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Business Valuation Using Accounting Numbers

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Abstract. The purpose of this paper is to review recent research on comparables-based multiples valuation as well as multi-period valuation models with the aim of emphasizing their findings, inconsistencies and parts where further improvement is needed, and financially analyze Associated British Foods at the operating entity level. Chapter 2 of the paper provides an insight into the method of multiples and main multi-period valuation models such as Free Cash Flow Valuation Model, Residual Earnings Valuation Model and Abnormal Earnings Growth Model, underlining advantages and disadvantages and introducing newly devised extensions of generic theoretical models. Furthermore, Chapter 3 of this paper provides empirical implementation of the method of multiples and clearly demonstrates that each of the multi-period models, provided employed properly, results in the same intrinsic value estimate over infinite horizon at the operating entity level. It also gives a detailed insight into practical difficulties of implementation which analysts face nowadays.

Keywords: Comparables-based multiples valuation, Free Cash Flow Valuation Model, Residual Earnings Valuation Model, Abnormal Earnings Growth Model.

CONTENTS

CHAPTER 1 INTRODUCTION

Since the very beginning of the process of business harmonization to a global set of financial reporting standards, International Financial Reporting Standards (IFRS), financial valuation has improved substantially and become more reliable thus making value estimate of the firm more accurate and promoting overall market efficacy. Stated differently, the harmonization has had great impact on financial valuation through achievement of greater data transparency, implementation of globally accepted standards, cross-border comparability and so forth (Choi 2012:8). The choice of valuation model differs between analysts to a great extent and it is mainly driven by assumptions, specific industry sectors, the trade-off between costs and accuracy, client-driven factors and analysts' preferences. Some analysts, like Penman (2013), favor the Residual Earnings Valuation Model (REVM), while Copeland et al. (2000) mention the importance of the Free Cash Flow Valuation Model (FCFVM) in accounting mostly due to its popularity and the fact that it can be easily put into practice. Although each multi-period model has its pros and cons, all of them theoretically result in the same intrinsic value, provided employed correctly. The main reason why REVM has emerged over time is its dependence on book value and earnings, which makes it very appealing since analysts tend to estimate future earnings, but not free cash flows.

Chapter 2 of this paper provides a discussion on the method of multiples and the multi-period valuation models, including technical aspects of the literature and highlighting empirical findings and inconsistencies. In particular, it strives to emphasize the most relevant assumptions underlying valuation models coupled with their advantages and disadvantages while introducing newly devised extensions of generic valuation models. The main aim of Chapter 3 of this paper is to analyze Associated British Foods at the operating entity level and prove that each of the multi-period models, provided employed properly, results in the same intrinsic value over infinite horizon. The method of multiples is also implemented so as to back up the intrinsic value estimate provided by the multi-period models. The chapter also provides a brief discussion on practical difficulties of implementation of valuation methods which analysts face nowadays. Finally, Chapter 4 of this paper concludes the discussion on valuation models.

CHAPTER 2 LITERATURE REVIEW

This chapter reviews different research papers on the use of accounting numbers in the valuation of the business and highlights key issues and inconsistencies. It also strives to provide theoretical link between accounting numbers and the value of the business by taking into account differing valuation models such as the method of multiples, FCFVM, REVM and the Abnormal Earnings Growth Model (AEGM). Advantages and disadvantages of each model are discussed together with their applicability and empirical evidence of their accuracy.

2.1 Valuation using the method of multiples

The method of multiples has been extensively used in financial valuation and it consists of three important steps (O'Hanlon 2013:4). Firstly, we must find comparable firms. This can be done on a variety of basis such as industry, risk, size, growth rate etc. Secondly, we should select multiple derived from comparable firms which will be used to compute value estimate of our target firm. For instance, multiples which are mostly chosen are price to book (P/B) and enterprise value to earnings before interest, tax, depreciation and amortization (EV/EBITDA) ratio[1]. Finally, we can now calculate harmonic mean, arithmetic average or some other measure of central tendency so as to apply the multiple to the corresponding target firm's accounting item, such as earnings or book value.

$$Value\ estimate_t = Value\ driver_t \times Multiple\ derived\ from\ comparable\ firms \quad (1)$$

The main draw of the method of multiples is that it is time-efficient and cost-effective meaning that it can be easily implemented in contrast to some other robust models. Also, it can be used together with other multi-period models in order to back up the value estimate. The method of multiples is based on the amount which the market is willing to pay for the stock and it does not depend on constant growth assumption which can sometimes be implausible. However, the method suffers from serious shortcomings. When employing equity level multiples, the price of the target firm is estimated from the price of the comparable firm that represents violation of the main tenet of financial

[1] P/B is equity level multiple, whereas EV/EBITDA represents entity level multiple.

valuation which tells us that price should never be derived from price (Penman 2013:19). Also, when using the method of multiples, one is not really estimating the intrinsic, fundamentals-based value of the firm, but the amount the market is willing to pay for it. In other words, it has nothing to do with free cash flow or the flow between firm's net operating assets and net financial obligations where value is typically created. Moreover, peer firms can sometimes be undervalued or overvalued which would in turn have effect on the value of target firm and they can be subject to different accounting standards, IFRS or Generally Accepted Accounting Principles (GAAP), or even use different accounting policies under the same standard. The method is also subject to analysts' discretion, meaning that they can select peers based on their preferences. The denominator of the multiple can sometimes be negative, e.g. price to earnings (P/E) ratio, and different multiples give different value estimate (O'Hanlon 2013:9).

2.1.1 Selecting comparable firms

The question which often arises when analysts use the method of multiples is which firms are actually considered to be target firm's peers and which multiples to opt for. Alford (1992) conducts a research on P/E valuation method and its prediction accuracy and tackles the issue of choosing different peers based on industry, risk measured by total assets, and earnings growth. In theory, peers are usually chosen on the basis of industry since it is considered that all firms in the same industry go through the same business cycle, that is, they are all susceptible to the same level of market risk. His findings suggest that peers be selected based on industry, industry and similar total assets, and industry and similar return on equity (ROE) which is an approximation for earnings growth. The median absolute prediction error is lowest when peers are chosen based on industry, industry and firm size, and industry and ROE.

Liu et al. (2002) examine a wide variety of multiples, including forward-looking ratios, and dispersion of pricing errors in the industry and the cross-sectional context. Their research is based on the following multiples: historical cash flows, such as earnings before interest, tax, depreciation and amortization (EBITDA) and cash flow from operations (CFO), historical accrual-based measures, such as sales and earnings, and forward-looking measures, such as price to earnings to growth ratio and two-year

forward-looking P/E ratio. They conclude that forward-looking measures are considered superior to other measures, showing the lowest dispersion of pricing errors, whereas fundamentals-based or residual earnings measures perform poorly in comparison to the forward-looking earnings. Besides that, sales perform the worst of all the multiples examined in the paper. This finding might be counterintuitive since sales together with earnings, which perform the best, represent an accrual item which is easily manipulated. CFO might also be expected to perform better than some other multiples since they are less prone to management discretion.

When it comes to the intrinsic value multiples, they are based on REVM which means that they entail book value as an anchor and residual earnings as flows in their computation. In essence, the multiples have been partitioned into three measures:

1. P1 - residual earnings are projected from explicit or implied earnings forecasts for the first five years and remain constant thereafter.
2. P2 - residual earnings are projected from explicit or implied earnings forecasts for the first five years and equal to zero thereafter.
3. P3 - the level of profitability, measured by ROE, is assumed to trend linearly from the third to the twelfth year to the industry median and residual earnings remain constant from the twelfth year onwards.

$$P1_t = BV_t + \sum_{s=1}^{5}\left\{\frac{E_t(EPS_{t+s} - k_t BV_{t+s-1})}{(1+k_t)^s}\right\} + \frac{E_t(EPS_{t+s} - k_t BV_{t+4})}{k_t(1+k_t)^s} \tag{2}$$

$$P2_t = BV_t + \sum_{s=1}^{5}\left\{\frac{E_t(EPS_{t+s} - k_t BV_{t+s-1})}{(1+k_t)^s}\right\} \tag{3}$$

$$P3_t = BV_t + \sum_{s=1}^{2}\left\{\frac{E_t(EPS_{t+s} - k_t BV_{t+s-1})}{(1+k_t)^s}\right\} + \sum_{s=3}^{11}\frac{[E_t(ROE_{t+s}) - k_t]BV_{t+s-1}}{(1+k_t)^s} + \frac{[E_t(ROE_{t+12}) - k_t]BV_{t+11}}{k_t(1+k_t)^{11}} \tag{4}$$

In this definition, BV_t is book value, E_t denotes expectation, EPS_{t+s} stands for earnings per share, k_t is a discount factor and ROE_{t+s} represents the level of profitability. Book values are computed using the Clean Surplus Relationship (CSR)[2].

