

Epistemology, Research Methodology and Rule 702 of the Federal Rules of Evidence Versus Eva[®]

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ABSTRACT. This article questions the continued use and application of EVA[®] (economic value added) because it is epistemologically a non-sequitur, fails to satisfy the requirements of sound research methodology in terms of being a reliable and valid metric, and is unlikely to satisfy the requirements of Rule 702 of the Federal Rules of Evidence. In the light of these insufficiencies, the continued use of EVA[®] is ethically questionable, and moreover in time is likely to result in class actions.

KEY WORDS: CAPM, cost of capital, empirical failure, EVA[®], reliability, rules of evidence, validity, valuations

1. Introduction

Research methodology requires measurement criteria to be valid and reliable (Cooper and Emory, 1995, pp. 148–156; Ghauri et al., 1995, pp. 46–51; Davis, 1996, pp. 172–180; Sekaran, 2000, pp. 204–210; Cavana et al., 2000, pp. 210–215). Empirical evidence of EVA[®] (economic value added) suggests that this measurement criterion is neither reliable nor valid because, inter alia, it is sometimes associated with value created and sometimes with value destroyed. Moreover it is widely accepted that the CAPM (capital asset pricing model) that forms an importance basis for the calculation of EVA[®], is also neither reliable nor valid. Many corporations in the U.S. and elsewhere have, at considerable cost over a number of years, implemented EVA[®] as part of a value creation process. The benefits of implementing EVA[®] for shareholders are by no means clear because this metric is epistemologi-

cally a *non-sequitur*, and because of mixed empirical evidence. Despite the compelling evidence, EVA[®] continues to be widely used by accountants, management consultants and others, and as a consequence the epistemological basis of such continued practice must of necessity come under scrutiny and this raises an ethical and moral dimension.

The issue is not only epistemological, but also has legal implications. On 1 December 2000, in the U.S.A. the new Rule 702 of the Federal Rules of Evidence came into operation. Executive officers, accountants and management consultants who purport to be acting consistently with the goal of shareholder wealth creation by implementing EVA[®] schemes, may be placing themselves at risk because EVA[®] may not score at all well in terms of the criteria enunciated by Rule 702 of the Federal Rules of Evidence.

This article questions the continued use of EVA[®] as a metric that purports to enable value enhancement because of its epistemological, methodological, and legal deficiencies. The purpose of this article is not to make a comparison of EVA with EPS (earnings per share), ROE (return on equity), CFROI (cash flow return on investment), or standard capital budgeting criteria. The EVA criterion is not unique in the sense that it takes the cost of all the types of capital used into account. The NPV (net present value) criterion and PI (profitability index) also take the cost of capital into account; and the IRR (internal rate of return criterion) can only be interpreted in terms of the cost of capital. NPV, PI and IRR have been used by the accounting profession as performance and valu-

ation metrics for a long time. The purpose of this article is to caution against the injudicious use of the EVA criterion because of the inherent weaknesses of the mechanics upon which it is based, as well as the assertions that accompany it. The inherent weaknesses relate to epistemology, research methodology, and current legal requirements in the U.S.A. The assertions concerning the benefits for total shareholder return of using the EVA criterion are questionable in light of empirical evidence that shows that the main drivers of total shareholder return are not the type of fundamental accounting, economic, and financial information that is incorporated within the EVA criterion. Business professionals, managers, and consultants who continue to use the EVA criterion in its current format are placing themselves at unnecessary risk with the U.S. Justice Department especially in the post Arthur Andersen/ENRON/WorldCom/Merrill Lynch-Grubman environment.

2. Epistemics and EVA[®]

EVA[®] is defined:

$$\text{EVA}^{\circledast} = (\text{Return on capital invested} - \text{Cost of capital}) (\text{Capital invested})$$

where:

the cost of capital at the disaggregated component level is calculated according to the CAPM, and is aggregated according to the weighted average cost of capital (WACC).

