

Nowak, Arne; Fahling, Ernst

Article

The Influence of R&D Intensity on the Performance and Application of Fundamental and Relative Equity Valuation Methods – Part I

ISM Research Journal

Provided in Cooperation with:

International School of Management (ISM), Dortmund

Suggested Citation: Nowak, Arne; Fahling, Ernst (2015) : The Influence of R&D Intensity on the Performance and Application of Fundamental and Relative Equity Valuation Methods – Part I, ISM Research Journal, ISSN 2627-4647, Verlagshaus Monsenstein und Vannerdat, Münster, Vol. 2, Iss. 1, pp. 19-35

This Version is available at:

<https://hdl.handle.net/10419/324683>

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Nowak, Arne; Fahling, Ernst

The Influence of R&D Intensity on the Performance and Application of Fundamental and Relative Equity Valuation Methods, Part I

Literature Review

Abstract

This paper reviews the relevant literature on equity valuation techniques and addresses the question to what degree the vanishing information content of accounting numbers influences the precision, applicability and analyst's choice of fundamental and relative valuation methods. In that context it outlines the mathematical evolution of fundamental valuation techniques and how the advancements amended the shortcomings of predecessors. It furthermore elaborates on the method, implementation and obstacles of relative equity valuation and reviews analysts' preferences with regard to the application of different valuation approaches. The paper reveals that the residual earnings method is the most accurate fundamental valuation method that even outperforms the price to forward earnings multiple, which is testified to be the best performer among relative methods. Nevertheless, from a practical perspective, the discounted cash flow model as well as the price to earnings multiple have developed into industry standards that are still most widely applied among analysts.

1 Introduction

Stock index compositions of developed economies have been shifting towards dominance of innovation-driven high quality service providers, which are characterized by high volumes of knowledge-based assets, uncertain growth opportunities (cf. OECD 2012) and disproportional equity market premiums (cf. Boer 2000). However, the national and international generally accepted accounting principles (GAAP) are merely hesitantly adjusted in line with this development – causing a divergence between business practice and its reflection on firms' financial statements. In particular, firms whose business model relies on extensive research and development (R&D) expenditures to create new products and future growth opportunities are in-

creasingly difficult to be evaluated based on accounting numbers. Since extensive empirical research supports the relevance of accounting numbers for equity valuation, this divergence poses a serious challenge to the accounting and finance community. This paper reviews the relevant literature on the importance of accounting numbers for equity evaluation and the evolution of direct and relative valuation methods. It further discusses the effectiveness of different commonly applied fundamental and multiple-based valuation models supported by empirical evidence from previous literature.

2 Value relevance of accounting information

Ball/Brown (1968) agree with prior literature to the extent that the inconsistent evolution of accounting regulations caused heterogeneity across income numbers that disqualifies direct comparisons across firms. Nevertheless, they challenge the common opinion that the lack of substantive meaning caused by heterogeneity implies a lack of utility, and test how the market reacts to reported information. They assume that in efficient markets, securities' prices adjust immediately to relevant information. Hence, reported earnings are value relevant to investors if the market adjusts after publication. They show that, on average, over a period of twelve months prior to the release of the preliminary financial reports, stock prices gradually increase (decrease) for firms that are subject to a positive (negative) earnings surprise (actual earnings – expected earnings) until the date of release without significant leaps for the months of the release. Due to the observed relationship between market price changes and reported earnings, they conclude that reported earnings have informative value.

Beaver (1968) argues that a relationship between earnings and security value is merely a condition but no evidence for the existence of informative value since the information on the determinants of earnings may be readily available to and digested by investors prior to earnings releases. This assumption explains the gradual adjustment pattern observed by Ball/Brown (1968) prior to the actual release. Therefore, Beaver (1968) claims that information relevance is reflected in concrete trading activity – signaled either by changes of individual and/or aggregate investors' market exposure without or with market price adjustments, respectively. His results certify both scenarios and are robust towards market reactions. He concludes that accounting data is useful.

Oppong (1980) performs a time series analysis to verify Beaver's (1968) results. He observes the same increase in price fluctuation around the announcement date of the financial reports for US firms over the time period from 1966-70. However, a deeper analysis of the drivers of fluctua-

tion reveals that it is mainly driven by very few extreme values. Hence, he concludes that accounting income figures are of limited usefulness to investors.

