($)**	**V ($)**
Mean	292.0012	216.0230	27.87653	16.50428
Median	238.9323	165.9100	24.98500	11.97354
Maximum	1383.500	1785.11	126.5750	241.3767
Minimum	6.650000	1.789292	0.190000	0.367880
Std. Dev.	214.4708	191.0904	17.96594	16.85531

***Note*:** P is the market stock price. V is the value per share calculated using the F&L (1998) RI model.

Table 4: Correlation Matrix between V and P

	UK Correlation Matrix	US Correlation Matrix	
	P		**P**
V	0.715*	**V**	.519*

***Notes*:** *Correlation is significant at 1% level (2-tailed). P is the market stock price. V is the value per share calculated using the F&L (1998) RI model.

The results of the pooled data fixed effect cross section regression, using the above-described criteria for both UK and US, are shown in Table 5. This table shows a high correlation between the market prices and the values estimated using the residual income model, with R-squared (goodness of fit) 77.16% and 76.46% for both UK and US respectively and significance level based on Chi^2- statistic of 99% for both UK and US respectively. This implies that, for the UK market, more than 77% of the cross sectional variation in stock prices can be explained by the value calculated using the

[11] There are other methods for calculating the cost of equity such as market model. However, there is little consensus on which one is better. Therefore, the question of which of these models is better is still an open one

[12] Detailed definitions of the variables are in appendix A.

residual income model. For the US market, it means that more than 76% of the cross sectional variation in stock prices can be explained by the value calculated using the residual income model. The above results are in line with F&L (1998), who find that the model explains more than 70% of the cross-sectional variation in stock prices.[13]

Table 5: UK and US results,[14] $P_{it} = \alpha_i + \beta V_{it} + u_{it}$

	UK Results	US Results
Coefficient	0.551697	0.489471
Std. Error	0.05706	0.017357
t-Statistic	9.67	28.20
Prob.	0.0000	0.0000
R-squared	0.779622	0.766467
Chi^2-Statistic	93.48	28.20034
Prob (Chi^2-Statistic)	0.0000	0.0000

As a consequence, the above results of panel data analysis are statistically significant enough to state that the residual income model (F&L, 1998, version) can to a significant degree, capture cross-sectional differences in stock market performance of companies used in this sample and over a significant period of time. In addition, the results also reveal that there is no significant difference in this respect between the UK and the US markets[15].

8. Pooling the Data Cross-Sectionally

In this section, the data will be analysed cross-sectionally only. This will enable us to look at the behaviour of the model year by year, as the same sample size will be used in all different years. The results on a year-to-year basis, using the Least Squares Method, for both UK and US data are presenting in the following tables:

Table 6: Cross Sectional Results

Cross-sectional analysis for UK data			Cross-sectional analysis for US data		
Year	**Observation**	**R^2**	**Year**	**Observation**	**R^2**
1991	132	0.622301	1991	185	0.509813
1992	132	0.577217	1992	185	0.420980
1993	132	0.551555	1993	185	0.500816
1994	132	0.713151	1994	185	0.386706
1995	132	0.758446	1995	185	0.437766
1996	132	0.686234	1996	185	0.545072
1997	132	0.653593	1997	185	0.686413
1998	132	0.544850	1998	185	0.646051
1999	132	0.558608	1999	185	0.630983
2000	132	0.402171	2000	185	0.313806
2001	132	0.571652	2001	185	0.135261
2002	132	0.581902	2002	185	0.276742

[13] We also transform the original data logarithmically and the results are almost the same.
[14] We use non-parametric test as well, specifically, we use Spearman's correlation as this test is used by Frankel and Lee (1998) in order to compare our results with their results. We also used random effect models and the results are comparable.
[15] We also compared the F&L model with a naïve book value model i.e. how much of the variation in market stock price does book value explain. The results are very similar to the F&L results

It is clear that R-squared is higher for panel data than for cross-sectional data. The reason is because panel data captures both time-series and cross-sectional influences which the cross-sectional analysis is unable. On the other hand, although the value of R-squared differs between the years, these differences, except for the last two years in US data, are not very significant and can largely be explained by market dynamics and overreaction to shocks in these particular years. The results are controlled for heteroscedasticity using the White Consistent Coefficient Covariance. On the other hand, unlike panel data, cross-sectional results have revealed some differences between the UK and US markets. Therefore, in order to examine the differences in R-squared between UK and US in the above table, the model will be tested for each industry i.e. a regression will be carried out for each portfolio in both the UK and US samples.