Epistemologically, EVA[®] is a *non-sequitur* because it is construct deficient in both EMH (efficient market hypothesis) and non-EMH-worlds. Calculation of EVA[®] requires the calculation of the costs of capital of the specific capital components used by a firm. These costs of capital are calculated using the CAPM despite considerable research over a sustained period of time that shows the CAPM to be a less than satisfactory approach to valuation and the calculation of the cost of capital, and to be nothing short of an empirical failure (Fama and French, 1996). There are alternatives to the CAPM, and they have been well documented in the financial journals and

textbooks. WACC is not an entirely satisfactory aggregation process, and upon closer consideration given its origin and purpose, should be replaced with an alternative process.

2.1. Epistemics and EVA[®] in an EMH-world

As already mentioned, the calculation of EVA[®] is heavily dependant on the CAPM. In an EMH-world, where assets plot on the Security Market Line (SML) or Capital Market Line (CML), and asset prices (market prices) correspond to asset values (intrinsic values), it is not possible to meaningfully talk about a measure such as EVA[®]. On the SML and CML, by definition net present value (NPV) equals zero and the required rate of return (RRR) or cost of capital equals the internal rate of return (IRR), in which case EVA[®] must equal zero. The CAPM is an equilibrium model and as a consequence the numerical values of the RRR (cost of capital) and IRR must be equal. Since EVA[®] measures the difference between RRR and IRR, in an EMH-world EVA[®] is attempting to measure a quantum that by definition cannot exist, except perhaps as noise. Arbitrage and competitive action ensure that abnormal profit cannot consistently occur. If the phenomenon of EVA[®] were to be observed, its occurrence would be random, statistically non-significant, would not be serially correlated and, on the average, positive-EVA[®] would be offset by negative-EVA[®]. In an EMH-world, it is not possible to consistently earn excess returns (i.e., abnormal or super-profits) except at the price of higher risk, measured by the beta coefficient. Thus, within the logic of the EMH, EVA is a financial fiction.

Equilibrium models, as abstractions from reality that are based on restrictive assumptions, have a role and place within fundamentally theoretic environments such as university subjects, to illustrate and explain theoretical propositions. In the real world where practitioners profess expert knowledge and experience, fundamentally theoretic models and propositions that may satisfactorily serve pedagogical purposes, may have limited relevance, and their application may be ill-advised.

2.2. *Epistemics and EVA® in a non-EMH world*

In a non-EMH world, the validity of using the CAPM as the basis for the calculation of EVA is questionable because the CAPM is derived from the EMH, is dependant upon the existence and functioning of the EMH, and requires that beta be able to explain expected return. In a non-EMH world, the CAPM and beta should not be used to calculate the cost of equity that forms part of the weighted average cost of capital (WACC). Numerous studies over more than a decade have shown that using the CAPM and beta is an undesirable way of calculating the cost of capital and should not be used for valuation purposes, and this sentiment has been very clearly and unambiguously stated by Fama and French (1996). Thus, the basis for the calculation of the cost of capital that is used to calculate EVA®, namely CAPM, has been rejected because of the poor relationship between the cross section of returns and the systematic risk coefficient, beta. In plain language, empirical evidence has failed to support beta and the CAPM (Fama and French, 1996).

2.3. *The EVA criterion and WACC*

The EVA criterion requires the use of WACC as the aggregation process of the component costs of capital that finance the corporation. In corporate finance, the goal is to maximize value in a competitive environment. WACC was developed juristically with the goal of ensuring fairness in a regulated environment, not value maximization in a de-regulated environment. I find it alarming that financial managers and consultants are not as informed as public knowledge permits of the objective, origin and development of WACC, and therefore have taken some time to prepare and present an overview of it. Perhaps mindless of the purpose for which the judiciary developed WACC, the finance profession now uses it in an attempt to maximize value. With the enactment of Rule 702 of the Federal Rules of Evidence in the U.S.A., the application of WACC by financial professionals possessed of expert and specialised knowledge and skills for

purposes of value maximization, may not satisfy the requirements of Rule 702 and may bring the reputation of financial professionals, who purport to be able to enhance value, into ill repute.

WACC was carefully and rigorously developed over a considerable period of time by the legal profession for the public utility industry in order to assist in the pricing of the services provided by the utilities (Leventhal, 1965). Of major concern was the need to provide a fair rate of return for all the contributors of financial capital, debt and equity, in order to maintain the financial integrity of each public utility, and then to encourage its economic efficiency. Long after WACC had been developed and was being applied to the pricing of the utility industry, it made its debut in the finance literature and finance profession.