To shed some light, Lev (1989) reviews two decades of research on the value relevance of accounting data. He consistently finds extremely low R^2 ($\approx 5\%$ on average) for different linear regressions of stock price changes on reported performance in line with Oppong's (1980) findings regarding limited usefulness of accounting numbers. Lev's (1989) results are robust for different performance metrics, statistical methodologies, time periods and market reactions windows, whereby cross-sectional and time-series analyses deliver equal results. However, he argues that this counterintuitive result is likely to be due to the low quality of reported earnings. While researchers use earnings values as reported, it is reasonable to assume that analysts separate persistent from transitory elements and focus on the latter which have higher predictive power (cf. Fairfield et al. 1996) and are less subject to earnings surprises. In fact, Collins/Kothari (1989) show that adding a metric of earnings persistence as an explanatory variable to the linear regression increases explanatory power substantially. Hence, a weak relationship between current reported earnings figures and stock return not necessarily implies lacking utility of financial reports. Theoretically, Feltham/Ohlson (1995) and Ohlson (1995) establish a link between book values of equity, forecasted earnings and equity market valuation, and Lee (1999) argues that historical accounting data alone is not supposed to provide a business valuation but a base for forecasting value indicators. Sales forecasts are developed based on interdisciplinary macroeconomic influences that are highly uncertain, and applying GAAP rules and historical ratios results in the earnings metric used by researchers to test the relationship between accounting performance and market reactions. Therefore, prudent GAAP or management discretion can distort the true relationship between reported performance and market reactions. Hence, even if earnings as reported do not, on average, show a high correlation with stock returns, increased trading activity around the announcement date implies solid value relevance of reported information. It is, however, likely that analysts adjust published figures before forecasting and conversion into a value estimate occurs. Converting accounting numbers into value estimates requires direct or relative valuation methods both of which can be applied from an equity or entity perspective.

3 Valuation perspectives and approaches

The underlying principle that determines the value of financial assets is consistent and independent of perspective: It is the sum of its future payoffs discounted by a factor that accounts for risk-level and time-value to a present value. The entity perspective evaluates the firm's total

assets (V_0^F) independent of its capital structure. Hence, it evaluates the enterprise as a whole without separating between debt and equity claims.

$$V_0^F = V_0^E + V_0^D \quad (1)$$

where

$$V_0^F = \text{Intrinsic Enterprise Value}$$

$$V_0^E = \text{Intrinsic Value of Equity}$$

$$V_0^D = \text{Intrinsic Value of Debt}$$

The equity perspective only evaluates the claims held by owners (V_0^E) on the company's assets and future payoffs (cf. Penman 2013: 10-12).

$$V_0^E = V_0^F - V_0^D \quad (2)$$

Schreiner/Spremann (2007) find prove for the superiority of equity approaches for multiple valuation techniques and Courteau et al. (2006) define two generic approaches to equity valuation based on accounting numbers: While direct methods estimate an intrinsic value based on forecasted future streams of return, relative methods are not based on fundamental analysis but derive market prices based on benchmark multiples from a pre-defined peer group.

Other non-mainstream valuation methods that are sometimes applied by analysts are asset-based valuation methods, which derive a company valuation based on its recognized assets (cf. Penman 2013: 82-84), hybrid models, which form a combination of stock- and flow-based valuation techniques such as the Economic Value Added (EVA) (cf. Pettit, J.; Stern Stewart & Co. Research 2000) and real-option approaches which derive value estimates based on statistical probabilities (Taudes 1998, Perlitz et al. 1999).

4 Direct valuation models

The literature (cf. Francis et al. 2000; Ohlson 2005) generally refers to four types of flow based valuation models: The dividend discount model (DDM), the discounted cash flow model (DCF), the residual earnings valuation model (REVM) and the abnormal earnings growth model (AEGM). Fundamental analysis and intrinsic value approaches certainly originate from the seminal paper of Williams (1938: 55-89), who developed the DDM based on the rationale that the security value equals its discounted future payoffs. Since the development of the DDM in 1938, there have been various significant scientific contributions in the field of fundamental valuation

approaches, each of which tackled shortcomings of predominant methodologies. Nevertheless, each incremental improvement is based on the same rationale, algebraically a reformulation of the DDM and requires forecasting payoffs over a finite horizon, a terminal value at the end of the horizon and the cost of capital (cf. Courteau et al. 2006).

