## ACADEMIC INVESTIGATIONS & CONCEPTS

# SECTION 1

# DOES EVA BEAT EARNINGS? A LITERATURE REVIEW OF THE EVIDENCE SINCE BIDDLE ET AL. (1997)

## *Jon Svennesen Toft\*, Rainer Lueg\*\**

## Abstract

17 years ago, Biddle et al. (1997) demonstrated that sophisticated residual income-based figures are not as superior to traditional accounting-based performance measures in tracking shareholder value as consulting firms have claimed. During these 17 years, the intensive discussion of which type of measure tracks shareholder value creation the best continued, both from a theoretical and a practical perspective. This article compares the new findings from advanced research between 1997 and 2014 to assess the ongoing validity of Biddle et al.'s (1997) conclusions. We separate articles into two groups: the ones that find accounting-based performance measure to perform best, and the ones who speak in favor of residual income-based performance measures. In order to do this, we have scanned 618 articles that relate to the findings of Biddle et al. (1997) and analyze the 21 articles that actually contributed new evidence. We find that the conceptual discussion still favors management control systems based on the more sophisticated residual income-based measures. Yet empirically, the vast majority of new studies with advanced research designs still find that accounting numbers are by no means inferior in measuring shareholder value creation.

**Keywords:** Literature Review, Accounting-based Performance Measures, Residual Income-based Performance Measures, Shareholder Value, Economic Value Added, EVA, Stern Stewart, McKinsey, Boston Consulting Group, Consulting, Management Control, Total Shareholder Return

**JEL classification:** M1, M2, M4

*\*Aarhus University, School of Business and Social Sciences, Department of Economics and Business, Fuglesangs Allé 4, 8210 Aarhus V – Denmark*
*\*\*Corresponding author. Aarhus University, School of Business and Social Sciences, Department of Economics and Business, Fuglesangs Allé 4, 8210 Aarhus V – Denmark*
Tel: +45 871 64969

## 1 Introduction: what is the score on shareholder value measures?

Together with other consulting firms, Stern Stewart and Co. sparked the discussion about an appropriated performance measure by introducing EVA and publishing several articles on EVA in the late 1980s and early 1990s. Back then, this discussion was very popular in the business press. Many researchers and managers became aware of the importance of appropriate performance measures in their control systems that could track shareholder value creation. Dismissing traditional accounting measures as outdated, "metric wars" started between leading consulting firms for the theoretically superior measure of overall company performance (Myers, 1996).

The consulting firms' campaigns experienced a serious setback when Biddle et al. (1997) demonstrated that highly sophisticated shareholder value measures like Economic Value Added (EVA)

were not as superior to simple accounting-based measures as claimed. Lueg and Schäffer (2010) as well as Feltham et al. (2004) show that the article of Biddle et al. (1997) is among the most influential articles in the area of shareholder value. After 17 years, we conduct a systematic literature review of empirical evidence to see if the results from Biddle et al. (1997) are still valid. The focus will primarily be on correlational studies similar to those of Biddle et al. (1997) as well as on comments on such findings.

We find that—from a theoretical standpoint—the microeconomic link between stock returns and residual-based performance measures is still seen as stronger than the connection of stock returns with accrual-based accounting measures. But empirically, the residual-based measures of shareholder value are not clearly superior to accounting measures. This finding questions the high effort of implementing and maintaining such a figure in a management control system. Our findings are of high value to the shareholder value literature, because we can show that the seminal findings of Biddle et al. (1997) were systematically replicated over the last 17 years.

The structure of this literature review is as follows: First, this literature review introduces a theoretical foundation of correlational studies. Second, the methodology is explained. Third, we synthesize the literature published between 1997 and 2014 and conclude.

## 2 Theoretical foundation of risk-adjusted figures

The overall objective of value-based management is to manage shareholder value through policies within the company. To ensure that the company is creating shareholder value, managers must be able to measure shareholder value creation. This is done through performance measures that reflect the effect of managerial decisions. Most authors generally agree on the requirements of an appropriate performance measure. For instance:

"Any financial performance measure used in managerial compensation, on the one hand, must be correlated highly with changes in shareholder wealth and, on the other, should not be subject to all of the randomness and 'noise' inherent in a firm's stock price." (Bacidore, Boquist, Milbourn, & Thakor, 1997)

"No measure of performance could ever have a higher statistical correlation with stock returns than the return itself. Thus, if correlation were the only goal, firms should solely use their stock price for compensation and ignore all other measures. [But] stock returns can be a noisy and even a misleading measure of managers' value-added."(Garvey & Milbourn, 2000)

Recent literature still agrees with Bacidore et al. (1997) and Garvey and Milbourn (2000) on the importance of the level of association between

performance measures and stock returns (Venanzi, 2012, p. 35). Although the requirements for an appropriated performance measure are generally agreed upon, the empirical evidence is not univocal. Researchers have come to different conclusions regarding which group of measures—accounting or residual income—is superior (Venanzi, 2012, p. 40).