Table 7 below provides R-Squared for each portfolio for UK companies, with P1 standing for Chemical Industry, P2 Engineering, P3 Food and Hotel, P4 Media, P5 Retail, P6 Transportation, P8 Electronic, P9 Services, and P10 construction industry. Note that the number of companies in P7, Utility industry, is only 5 and therefore this industry has been excluded.

Table 7: Cross-Sectional Results R-squared for UK Portfolio

	P1	P2	P3	P4	P5	P6	P8	P9	P10
1991	0.66	0.92	0.82	0.95	0.82	0.60	0.69	0.74	0.52
1992	0.63	0.26	0.86	0.91	0.76	0.58	0.64	0.88	0.73
1993	0.41	0.11	0.71	0.64	0.82	0.77	0.68	0.80	0.68
1994	0.91	0.27	0.64	0.77	0.87	0.83	0.83	0.91	0.78
1995	0.93	0.76	0.86	0.39	0.89	0.51	0.84	0.86	0.84
1996	0.90	0.72	0.78	0.56	0.83	0.68	0.82	0.70	0.92
1997	0.81	0.63	0.76	0.33	0.86	0.63	0.84	0.54	0.92
1998	0.82	0.50	0.52	0.28	0.88	0.49	0.57	0.53	0.91
1999	0.60	0.41	0.76	0.82	0.72	0.38	0.53	0.34	0.85
2000	0.63	0.51	0.55	0.34	0.87	0.78	0.26	0.44	0.73
2001	0.42	0.61	0.62	0.51	0.81	0.71	0.46	0.12	0.60
2002	0.97	0.83	0.72	0.43	0.86	0.78	0.81	0.30	0.71

***Note*:** The above results are controlled for heteroskedasticity using the White Consistent Coefficient Covariance.

Table 8 provides R-Squared for each portfolio for US companies, with P1 standing for Chemical Industry, P2 Engineering, P3 Food and Hotel, P4 Media, P5 Retail, P6 Transportation, P7 Utility, P8 Computer, P9 Miscellaneous, and P10 Telecom Equipment and P11 for Pharmaceutical industry. Examining the above two tables, P5 (UK retail industry) data has the highest significance with average R-squared equal to 0.83. The utility industry in UK data was excluded since it cannot be taken into consideration, as the number of companies in the portfolio was very small (5 companies only). The total average R-squared for UK portfolio for 12 years is equal to 0.64. On the other hand, P4 i.e. Media industry is the highest significant industry in the US data with average R-squared equal to 0.96. P11 (Pharmaceutical industry) together with P10 were excluded (added later to miscellaneous) as the number of companies in these portfolios were also very small. The total average R-squared for US portfolio for 12 years is equal to 0.60. It can be concluded that the residual income model performs very well in explaining the variation in market stock prices for all UK portfolios except for Utility where there were insufficient observations in order to make a decision. The main weakness of the residual income model for the US portfolio was in the Pharmaceutical industry (later added to miscellaneous). The reason why the residual income model performs poorly in the Pharmaceutical industry might be that the number of observations is very small. In addition, such companies usually invest heavily in R&D, which is classified as an intangible asset, and it could be difficult for those intangibles to be valued by the market. In addition, many take-overs in the Pharmaceutical industry have taken place in the past few years.