4.1 Dividend discount model

William's (1938) DDM relies on the logic that the equity's intrinsic value equals the sum of discounted expected future cash-flows to its holders, defined as dividends. The discount rate equals the cost of equity capital and accounts for time-value and systematic risk. However, equity investments do not mature but must be treated as a going concern investment which implies an infinite stream of future cash flows:

$$V_0^E = \sum_{t=1}^{\infty} \frac{E(Div_t)}{(1 + r_e)^t} \quad (3)$$

where

$$\begin{aligned} V_0^E &= \text{Intrinsic Value of Equity} \\ Div_t &= \text{Periodic Dividends} \\ r_e &= \text{Cost of Equity Capital} \end{aligned}$$

However, forecasting dividends for an infinite period is not feasible and needs to be capped at a realistic horizon. Consequently, it is necessary to estimate the terminal value at which the security could be sold at the end of a realistic forecasting period (cf. Courteau et al. 2006). The terminal value (TV_T) is usually estimated as a growing perpetuity under the assumptions of constant cost of equity and growth – also known as the growth model (cf. Gordon 1959):

$$TV_T = \frac{Div_{T+1}}{(r_e - g)} \quad (4)$$

where

$$g = \text{Perpetual Growth Rate}$$

Adding the terminal value estimate to the end of a finite forecasting horizon results in the dividend discount model:

$$V_0^E = \sum_{t=1}^T \frac{E(Div_t)}{(1+r_e)^t} + \frac{TV_T}{(1+r_e)^T} \quad (5)$$

The DDM is subject to some obvious conceptual and practical shortcomings. The model requires relatively long forecasting periods whereby dividend forecasts are merely reliable for a shorter term. Additionally, dividends are not an indicator of value creation but wealth distribution. Hence, neither does it focus on value drivers nor can it be validated ex-post since changes in dividends do not necessarily reflect value changes of the company. Consequently, it merely works for mature firms that pay dividends and commit to a stable payout ratio (cf. Williams 1938: 55-89; Penman 2013: 110-114).

4.2 Discounted cash flow model

The DCFM (cf. Copeland et al. 2000: 131-152), derives value estimates from internally generated free cash flows (FCF) that are free in use to make new investments, distribute dividends or repay debt. The FCF is the difference between the operating income and the cash invested to maintain operations for each period:

$$FCF_t = OI_t - (NOA_t - NOA_{t-1}) \quad (6)$$

where

FCF_t	=	Free Cash-Flow
OI_t	=	Operating Income
NOA_t	=	Net Operating Assets

Hence, unlike the DDM it focuses on internally generated value and does not depend on the firm's payout policy. The application of the DCFM to value a company as a going concern investment is usually done from the entity perspective. As the DDM, the DCFM requires the estimation of a terminal value term at the end of a finite forecasting period.

$$V_0^F = \sum_{t=1}^T \frac{E(FCF_t)}{(1 + r_{WACC})^t} + \frac{TV_T}{(1 + r_{WACC})^T} \quad (7)$$

where

$$\begin{aligned} r_{WACC} &= \text{Weighted Average Costs of Capital} \\ &= \frac{\text{Equity}}{\text{Equity} + \text{Debt}} r_e + (1 - \text{Tax}) \frac{\text{Debt}}{\text{Equity} + \text{Debt}} r_d \\ r_d &= \text{Cost of Debt Capital} \\ \text{Equity} &= \text{Market Value of Equity} \\ \text{Debt} &= \text{Market Value of Debt} \\ TV_T &= \frac{FCF_{T+1}}{(r_{WACC} - g)} \end{aligned}$$

Unlike the DDM, the DCFM estimates the enterprise value which can be converted into owners' share by deducting the market value of debt:

$$V_0^E = \sum_{t=1}^T \frac{E(FCF_t)}{(1 + r_{WACC})^t} + \frac{TV_T}{(1 + r_{WACC})^T} - V_0^D \quad (8)$$