Several problems have been highlighted in relation to accounting-based measures (e.g., EBEI and CFO) (Venanzi, 2012, pp. 1-8). Accounting-based measures could be subject to manipulation or moral hazard, such as non-business-related changes in accounting policies, short-termism, and tempering with a company's earnings. All of this leads to harder or even unreliable comparisons among companies over time. Some managers try to maximize current performance, sacrificing future performance by cutting current expenses on research and development, advertising, training of employees, or shifting current expenses such as maintenance into the future. So using absolute accounting-based measures to evaluate managers can easily be inaccurate. Hence it does not always measure shareholder value. Also, these measures ignore risk. Depending on the context, omitting risk can lead both to over- and underinvestment. Theory suggests that retaining and reinvesting dividends will increase shareholder value only if the returns of the investments are higher or equal to the expected cost of capital (Berk & DeMarzo, 2011). Since cost of capital is excluded from accounting-based measures, they might be inappropriate from a theoretical perspective.

Despite these criticisms, accounting-based performance measures have positive attributes as well. They are easy to calculate, are mandatory for larger companies, and thereby they are directly observable from financial statements. This yields a very favorable ratio between information gain for managers and the low cost of calculation (Graham, Harvey, & Rajgopal, 2006).

Managers who tend to maximize probability factors like return on assets (or the spread between return on assets and weighted average cost of capital [WACC]) will probably reject positive net present value investments that dilute their current return on assets, even if these investments added residual value. This will lead to underinvestment, which means that managers will not engage in low-risk investments but rather engage in high-risk investments, increasing shareholder value at the expense of debt holders (Berk & DeMarzo, 2011, p. 525). Investments that earn a return below WACC are destroying shareholder value. Certainly, it is cumbersome to calculate residual income-based performance measures such as EVA due to their many components (WACC etc.). Thereby, residual income-based figures decrease the ratio of information versus the cost of calculation (Graham et al., 2006). However, proponents of these shareholder value measures argue that the calculation pays off: managers supposedly receive better information on

what shareholders want them to invest in. Eventually, companies that use these figures should outperform its peers that do not focus that closely on shareholder returns (Chen & Dodd, 2001; Feltham et al., 2004; Stark & Thomas, 1998; Venanzi, 2012; Worthington & West, 2004).

There are many arguments for using accounting-based or residual income-based measures. Among others, Graham et al. (2006) surveyed 401 U.S. financial executives on the use of performance measures. Two-thirds ranked earnings before extraordinary items (EBEI) as the number one metric, less than 22% chose cash from operations (CFO), and less that 3% chose other measures like EVA. The reasons for the relatively high ranking of EBEI were (1) investors' need for a simple metric, (2) broadest distribution and coverage by media, and (3) common measure used in earning-per-share calculations. It is important to understand how to use performance measures for valuation purposes. From a valuation theory perspective, the focus is on the discounted cash flow to calculate shareholder value; but from an investment practice perspective, the focus is on performance measure, such as EBEI, CFO, and RI (O'Byrne, 1996).

So the need for a performance measure that is consistent with the methods from valuation theory still exists. Since Biddle et al. (1997), most studies that tested the superiority of these two types of measures still used correlational studies.

## 3 Methodology

### 3.1 Literature search method

We intend to investigate if empirical studies over the past 17 years have replicated or refuted the findings from Biddle et al. (1997) on accounting-based and residual income-based performance measures. Due to the seminal nature of the work of Biddle et al. (1997), we expected that high quality studies would cite this earlier work. Our literature search therefore builds on the descendant method. First, we searched the article of Biddle et al. (1997) on Google Scholar, ScienceDirect, SpringerLink, JSTOR, and Wiley Online Library. Second, we chose the "citied by" function to identify all works that referred to this article. After eliminating duplicates and non-peer-reviewed works like working papers or conference summaries, we identified 618 articles from 1997 to 2014. Third, we scanned their abstracts to see which ones were (a) similar empirical studies or (b) discussions of our main article. This yielded 21 articles worth considering. 14 of these (including G. Biddle et al., 1997) are empirical studies, and the other 7 are discussions.

### 3.2 Limitations of our approach

There might be relevant articles that have not cited Biddle et al. (1997) and are therefore not included in this literature review. We are confident that this did not omit any 'specific' empirical studies on this topic, because the popularity of the Biddle et al. (1997) article commands its citation. Yet, there is a chance that we missed works which discuss the relevance of accounting information in capital markets on a more 'general' level. Furthermore, we acknowledge that even though our very specific research question and our conservative choice of peer-reviewed research assures a certain minimum level of quality, it might also exclude truly non-conventional and possible groundbreaking new studies in this field.

## 4 Analysis of empirical literature

This section groups studies based on the similarity of their findings. The first group comprises authors that find accounting-based performance measures superior, the second those that argue in favor of residual income-based performance measures. The individual papers in the two groups are ordered chronologically to demonstrate mutual references and follow developments within the groups. For valid comparison, we primarily include annual pooled statistics and the obtained R2s. Table 1 at the end of this section provides an overview of contributing authors, publication year, the main purpose of their research, the datasets, the period studied, model used, the employed dependent and independent variables, the overall verdict of their findings, as well as additional comments by the authors.