2.3.1. *Origin and objective of WACC*

In the case of finance, the objective is value maximization, which is quite different from that for which WACC was developed, tried, and tested. The objective function of corporate finance is not congruent with the objective function for which WACC was developed. Chronologically, WACC was a topic of much discussion, and considerable expense and effort with the legal fraternity long before it became an agenda item in the theory and practice of corporate finance. The origin and development of WACC is to be found in a series of U.S. Supreme Court cases, starting with the Bluefield Waterworks Case of 1923, and including such watershed cases as the Hope Natural Gas Case of 1944. As long ago as 1938, WACC as a measure, had been described and applied to 15 large electric utilities in a Federal Communications Commission study (Federal Communications Commission, 1938).

WACC was developed by the legal fraternity as a device to ensure that all the contributors of financial capital obtained a fair return. During those early days of the 20th century, a major issue in the pricing of utilities was *how to provide a fair rate of return for all the contributors of financial capital, debt and equity, in order to maintain the financial integrity of each public utility, and then to encourage its economic efficiency.* The pricing

of utility services to the public had to *include a charge for the cost of finance used*. The cost of capital for most public utilities was and still remains a basic element in the prices that they are permitted to charge for their services.

To resolve the issue of the meaning of a *fair rate of return for public utilities*, recourse was made to a juristic process, and a series of complex and protracted Supreme Court cases ensued. Leventhal (1965) presents and analyses many of the landmark court cases. The Bluefield Waterworks Case of 1923, and the Hope Natural Gas Case of 1944 are regularly quoted in most testimony presented in rate-of-return hearings before regulatory commissions. In this context, the Bluefield Waterworks Case of 1923 is so frequently cited because of its emphasis on comparable earnings. Likewise, the Hope Natural Gas Case of 1944 is also frequently cited because of emphasis on financial integrity, the ability to be able to attract financial capital, and the nature of the risks public utilities face. In this watershed case, Justice William O. Douglas wrote:

From the investor or company point of view it is important that there be enough revenue not only for operating expenses but also for the capital cost of the business. These include service on the debt and dividends on the stock. . . . By that standard the return to the equity owner should be commensurate with returns on investments in other enterprises having corresponding risks. That return, moreover, should be sufficient to assure confidence in the financial integrity of the enterprise, so as to maintain its credit and to attract capital.

Mr. Justice Brandeis concurred, and other prominent justices wrote separate affirmative opinions in this case (Leventhal, 1965; Federal Power Commission vs. Hope Natural Gas Co., Case #320 U.S. 591; 51 PUR. NS L 93,200,201 (1944)).

In support of the numerous court cases, extensive supplemental financial statistics were presented for comparable companies and groups of companies, such as information on bond yields, capitalization structures, earnings per share, dividends per share, book value per share, price earnings ratios, growth rates of earnings, dividends, and book values per share, as well as cash flow per share. In other words, a very

thorough and careful analysis was undertaken in support of the WACC.

It is instructive to briefly consider some of the accomplishments of Justice William O. Douglas. From 1934 to 1936, he was the Director of the Protective Studies Committee of the SEC; from 1936 to 1938 he was Commissioner and Chairman of the SEC. He was clearly no stranger to the world of finance, the excesses of Wall Street of the 1920s and 1930s, or the many hearings into the financial meltdown and Great Depression, such as the Pecora Hearings, that gave rise to the formation of the SEC. It was the S.E.C. that instituted GAAP.

Clearly then, WACC is a juristic concept that chronologically predates its debut in the finance profession by at least a decade. It was intentionally developed as a juristic concept that would ensure fairness within the public utility industry. It was designed to ensure the financial integrity of the utility by being able to continue attracting new finance capital to sustain, expand, and enhance the efficiency of utility operations. At no stage was it intended as a concept that would enable value or profit maximizing behaviour.