The main reasons why fundamentals-based measures have not performed as well as forward-looking measures could be improper discount rate, wrongly estimated forward earnings and terminal value assumption. Since the pricing error is higher in the case of P2 than P1, it can be inferred that it is wrong to assume zero residual earnings from the fifth year onwards, meaning that the assumption about terminal value is flawed. In addition, the highest pricing error in P3 could be mainly due to the inappropriate ROE assumption or constant growth from the twelfth year onwards. However, since the performance of ES1[3] and ES2[4] is almost equal, it can be deduced that the discount factor is not responsible for weak performance of intrinsic value measures, but the terminal value assumption is (Liu et al. 2002:154).

In comparison to Liu et al., the main goal of study conducted by Bhojraj and Lee (2002) is to identify peers based on enterprise value to sales (EV/SALES) ratio, rather than price to sales ratio due to leverage effect, and P/B ratio. The main reason for choosing those ratios is that denominators are very likely to be positive. In fact, they prove that all profit and loss firms have positive sales, but only 1 percent of the profit firms and 6 percent of loss firms have negative book value. In addition, their sample includes *new economy* firms, for example technology and telecommunication firms, whilst Alford (p.96) selects only firms with positive earnings. Bhojraj and Lee (p.409) include the whole universe of firms and classify them according to their two-digit standard industrial classification code, which were then regressed on nine independent variables[5]. After using the estimated coefficients from the regression, they apply them together with current information and predict future ratios of the firm, which are called

[2] CSR implies that forecasted ending book value is equal to opening book value plus forecasted earnings minus forecasted dividends which are assumed to be constant.
[3] ES1 represents the sum of forward earnings from the first to the fifth year.
[4] ES2 denotes the present value of the sum of forward earnings.
[5] Nine independent variables used in the regression are as follows: the harmonic mean of EV/SALES multiple for all the firms with the same two-digit standard industrial classification code, the harmonic mean of P/B multiple for all the firms in the same industry, the industry-adjusted profit margin, dummy variable capturing the differential effect of profit margin on the P/S ratio for loss firms, industry-adjusted growth forecasts, book leverage, return on net operating assets, ROE, and total research and development costs divided by sales.

warranted multiples, warranted EV/SALES and warranted P/B ratio. Their findings show that selecting firms based on warranted multiples[6] represents a substantial improvement over alternative ways, where peers are chosen based on either industry or size.

If the current prices and valuation multiples were temporary incorrect, then Bhojraj and Lee's research design would not be valid because actual price is used as a benchmark. In the long run, current prices and valuation multiples would correct by themselves, therefore exhibiting mean-reversion effect.

2.1.4 Inconsistencies in the research papers on the method of multiples

One of the potential downsides of Alford's study is that peers have been selected based on their four-digit standard industrial classification code, which can often misclassify firms. In fact, this study does not take into account loss firms which reported negative earnings, e.g. technology and telecommunication firms. Since Alford, Liu et al. and Bhojraj and Lee use equity level multiples, they implicitly assume a linear relationship between price and earnings, and price and book value, whereas the relationship is actually convex (Burgstahler and Dichev 1997). Their studies also violate main valuation tenet which says that the value estimate should never be based on price. Similar to Alford (p.100) and Liu et al. (p.143), Bhojraj and Lee (p.427) presume efficient market hypothesis when computing pricing errors, meaning that the value estimate obtained from the method of multiples is inefficient and actual price as such is used as a benchmark price.[7] Sloan (2002:442) also confirms and asserts that Bhojraj and Lee's empirical study could be undermined in that it assumes that current stock price is negligible indicator of its valuation, whereas future stock price or price of peer firm is considered to be a better indicator of valuation. In addition, he maintains that they should rank firms based on the difference between the predicted multiple and the actual multiple.

[6] The firm which has warranted multiple closest to the target firm is chosen to be its peer.
[7] Value estimate from the method of multiples should always be based on efficient market hypothesis since it is derived from market data. This implies that if inefficient or distorted market data is used, it will affect the value estimate and thus undermine the method of multiples.

2.2 Free Cash Flow Valuation Model

The market value of the firm is often defined as the sum of net debt[8] and the value of equity. Equity is estimated based on its fair value whereas net debt is reported at book value, which is close to market value. The firm value is usually created in transactions between net financial obligations and net operating assets. Put succinctly, free cash flow is a cash flow arising from operating activities less any cash outflow necessary to generate those cash inflows. Likewise, it is often defined as operating income less any change in net operating assets:

$$V_0^F = \sum_{t=1}^{\infty} \frac{(C_t - I_t)}{\rho_F^t} \tag{5}$$

$$(C_t - I_t) = OI_t - (NOA_t - NOA_{t-1}) \tag{5a}$$

$$(C_t - I_t) = NFA_t - NFA_{t-1} - NFI_t + d_t \tag{5b}$$

where V_t^F is intrinsic value of the firm, $(C_t - I_t)$ stands for free cash flow, ρ_F^t is one plus cost of capital, OI_t is operating income, NOA_t represents net operating assets, NFA_t denotes net financial assets, NFI_t is net financial interest and d_t represents dividends.

FCFVM is usually implemented in firms which have cash cow business[9] and, according to Penman (2013:120), it offers two basic merits compared to other valuation models. Accrual accounting has no influence on free cash flows which means that they are pretty simple to think of. Also, FCFVM is widely used as a valuation model and analysts are familiar with its application. However, earnings, not free cash flows, are usually being forecasted by financial analysts, meaning that FCFVM is not aligned with what investors estimate. A major shortcoming of the model is that it does not measure value added from operations, that is, it does not match value added with value given up meaning that it is based on cash flow principle rather than matching principle. It can occur that a firm spends more funds on capital expenditures than it takes in from operations, therefore resulting in negative free cash flows for the near future although the

[8] Net debt is defined as debt which firm holds on its balance sheet as obligations less any debt which firm holds as assets.
[9] The term describes a firm which generates high cash flows and is always liquid.

project has positive net present value. Typically, long forecast horizons are necessary to capture value created by the firm. This in turn implies that terminal value plays an important role in the valuation.

2.3 Residual Earnings Valuation Model

REVM uses book value as an anchor and sum of the present value of residual earnings. It is of utmost importance to emphasize that REVM is admittedly based on the Present Value of Expected Dividends (PVED) and CSR. In other words, REVM should give the same intrinsic value estimate as the Dividend Discount Model (DDM), as well as FCFVM, at both equity and operating entity level, provided employed properly. In theory, residual earnings are often defined as earnings in excess of charge on employed capital.

$$V_0^E = B_0 + \sum_{t=1}^{\infty} \frac{RE_t}{\rho_E^t} \tag{6}$$

$$RE_t = Earn_t - (\rho_E - 1)BV_{t-1} \tag{6a}$$

$$RE_t = [ROCE - (\rho_E - 1)]BV_{t-1} \tag{6b}$$

where V_t^E is value of equity, ρ_E^t is one plus return on equity, B_0 and BV_{t-1} denote book value, RE_t is residual earnings and $Earn_t$ stands for earnings. REVM can also be expressed at the operating entity level:

$$V_0^F = NOA_0 + \sum_{t=1}^{\infty} \frac{ORE_t}{\rho_F^t} \tag{7}$$

$$ORE_t = NOA_t + (C_t - I_t) - \rho_F NOA_{t-1} \tag{7a}$$

In this definition, ORE_t denotes operating residual earnings, NOA_t stands for net operating assets, ρ_F^t is one plus cost of capital and V_0^F is intrinsic value of the firm.

If return on common shareholders' equity (ROCE) is greater than required rate of return (e.g. positive residual earnings), then asset trades at premium and as such represents a

good buy. But, if ROCE is equal to required rate of return then the asset trades at its book value. Hence, two relevant drivers of residual earnings are ROCE and book value (Penman 2013:148).