Table 8: Cross-Sectional Results R-squared for US Portfolio

	P1	P2	P3	P4	P5	P6	P7	P8	P9
1991	0.37	0.58	0.95	0.93	0.50	0.59	0.49	0.96	0.57
1992	0.52	0.45	0.93	0.95	0.55	0.66	0.42	0.50	0.54
1993	0.69	0.38	0.82	0.97	0.54	0.66	0.57	0.71	0.72
1994	0.80	0.15	0.81	0.99	0.56	0.63	0.45	0.79	0.85
1995	0.56	0.30	0.86	0.96	0.83	0.53	0.36	0.62	0.86
1996	0.51	0.29	0.61	0.99	0.88	0.62	0.23	0.87	0.73
1997	0.66	0.06	0.62	0.99	0.65	0.97	0.48	0.87	0.91
1998	0.37	0.26	0.31	0.95	0.14	0.64	0.42	0.84	0.68
1999	0.44	0.37	0.12	0.92	0.21	0.44	0.06	0.31	0.79
2000	0.33	0.12	0.34	0.89	0.70	0.60	0.14	0.68	0.79
2001	0.62	0.27	0.40	0.96	0.28	0.86	0.05	0.73	0.74
2002	0.50	0.08	0.40	0.98	0.43	0.89	0.07	0.77	0.85

Note: The above results are controlled for heteroskedasticity using the White Consistent Coefficient Covariance.

The results of both panel and cross-sectional data analysis are statistically significant, yet the UK data set provides more significant results than US in cross-sectional results. This could be due to the fact that the residual income model performs poorly for the pharmaceutical industry in the US sample, while there was no pharmaceutical industry in UK portfolios. From the US portfolios' results after the pharmaceutical industry was removed R-squared gets approximates to the UK figure. Moreover, these differences also could be due to the characteristics of each UK and US market. For instance the Utility industry represents a very high proportion in US data (41 companies) while there were only 5 companies in the UK data set. In addition, cross-sectional data analysis has shown that R- squared for US data set has dropped to a low figure of 0.135261 (Table 6) in year 2001. This might be attributed to the accidents that happened in US on 11 September 2001 when most of the stock prices went down.

9. Determination of Performance

In the previous section, the test results of panel data and cross-sectional analysis show that the majority of the cross-sectional variations in the levels of stock market prices of both UK and US firms can be explained by the value calculated using the Residual Income model. However, despite the fact that the RI model can be employed for performance measurement, it is still a measure of value creation over the time interval concerned (12-years) and as stated previously, the model estimates the value of equity at a particular point in time, but does not directly indicate the value created during a certain period. For this reason, this model can be operationalised as a performance measure in two ways:[16]

1. From an accounting point of view, the first difference in Equation (8), namely the first difference between Vt and Vt-1 divided by (Vt) and adjusted for dividends, represents firm performance. Therefore, the determination of firms performance using Equation (8) will lead to the following Equation (9):

$$\text{Peformance}_t = V_t - V_{t-1} + \text{Dividend}_t \qquad (9)$$

The reason we add back the dividend is that it is part of the value created during the period; it is a component of performance that is not included in Vt.

2. The value of equity at a particular point in time (Vt) is largely dependent on the value of equity in the previous period (Vt-1). The actual value created in a certain period of time consists of

[16] As explained before, although the simple residual income can be used as a performance measure. However, the above two performance measures (Equations 3 and 4) are expected to outperform the simple residual income as they include analysts' earnings forecasts; evidently, analysts' earnings forecasts contain more value-relevant information than is reflected in simple historical residual income model.

earnings (including dividend) over and above the cost of capital employed, which is the Residual Income Component (RIC) of the Residual income model as defined in Equation (8) and is represented in Equation (10):

$$Performance_{(t,t+1)} = \frac{(FROE_t - r_e)}{(1+r_e)} B_t + \frac{(FROE_{t+1} - r_e)}{(1+r_e)^2} B_{t+1} \qquad (10)$$

The RIC from the accounting point of view represents a performance measure. The concern of this study is performance rather than valuation and it can be argued that the performance measure can manifest itself in the residual income component rather than in book value and continuing value. These are important in valuing companies and not in calculating their performance. Furthermore, we scaled Equation (10) by total assets per share to account for firm size. Accordingly, two regression analyses will be carried out to test for Equation (9) and Equation (10) in the next section. The results from both regressions will be compared in order to identify the performance measurement that is considered superior.