2.3.2. WACC and corporate finance

In the literature of corporate finance, the first presentation of WACC was made by Joel Dean in 1951 in two of his books, "Capital Budgeting" and "Managerial Economics". Only in 1952 did David Durand of M.I.T. propose the then unorthodox position that the financial goal of a business should be to maximize the investment value of the firm rather than to maximize income (1952, pp. 215–247). Since that time, WACC has been used to maximize value by the finance profession, by means of investment, financing, and dividend decisions. More recently it has been used to establish the extent to which management is ostensibly adding value to the firm. In this regard, EVA[®] and MVA[®] (market value added) are typical. From the origin, objective and development of WACC it is evident that was conceptually developed with the objective of fairness rather than maximizing behaviour.

Objective of corporate finance -- value maximization.
In corporate finance, the goal is not to ensure

fairness, but to maximize value in an environment that is substantially different from that of the public utilities. This environment is characterized by considerably greater risk, greater market volatility, and rate or price setting is inadmissible because it is anti-competitive behavior.

2.3.3. *WACC and the judiciary*

To date, the judiciary has not considered whether the application of WACC for purposes of value maximization is an appropriate application. However, if this were to happen as may well be the case in the current environment that is scrutinizing all manner of corporate accounting and financial activity, it would by implication bring into question the continued relevance of WACC for the valuation of utilities as part of the process of price and rate setting. When the relevance of WACC for corporate finance is submitted to the judiciary it would be quite unlikely to receive a favourable hearing for several reasons.

Firstly, there is the question of goal incongruence. The goal of corporate finance is value enhancement so that wealth is created for shareholders. Chrematistics, the science of wealth creation, let alone wealth maximization, is incompatible with a juristic concept as carefully and specifically crafted as the WACC. In this regard, the recent bubble in the world's major stock exchanges is instructive in illustrating the absurdities of using WACC. If the prices that prevailed in major stock exchanges in 1997, 1998, 1999, and 2000, were used to calculate the cost of equity, the resulting figures would have been very low because of the financial bubble that had grossly inflated asset prices and driven price/earnings multiples to unprecedented levels. Given the inverse relationship between asset prices and their required rates of return (their discount rate or cost of capital), the higher the asset price the lower the cost rate of capital. The implication of an artificially low cost of equity drawn from using market prices to calculate WACC, and an environment of a low cost of debt in nominal terms, is to grossly overstate the intrinsic value created by a firm's management. In these circumstances it is the financial bubble through its impact on market prices that is primarily creating wealth for shareholders, even if very little

intrinsic value is being created by a firm's management. When the EVA criterion is being used, positive EVA will arise when a financial bubble artificially reduces the cost of capital and management does not increase the internal rate of return. In a depressive market where stocks trade at very low price earnings ratios, EVA will be obliterated as price earnings ratios decline even if management is creating intrinsic value because the price investors are prepared to pay for assets is declining and the cost of capital being imputed to those assets is rising. Specifically, in both manic and depressive markets the EVA criterion, even if purged of the CAPM, cannot provide a reliable or valid indication of intrinsic value created by managers, accountants, workers or financial capital, because EVA is also created and distorted by pricing behaviour in financial markets. The question of what determines asset prices needs to be considered (section 4), especially if accounting, economic and financial fundamentals are not the sole or main drivers of market price. If accounting, economic and financial fundamentals are not the sole or main drivers of market price, then intrinsic value will not correspond to market price, and reliance on market price as an indicator of true value is not an acceptable professional practice.

Secondly, there is the matter of being able to satisfactorily divorce a juristic concept enshrined in law, that strives for fairness in price and rate setting for regulated industries, from businesses incorporated to create and stimulate competition. Competition and the competitive process requires not only competition in pricing but also in terms of all manner of qualitative and quantitative attributes such as variety, description and technical specification. In short, regulated utilities deal with standardized products and services that are largely homogenous, unlike business in general whose offerings are differentiated and are heterogeneous. To sanction the use of WACC for corporate finance is to open for discussion its potential disqualification for public utilities. This would be strongly resisted by the utility industries, utility commissions, and the Department of Justice.