REVM has plenty of advantages over other valuation models, which makes it very attractive to analysts. It focuses on value drivers and uses accrual accounting, meaning that value added is matched with value given up, and capital expenditures and other forms of investing[10] are recognized as an asset rather than outflow in contrast to FCFVM. It does not depend so heavily on terminal value as FCFVM because the model is partially based on stock and flow measures. Therefore it is less reliant on constant growth assumption. The most important advantage which distinguishes REVM from other models is that it serves as a protection of paying too much for growth. In fact, if the firm tries to increase its earnings and thus boost its value, it will be able to do so only by reducing book value. Thus, the value of the firm cannot be increased and the intrinsic value remains the same (Penman 2013:161). REVM is often regarded as a complex valuation tool depending on accounting numbers which are sometimes suspect and it needs to be supported with an analysis of accounting quality. Penman (2013:165) also notes that if the firm repurchases or issues new shares at fair value, it will have no impact on the price per share.[11] On the other hand, if the firm issues or repurchases shares at higher or lower than the market value, then the gain or loss incurred by shareholders is not captured by REVM.

[10] For instance, an acquisition of a subsidiary.
[11] Book value will increase but ultimately it will not affect the price per share.

2.3.1 Normal and intrinsic P/B ratio

Very important notions in REVM are normal and intrinsic P/B ratio. Normal P/B ratio is equal to one which means that ROCE equates to the required rate of return. Put differently, residual earnings are zero. But if ROCE is greater than required rate of return, then P/B ratio is above normal since the investment earns more than its normal return, thus having positive residual earnings.

$$\frac{V_0^E}{B_0} = \left(B_0 + \sum_{t=1}^{\infty} \frac{RE_t}{\rho_E^t} \right) \Big/ B_0 \tag{8}$$

2.3.2 Ability of Residual Earnings Valuation Model to predict cross-sectional stock returns

Frankel and Lee (1998) test the ability of P/B ratio and the intrinsic value obtained from REVM to predict cross-sectional stock returns. The underlying assumption of their research is that the stock can be temporary mispriced but exhibits reversion to the fundamental value in the long run. They conclude that intrinsic value to price (Vf/P) ratio proves to be superior measure of predictability of stock returns than P/B ratio over 24 and 36 months. Their finding is not due to betas, firm size or book to price (B/P) ratio. High Vf/P ratio implies that the stock is underpriced and is a good buy, and vice versa. Frankel and Lee (p.293-294) also document that the intrinsic value, which is based on analysts' forecast, is highly correlated with stock prices (80 percent) over one-year period and the difference increases even more over two-year and three-year time horizon. However, Vf/P-based strategies predict stock returns similar to B/P strategies over 12 months.

The study shows that Vf/P-based strategies are better predictors of cross-sectional stock returns than B/P strategies although the strategies yield the same result over 12 months. Yet, a few academics are still in dispute over whether this finding means that firms with higher Vf/P ratio are more risky or there is opportunity for profitable trading (Lee 1999:421-422).

2.3.3 Theoretical extension of Residual Earnings Valuation Model: Linear Information Model

The Linear Information Model (LIM), which was developed by Ohlson (1995) and Feltham and Ohlson (1995), is considered to be a major improvement of generic REVM in accounting. It is based on three key analytical assumptions: PVED, owners' equity accounting[12] and stochastic time-series behavior of residual earnings. In addition to the three assumptions, the model also explicitly assumes risk neutrality, meaning that the discount factor is a risk-free rate. What distinguishes the linear model from generic REVM is the fact that it entails other information factor, value-relevant events which have great influence on residual earnings. Ohlson (1995) developed the following term representing generating process for residual earnings:

$$RE_{t+1} = \omega_1 RE_t + v_t + e_{1,t+1} \quad (9)$$

$$v_{t+1} = \gamma_1 v_t + e_{2,t+1} \quad (9a)$$

where

RE_t = residual earnings.

ω_1, γ_1= LIM parameters (non-negative and less than one).

v_t = other information, not yet reflected in the accounting system.

e_1, e_2 = zero-mean disturbance terms.

Term $\omega_1 RE_t$ stands for current accounting information, whereas term v_t represents current non-accounting information also known as other information. It is important to emphasize that LIM parameter, ω_1, is always between zero and one. In other words, if ω_1 is high or close to one, residual earnings are considered to be persistent, thus adding premium to the value of the asset. However, if ω_1 is equal to zero, it implies that residual earnings are only transitory and intrinsic value equals book value. The assumption that residual earnings equate to zero asymptotically and the intrinsic value equals book value

[12] Not only does owners' equity accounting take into account CSR, but it also assumes that dividends affect book value but not current earnings.

is called unbiased accounting. Put succinctly, as τ approaches infinity LIM parameters tend to go to zero (Ohlson 1995).

$$V_{t+\tau}^{E} = B_{t+\tau} + \left(\frac{\omega_1^{\tau}}{\rho_E - \omega_1}\right) RE_t \tag{10}$$

However, Ohlson (2009:254) maintains that unbiased accounting as such is flawed since it excludes long-term growth in expected earnings beyond retained earnings.

Combining REVM with LIM provides extended accrual-based valuation model which suggests that the intrinsic value of equity is computed using current residual earnings and other information and is considered to be a weighted average of book value and ex-dividend earnings multiple:

$$V_t^E = B_t + \alpha_1 RE_t + \alpha_2 v_t \tag{11}$$

$$V_t^E = [1 - \alpha_1(\rho_E - 1)]B_t + \alpha_1(\rho_E - 1)\left(\frac{Earn_t \rho_E}{(\rho_E - 1)} - d_t\right) + \alpha_2 v_t \tag{11a}$$

$$\alpha_1 = \frac{\omega_1}{(\rho_E - \omega_1)} \tag{11b}$$

$$\alpha_2 = \frac{\rho_E}{(\rho_E - \omega_1)(\rho_E - \gamma_1)} \tag{11c}$$

In this definition, α_1 denotes value which every unit of residual earnings contributes and α_2 represents a declining perpetuity of declining perpetuities (Choi 2013:39). Stated differently, since ω_1 and γ_1 are less than one, other information and residual earnings will decrease in the future. Therefore, α_2 will decline as well and decrease the value estimate of equity.

Ohlson (1995) uses risk-free rate as a discount factor which obviously generalizes the analysis. In other words, such discount rate does not entail any sort of risk associated with earnings, book value or dividends although it is justified in theory. Thereby, he could

have also used the Capital Asset Pricing Model (CAPM)[13] so as to compute the required return on equity which would reflect only systematic risk.

In contrast to Ohlson (1995), Feltham and Ohlson use conservative accounting as their main assumption. It implies that the market value of equity is greater than the book value, meaning that operating residual earnings are positive and non-zero. While unbiased accounting results in zero expected residual earnings, conservative accounting compensates understatement of net operating assets through the increase of operating residual earnings. It is important to mention that Feltham and Ohlson (p.692) break down the value of equity into book value, operating residual earnings, other information and net operating assets, assuming that residual earnings generated from net financial assets are equal to zero.

$$V_t^E = B_t + \alpha_1 ORE_t + \alpha_2 v_t + \alpha_3 NOA_t \tag{12}$$

$$\alpha_1 = \frac{\omega_1}{(\rho_F - \omega_1)} \tag{12a}$$

$$\alpha_2 = \frac{\rho_F}{(\rho_F - \omega_1)(\rho_F - \gamma_1)} \tag{12b}$$

$$\alpha_3 = \frac{\rho_F \omega_0}{(\rho_F - \omega_1)(\rho_F - g)} \tag{12c}$$

$$ORE_{t+1} = \omega_0 NOA_t + \omega_1 ORE_t + v_t + e_{1,t+1} \tag{12d}$$

$$v_{t+1} = \gamma_1 v_t + e_{2,t+1} \tag{12e}$$

$$NOA_{t+1} = gNOA_t + e_{3,t+1} \tag{12f}$$

ORE_t denotes operating residual earnings and g reflects one plus growth rate of net operating assets.

Feltham and Ohlson (p.696) derive their extended REVM model from PVED assumption where they use risk-free rate to discount expected dividends. Even though this holds in theory, the risk-free rate does not entail any risk associated with dividends and equity. Furthermore, Ohlson (2009:255) criticizes his previous study saying that the paper

[13] CAPM formula: $\rho = R_f + \beta(market\ risk\ premium)$

does not clearly state what the source of conservative accounting is: other information, net operating assets or even both? He also mentions that Feltham and Ohlson could have used economic earnings[14] instead of permanent earnings[15] as foundation of the linear model. In addition, not every firm in practice applies conservative accounting.[16] Therefore, LIM devised by Feltham and Ohlson is limited only to firms characterized by conservative accounting.