9.1. The Regressions

The two performance models i.e. equation (9) and (10) will be tested and compared in order to choose a performance measure from one of them. These two hypotheses will be tested using the two following models respectively:

$$\Delta P_{it} = \alpha_i + \beta CV_{it} + u_{it}$$, and

$$\Delta P_{it} = \alpha_i + \beta RIC_{it} + u_{it}$$

ΔP is the market stock prices performance calculated as the first difference i.e. $\Delta P_t = P_t - P_{t-1} + D_t$, where Dt is the dividend at time t. CV is the performance measure calculated based on first difference of the RI i.e. $CV_t = CV_t - CV_{t-1} + D_t$. Both CV and Pt were divided by the base year to account for size and percentage; D is included in both regressions for reasons explained above. In the first regression, ΔP is the same as in second regression however, it is for two periods of time i.e. P_t, P_{t+1} and RIC is the residual Income component as represented in Equation (10) and scaled by total assets per share. All the above variables are defined as before.

9.2. Empirical Results

Table 9 reveals that the mean of the performance measured by the RIC in both the US and the UK markets is very close. The standard deviation is very close as well. On the other hand, table 9 reveals that P in the US market is higher than the one in the UK market. The criteria in Table 2 used in the previous results will be reused here. The results of the panel data fixed effect cross section regression from Equation (9) for both UK and US are shown in the table 10.

Table 9: Descriptive Statistics for Performance Measures

	UK		**US**	
	Δ P / Pence	**RIC / Pence**	**Δ P / $**	**RIC / $**
Mean	52.45	6.17	6.11	0.071
Median	43.7	4.31	5.19	0.029
Maximum	1266.67	169.46	230.47	1.66
Minimum	-865.7	-80.15	-60.05	-0.90
Std. Dev.	148.45	14.64	14.09	0.16

Table 10 shows the correlation between the market stock prices performance and the performance estimated using Equation 9. R-squared (goodness of fit) is 22% and 26% for both the UK and US markets respectively. These results are also significant at T-statistic of 99% significance level for both UK and US respectively. This implies that, for the UK market, more than 22% of the cross sectional variation in stock prices performance can be explained by the performance calculated using the RI first difference. For the US market, it means that more than 26% of the cross sectional variation in stock price performance can be explained by the performance measurement calculated using the RI first difference.

Table 10: Results from Equation (9) First Difference: $\Delta P_{it} = \alpha_i + \beta CV_{\text{it}} + \text{u}_{\text{it}}$

	UK Results	**US Results**
Coefficient	0.29	0.24
Std. Error	0.014	0.011
t-Statistic	20.61	21.13
Prob.	0.000	0.000
R-squared	0.22	0.26
T-Statistic	2.98	3.75
Prob (T-Statistic)	0.000	0.000

The results of the panel data fixed effect cross section regression from Equation (10) for both UK and US are shown in the table 11 below.

On the other hand, Table 11 shows also a correlation between the market stock price performance and the performance estimated using Equation (10). R-squared (goodness of fit) is 22% and 29% for both the UK and US markets respectively. These results are also significant at T-statistic of 99% significance level for both UK and US respectively. This implies that, for the UK market, more than 22% of the cross sectional variation in stock prices performance can be explained by the performance calculated using the RIC in Equation (10). For the US market, it means that more than 29% of the cross sectional variation in stock price performance can be explained by the performance calculated using the RIC in Equation (10) scaled by total assets per share.

Table 11: Results from Equation (3.1) RIC: $\Delta P_{it} = \alpha_i + \beta RIC_{\text{it}} + \text{u}_{\text{it}}$

	UK Results	**US Results**
Coefficient	0.54	0.51
Std. Error	0.103	0.097
t-Statistic	5.26	5.19
Prob.	0.000	0.000
R-squared	0.22	0.29
T-Statistic	3.01	4.06
Prob (T-Statistic)	0.000	0.000

Although the above results are statistically significant, allowing us to conclude that the majority of the changes in the market stock prices can be explained by either Equation (9) or (10). However, the results also reveal significant differences between the full RI valuation model (Equation (9)) and the two-year performance model i.e. Equations (9) and (10). This can be attributed to the fact that the full model explains the cross sectional variation of the levels in stock prices rather than the first differences; this does not mean that either the RIC or the first difference model can explain the cross sectional variation of the levels in stock prices the same as the full RI valuation model does.