The concept of discounting cash flows to estimate value is commonly taught (cf. Demirakos et al. 2004) and widely applied (cf. Brown et al. 2014). Cash flows are independent of the accounting policy but do not match value created with value sacrificed. Like the DDM the DCFM does not focus on the underlying value drivers and it categorizes investments as value destroying. Hence, potential determinants of future value are possibly misinterpreted. Furthermore, FCFs can be subject to short-term volatility and negative values which requires long forecasting periods and usually indirect derivation from analysts' earnings forecasts (cf. Copeland et al. 2000: 233-267; Penman 2013: 114-120). The REVM addresses issues of long forecasting periods, ignorance of value drivers and the matching principle.

4.3 Residual earnings valuation method

The REVM was developed by Edwards/Bell (1961). Mathematically, it reconciles with William's (1938) DDM via the clean surplus relationship (CSR) which assumes that periodic changes in book value of equity equal periodic income net of dividends. Its core concept is equivalent to the DDM and DCFM since the value estimation is based on discounted future payoffs over a

limited forecasting horizon. However, Edwards/Bell (1961) introduce the anchor concept to fundamental valuation in order to shift weight from the terminal value to earlier periods:

$$V_0^E = B_0 + Premium \quad (9)$$

where

$$B_0 = \text{Book Value of Equity}$$

$$Premium = \text{Premium above } B_0$$

The REVM assumes that the normal return on equity (ROE) is already captured by its book value. Hence, if the ROE equals the required cost of equity capital (r_e), the intrinsic value of equity should equal its book value. This implies that if the return on equity exceeds (deceeds) required cost of equity, the intrinsic value should lie above (below) its book value. Earnings in excess of required earnings are defined as residual earnings (RE):

$$RE_t = (ROE - r_e)B_{t-1} \quad (10)$$

Hence, the premium (discount) on top of the book value is determined by the expected future residual earnings discounted at the corresponding cost of equity:

$$V_0^E = B_0 + \sum_{t=1}^T \frac{E(RE_t)}{(1+r_e)^t} + \frac{TV_T}{(1+r_e)^T} \quad (11)$$

where

$$TV_T = \frac{RE_{T+1}}{(r_e - g)}$$

After reformulation, the residual earnings method can be applied from the entity perspective to estimate total enterprise value:

$$V_0^F = NOA_0 + \sum_{t=1}^T \frac{E(REOI_t)}{(1+r_{WACC})^t} + \frac{TV_T}{(1+r_{WACC})^T} \quad (12)$$

where

$$REOI_t = \text{Residual Operating Income}$$

$$= (RNOA_t - r_{WACC})NOA_{t-1}$$

$$RNOA_t = \text{Return on Net Operating Assets}$$

Unlike DDM and DCFM, the REVM does not require extensive forecasting since a large value share is captured in the book value. Additionally, earnings grow relatively smooth from the beginning due to accrual accounting which matches revenues and expenses periodically. Moreover, earnings are in line with analysts' forecasts and book values are audited figures from the financial statements. Thirdly, residual earnings reflect the interplay of two value drivers: Growth of book value and ROE (cf. Edwards/Bell 1961; Lee/Swaminathan 1999; Penman 2013: 140-163). This allows capturing value beyond cash flows.

Apparently, the REVM tackles many shortcomings of DDM and DCFM. However, the convenience and meaningfulness of earnings and book value as value indicators can be distorted since their reliance on accounting numbers makes them susceptible to manipulations or unfavorable standards. Hence, application of the REVM requires in-depth understanding of GAAP and adjustments to varying policies.