2.4 Empirical comparison of performance of Dividend Discount Model, Free Cash Flow Valuation Model and Residual Earnings Valuation Model

Although in theory DDM, FCFVM and REVM should give the same intrinsic value both at the operating entity and equity level, provided employed correctly, it is often the case that in practice they result in different intrinsic values due to different assumptions[17] used.

Francis et al. (2000) test empirically signed prediction error[18], absolute prediction error[19] and explainability of FCFVM, DDM and REVM. Cost of equity is calculated by implementing CAPM, whereas the Weighted Average Cost of Capital (WACC) includes after-tax cost of debt, cost of equity, cost of preferred shares and their weights. It is worth noting that Francis et al. (p.53) use long-term target capital structure when calculating WACC instead of current capital structure and the forecast horizon encompasses a five-year period. They also establish three key assumptions on terminal value: future payoffs after the fifth year are discounted into perpetuity and constant growth rate is either 0 percent or 4 percent. Francis et al. (p.55) infer that REVM proved to be superior to other models in terms of median absolute prediction error both when constant growth rate is assumed to be 0 percent and 4 percent.

Likewise, median difference of signed prediction error when constant growth is 0 percent yields the same result. However, when the same prediction error is taken into

[14] Economic earnings are equal to price change plus dividends. They usually require that price change is equal to book value.
[15] Permanent earnings are defined as earnings plus reinvested retained earnings.
[16] Some firms apply aggressive accounting as well.
[17] For instance, discount rate which violates no arbitrage approach, unlimited borrowing, violation of CSR etc.
[18] Signed prediction error is measured as the intrinsic value minus the current price scaled by the current price.
[19] Absolute prediction error is measured as the absolute difference between the intrinsic price and the current price scaled by the current price.

account then FCFVM does a better job than REVM and DDM only when constant growth equates to 4 percent. The superiority of REVM in contrast to other valuation models is justified by the fact that REVM does not depend heavily on terminal value assumption, but rather book value. Put differently, if there were constant growth assumption errors[20] then they would have substantial effect on FCFVM and DDM but not REVM since it entails both stock and flow measures in contrast to FCFVM and DDM, which solely depend on flow measure.

However, since the authors of the study use Value Line without making adjustments when it comes to dirty surplus items, it can be argued that their findings are subject to measurement errors and bias and as such do not satisfy CSR. Yet, Penman (2001:691) argues that under GAAP analysts can assume that dirty surplus items have zero expected value. In other words, CSR should not be affected by dirty surplus accounting.

Likewise, Penman and Sougiannis (1998:358) document that accrual-based valuation models, REVM in particular, dominate cash flow models both using perpetuity and constant growth assumption for every forecast horizon. Unlike Francis et al., they use larger and more diversified sample size, ex-post and ex-ante realization[21], portfolio averaging process[22], and different time horizon and terminal value assumptions. Also, they assess signed prediction error only, whereas Francis et al. (p.46) focus on both signed and absolute prediction error, and explainability. Unlike Frankel and Lee (p.303) who define pricing error as intrinsic value less valuation based on historical earnings, Penman and Sougiannis (p.357) measure valuation error as actual price less intrinsic value scaled by actual price, meaning that they assume efficient market hypothesis. This in turn implies that their value estimate is an approximation and that the current price is the fair price.

Lundholm and O'Keefe (2001a) strongly disagree with empirical studies conducted by Francis et al. and Penman and Sougiannis for DDM, FCFVM and REVM should yield the same estimate of intrinsic value both at the equity and the operating entity level over finite and infinite horizon. They argue that different intrinsic values arise due to

[20] Constant growth assumption error refers to the error caused by wrongly estimated constant growth rate.
[21] Ex-ante realizations are realisations of the payoffs subsequent to time t as if they were forecasts at time t meaning that they are free of optimistic bias.
[22] Portfolio averaging process is process in which measurement errors, if any, cancel out.

inconsistencies in forecast[23], incorrectly discounted rate error[24] and missing cash flow error[25]. Yet, Penman (2001:681) refutes statement made by Lundholm and O'Keefe (2001a:311) that recent empirical studies misguide users of valuation models. He argues that it might occur that a firm pays no dividends and has zero free cash flows thus DDM and FCFVM cannot be applied over finite horizon, whereas it has positive book values and earnings for five-year period. In such a short time period it is difficult for FCFVM and DDM to capture the whole value in contrast to REVM.

However, Lundholm and O'Keefe (2001b:694) still rebut the claims made by Penman (2001) maintaining that book value should be taken into account as well when forecasting future dividends and there should be no difference between the different valuation models if employed correctly even over finite horizon.

[23] Inconsistencies in forecast usually happen when one starts applying perpetuity formula with the wrong amount for the terminal value.
[24] Incorrectly discounted rate error can occur when cost of equity and after-tax cost of debt are improperly computed.
[25] Missing cash flow error results in violation of CSR.

2.5 Abnormal Earnings Growth Model

Abnormal earnings growth is defined as cum-dividend earnings less normal earnings. When employing AEGM, analysts should concentrate on cum-dividend growth instead of ex-dividend growth for it ignores the value yielded from reinvesting dividends. If analysts forecast that cum-dividend earnings are equal to normal earnings then the value of equity will be equal to capitalized earnings. However, if cum-dividend earnings grow at a rate greater than normal earnings then the value of equity is greater than capitalized earnings. Likewise, abnormal earnings growth is equal to the difference between cum-dividend earnings growth rate and required return on equity multiplied by prior earnings. So, if cum-dividend earnings growth rate is above the required rate of return, then asset trades at a premium.

$$V_0^E = \frac{Earn_1}{\rho_E - 1} + \sum_{t=1}^{\infty} \frac{AEG_{t+1}}{(\rho_E - 1)\rho_E^t} \tag{13}$$

$$AEG_{t+1} = Earn_{t+1} + (\rho_E - 1)d_t - \rho_E Earn_t \tag{13a}$$

$$AEG_t = (G_t - \rho_E)Earn_{t-1} \tag{13b}$$

where

AEG_t = abnormal earnings growth.

$Earn_1$ = forward earnings.

G_t = one plus cum-dividend earnings growth rate.

AEGM can also be expressed at the operating entity level:

$$V_0^F = \frac{OI_1}{\rho_F - 1} + \sum_{t=1}^{\infty} \frac{AOIG_{t+1}}{(\rho_F - 1)\rho_F^t} \tag{14}$$

$$AOIG_{t+1} = (OI_{t+1} - OI_t) - (\rho_F - 1)[OI_t - (C_t - I_t)] \tag{14a}$$

In this definition, OI_t denotes operating income, $AOIG_{t+1}$ represents abnormal operating income growth, ρ_F^t is one plus cost of capital and V_0^F stands for intrinsic value of the firm.

The strength of AEGM is that it focuses directly on earnings and earnings growth, and not free cash flows. AEGM also uses accrual accounting meaning that sales are matched with expenses. Therefore, value created is matched with value given up. Typically shorter forecast horizons are needed to capture the value. Besides that, AEGM protects investors from paying too much for growth. However, not only does the complexity of the model calls for in-depth understanding of accrual accounting, but it also requires analysts to comprehend cum-dividend and normal earnings. The most significant drawback is that AEGM heavily depends on required return and growth assumption, whilst REVM depends partially on book value and growth assumption. Likewise, REVM provides more information on value drivers whereas AEGM does not entail such information. When it comes to accrual accounting, it is important to be very cautious since earnings can be manipulated. Hence, earnings quality analysis is often required together with implementation of AEGM (Penman 2013:195).

2.5.1 Normal forward and intrinsic P/E ratio

When analyzing the firm using AEGM, it is important to understand the relationship between forward and normal P/E ratio and abnormal earnings growth. If analysts forecast no abnormal earnings growth, the intrinsic P/E ratio will be equal to normal forward P/E ratio which is denoted as one scaled by the required return. If analysts expect cum-dividend earnings to be the same as normal earnings then no value will be added. However, if there is abnormal earnings growth, intrinsic P/E ratio will be above normal P/E ratio.

$$\frac{V_0^E}{Earn_1} = [1/(\rho_E - 1)] + \left[\sum_{t=1}^{\infty} \frac{AEG_{t+1}}{(\rho_E - 1)\rho_E^t} \Big/ Earn_1\right] \quad (15)$$

Ohlson (2009:249) refers to Ohlson and Juettner-Nauroth (2005) in his work and argues that forward P/E ratio depends both on long-term growth, γ, and short-term growth, g_2. Put succinctly, the forward ratio will increase if short-term growth rate goes up, ceteris paribus.

$$\frac{V_0^E}{Earn_1} = \frac{1}{r}\left[\left(\left(\frac{\Delta x_2 + rd_2}{x_1}\right) - \gamma - 1\right)\Big/(1 + r - \gamma)\right] \tag{16}$$

where

r = capitalization factor.

d = dividends.