9.3. Comparison between the Two Performance Models

Table 12 presents that both models are statistically significant and they lead us to reject the null hypothesis. In addition, R-squared from both models are very close. This means that both the RIC and the first difference models can be used in explaining performance measure for the US and the UK markets.

Table 12: Comparison between the Two Performance Models

	Equation (9) based on the Residual Income first difference		**Equation (10) based on the Residual Income Component Model**	
	UK Results	**US Results**	**UK Results**	**US Results**
R-squared	0.22	0.26	0.22	0.29
F-Statistic	2.98	3.75	3.01	4.59
Prob (F-Statistic)	0.000	0.000	0.000	0.000

10. Conclusions

The first purpose of this paper was to test the hypothesis which states that the defined Residual Income model can, to a significant degree, capture cross-sectional variation in stock market price of the sample over a significant period of time. The results from both panel and cross-sectional data support the above stated hypothesis. This leads to the conclusion that the residual income model represented in Equation (8) captures cross-sectional variation in stock market prices and therefore, it can be used to determine firm performance. However, as stated previously, equation (8) measures equity value and not firm performance. Therefore, two ways were proposed in order to determine firm performance. The first is represented in Equation (9). From an accounting point of view, the first difference in Equation (8) namely first difference between Vt and Vt-1 (adding back dividend at time t) represents firm performance. The second is represented in Equation (10) and it is based on the argument that the actual value created in a certain period of time consists of earnings (including dividend) over and above the cost of capital employed, which is the Residual Income Component (RIC) of the Residual income model as defined in Equation (8). Furthermore, these two performance models i.e. Equation (9) and Equation (10) were empirically tested and compared. The results revealed that the RIC model represented in Equation (10) is very close the first difference in equation (9) in capturing stock price returns performance. This leads to the conclusion that either Equation (9) or Equation (10) can be used as a performance measure.

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Appendix A: Definition of the Variables as in Datastream

Item	Not.	Description
190	(DPS)	Dividend per share. This item is used to determine the dividends payout ratio and the related effect on the future book value.
305	(TBV)	Equity Capital and Reserves. This item is used in combination with number of shares (NOSH) to determine book value per share in the event that item 1308 is not available.
392	(TA)	Total Assets.
625	(NI)	Earned for Ordinary. This is the net profit arrived at after deducting tax, minority interest and preference dividends, but before any post-tax as reported extraordinary items, allocation to reserves other than untaxed reserves and post tax disclosed extraordinary items.
1308	(B)	Book value per share. Calculated on an issued basis, using that portion of share capital and reserves (excluding preference capital) minus intangibles attributable to the issue, divided by the year-end number of shares in that issue. It is adjusted for subsequent rights and scrip issues.
NOSH	NOSH	Number of shares
F1MN (FY1)	F1MN (FY1)	FY1. The earnings-per-share forecasts one-year-ahead taken from I/B/E/S.
F2MN (FY2)	F2MN (FY2)	FY2. The earnings-per-share forecasts two-year-ahead taken from I/B/E/S.
LTMN (LTG)	LTMN (LTG)	Long-term growth (LTG). I/B/E/S consensus long-term earnings growth estimate
Beta	(β)	Annual average of monthly betas provided by Datastream. Beta is calculated based on monthly observations extending over 5 years i.e. 60 months and for each of the preceding 60 months return on security (Rj) is calculated for every security and regressed against market rates (Rm).
Rf	Rf	Risk free rate. Government bond rates for both US and UK were used over the sample period for US and UK sample
Rm	Rm	Market rates. The return for FTSE 500 and S&P 500 obtained from Datastream were used as a proxy for market return for UK and US sample respectively.
Price	(p)	Market stock price. Calculated as an average of 8 weeks around year-end.