4.4 Abnormal earnings growth model

With the AEGM, Ohlson/Juettner-Nauroth (2005) introduced a variation of the anchor principle. Instead of book value, the AEGM anchors on capitalized next period earnings, since the clean surplus relationship assumed by the REVM does not hold on a per share basis in case of changes in outstanding shares during the course of the year (Ohlson 2005). Hence, unless earnings grow at an abnormal rate, the value of equity should equal the present value of a perpetual stream of earnings, since, for a going concern investment, earnings are assumed to persist for infinity. The AEGM solely separates expected future income into a constant and a growth element.

$$V_0^E = \frac{Earn_1}{r_E} + Premium \quad (13)$$

where

$$Earn_1 = \text{Next Period Earnings}$$

$$Premium = \text{Premium above } \frac{Earn_1}{r_e}$$

This implies that the intrinsic company value should only exceed the anchor value for earnings growth in excess of the required costs of equity which is referred to as abnormal earnings growth (AEG):

$$AEG_{t+1} = (Earn_{t+1} - Earn_t) - r_e(Earn_t - Div_t) \quad (14)$$

Assuming that the clean surplus relationship holds, abnormal earnings growth can be reformulated into the more intuitive residual earnings delta:

$$AEG_{t+1} = RE_{t+1} - RE_t$$

Each forecasted year of abnormal earnings growth is assumed to persist for infinity and, hence, capitalized and discounted at the cost of equity capital:

$$V_0^E = \frac{E\text{arn}_1}{r_e} + \sum_{t=1}^T \frac{E(AEG_{t+1})}{r_e(1+r_e)^t} + \frac{TV_T}{r_e(1+r_e)^T} \quad (15)$$

where

$$TV_T = \frac{AEG_{T+2}}{(r_e - g)}$$

Reformulation allows application of the model from the entity perspective:

$$V_0^F = \frac{OI_1}{r_{WACC}} + \sum_{t=1}^T \frac{E(AOIG_{t+1})}{r_{WACC}(1+r_{WACC})^t} + \frac{TV_T}{r_{WACC}(1+r_{WACC})^T} \quad (16)$$

where

$$\begin{aligned} AOIG_{t+1} &= (OI_{t+1} - OI_t) - r_e(OI_t - FCF_t) \\ &= REOI_{t+1} - REOI_t \\ TV_T &= \frac{AOIG_{T+2}}{(r_{WACC} - g)} \end{aligned}$$

Unlike the REVM, the AEGM does not assume the clean surplus relationship on a per share basis. Furthermore, since, for a competitive environment, it is legitimate to assume that AEG converges to zero (cf. Nissim/Penman 2001) the AEGM allows relatively short forecasting horizons and low weight on the terminal value. Ohlson (2005) argues that high valuation accuracy despite of short forecasting periods implies that capitalized earnings are superior to book value anchors. Nevertheless, entire dependency on forecasted earnings increases the AEGM's susceptibility to manipulation, forecasting errors and analyst optimism (cf. Beckers et al. 2004). Furthermore, unlike the REVM there is no link to audited financial statements.

Mathematically, DCFM, REVM and AEGM are merely reformulations of the DDM. Hence, theoretically there is no difference in intrinsic value calculations across methods if applied correctly (cf. Lundholm/O'Keefe 2001). However, Penman (2001) argues that, in practice, forecasting horizons and differences in accounting policies can distort results. Indeed, empirical reality supports the idea that models perform significantly different in practice. Francis et al. (2000) reveal that residual earnings valuation models clearly outperform DDM and DCFM in terms of accuracy

and explanatory power. Hence, it is natural to infer that forecasting horizons and accounting methods do influence valuation performance in practice.

5 Relative valuation methods

Unlike direct approaches, relative valuation models do not estimate intrinsic company values based on fundamental analysis but infer prices that investors are willing to pay based on an average value of comparable transactions. The application of this process requires the identification of a group of comparable firms, the choice of drivers that are likely to determine the value of the company and the appropriate algebraic approach to calculation of the peer group average (cf. Penman 2013: 76-78). Value drivers can be on an equity or entity level. In case the entity approach is chosen, deducting debt (see formula (2)) leads to the estimated value equity. The value estimate of the target firm is determined as:

$$V_0 = VD * \emptyset PGM \quad (17)$$

where

V_0	=	Equity or Entity Value Estimate
VD	=	Value Driver
$\emptyset PGM$	=	Average Peer Group Multiple

Multiple-valuation is convenient, less expensive than direct models and widely used by analysts in practice (cf. Asquith et al. 2005). However, there are severe conceptual and implementation issues: Relative methods challenge the target's current market price by comparison to the average market price of a peer group. Hence, it assumes mispricing of the target but simultaneously a fair price of its peers. Moreover, multiples are a ratio of equity-/ entity value and corresponding value drivers that are unconditionally applied. However, the implicit linear relationship between numerator and denominator has been disproven by Burgstahler/Dichev (1997) for the case of price-to-earnings (P/E) due to the minimum liquidation value of assets.