Thirdly, it is doubtful whether WACC for corporate finance could satisfy the requirements

of Rule 702 of the Federal Rules of Evidence in the U.S.A. On 1 December 2000, some seven years after Daubert and cases interpreting Daubert, Rule 702 of the Federal Rules of Evidence, which was amended in response to the Daubert holding, became effective. The new rule now in force, reads:

If scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training or education, may testify thereto in the form of an opinion or otherwise, if:

- (1) *the testimony is based upon sufficient facts or data,*
- (2) *the testimony is the product of reliable principles and methods, and*
- (3) *the witness has applied the principles and methods reliably to the facts of the case.*

Application of WACC by corporations could be interpreted not as “. . . *the product of reliable principles and methods . . .*” but rather as the product of unreliable principles and methods. Such an interpretation would enable the inference not that “. . . *the witness has applied the principles and methods reliably to the facts of the case . . .*” but that the witness has mis-applied the principles and methods to the facts of the case because WACC is not suited to non-regulated competitive business conditions where the goal is to maximize value. The fact that WACC has been mis-applied for so long in corporate finance and has become habitual despite the availability of an alternative costing system, namely sequential marginal costing (Paulo, 1992; Solomon, 1963, p. 88; Lindsay and Sametz, 1968, pp. 324–329, 340–342), does not constitute valid grounds for this mis-practice or the continuation of this mis-practice. This mis-application does not constitute extenuating circumstances and does not exonerate applicants especially those possessed of and professing expert knowledge and specialised skills.

3. Sound research methodology and EVA®

A performance metric that can be successfully operationalized in the real world of consultants

and other professional experts, as distinct from a fundamentally theoretic model that is used in the lecture theatre to explain in an abstract way how asset prices should behave under conditions of general or partial equilibrium, needs to satisfy the basic requirements of sound research methodology. Sound research methodology requires measurement criteria to be valid and reliable (Cooper and Emory, 1995, pp. 148–156; Ghauri, Gronhaug and Kristianslund, 1995, pp. 46–51; Davis, 1996, pp. 172–180; Sekaran, 2000, pp. 204–210; Cavana et al., 2000, pp. 210–215). Methodologically, reliability is concerned with estimates of the extent to which a measuring criterion is free from random or unstable error (Cooper and Emory, 1995, p. 153). Reliable criteria are those that can be used with confidence and are robust in the sense that they deliver consistent results through different time periods under different conditions (ibid.). Reliability contributes to validity and although it is necessary for validity, it is not a sufficient condition for validity. Consider as an illustrative example a temperature gauge (thermometer) that correctly indicates the temperature. This thermometer is both reliable and valid. However, if this thermometer consistently over-indicates the temperature then it is reliable, but it is not valid. If this thermometer sometimes over-indicates and at other times under-indicates the temperature then it is neither reliable nor valid. The requirements of a good measurement criterion are validity, reliability, and practicality (op. cit., 148). Practicality concerns a number of issues, of which interpretability is of considerable importance. As will be shown, the CAPM, which forms an important basis for the calculation of EVA®, scores poorly with regards to these requirements, and as a consequence cannot satisfy Rule 702's criterion of reliable methodology. WACC has already been shown to be a questionable aggregation process. A sound management system is unlikely to make use of invalid and unreliable metrics, and financial professionals and other managerial experts need to reflect upon the risks of not distancing themselves from a metric that is deficient in these respects.

Considerable research over more than two decades shows that the CAPM as a model, is mis-

specified (i.e. is wrong), and as a consequence it is hardly surprising that it is a less than satisfactory approach to valuation and the calculation of the cost of capital (Harrington, 1987, pp. 55–79). Fama and French (1996) describe the CAPM as being nothing short of an empirical failure, and in support of their research findings, cite the work of others (Banz 1981; Basu 1983; Chan et al., 1991; Fama and French, 1992, 1993, 1996; Lakonishok et al., 1994). As a result of the empirical failure of the CAPM, Fama and French state unequivocally that the CAPM is an undesirable way of calculating the cost of capital and should not be used for valuation purposes, not even as an approximation because of the serious average-return anomalies associated with it (1996, p. 1957). Specifically, they show most clearly that the CAPM fails because of the fact that beta cannot explain expected return. Fama (cited in Harrington, 1987, p. 61) concluded that only in one period, 1961–1968, did the CAPM describe the market well, and that this finding led him to a negative conclusion regarding the CAPM.