### 4.1 An appraisal of the original findings of Biddle et al. (1997)

Biddle et al. (1997) used relative information content to analyze the association between the performance measures CFO, EBEI, RI, and EVA with stock returns. The authors decomposed EVA into its components (CFO, accrual, after tax interest expense [ATInt], capital charge [CapChg], and accounting adjustments). Then, they tested if one component provided incremental information content beyond the other components. By using a one-lag regression model derived from an ordinary least square model and a linear stochastic process, they overcame obstacles in calculating the expected future values of different performance measures. The motivation for the analysis was primarily the increasing interest in value relevance of different performance measures in the media and among academics. For instance, the consulting firm Stern Stewart & Co. claimed that EVA was the best performance measure to track stock returns. Biddle et al. (1997)did not support the claim of Stern Stewart & Co. Instead, they found that EBEI could explain the most variance of market-adjusted

returns (R2=9.04%; all further parenthesis with percentages in them also refer to the variance explained), and thereby a lot more than RI (6.24%), EVA (5.07%), and CFO (2.38%). Biddle et al. (1997) also differentiated between positive and negative coefficients yielded EBEI (12.78%) to outperform RI (7.32%), EVA (6.49%), and CFO (2.80%). In an incremental information content test, EVA did add information beyond that contained in EBEI. However, the contribution was not sufficient to provide EVA with greater information content than EBEI. Biddle et al. (1997) also provided additional sensitivity analyses by partitioning observations into five non-overlapping two-year test periods, evaluating EVA adopters, expanding the return period to five years, and changing the return period to two-year contemporaneous and one-year ahead. From the five non-overlapping two-year test periods, Biddle et al. (1997) found no evidence of EVA, RI, or CFO outperforming EBEI. From the analysis of EVA adopters, Biddle et al. (1997) found, in respect to relative information content, that EBEI was not as dominating as in their other tests. Yet, neither did EVA dominate EBEI. In incremental information content, Biddle et al. (1997) found no evidence that the adoption was based on stronger association with stock returns. In the expanded five-year returns, EBEI (31.18%) significantly outperformed CFO (18.88%), EVA (14.46%), and RI (10.90). This suggested that EBEI was more appropriate for tracking shareholder value in the long-term than the other performance measures. This was also the case in a two-year contemporaneous and a one-year ahead analysis, where EBEI (4.4%) outperformed the other performance measures (2%–2.3%). Biddle et al. (1997) concluded that EVA is an effective tool for internal decision making, performance measurement, and incentive compensation, despite not being superior to earnings. They suggested that earnings might be a better proxy for future cash flows used in valuating equity. The adjustments might remove important information used by the market to value equity but at the same time made EVA closer to the true level of economic profitsand reduced the association with stock returns.

O'Byrne (1999)—former partner at Stern Stewart & Co—replied to this study. He argued that the ability of EVA to explain stock returns was dependent on expected EVA performance and not on realized EVA performance. He dismissed the model from Biddle et al. (1997) as overly simplistic, despite the fact that it was already well-established in influential research (Easton & Harris, 1991). Although, Biddle et al. (1997) questioned the superiority of EVA, they still agreed with Stern Stewart & Co. on the conceptual superiority of EVA over traditional accounting-based performance measures. In line with O'Byrne (1999), evidence from practice repeatedly affirmed the fact that decision makers focus on the costs of both debt and equity in order to create shareholder value (Venanzi, 2012).

## 4.2 Correlational studies supporting the use of accounting-based performance measures

Since their first publication, the arguments of Biddle et al. (1997) have received support from many other researchers. Clinton and Chen (1998) investigated relative information content among nine performance measures using linear regression. They found traditional accounting-based measures to predict 12.5%–27.2% of the annual stock return and cash-based measures to predict 23.2%–31.3% of the annual stock return. Residual income-based measures only predicted around 4%. Clinton & Chen (1998) recommended the use of traditional accounting-based measures and cash-based measures over alternative residual income-based measures like EVA, which is in line with Biddle et al. (1997).

Chen and Dodd (2001) found operating income (OI) (6.2%) to be superior to both RI (5.0%) and EVA (2.3%) by using a relative information content test. These results were derived using a test of robustness on an average of 10 yearly regressions, revealing OI (9.4%) still being superior both to RI (7.8%) and to EVA (6.6%). In an incremental information content test, they found EVA to add information content beyond that contained in RI, but only slightly so. Nevertheless, they recommended not to implement EVA because the cost of implementing was supposedly higher than the information content gained (also see: Graham et al., 2006; Kramer & Peters, 2001).