5.1 Peer group selection

Bhojraj/Lee (2001) developed a systematic approach that enables the selection of peers based on similarity of relevant value drivers derived from fundamental valuation approaches. However, in practice, analysts have specific knowledge of company and industry (cf. Brown et al. 2014) and their choices are often enigmatic to outsiders. A commonly accepted approach in research

is to use industry multiples based on standard industrial classifications (SIC), ROE or a combination of both (cf. Alford 1992).

5.2 Choice of value driver

Choosing an appropriate value driver implicitly determines the evaluation perspective. Traditionally, price-to-book value of equity (P/B) and price-to-earnings multiples (P/E) are found in analysts' reports (cf. Lee/Swaminathan 1999) and most widely used and accepted. Fama/French (1992) assign high explanatory power to P/B ratios and Lie/Lie (2002) find that asset value multiples work with comparatively high accuracy. Their superior performance and wide adoption may be reasoned in their intuitive interpretation. P/B and P/E_1 can be linked to the REVM and the AEGM respectively. A $P/B > 1$ implies market expectations of positive residual earnings and $P/E_1 > 1/r_e$ implies market expectations of positive abnormal earnings growth (cf. Alford 1992; Penman 2013: 185-200). Nevertheless, Kim/Ritter (1999) as well as Liu et al. (2002) show that forward earnings (E_t) is the best performing value driver. They also evidence, in line with Lie/Lie (2002) that forward earnings outperform historical earnings. Liu et al. (2007) show, that two-year ahead forward earnings (E_2) is the most precise value driver. This may be reasoned in the rationale that in line with direct valuation methods, value is a function of earnings that may not be linear (cf. Burgstahler/Dichev 1997) but increasing (cf. Liu et al. 2002).

5.3 Entity perspective

Despite of the repeatedly shown superiority of the price-to-earnings ratio from the equity perspective, there are situations when entity approaches may be preferred or even necessary to apply. In academics, one usually assumes that capital structures and accounting policies are similar within the considered peer group. However, in practice, this does not have to be case. Hence, analysts commonly apply entity perspective multiples such as enterprise value (EV)-to-sales, -EBITDA, -EBIT or -book value of assets. The application of entity-multiples makes capital structures irrelevant and allows the sum of the parts (SOTP) method to evaluate the company as a sum of its business divisions (cf. Penman 2013: 463-468). Book values of assets are among the best performers (cf. Lie/Lie 2002; Liu et al. 2007) from an entity perspective. Lie/Lie (2002) show that EBITDA performs better than EBIT, and Liu et al. (2007) show that EBITDA is in the middle and sales at the lower end. On average, multiple approaches tend to be negatively biased and are highly sensible towards the volume of intangible assets in the company (cf. Beaver/Morse 1978; Lie/Lie 2002).

5.4 Algebraic approach

Selecting the optimal algebraic approach to calculate the average multiple from the peer group is not straightforward since the arithmetic mean is likely to be distorted by extreme values. Possibilities to avoid these distortions are the application of medians or harmonic means. Like Baker/Ruback (1999), Liu et al. (2002) provide the empirical evidence that harmonic means outperform arithmetic means and medians.

6 Theoretical superiority and analyst preferences

Francis et al. (2000) show that the REVM is the best performing direct valuation method for the general case. Liu et al. (2002) argue that in the multiple valuation universe, forward-earnings is the best value driver and that its forecasting ability improves for further horizons up to three years ahead and aggregation. Moreover, they state that forward-earnings multiples outperform the residual earnings methods. However, theoretically direct methods are assumed to outperform multiples (cf. Penman 2013: 84-85) which is evidenced by Courteau et al. (2006) who compare the performance of direct versus relative valuation methods and find that the REVM outperforms 4-year-ahead aggregate earnings multiples. Based on the logic established by Liu et al. (2002) their results assign superiority of direct methods over relative methods.