The CAPM is not only mis-specified because of the problems with beta. Empirical evidence shows that it is mis-specified with regard to *slope and intercept* (Douglas, 1969; Miller and Scholes, 1972, pp. 47–78; Black et al., 1972; Fama and MacBeth, 1973, 1974; Reinganum, 1981). Moreover, *beta is not an adequate or correct measure of risk* (Friend and Blume, 1970; Blume and Friend, 1975; Cooley et al., 1977; Arnott, 1983; Lakonishok and Shapiro, 1984). In addition, evidence shows that the *distributions* underlying the CAPM may *not be normal, but rather may be skewed* (Arditti, 1967; Kraus and Litzenberger, 1976; Simkowitz and Beedles, 1978).

In short, conceptually CAPM is a feeble pricing model because it is not reliable, is not valid, and is not practical in so far as it cannot be consistently or meaningfully interpreted because it does not measure what it purports to measure.

Calculation of the cost of capital by means of the CAPM requires estimation of the systematic risk coefficient, beta. If beta alone cannot explain expected returns, as has been shown empirically

(Banz, 1981; Basu, 1983; Chan et al., 1991; Fama and French, 1992, 1993, 1996; Lakonishok et al., 1994), then the CAPM is sufficiently flawed to make its use and application an inadvisable and risky procedure.

Fama and French (1996) state that: “. . . It is, of course possible that the apparent empirical failures of the CAPM are due to bad market proxies for the market portfolio. . . . This bad-market-proxy argument, however, does not justify the way the CAPM is currently applied, for example, to estimate the cost of capital. . . .” These authors concluded that: “. . . the evidence that beta does not suffice to explain expected return is compelling. And the average-return anomalies of the CAPM are serious enough to infer that the model [CAPM] is not a useful approximation.”

Prior to Fama and French (1996) voluminous empirical research from the early 1970s onwards had raised serious concerns about the validity of CAPM. The phenomena observed were classified as anomalies or paradoxes (Joy and Jones, 1979), and included the price ratio effect (Basu, 1977, 1983; Goodman and Peavy, 1985; Latane et al., 1969), the small firm or size effect (Keim, 1983, 1986), the January effect (Roll, 1983; Bhardaj and Brooks, 1992; Haugen and Jorion, 1996), the Value Line phenomenon (Stickel, 1985; Huberman and Kandel, 1990), and the surprise announcements effect (Jones et al., 1984). These effects, the empirical failure of the CAPM, show unambiguously that CAPM has severe limitations and is the wrong way to perform valuations such as calculating the cost of capital.

As a consequence of the deficiencies of the CAPM epistemologically as well methodologically, it is surprising that the empirical evidence concerning *EVA*[®] is not less satisfactory. Chen and Dodd (2001) state that insufficient empirical evidence exists to support the claim of *EVA*[®]'s supremacy as a performance measure in terms of value-relevance, and that the evidence supporting the rhetoric has been primarily anecdotal. Chen and Dodd (1997) found that only 20% of the variation in stock return could be explained by average *EVA*[®] per share, and concluded that the strength of the association

between EVA[®] adoption and implementation and financial performance is far from what has been claimed by EVA[®] proponents. Biddle et al. (1997) provide evidence refuting the assertion that EVA[®] is more highly associated with stock returns than accounting earnings and operating cash flows. Chen and Dodd (2001) suggest that this may be so because the roots of EVA[®] are in traditional accounting data. Chen and Dodd (2001) conclude that adopters and potential adopters of EVA[®] should recognize that the data do not support popular press testimonials as to the value-relevance of this metric, and that these "stories" cannot be generalized for all firms. Yook and McCabe (2001) contend that the results of the efficacy of EVA[®] as a corporate valuation tool and the information content of this metric compared to conventional accounting metrics, has been inconclusive. Cordeiro and Kent (2001) found that in any given year after adoption, 34% to 50% of EVA[®] adopters underperform their peers, a finding that lead them to draw the inference that it is not clear that adoption of this metric comes even close to guaranteeing performance improvements. These authors state that their finding of no significant relationship between EVA[®] and security analyst forecasts of future earnings per share performance is somewhat surprising, given the media hype about the benefits of EVA[®].

Fernandez and Reinoso (2002) compared EVA[®] calculated by Stern Stewart and Company (2000) with created shareholder value, and found that:

- the correlation of EVA[®] with created shareholder value was only 17.66%;
- sixty companies had negative EVA[®] and positive created shareholder value;
- sixty-four companies had positive EVA[®] and negative created shareholder value.