Paulo (2002) referred to the work of Chen and Dodd (2001) and claimed that, according to the efficient market hypothesis, it was not be possible to consistently earn excess returns. In non-efficient markets, Paulo (2002) highlighted three problems: (1) the validity of using capital asset pricing model (CAPM), (2) the reason of stock price movements, and (3) the matter of dividends and earnings in relation to stock price. According to Paulo (2002), CAPM, and the related 'beta' can only be used under in relation with the efficient market hypothesis. He also referred to empirical evidence that economic fundamentals, financial fundamentals, and news are not drivers of stock prices, but of stock price volatility. Paulo (2002) finally concluded that dividends and earnings were not drivers of stock prices. Since he saw the applicability of a CAPM-based performance measure as superfluous in efficient markets and as inappropriate in inefficient markets, there was little sense in proving its superiority empirically.

Chen and Dodd (2002) replied to the criticism from Paulo (2002). According to the efficient market hypothesis, Chen and Dodd (2002) assumed that Paulo (2002) had misunderstood the efficient market hypothesis. The efficient market hypothesis does not

prevent companies from earning abnormal profits. The long-term equilibrium is not a static point where assets only earn the opportunity cost of capital and all abnormal profits are removed due to competition. According to Chen and Dodd (2001), the long-term equilibrium is a dynamic point constantly changing, making it possible to earn abnormal profits. Regarding the critic that CAPM is not working in practice, Chen and Dodd (2002) emphasized four points: (1) CAPM assumed efficient portfolios and not efficient markets. Chen and Dodd (2002) did, however, not reject that the weaker association between EVA and stock returns could, to some extent, be caused by distortions using CAPM. (2) Chen and Dodd (2002) accept that the three-factor model by Fama and French (1995) could be used as an alternative. Still, since CAPM is the model that has the broadest acceptance among academics and practitioners in the field of accounting and finance, Chen and Dodd (2002) did not rule out the importance of CAPM. (3) They were convinced that fundamental accounting information still accounts for an important part of the stock returns. As Chen and Dodd (2002) put it,

"If earnings are as trivial as Dr. Paulo believes, how can one explain investors' dramatic reaction when a firm's earnings surpass or fall short of an expected target?"

(4) Paulo (2002) found stock prices to be more disengaged from earnings in recent years. Nonetheless, according to Chen and Dodd (2002), this is not due to lesser association between earnings and stock prices but rising accounting conservatism. Accounting conservatism lets financial statements reflect potential losses but not potential gains (Holthausen & Watts, 2001).

In response to Chen and Dodd (2002), Tsuji (2006) calculated EVA using the three-factor model by Fama-French and the CAPM. Tsuji (2006) found the three-factor model by Fama-French generally to be yielding inferior results to CAPM. The study concluded that more research had to be done in this area to determine whether WACC from comprehensive models generally yields inferior results, because this would be inconsistent with theoretical claims (Chen & Dodd, 2002; Palliam, 2006).

Ismail (2006) found similar results to those of Biddle et al. (1997) by using a simple linear regression and two models based on levels and changes of performance. From the relative information content test using levels, Ismail (2006) found RI (20.79%) and EVA (20.20%) outperforming CFO (19.87%), despite not being statistically significant. EVA and RI were outperformed by the accounting-based measures NOPAT (25.78%) and net income (NI) (25.03%). Using changes as the independent variables, EVA (23.77%) outperformed NOPAT (23.76%), but not statistically significant. EVA was still outperformed by NI (24.35%), but this relationship was not statistically significant either. RI (23.03%) was outperformed by NOPAT (not statistically significant), and RI outperformed CFO (19.81%). The latter was statistically significant. Ismail (2006) only performed incremental information content using levels. He found CFO and accrual to have most information content. Only some accounting adjustments that were unique to EVA added minor information content. Ismail (2006) concluded that EVA did not outperform NI and NOPAT in explaining stock returns. He thereby rejected the claim of Stern Stewart & Co. that EVA is the best performance measure.

Kyriazis and Anastassis (2007) found OI (16.85%) to be superior to NI (9.31%), RI (7.97%), and EVA (6.89%). Changing the stock return from abnormal to annual yielded the same ranking, despite the fact that the R2s were slightly lower (16.65%, 8.22%, 7.61%, and 5.80%). Both incremental information content analyses (abnormal and annual returns) rejected the claims of Stern Stewart & Co. Although EVA added information beyond that contained in NI and OI, it did not add information content beyond normal RI. This means that Stern Stewart & Co.'s accounting adjustments did not add substantial information content. Kyriazis and Anastassis (2007) performed a test using changes in performance measures instead of the model provided by Biddle et al. (1997). They now found NI (7.61%) to outperform RI (6.93%), EVA, (6.13%) and OI (5.17%), but the latter three with no significant differences in R2s. The incremental information content analysis reveals no sign of components of EVA adding information beyond that contained in NI. Kyriazis and Anastassis (2007) explained why EVA might not be superior to other performance measures: (1) market participants calculate different WACCs, (2) the Stern Stewart & Co. adjustments to EVA remove relevant information for the market, (3) the majority of investors did not recognize the importance of taking the cost of capital into account, and (4) EVA might reflect the true value, but if the stock return reflects the expectations, then the correlation might be weak.