Δx_2 = change in earnings at time two.

x_1 = earnings at time one.

γ = long-term growth.

$\frac{\Delta x_2 + rd_2}{x_1}$ = short-term growth.

2.5.2 Theoretical link and the difference between Residual Earnings Valuation Model and Abnormal Earnings Growth Model

The main difference between REVM and AEGM is that REVM uses book value as an anchor and then charges earnings by the required return which is applied to book value, whereas AEGM starts with capitalized earnings and then charges cum-dividend earnings by normal earnings. If one applies CSR and rearranges abnormal earnings growth formula, it can be inferred that future abnormal earnings equate to the change in residual earnings.

$$AEG_{t+1} = (Earn_{t+1} - Earn_t) - (\rho_E - 1)(Earn_t - d_t) \tag{17}$$

$$AEG_{t+1} = (Earn_{t+1} - Earn_t) - (\rho_E - 1)(B_t - B_{t-1}) \tag{17a}$$

$$AEG_{t+1} = (Earn_{t+1} - (\rho_E - 1)B_t) - (Earn_t - (\rho_E - 1)B_{t-1}) \tag{17b}$$

$$AEG_{t+1} = RE_{t+1} - RE_t \tag{17c}$$

It is also worth noting that if we take into account the relationship between residual earnings and abnormal earnings growth then we can deduce that if residual earnings are expected to grow constantly after time t+1, abnormal earnings will grow at a constant rate after time t+2.

Chen et al. (2004) and Juettner-Nauroth and Skogsvik (2005), as summarized by O'Hanlon (2008:4), argue that except being based on PVED assumption, REVM and AEGM differ from one another to a great extent. On one hand, REVM is based on CSR assumption meaning that if non-zero expression is added to PVED formula it would represent violation of CSR and REVM would not yield the same intrinsic value of equity as DDM. On the other hand, PVED assumption does not require AEGM to rely on CSR. Therefore, it might be more appropriate to use AEGM in settings where CSR is violated. Taken in its totality, Ohlson (2005:342) maintains that AEGM proved to be superior to REVM since it does not require book value item, it is more focused on earnings than book value and analysts try to forecast growth in earnings, not in book values.

2.6 Summary

To sum up, accounting researchers have strived to find the most suitable comparable firms and multiples in financial valuation. Alford concludes that firms should be selected based on industry, industry and risk, and industry and ROE. Liu et al. assert that, when computing value estimate, forward-looking measures are the most efficient multiples. In addition, Bhojraj and Lee find that selecting firms based on warranted multiples represents a substantial improvement over alternative ways.

Since REVM consists of stock and flow measure, it has been extensively used by both academics and practitioners. Ohlson (1995) and Feltham and Ohlson extend generic REVM in order to obtain more accurate intrinsic value estimate. Furthermore, Francis et al. and Penman and Sougiannis infer that REVM proved to be superior to FCFVM and DDM in terms of prediction error taking into account both constant growth rate assumption and zero growth rate.

CHAPTER 3 IMPLEMENTATION OF VALUATION METHODS

The aim of Chapter 3 is to provide a clear link between the theory and practice, emphasize practical difficulties of implementation which analysts face and prove empirically that FCFVM, REVM and AEGM yield the same intrinsic value over infinite horizon as implied by accounting theory. Hence, this chapter analyzes Associated British Foods and employs the three multiple-stage valuation models. Moreover, the method of multiples has also been implemented so as to back up the intrinsic value estimate.

3.1 Brief overview of Associated British Foods

Associated British Foods has been a fast-growing firm whose tremendous upturn can be attributed mainly to Primark, which recorded 118 percent increase in revenues from 2007 to 2012. Accordingly, Associated British Foods grew by approximately 80 percent during the same period. Much of Primark's growth was due to its low price/margin model and space increment. Besides Primark, sugar has also proven to be one of the main sources of firm's growth in revenues. Its revenues have increased on average about 131 percent from 2007 to 2012, but they are expected to decrease in 2013 by approximately 6 percent, mainly because of lower production in the European Union, foreign exchange rate and higher beet costs. On the other hand, the sugar division is expected to restore the growth rate from 2014 onwards due to the increased world production and demand for sugar cane and sugar beet. Also, supply quotas in the European Union will expire in 2015 and without imposing further restrictions this will lead to larger sugar production in both Spain and the United Kingdom. Despite profit declines in 2012, due to trading conditions and higher restructuring costs in Australia, management maintains that the grocery division will increase by approximately 4 percent from 2013 to 2016. Food ingredients have been dragging company's revenues since 2007, but the management still hopes that there is scope for improvement and that the division can actually become the catalyst of growth (Ackerman et al. 2012).

3.2 Underlying assumptions

The analysis used following important assumptions:

1. Valuation date is 15th of September 2012.
2. WACC is equal to 8.84 percent.
3. Sales are expected to grow 4.42 percent, 6.92 percent, 9.42 percent and 11.92 percent in 2013, 2014, 2015 and 2016, respectively. They will experience constant growth of 5 percent thereafter.
4. Other comprehensive items, such as items related to defined-benefit pension schemes, effects of movements in foreign exchange and items related to net-investment hedges and cash-flow hedges, are assumed to be zero from 2013 onwards since they were fairly volatile in the previous years.
5. Tax rate is assumed to be approximately 26 percent after 2012.

Other income statement and balance sheet items for 2013 were forecasted based on revenue margin, which was computed as average of previous six years as reported by Associated British Foods in annual reports 2007 to 2012 inclusive. Further information on reformulated financial statements as well as how free cash flows, WACC and average multiples were computed can be found in appendices.

3.3 Financial valuation of Associated British Foods

Table 1: Comparables-based valuation: Sum-of-the-parts

£m	EV/EBITDA	EV	EV/EBIT	EV
Grocery	7.44	2,455.20	9.70	2,058.34
Sugar and agriculture	6.99	4,263.90	8.86	3,760.18
Primark	13.60	8,146.40	16.76	6,401.65
Ingredients	9.31	670.32	11.42	484.66
Sum of enterprise values		15,535.82		12,704.84
Harmonic mean of enterprise value	13,978.43			
Net debt	-1,448.00			
Minority interest	-387.00			
Equity value	12,143.43			
Number of shares	791.70			
Price per share	15.34			

The method of multiples is employed by using sum-of-the-parts method where each business segment was valued individually. Since Liu et al. argue that forward-looking measures are the most accurate when implementing multiples, therefore the analysis used one-year ahead EV/EBITDA and enterprise value to earnings before interest and tax (EV/EBIT) ratio. It is important to mention that multiples, which are used in computation of estimated enterprise value of each business segment, are calculated as a harmonic mean of peers' multiples. After summing up business segments' enterprise values, the harmonic mean was computed so as to avoid the effect of outliers. Thereby, overall enterprise value equals £13,978,430,000. In order to arrive at the equity value and price per share, both net debt and minority interest are subtracted from the enterprise value. The method of multiples yields equity value of £12,143,430,000 and value estimate of £15.34. Actual price of 15th of September 2012 is £12.75, meaning that the stock is currently underpriced.