This recent evidence raises serious doubts about the capacity of EVA[®] to deliver the beef, and is hardly surprising given the epistemological methodological inadequacy of the CAPM.

4. Accounting, economic and financial fundamentals, TSR (Total Shareholder Return) and the EVA criterion

What drives equity market values? Extensive empirical research has shown that an equilibrium pricing theory, such as the EMH, is not a satisfactory descriptor of the real world, and therefore should be used with extreme caution by management consultants and other practitioners. To quote Buffet, ". . . Price is what you pay, value is what you get [or fail to get] . . ." (Hagstrom, 1995). Market price seldom corresponds to intrinsic value and this disequilibrium can continue for extensive periods of time. Moreover, whereas economic and financial fundamentals will affect value, they are not the main movers of stock prices. In this regard, Fama (1981) found that a substantial fraction of return variation cannot be explained by macroeconomic news. Roll (1984) found that news about weather conditions, the principal source of variation in the price of orange juice, explains only about 10% of the movement in orange juice futures prices. Roll (1988) further found that it is difficult to account for more than one-third of the monthly variation in individual stock returns on the basis of systematic economic influences. When investigating which factors moved share price, Cutler et al. (1989) found that macroeconomic news explains only about one-fifth of the movement in stock prices, and they state: "The view that movement in stock prices reflect something other than news about fundamental values is consistent with evidence on the correlates of *ex post* returns (1989, p. 9). Haugen et al. (1991) established that the main driver of stock returns was changes in volatility, and that fundamental economic and financial factors were not the main drivers of changes in volatility. In fact, they found that as few as one-quarter of the volatility shifts are associated with the release of significant (accounting, financial and economic) information.

Empirical evidence shows that notable drivers of equity prices include *volatility* (Shiller, 1989, 2000; Cutler et al., 1989; Haugen et al., 1991), *momentum* (Chan et al., 1996; Moskowitz and Grinblatt, 1999; Hong and Stein, 1999; Hong

et al., 2000; Lee and Swaminathan, 2000) and *financial herding* (Graham, 1999). Research into volatility itself has stimulated research into momentum and financial herding. Grinblatt et al. (1995), and Wermers (1999) came to the conclusion that a large part of herding behaviour occurs when investors “momentum-follow,” and Nofsinger and Sias (1999) found evidence that implicates the use of momentum strategies by growth-oriented funds as an important source of herding. What is worthy of note is that momentum and herding have a notable impact on market price that is not related to economic or financial fundamentals. When volatility, herding and momentum are substantially present, as so often seems to be the case, and when these phenomena have a much greater impact on stock prices and stock returns than fundamental economic and financial factors, a number of problems emerge for EVA. *Firstly*, market values will not correspond to intrinsic values because pricing is being driven by non-fundamental factors. *Secondly*, the use of WACC, based as it is on market values and weights, is a highly questionable practice, because of the manic-depressive nature of market prices (Hagstrom, 1995; Loewenstein, 1995). In this regard, consider the excesses of the Nikkei-Dow in the 1980s and early 1990s in comparison with its levels in 2001. Consider also the excesses of the NASDAQ in 1999 and early 2000 in comparison with its levels in 2001, and the gyrations of U.S. blue chip stocks as reflected in the DJIA in recent times.

4.1. *Dividends, earnings, and the behaviour of dividends and earnings*

If economic and financial fundamentals were the main drivers of security prices, it would be reasonable to expect dividends, earnings, and their time series behaviour that would encompass growth and structural composition, would correlate rather well with price. Yet the evidence does not support this contention. Fama and French (2001) report that the proportion of firms paying cash dividends has declined from 66.5% in 1978 to 20.8% in 1999, and that the evidence shows this to be part of a long-term process. For

example, in every year from 1943 to 1962, more than 82% of NYSE firms paid dividends; in 1951 and 1952 more than 90% paid dividends, but with the addition of AMEX in 1963 the proportion of dividend payers declined to 69.3%. This decline continued with the addition of NASDAQ in 1973 (Fama and French, 2001). Clearly, unprofitable firms and those with low earnings cannot pay dividends. Investors have become more willing to hold the shares of small, relatively unprofitable growth companies (Fama and French, 2001). As dividends diminish, stocks returns are being driven increasingly by swings in capital values.