Holler (2008) used both market values and abnormal stock returns. In relation to market value, Holler (2008) found RI (19.4%) and EBEI (18.7%) to outperform EVA (14.4%) and CFO (9.0%). In incremental information content, only accrual added significant information content beyond that contained in CFO. Adjustments related to EVA and ATInt only added marginal information content, and CapChg was not statically significant. Holler (2008) also separated positive and negative coefficient values for each performance measure, resulting in EBEI (27.9%) being superior to RI (27.5%), EVA (18.4%), and CFO (11.2%). Holler (2008) changed the dependent variable to abnormal stock returns, yielding quite different results. EBEI (7.5%) outperformed RI (7.4%), CFO (7.3%), and EVA (0.4%), indicating EBEI to be superior to the other performance measures. Again, only accrual added significant

information content beyond that contained in CFO and ATInt, CapChg. Accounting adjustments were mostly insignificant. Splitting performance measures' coefficients in positive and negative values resulted in EBEI (12.2%) retaining superiority to RI (10.4%), CFO (9.6%), and EVA (1.8%). Like Biddle et al. (1997), Holler (2008) performed several sensitivity analyses among extent return intervals: contemporaneous, five years, and raw returns. Using different time intervals for abnormal stock returns, Holler (2008) documented that CFO (10.7%) outperformed RI (2.2%), EBEI (1.8%), and EVA (0.7%). Regarding the five-year return interval, RI (20.7%) outperformed EBEI (12.6%), CFO (6.7%), and EVA (1.8%). Holler (2008) concluded that CFO does not dominate EBEI, and that the components of EVA add only marginal and not consistently significant information content. Holler (2008) suggested six reasons why EVA performs relatively poorly in contrast to the other performance measures: (1) EBEI might be a better predictor of future cash flows. These findings are consistent with those of other studies (G. Biddle et al., 1997; Chen & Dodd, 2001), (2) EVA might provide investors with 'true' value, but investors seem more concerned about EBEI signaling forthcoming issues, shareholder risk, and returns (consistent with Kyriazis & Anastassis, 2007), (3) calculation of accounting adjustments might be flawed, (4) investors might have negligible cost of capital, including in the calculation of EVA, (5) cross-sectional returns paradigm requires constant coefficients for all firms and industries, which may not hold, and finally, (6) the semi-strong market hypothesis might only apply to EBEI or a closely related measure.

Kaur and Narang (2009) found profit after tax (45.5%), return on capital employed (25.9%), and return on total assets (23.4%) to be superior to EVA (23.0%), which indicated that the market seemed more focused on accounting-based performance measures and profitability measures than residual income-based performance measures in relation to market value added. They concluded, consistent with other authors (Holler, 2008; Kyriazis & Anastassis, 2007; Schremper & Pälchen, 2001; Tsuji, 2006), that residual income-based performance measures could account for much of the true value of a company, but the association with stock returns was lost due to the fact that expectation of the future is compounded into stock returns. Another reason could be 'earnings myopia' which is the behavior of remaining relying external performance on earnings, despite having adopted EVA, because financial analysts rely on earnings related measures (G. Biddle et al., 1997).

Maditinos, Ševic and Željko (2009) found earnings per share (EPS) (1.9%) to be superior to EVA (0.9%), return on investment (0.4%), SVA (0.01%), and return on equity (0.00%) and EVA to add information beyond that of EPS. Only EPS, EVA and return on investments were statistically significant. Maditinos et al. (2009) argued that EPS was superior to the other performance measures, although the explanatory power of EPS seemed very low and would probably be rejected by Ferguson and Leistikow (1998) as being too low or even worthless. Ferguson and Leistikow (1998) discussed the level of an appropriate explanation power in their comments to Bacidore et al. (1997), which we discuss in the following.

Kumar and Sharma (2011) found NOPAT (44.98%) and CFO (31.44%) to outperform EVA (22.5%) in relative information content, although EVA beat return on capital employed (10.37%). Surprisingly, EPS was not statically significant in relation to market value added, although Maditinos et al. (2009) found EPS to be more strongly associated with stock returns than other performance measures. This could be due to differences in dependent variables, as Maditinos et al. (2009) used annual compounded returns, while Kumar and Sharma (2011) used market value added. Regarding the incremental information content, EVA only added marginal information content beyond that contained in the other performance measures.

## 4.3 Correlational studies supporting the use of residual income-based performance measures

Yet, there is also a critical mass of sophisticated research that rallies behind the superiority of residual income-based measures. Bacidore et al. (1997) announced in their article a new performance measure, refined economic value added (REVA), which used total market value of a company's assets instead of the economic book value of assets to calculate the EVA component 'capital employed' (CE). They argued for the advantages of REVA over EVA in measuring shareholder value creation more accurately, accounting for both physical assets and strategy, and being easier to calculate. Yet, Bacidore et al. (1997) acknowledge that EVA can be used to compensate divisional managers and those below them who cannot influence the strategy. Their statistical tests indicated that REVA was superior to EVA with $R^2$s ranging from 1.14% to 4.42%.