Table 2: Free cash flow valuation

£m	2012	2013E	2014E	2015E	2016E	2017E	2018E	2019E	2020E
Operating income	387.91	648.51	693.37	758.67	849.09	891.54	936.12	983.93	1,032.07
Change in net operating assets	178.00	-145.64	-148.55	-151.52	-154.55	-394.11	-413.82	-434.51	-456.24
Free cash flow	565.91	502.87	544.82	607.15	694.54	497.43	522.30	548.42	575.84
Growth rate		-11.14%	8.34%	11.44%	14.39%	-28.38%	5.00%	5.00%	5.00%
Present value of free cash flows	1,887.77								
Present value of terminal value	9,230.97								
Enterprise value	11,118.73								
Net debt	-1,448.00								
Minority interest	-387.00								
Equity value	9,283.73								
Number of shares	791.70								
Price per share	11.73								

Table 3: Residual earnings valuation

£m	2012	2013E	2014E	2015E	2016E	2017E	2018E	2019E	2020E
Net operating assets	7,282.00	7,427.64	7,576.19	7,727.72	7,882.27	8,276.38	8,690.20	9,124.71	9,580.95
Free cash flow	565.91	502.87	544.82	607.15	694.54	497.43	522.30	548.42	575.84
Operating residual earnings		4.78	36.77	88.94	165.96	194.75	204.49	214.71	225.45
Growth rate			669.25%	141.88%	86.60%	17.35%	5.00%	5.00%	5.00%
Change in operating residual earnings			31.99	52.17	77.02	28.79	9.74	10.22	10.74
Present value of operating residual earnings	222.67								
Present value of terminal value	3,614.06								
Anchor	7,282.00								
Enterprise value	11,118.73								
Net debt	-1,448.00								
Minority interest	-387.00								
Equity value	9,283.73								
Number of shares	791.70								
Price per share	11.73								

Table 4: Abnormal earnings growth valuation

£m	2012	2013E	2014E	2015E	2016E	2017E	2018E	2019E	2020E
Operating income	387.91	648.51	693.37	758.67	849.09	891.54	936.12	983.93	1,032.07
Free cash flow	565.91	502.87	544.82	607.15	694.54	497.43	522.30	548.42	575.84
Abnormal operating income growth			31.99	52.17	77.02	28.79	9.74	10.22	10.74
Growth rate				63.08%	47.63%	-62.62%	-66.17%	5.00%	5.00%
Capitalized abnormal operating income growth			361.86	590.14	871.30	325.70	110.15	115.66	121.44
Present value of abnormal operating income growth	1,738.50								
Present value of terminal value	2,044.15								
Anchor	7,336.08								
Enterprise value	11,118.73								
Net debt	-1,448.00								
Minority interest	-387.00								
Equity value	9,283.73								
Number of shares	791.70								
Price per share	11.73								

Tables 2, 3 and 4 prove that the multi-period models are indeed algebraic transformations of DDM. In other words, they provide the same intrinsic value estimate of £11.73 which is £1.02 higher than the actual price of 15th of September 2012. In other words, according to the multi-period models the stock is currently overpriced. Furthermore, since abnormal earnings growth is the first difference of residual earnings, it starts to grow at a constant rate after 2018, whereas free cash flows and residual earnings increase at a constant rate from 2017 onwards. It is also worth noting that Table 3 explicitly implies that the change in residual earnings equates to abnormal earnings growth.

Since all of the multi-period models employed in this chapter are particularly sensitive to changes in constant growth rate and WACC, the sensitivity analysis, showing the change in intrinsic value estimate, is implemented in Table 5. It would not be hard to imagine that constant growth rate is 50 basis points lower than the assumed constant growth rate.

Table 5: Intrinsic value estimate – sensitivity scenarios

£	Constant growth rate increase (bps)				
WACC increase (bps)	-50	0	+50	+75	+100
-50	11.75	13.50	15.86	17.38	19.23
0	10.38	11.73	13.47	14.56	15.83
+50	9.29	10.36	11.70	12.51	13.44
+100	8.40	9.26	10.33	10.96	11.67

According to Table 5, if WACC turned out to be 50 basis points lower than the assumed WACC, then the new price per share would be £13.50 which is £1.77 higher than the computed intrinsic value per share, ceteris paribus.

3.5 Practical issues of implementation of valuation methods

When implementing the method of multiples, analysts often struggle with finding comparable firms of the target firm. Also, other issues which may arise are differing accounting standards under which firms operate, different value estimates by different multiples, mispriced peers and negative denominators. Sometimes it occurs that value

estimate is distorted by extreme values. Therefore, it is advisable to use harmonic mean and median rather than arithmetic average. Equity multiples might be often distorted by leverage effect as well (O'Hanlon 2013:9). That said, it is important to employ entity level multiples which are unaffected by the method of financing. Moreover, the method of multiples is prone to subjective judgment by analysts. For example, analysts can subtract conglomerate discount from equity value and thus affect the value estimate. Also, another discretionary right which analysts exercise is choosing between different comparable firms for their target firm.

In practice, there are several implementation issues regarding FCFVM, REVM and AEGM which analysts have to deal with. First, cost of equity is usually obtained by CAPM. Therefore, the question which arises is which beta should analysts use? Is it industry beta or beta of the firm? On one hand, industry beta is a good proxy of market risk since measurement errors cancel out thus representing firm's beta more accurately, provided beta of the firm is distorted. On the other, industry beta can be different from firm-specific beta. Second, market risk premium is also quite debatable and often prone to subjective judgment. Third, when incorporating cost of equity and cost of debt into WACC, analysts also have to opt for the appropriate weights. Yet, this might be very difficult to do as well. Should analysts use target capital structure weights, which firm strives to achieve, or current capital structure weights? A few research pundits propose using REVM when estimating WACC and market risk premium since its estimate is more correlated with firm-specific characteristics than CAPM (Lee 1999:422). Finally, all three valuation models, except for REVM, depend heavily on terminal value calculation. In other words it follows that the value estimate mainly relies on constant growth rate assumption. Therefore, it is often prone to subjective judgment and prediction error since it is quite unrealistic to assume constant growth rate after a certain period. In order to partially mitigate this issue, analysts often use historical real gross domestic product growth rate as their future constant growth rate. In contrast to REVM and AEGM, free cash flows demand some adjustments before computing enterprise value. For example, under GAAP interest paid and received are usually embodied in net income. Hence, analysts need to remove effect of interest from CFO since it has nothing to do with operations. Moreover, GAAP, similar to IFRS, allows purchase and sale of interest-

bearing securities to be reported under cash used in investing activities. Therefore, analysts need to remove effect of interest-bearing securities. IFRS allows analysts to choose whether they will classify interest-bearing securities as either CFO or cash flow from financing, which also arises the question of discretion.

3.6 Summary

To recap, each of the multi-period valuation models results in the same intrinsic value estimate since they are based on the same underlying assumptions. Even though the models are derived from the same assumptions, they might generate different intrinsic value estimates in practice.

However, since the method of multiples is based on different assumptions than the multi-period valuation models, it provides different value estimate. Similar to multi-period valuation models, analysts also face practical difficulties when employing the method of multiples.

CHAPTER 4 CONCLUSION

Financial valuation captures the essence of capital markets, improves overall efficacy and dictates future stock movements. It provides investors and general public with accounting information on security which is critical in making investment decisions, thus having a huge impact on the business world. Looking ahead, financial valuation coupled with harmonization of accounting systems will experience even easier implementation, not being susceptible to certain accounting adjustments, and increased accuracy therefore enhancing investors' credibility. Admittedly, the most relevant concept in financial valuation is forecasting which supplies users of financial statements with information on firm's future performance. Historical data from financial statements enable analysts, who use ordinary least squares or some other forward-looking technique, come to grips with such tedious task and try to predict the uncertain time to come.

Even nowadays accounting scholars are still in dispute over the efficacy and accuracy of various valuation models and, in particular, underlying assumptions. On one hand, a few academics argue that the method of multiples best reflects the amount the market is willing to pay for the stock, thus mirroring the law of supply and demand. It has also seen a major practical improvement in accuracy since influential articles have been published, such as Alford, Liu et al. and Bhojraj and Lee, thus facilitating their implementation. Particularly, these research papers had a considerable impact on the method of selecting suitable comparable firms as this is the area analysts most struggle with. Despite having obvious drawbacks, especially when it comes to efficient market hypothesis assumption, the papers could not have been written and published without containing such apparent inconsistency. However, taking into account enormous betterment accounting has exhibited, further improvement is admittedly needed in financial valuation so as to propose models which are based on plausible assumptions which hold both in theory and practice. In contrast to other robust models, the method of multiples does not rely on assumption about constant growth rate which has often proven to be unrealistic in practice. On the other hand, some scholars and practitioners assert that multi-period valuation models estimate most accurately the intrinsic value and the market is rather inefficient as it does not reflect adequately the true value of the security. In particular, REVM has been extensively used by academics and practitioners for it is based on both

flow and stock measures, therefore not depending heavily on constant growth assumption. Furthermore, its prediction accuracy has been documented and tested empirically in accounting research literature. For example, Francis et al. and Penman and Sougiannis conclude that REVM dominates other multi-period valuation models in terms of prediction error taking into account both constant growth rate assumption and zero growth rate. Since empirical tests of Ohlson (1995) and Feltham and Ohlson, accounting research has shown enormous improvement in development and transformation of generic REVM to contemporaneous extended version, namely LIM. Many accounting academics have tried to modify the model and obtain more accurate intrinsic value estimates, but none of these modified models computes intrinsic value better than LIM (Richardson and Tinaikar 2004:227). Although multi-period models do provide intrinsic value estimate, it is quite debatable to assume that it stands for the true value of the security. That is to say, they depend on constant growth assumption meaning that stock price often reflects unrealistic expectations in terms of constant future payoffs. All things considered, despite the method of multiples is considered to be a naïve procedure of assessing stock value ignoring main valuation tenet, it seems to be more suited, especially at the practical level, than multi-period valuation models because it more likely mirrors current market conditions, but only under supposition that efficient market hypothesis holds. Finally, as Lee infers in his article, "……no valuation technique can be expected to deliver a single correct value measure. Ultimately, valuation is as much art as it is science" (p.414). In other words, different valuation models rely on different underlying assumptions, therefore providing different value estimates.