Market participants that have increasingly gained the interest of researchers are sell-side analysts. A vast amount of research has addressed the topic of analysts' valuation method preferences. Demirakos et al. (2004) argue that the long history of teaching and common acceptance developed the DCFM into a market standard and Imam et al. (2008) testify to the importance of the DCFM in practice. Empirically, it has been shown that price-to-earnings multiples are most widely adopted by analysts (cf. Block 1999), and a recent analyst survey by Brown et al. (2014) has revealed that more than 60% of sell-side analysts employ P/E multiples and the DCFM by default – far ahead all other methods. Additionally, Demirakos et al. (2010) indicate that P/E-based target prices more accurately meet real prices after a 12-months forecast horizon than DCFM-based target prices do. The finding that price-to-earnings multiples are most widely applied by analysts is in line with empirical academic research. However, while theoretically and empirically the REVM, which has been around since 1961, was attested superiority towards the DCFM, the REVM has still not managed to dethrone the DCFM from its default status.

7 Conclusion

This paper explores the relevance of accounting numbers for equity valuation in the context of a more innovation-driven economy where market participants are characterized by high volumes of knowledge-based assets which are difficult to capture by book values under national or international GAAP. The paper draws from previous literature that accounting numbers are still relevant to investors and that markets react to their publication. The paper reviews the mathematical evolution of fundamental valuation methods and illustrates that incremental advancements have amended different types of shortcomings over the years. However, it also shows that despite of the fact that the residual earnings valuation method, which heavily relies on an equity book value anchor, appears to be statistically most accurate and has even been proven to outperform relative approaches is the not preferred technique by analysts in practice. With regard to relative valuation methods forward earnings with a long forecast horizon has proven to be the value driver of highest precision and accuracy which is also reflected in analysts preferences for practical implementation. In fact, despite of its academically testified superiority towards all other techniques the residual earnings valuation method has not been able to replace the discounted cash flow model or the price to forward earnings multiple as an industry standard valuation tool.

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Autoren

Arne Nowak arbeitet im Bereich Business Planning bei der HOCHTIEF PPP Solutions GmbH. Er hält einen B.Sc. International Economics von der Universität Groningen(NL), einen M.Sc. Finance von der ISM in Dortmund und einen M.Sc. Financial Management and Accounting von der Business School der Universität Lancaster(UK). Während seiner Studienzeit sammelte er sowohl praktische Erfahrungen in den Bereichen strukturierte Finanzierung (NORD/LB) und M&A (DABERO Service Group) als auch internationale Erfahrung in Europa, Nordamerika und Asien. Darüber hinaus wurde er von der Universität Groningen mit dem „Freshman of the Year Award“, von der ISM Dortmund mit den „Best Thesis of the Academic Year Award“ und von der Universität Lancaster mit dem „Best Overall Performance on the Academic Programme Award“ ausgezeichnet.



Prof. Dr. Ernst **Fahling** studierte Volkswirtschaftslehre an den Universitäten Stuttgart und Tübingen. Anschließend folgten Promotion/Forschungsjahre an den Universitäten Kiel, Bremen sowie an der University of Berkeley, California, USA. Von 1979 bis 1989 nahm er verschiedene Finanzfunktionen bei der Ford Werke AG in Köln sowie über mehrere Jahre bei Ford of Europe in Brentwood, UK, wahr. Von Ende 1989 bis Mitte 2000 verantwortete er bei der Daimler AG das konzernweite Asset Management, ab 1994 als Direktor Konzern-Treasury auch das Cash- und Devisen Management innerhalb des Daimler Konzerns. Danach war er Mitgründer und Generalbevollmächtigter einer Privatbank. In 2002 gründete er eine eigene Finanz Consulting GmbH. Er ist seit 2002 an der International School of Management, Dortmund, tätig und dort zunächst zuständig für den Studiengang Finanz- und Anlagemanagement. Aktuell leitet er den Master of Science, Finance. Zudem ist er Campusleiter der ISM Frankfurt. Seine Schwerpunkte in Lehre und Forschung liegen im Asset-, Risiko- und Treasury-Management, im Einsatz von Derivaten, im Corporate Finance sowie bei alternativen Anlagemöglichkeiten.