Ferguson and Leistikow (1998) had numerous criticisms on the article by Bacidore et al. (1997) and Maditinos et al. (2009). Among the most important for this study, they criticized that the investigated statistically significant variables had an explained variance close to zero. This would make the results irrelevant for practice. Ferguson and Leistikow (1998) also criticized that Bacidore et al. (1997) used a definition of capital based on market value instead of book value and that the threshold at which shareholder value was created seemed unclear. Bacidore et al. (1999) showed that the use of capital base was irrelevant when using the theory from Fairfield (1994). Bacidore et al. (1999) also argued for the

advantage of REVA over EVA by stating that the level for value creation using REVA started at zero: positive values indicated shareholder value creation, negative values the opposite. If a manger wanted to use EVA, the benchmark would have to be expected EVA, which required the calculation of market values as in REVA. Ferguson and Leistikow (1999) disagreed that capital base was irrelevant and claimed that a positive REVA did not necessarily create shareholder value and vice versa.

Albrecht (1998) supported Ferguson and Leistikow (1998) in their criticism of the use of capital base. If future expectations were high, managers rewarded based on REVA are at a disadvantage because their benchmark is much higher than that of managers being compensated, e.g., based on EBEI.

Further, Bacidore et al. (1997) advocated the use of REVA because stock price movements were influence by factors beyond the managers' control. Albrecht (1998) brought into consideration that REVA re-introduces these uncontrollable stock prices in the form of market values. As a result, REVA did not become as popular as EVA.

In response to Biddle et al. (1997), Feltham et al. (2004) argued that, in theory, it made little sense that EBEI was more closely associated with stock returns. EBEI failed to account for the capital charge on equity and was influenced by accounting distortions, which were avoided by making adjustments to EVA. First, Feltham et al. (2004) replicated the methods used by Biddle et al. (1997) using different companies. They found EVA (6.29%) to be superior to RI (6.20%), EBEI (3.32%), and CFO (2.91%). Second, they used a different time period and found RI (4.53%) to be superior to EVA (3.62%), EBEI (2.75%), and CFO (2.04%), but the gap between RI and EVA was not statistically significant. Third, they changed the

market from the U.S. stock market to the Canadian stock market. They found that EVA (10.72%) outperformed EBEI (3.19%), CFO (1.04%), and RI (0.07%).

Worthington and West (2004) found that EVA (23.68%) better explains stock returns than RI (18.53%), EBEI (14.42%), and CFO (13.51%). Yet, EVA lacked statistical significance, whereas RI was highly significant. They also found that RI, EBEI, and CFO only add limited incremental information content beyond that contained in EVA, supporting the claims of Stern Stewart & Co. that EVA is superior to other performance measures. Worthington and West (2004) investigated the importance of the components of EVA and found CapChg and ATInt to be most significant in explaining the association between EVA and stock returns. According to adjustments unique to calculation of EVA, they found these adjustments to be highly significant in explaining stock returns, emphasizing the superiority of EVA. The diverging results compared to Biddle et al. (1997) could, according to Worthington and West (2004), be due to differences in GAAP and the differences in the specifications of both dependent and independent variables. They point out that the single most important finding in their study is that a lot of the differences in explanation power could be captured by the differences in the constant term using different methods.

Finally, Parvaei and Farhadi (2013) found EVA (27%) to significantly outperform NI (14%), RI (11%), and FCF (9%). They also investigated the association between current values (t) of different performance measures and future stock returns (t+1) and found FCF superior to other performance measures. **Table 1** compares all reviewed articles:

**Table 1.** Overview of correlational studies on EVA

| Source | Research purpose | Dataset | Period studied | Model(s) | Dependent variable(s)[a] | Independent variables[b] | Findings | Comments/overall verdict |
|---|---|---|---|---|---|---|---|---|
| Biddle, Bowen and Wallace (1997) | Examines relative information content among EVA, RI, EBEI, and CFO and incremental information content among components of EVA. | 773 public traded U.S. firms, 6,174 firm years | 1984–1993 | Multiple linear regression with one lag | Market-adjusted stock returns | EVA, RI, EBEI, and CFO | EBEI outperforms both EVA and RI consistently. | EVA can be used for internal decision making, performance measurement, and incentive compensation. Notice that EVA might reveal the real value of companies, but the market includes expectations in stock prices, making the association between EVA and stock returns weaker. |
| O'Byrne (1999) | Provides evidence that EVA is the performance measure and valuation multiple needed to link theory and practice. | 1,000 public traded U.S. firms, 6,551 firm years | 1985–1993 | Simple linear regression | Market value | EVA, NOPAT, and FCF | EVA is superior in predicting market value than other measures of operating performance. | EVA is a great tool in understanding investor expectations, which are built into the current stock prices. |