REFERENCES

Ackerman, W., Sloane, A., Manso, C., Critchlow, A. (2012). *Primark inflection point justifies higher rating*, Societe Generale Cross Asset Research: 1-86.

Alford, A. (1992). The Effect of the Set of Comparable Firms on the Accuracy of the Price-Earnings Valuation Method. *Journal of Accounting Research* 30 (1): 94-108.

Associated British Foods (2007). *Annual Report and Accounts 2007: report of the independent auditors*, p.48-51.

Associated British Foods (2008). *Annual Report and Accounts 2008: report of the independent auditors*, p.48-51.

Associated British Foods (2009). *Annual Report and Accounts 2009: report of the independent auditors*, p.54-57.

Associated British Foods (2010). *Annual Report and Accounts 2010: report of the independent auditors*, p.56-60.

Associated British Foods (2011). *Annual Report and Accounts 2011: report of the independent auditors*, p.60-64.

Associated British Foods (2012). *Annual Report and Accounts 2012: report of the independent auditors*, p.64-68.

Bhojraj, S., Lee, C. M. C. (2002). Who Is My Peer? A Valuation-Based Approach to the Selection of Comparable Firms. *Journal of Accounting Research* 40 (2): 407-439.

Burgstahler, D. C., Dichev, I. D. (1997). Earnings, Adaptation and Equity Value. *The Accounting Review* 72 (2): 187-215.

Choi, S. (2012). *Session 2: International Financial Reporting Standards*, from AcF 503 Principles of Financial Reporting Lecture Notes, 2012/13, Lancaster University Management School.

Choi, S. (2013). *Business Valuation Using Accounting Numbers*, from AcF 706 Briefing Session for Dissertation, 2012/13, Lancaster University Management School.

Copeland, T., Koller, T., Murrin, J. (2000). *Valuation: Measuring and Managing the Value of Companies*. New York: John Wiley & Sons.

Deboo, M. (2012). *Primark valuation revisited (again)*, Investec Securities: 1-14.

Feltham, G. A., Ohlson, J. A. (1995). Valuation and Clean Surplus Accounting for Operating and Financial Activities. *Contemporary Accounting Research* 11 (2): 689-731.

Francis, J., Olsson, P., Oswald, D. R. (2000). Comparing the Accuracy and Explainability of Dividend, Free Cash Flow, and Abnormal Earnings Equity Value Estimates. *Journal of Accounting Research* 38 (1): 45-70.

Frankel, R., Lee, C. M. C. (1998). Accounting valuation, market expectation, and cross-sectional stock returns. *Journal of Accounting and Economics* 25: 283-319.

Lee, C. M. C. (1999). Accounting-Based Valuation: Impact on Business Practices and Research. *Accounting Horizons* 13 (4): 413-425.

Liu, J., Nissim, D., Thomas, J. (2002). Equity Valuation Using Multiples. *Journal of Accounting Research* 40 (1): 135-172.

Lundholm, R., O'Keefe, T. (2001a). Reconciling Value Estimates from the Discounted Cash Flow Model and the Residual Income Model. *Contemporary Accounting Research* 18 (2): 311-335.

Lundholm, R. J., O'Keefe, T. B. (2001b). On Comparing Residual Income and Discounted Cash Flow Models of Equity Valuation: A Response to Penman 2001 (*CAR*, Winter 2001). *Contemporary Accounting Research* 18 (4): 693-696.

Ohlson, J. A. (1995). Earnings, Book Values, and Dividends in Equity Valuation. *Contemporary Accounting Research* 11 (2): 661-687.

Ohlson, J. A. (2005). On Accounting-Based Valuation Formulae. *Review of Accounting Studies* 10: 323-347.

Ohlson, J. A. (2009). Accounting Data and Value: The Basic Results. *Contemporary Accounting Research* 26 (1): 231-259.

O'Hanlon, J. (2008). *A note on the residual earnings valuation model and the abnormal earnings growth model*, Lancaster University Management School.

O'Hanlon, J. (2013). *Valuation using comparables-based multiples*, from AcF 606 Financial Statement Analysis Lecture Notes, 2012/13, Lancaster University Management School.

Penman, S. H. (2001). On Comparing Cash Flow and Accrual Accounting Models for Use in Equity Valuation: A Response to Lundholm and O'Keefe (*CAR*, Summer 2001). *Contemporary Accounting Research* 18 (4): 681-692.

Penman, S. H. (2013). *Financial Statement Analysis and Security Valuation*, 5th edition. New York: McGraw-Hill International Edition.

Penman, S. H., Sougiannis, T. (1998). A Comparison of Dividend, Cash Flow, and Earnings Approaches to Equity Valuation. *Contemporary Accounting Research* 15 (3): 343-383.

Richardson, G., Tinaikar, S. (2004). Accounting based valuation models: what have we learned? *Accounting and Finance* 44: 223-255.

Sloan, R. G. (2002). Discussion of Who Is My Peer? A Valuation-Based Approach to the Selection of Comparable Firms. *Journal of Accounting Research* 40 (2): 441-444.

APPENDICES

Appendix 1: Peers' forecasted average multiples for 2013[26]

£m	EV/EBITDA	EV/EBIT
Panel A: Grocery		
Nestle	11.23	13.27
Conagra	6.89	8.52
Dairy	6.53	9.60
Goodman Fielder	6.66	8.66
Harmonic mean	7.44	9.70

£m	EV/EBITDA	EV/EBIT
Panel B: Sugar and agriculture		
Suedzucker	6.99	8.86
Harmonic mean	6.99	8.86

£m	EV/EBITDA	EV/EBIT
Panel C: Primark		
Inditex	13.95	17.94
H&M	13.27	15.73
Harmonic mean	13.60	16.76

£m	EV/EBITDA	EV/EBIT
Panel D: Ingredients		
Tate	8.35	10.48
Kerry	10.52	12.54
Harmonic mean	9.31	11.42

[26] Choice of peer firms was based on Ackerman et al. (2012).

Appendix 2: Computation of free cash flows

Panel A: Method 1

£m	2012	2013E	2014E	2015E	2016E	2017E	2018E	2019E	2020E
Operating income	387.91	648.51	693.37	758.67	849.09	891.54	936.12	982.93	1,032.07
Change in net operating assets	178.00	-145.64	-148.55	-151.52	-154.55	-394.11	-413.82	-434.51	-456.24
Free cash flow	565.91	502.87	544.82	607.15	694.54	497.43	522.30	548.42	575.84

Panel B: Method 2

£m	2012	2013E	2014E	2015E	2016E	2017E	2018E	2019E	2020E
Operating income	387.91	648.51	693.37	758.67	849.09	891.54	936.12	982.93	1,032.07
Change in net working capital	130.00	-19.44	-19.83	-20.23	-20.63	-52.61	-55.24	-58.00	-60.90
Depreciation	445.00	453.90	462.98	472.24	481.68	505.77	531.05	557.61	585.49
Capital expenditures	-397.00	-580.10	-591.70	-603.54	-615.61	-847.27	-889.64	-934.12	-980.83
Free cash flow	565.91	502.87	544.82	607.15	694.54	497.43	522.30	548.42	575.84

Appendix 3: Summary of reformulated income statement and statement of comprehensive income

Panel A: Operating items

£m	2012	2013E[27]	2014E	2015E	2016E	2017E	2018E	2019E	2020E
Earnings before interest and tax	864.00	846.51	905.07	990.31	1,108.33	1,163.75	1,221.94	1,283.03	1,347.18
% of sales	7.05%	6.62%	6.62%	6.62%	6.62%	6.62%	6.62%	6.62%	6.62%
Taxation	-202.09	-198.00	-211.70	-231.64	-259.24	-272.20	-285.81	-300.11	-315.11
% of sales	-1.65%	-1.55%	-1.55%	-1.55%	-1.55%	-1.55%	-1.55%	-1.55%	-1.55%
Gross operating income	661.91	648.51	693.37	758.67	849.09	891.54	936.12	982.93	1,032.07
% of sales	5.40%	5.07%	5.07%	5.07%	5.07%	5.07%	5.07%	5.07%	5.07%
Pension	-76.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
% of sales	-0.62%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Foreign exchange	-193.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
% of sales	-1.58%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hedges	-5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
% of sales	-0.04%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Net operating income	387.91	648.51	693.37	758.67	849.09	891.54	936.12	982.93	1,032.07
% of sales	3.17%	5.07%	5.07%	5.07%	5.07%	5.07%	5.07%	5.07%	5.07%

[27] Choice of certain sales growth was based on Ackerman et al. (2012) and Deboo (2012).