**Table 2.** Overview of correlational studies on EVA (continued)

| Source | Research purpose | Dataset | Period studied | Model(s) | Dependent variable(s)[a] | Independent variables[b] | Findings | Comments/overall verdict |
|---|---|---|---|---|---|---|---|---|
| Bacidore, Boquist, Milbourn and Thakor (1997) | Tests if their performance measure, refined economic value added (REVA) outperforms EVA in association with stock returns. | 600 public traded U.S. firms | 1982–1992 | Multiple linear regression with one lag | Abnormal return | REVA and EVA | REVA outperforms EVA in association with stock returns. | The usefulness of EVA is acknowledged, although outperformed by REVA. Using market value instead of book value. |
| Clinton and Chen (1998) | Tests if performance measures are useful in association with stock returns or just pure marketing stunts. | 325 public traded U.S. firms | 1991–1995 | Simple linear regression | Annual stock returns | OI, adjusted OI, CFO, RI, EVA, residual cash flow, return on investments, adjusted return on investments, and cash flow return on investment | CFO, adjusted OI, and residual cash flow have significant association with stock returns and outperform, e.g., RI and EVA. | Companies considering adopting RI, EVA, or cash flow return on investment should rather adopt CFO, adjusted OI, or residual cash flow. |
| Chen and Dodd (2001) | Tests the value relevance of three profitability measures. | Unknown numbers of public traded U.S. firms, 6,683 firm years | 1983–1992 | Multiple linear regression | Annual stock returns | OI, RI, EVA, RI minus OI, EVA minus RI. All variables are per share and both in level and changes. | RI has higher value relevance than EVA, although both outperformed by OI. | They state that including both cost of debt and equity increases value relevance, and EVA might have value relevance over RI, but the cost of implementing exceeds the higher value relevance. Additionally, they suggest nonfinancial measures to add value relevance beyond that of financial measures. |
| Feltham, Issac, Mbagwu and Vaidyanathan (2004) | Examines if EVA beats EBEI when using different companies, different period studied, and a different market. | 386–4,086 firm years | 1983–1999 | Multiple linear regression with one lag | Market-adjusted stock returns | EVA, RI, EBEI, and CFO | Results for different firms and markets indicate superiority of EVA, for a different time frame, RI indicates superior. | Questioning the findings from Biddle et al. (1997) because of different results. They suggest for the debate to be reopened. |
| Worthington and West (2004) | Tests the association between EVA and other performance measures and stock returns outside U.S. | 110 public traded Australian firms | 1992–1998 | Multiple linear regression using common, fixed, and random effect[c] | Annual stock return | EVA, RI, EBEI, and net cash flow | Findings indicate EVA to be superior to other performance measures tested and accounting adjustments to be statistically significant. | They argue that GAAP differences could cause disturbance in findings and that most of explanation power could be captured in the constant term dependent on the model used. |
| Ismail (2006) | Examines the claim of superiority of EVA as a financial metric compared to other measures. | Unknown numbers of public traded UK firms, 2,252 firm years | 1990–1997 | Simple linear regression using fixed effect[c] | Annual stock return | EVA, NI, CFO, RI, and NOPAT both in level and changes. | Findings indicate NOPAT and NI to be superior in explaining stock returns, although components unique to EVA provide incremental information content. | Agrees on comments from Chen and Dodd (2001) on the importance of including both cost of debt and equity and that nonfinancial measures might add value relevance over financial measures. |
| Kyriazis and Anastassis (2007) | Examines the explanatory power EVA and other performance measures in Greece. | 121 public traded Greek firms | 1996–2003 | Multiple linear regression with one lag | Abnormal return or annual stock return | NI, OI, RI, and EVA | Findings indicate NI and OI to have highest association with both abnormal and raw annual stock returns. | They suggest the weak association of EVA with stock returns to be due to their calculation, and use of WACC was different to that of market participants. Further, EVA reveals the true value, and stock returns included market expectations consistent with more authors (Biddle et al., 1997; Tsuji, 2006). |

**Table 3.** Overview of correlational studies on EVA (continued)

| Source | Research purpose | Dataset | Period studied | Model(s) | Dependent variable(s)[a] | Independent variables[b] | Findings | Comments/overall verdict |
|---|---|---|---|---|---|---|---|---|
| Holler (2008) | Examines the information content of EVA, RI, CFO, and EBEI. | 201 public traded U.S. firms, 2,147 firm years | 1995–2006 | Simple linear regression and multiple linear regression with one lag | Market value and abnormal return | EVA, RI, CFO, and EBEI | Overall, EBEI and RI outperform EVA, and CFO does not dominate EBEI. Further, accounting adjustments only add marginal and not consistent information content. | Holler (2008) suggests companies to apply RI rather than EVA because of lower implementation costs and only marginal information content in EVA beyond RI. |
| Kaur and Narang (2009) | Examines relative and incremental information content among several performance measures on the Indian market. | 104 public traded Indian firms | 1996–2007 | Simple linear regression | Market value added | EVA, EVA%, profit after tax, return on capital employed, return on net worth, return on total assets, EPS, return on investments, capital productivity, and employees' productivity. | Findings indicate profit after tax to be most associated with market value added and outperform EVA. | They suggest profit after tax to be more responsive to new information than EVA, which explains greater association in short term. |
| Maditinos, Ševic and Theriou (2009) | Investigates explanation power of several performance measures in the Greek market. | 163 public traded Greek firms | 1992–2001 | Multiple linear regression with one lag | Annual stock returns | EPS, return on investments, return on equity, and EVA as level and changes and SVA only as level. | Findings indicate EPS to generally outperform EVA and SVA. | They suggest EVA to be useful when combined with EPS. Failure of EVA suggested by Maditinos et al. (2009) includes these: EVA is implemented too fast, not supported by CEO or division heads, and inadequate training of employees. |
| Kumar and Sharma (2011) | Examines claim of superiority of EVA to other performance measures. | 97 public traded Indian firms, 873 firm years | 2000–2008 | Simple linear regression | Market value added | EVA, return on net worth, NOPAT, return on capital employed, EPS, AND CFO | Findings suggest NOPAT and CFO outperforming EVA and EPS to be least associated. | Although EVA is outperformed, it still adds incremental information content. |
| Parvaei and Farhadi (2013) | Investigates information content among several performance measures. | 80 public traded Iranian firms | 2005–2009 | Multiple linear regression with one lag using fixed effect[c] | Annual stock returns | EVA, RI, NI, FCF | Findings suggest EVA to outperform the other performance measures. | This study suggests FCF or change in FCF as being best predictor of future stock returns. |

Notes: Conceptual comments on the empirical papers: (Albrecht, 1998; Bacidore et al., 1999; Chen & Dodd, 2002; Ferguson & Leistikow, 1998, 1999; Ferguson, Rentzler, & Yu, 2005; Paulo, 2002; Tsuji, 2006)

[a]*Market value* = the market value of the company in absolute amount, *Market value added* = the value added from previous period in absolute amount, *Market-adjusted stock return* = stock returns adjusted by the return of the market, *Abnormal returns* = return over what is expected, *Annual stock return* = the raw annual return.

[b]Common-*effect model*, where interceptions are homogeneous across firms. *Fixed-effect model*, which allows different interceptions through a dummy-variable, and *Random-effect model*, where coefficients are random variables drawn from a larger population. Only articles, which have mentioned the effect model used are listed in the above table.

## 5 Discussion

This literature review followed up on the seminal findings on Biddle et al. (1997) that EVA does not have incremental value over accounting-based performance measures in explaining stock return. We find that even the proponents of accounting-based measures admit that—from a purely conceptual perspective—residual income-based performance measures like EVA are superior, mostly because they include a capital charge. Empirically however, we find that the vast majority of literature provides evidence that accounting-based measures are superior in explaining stock returns. According to our review, the weak relationship between residual income-based performance measures and stock returns might be due to several factors:

First, stock returns represent changes in expectations about a companies' future discounted cash flow. It is problematic to match them with historic (realized) information (Kyriazis & Anastassis, 2007; O'Byrne, 1999). Also, if cash is the cornerstone of corporate value, there is not motivation to take the detour over the accrual-based EVA measure (Holler, 2008).

Second, it is an unresolved debate if a figure like EVA can even have an influence on company value in semi-efficient markets (Chen & Dodd, 2002; Holler, 2008; Paulo, 2002). Managers use figures like EVA for internal decision making and control, which is an equivalent of managing—mostly—the 'firm-specific' risk of their company. EVA's measure of risk is CAPM-based and thus 'systematic'. So it is questionable how much investors prefer an EVA-managed firm over a non-adopter since they hold portfolios that diversify the firm-specific risk EVA (mostly) manages.

Third, another reason might be functional fixation of investors and analysts (Chen & Dodd, 2002; Holler, 2008; Kaur & Narang, 2009; Kyriazis & Anastassis, 2007): If they keep using possibly distorted accounting information for valuations, then stock returns will not reflect the 'true' value of the company. If this true value was EVA, then EVA would still have lower associations with stock returns than the accounting information used to construct these stock returns.

Fourth, calculating EVA is subject to many assumptions and adjustments. Researchers might calculate very different EVAs from those actually used by managers (e.g., in terms of WACC, accounting adjustments), and analysts and investors might even come to different EVA-assessments than any of these. Therefore, it would not be surprising if the correlation between the EVA and stock returns is imperfect (Holler, 2008; Kyriazis & Anastassis, 2007).

We also found that the results in percentage seem to differ depending on the data used, the period studied, and the model used. Feltham et al. (2004) demonstrated the ability to reach different results than Biddle et al. (1997) by using the same one-lag regression model but different data and periods studied. They suggested both data and period studied to have some influence on the results obtained. From the literature supporting both the accounting-based and residual income-based performance measures, authors have suggested the constant coefficients or constant interceptions to account for a high percentage of the association with stock returns (Holler, 2008; Worthington & West, 2004). This should be examined in more depth to see if the difference between accounting-based and residual income-based performance measures is dependent on the model used.

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