Appendix 3: Summary of reformulated income statement and statement of comprehensive income (continued)

Panel B: Financial items and non-controlling interest in comprehensive income

£m	2012	2013E[28]	2014E	2015E	2016E	2017E	2018E	2019E	2020E
Financial expense	-103.00	-78.51	-83.94	-91.85	-102.80	-107.94	-113.33	-119.00	-124.95
% of sales	-0.84%	-0.61%	-0.61%	-0.61%	-0.61%	-0.61%	-0.61%	-0.61%	-0.61%
Taxation	-24.09	-18.36	-19.63	-21.48	-24.04	-25.25	-26.51	-27.83	-29.23
% of sales	-0.20%	-0.14%	-0.14%	-0.14%	-0.14%	-0.14%	-0.14%	-0.14%	-0.14%
Non-controlling interest	-28.00	-40.95	-43.78	-47.90	-53.61	-56.29	-59.11	-62.06	-65.17
% of sales	-0.23%	-0.32%	-0.32%	-0.32%	-0.32%	-0.32%	-0.32%	-0.32%	-0.32%
Net financial expense	-106.91	-101.10	-108.09	-118.27	-132.37	-138.98	-145.93	-153.23	-160.89
% of sales	-0.87%	-0.79%	-0.79%	-0.79%	-0.79%	-0.79%	-0.79%	-0.79%	-0.79%
Comprehensive income	281.00	524.57	560.86	613.68	686.82	721.16	757.21	795.07	834.83
% of sales	2.29%	4.10%	4.10%	4.10%	4.10%	4.10%	4.10%	4.10%	4.10%

[28] Choice of certain sales growth was based on Ackerman et al. (2012) and Deboo (2012).

Appendix 4: Summary of reformulated balance sheet

Panel A: Operating items

£m	2012	2013E[29]	2014E	2015E	2016E	2017E	2018E	2019E	2020E
Working capital	984.00	1,003.68	1,023.75	1,044.23	1,065.11	1,118.37	1,174.29	1,233.00	1,294.65
% of sales	8.03%	7.85%	7.48%	6.98%	6.36%	6.36%	6.36%	6.36%	6.36%
Property, plant and equipment, and other intangible assets	6,310.00	6,436.20	6,564.92	6,696.22	6,830.15	7,171.65	7,530.24	7,906.75	8,302.09
% of sales	51.50%	50.31%	48.00%	44.74%	40.78%	40.78%	40.78%	40.78%	40.78%
Other net operating assets	-12.00	-12.24	-12.48	-12.73	-12.99	-13.64	-14.32	-15.04	-15.79
% of sales	-0.10%	-0.10%	-0.09%	-0.09%	-0.08%	-0.08%	-0.08%	-0.08%	-0.08%
Net operating assets	7,282.00	7,427.64	7,576.19	7,727.72	7,882.27	8,276.38	8,690.20	9,124.71	9,580.95
% of sales	59.44%	58.06%	55.39%	51.63%	47.06%	47.06%	47.06%	47.06%	47.06%

[29] Choice of certain sales growth was based on Ackerman et al. (2012) and Deboo (2012).

Appendix 4: Summary of reformulated balance sheet (continued)

Panel B: Financial items and non-controlling interest

£m	2012	2013E[30]	2014E	2015E	2016E	2017E	2018E	2019E	2020E
Cash	391.00	398.82	406.80	414.93	423.23	444.39	466.61	489.94	514.44
% of sales	3.19%	3.12%	2.97%	2.77%	2.53%	2.53%	2.53%	2.53%	2.53%
Loans	-538.00	-548.76	-559.74	-570.93	-582.35	-611.47	-642.04	-674.14	-707.85
% of sales	-4.39%	-4.29%	-4.09%	-3.81%	-3.48%	-3.48%	-3.48%	-3.48%	-3.48%
Loans (non-current)	-914.00	-932.28	-950.93	-969.94	-989.34	-1,038.81	-1,090.75	-1,145.29	-1,202.55
% of sales	-7.46%	-7.29%	-6.95%	-6.48%	-5.91%	-5.91%	-5.91%	-5.91%	-5.91%
Non-controlling interest	-387.00	-394.74	-402.63	-410.69	-418.90	-439.85	-461.84	-484.93	-509.18
% of sales	-3.16%	-3.09%	-2.94%	-2.74%	-2.50%	-2.50%	-2.50%	-2.50%	-2.50%
Net debt	-1,448.00	-1,476.96	-1,506.50	-1,536.63	-1,567.36	-1,645.73	-1,728.02	-1,814.42	-1,905.14
% of sales	-11.82%	-11.54%	-11.01%	-10.27%	-9.36%	-9.36%	-9.36%	-9.36%	-9.36%
Equity	5,834.00	5,950.68	6,069.69	6,191.09	6,314.91	6,630.65	7,462.23	7,310.30	7,675.81
% of sales	47.62%	46.51%	44.37%	41.37%	37.70%	37.70%	40.41%	37.70%	37.70%

[30] Choice of certain sales growth was based on Ackerman et al. (2012) and Deboo (2012).

Appendix 5: Summary of movements in intangible assets and property, plant and equipment

£m	2012	2013E[31]	2014E	2015E	2016E	2017E	2018E	2019E	2020E
Brought forward	6,358.00	6,310.00	6,436.20	6,564.92	6,696.22	6,830.15	7,171.65	7,530.24	7,906.75
% of sales	51.89%	49.32%	47.05%	43.86%	39.98%	38.83%	38.83%	38.83%	38.83%
Additions less disposals	397.00	580.10	591.70	603.54	615.61	847.27	889.64	934.12	980.83
% of sales	3.24%	4.53%	4.33%	4.03%	3.68%	4.82%	4.82%	4.82%	4.82%
Depreciation, amortization and impairment	-445.00	-453.90	-462.98	-472.24	-481.68	-505.77	-531.05	-557.61	-585.49
% of sales	-3.63%	-3.55%	-3.38%	-3.16%	-2.88%	-2.88%	-2.88%	-2.88%	-2.88%
Carried forward	6,310.00	6,436.20	6,564.92	6,696.22	6,830.15	7,171.65	7,530.24	7,906.75	8,302.09
% of sales	51.50%	50.31%	48.00%	44.74%	40.78%	40.78%	40.78%	40.78%	40.78%

[31] Choice of certain sales growth was based on Ackerman et al. (2012) and Deboo (2012).

Appendix 6: Computation of Weighted Average Cost of Capital

£m		
Debt	1,452.00	12.58%
Equity	10,089.84	87.42%
Enterprise value	11,541.84	100.00%
Return on debt		4.90%
Yield to maturity on five-year UK gilt	1.35%	
Five-year credit default spread	1.68%	
British pound swaps index	1.87%	
Return on equity		9.58%
Corporate tax rate		24.00%
WACC		8.84%

$$WACC = r_s \times \frac{S}{V} + r_d \times \frac{B}{V} \times (1 - T_c) \quad (18)$$

$$r_d = YTM + CDS + BPSI \quad (19)$$

where:

r_s = return on equity.

S = market value of equity.

B = market value of debt.

V = market value of enterprise.

r_d = return on debt.

T_c = corporate tax rate.

YTM = yield to maturity on five-year UK gilt.

CDS = five-year credit default spread.

$BPSI$ = British pound swaps index.