In comparison with previous decades, stocks have been taking on the characteristics of zero-coupon irredeemable unsecured bonds. Zero-coupon unsecured bonds are highly volatile. Without dividends it becomes very difficult to immunize portfolios of stocks. What this means is that stocks become more volatile and volatility is becoming a major source of returns to investors. It becomes a moot point whether the discounted dividend model should occupy such an important position when attempting to value equities under these circumstances.

Evidence of the relationship of price and earnings for the period January 1871 to January 2000 (129 years) is presented, analysed, and discussed at length by Shiller (2000), and these data are shown in Table I. What is clearly evident is that earnings have hardly kept up with the increases in stock prices since 1980. Not only have earnings failed to match the increases in stock prices, but price-earnings ratios have also increased very substantially since 1980.

Price earnings ratios have fluctuated substantially, with low values between 5 and 10 having been recorded in the early- and mid-1920s, early- and mid-1930s, and late-1970s through to the early- and mid-1980s. In sharp contrast, high price-earnings ratios above 30 were recorded in 1929, and during the late-1990s.

Shiller shows that the “wiggles in stock prices do not correspond very closely to wiggles in dividends” (2000, pp. 182–183). From the stock market peak in September 1929 to the bottom in June 1932, the stock market fell 81% as measured by the real S&P Index, but real divi-

TABLE I
Wall Street PE Ratio Lows and Highs by Decade
from 1881 to 2000

Decade	PE Low	PE High
1881–1890	12	18
1891–1900	14	23
1901–1910	11	25
1911–1920	6	15
1921–1930	6	33
1931–1940	7	22
1941–1950	8	16
1951–1960	12	23
1961–1970	14	24
1971–1980	8	19
1981–1990	7	18
1991–2000	15	45

dends only fell 11% (Shiller, 2000). From the market peak in January 1973 to the bottom in December 1974, the market fell 54% as measured by the real S&P Index, but real dividends only fell 6% (Shiller, 2000). If stock prices are not increasing or decreasing on the basis of earnings and dividends, what is moving stock prices? As part of the quest to obtain a better understanding as to what drives market price, a new journal, the *Journal of Psychology and Financial Markets*, has been established.

4.2. The relevance of accounting information to equity valuation

As far as the relevance of accounting information to equity valuation is concerned, there is a large and growing body of evidence that shows that accounting information is becoming progressively less relevant. Lev and Zarowin (cited in Stewart, 1998) sought to establish whether financial reporting conveyed useful information to investors. They examined three foundation pieces of reported financial information — earnings, cash flow, and book value for the thousands of companies in Compustat's data base — and correlated this information with changes in the companies' stock prices. They concluded that the association between key financial statement

variables and both stock returns and stock prices have been declining in importance over the past 20 years.

Shevlin (1996) reported research by Amir and Lev into the value-relevance of reported financial information for fast-changing, science-based companies and the value-relevance of non-financial information incremental to financial information. This research showed that the financial accounting information is only value-relevant after the inclusion of non-financial information and that the non-financial information examined was value-relevant both by itself and incremental to the financial information.

Business Week (2001) reported an interview in which Lev states that for most successful companies, patents, copyrights, brands, and other intangible assets outperform physical assets such as factories, offices, and even inventory by a notable margin. For example, Lepkowski and Baruch Lev have produced data that show that the more potent a company's patent activity, the better its stock performs on Wall Street; moreover, it has characteristics that appeal to accountants such as being quantifiable (Lepkowski, 1998). Yet, it is these intangibles that get little scrutiny under current accounting methods. Lev (2000) argues that accounting has not kept pace with the rise in importance of intangibles because accounting is based on transactions, such as purchases, sales, and capital expenditures that created value up until about 20 years ago. Lev explains that in the current environment, value is created or destroyed long before the transaction takes place, for example, when a drug passes or fails clinical tests. Markets react promptly, but accounting reacts two to four years later when sales are recorded and a consequence is a notable disconnection between what happens in capital markets and what the accounting system reflects. As a result, the bottom line, the income number, a highly important item in a financial report, becomes progressively less informative.

Lev (1997a) reports that the investment in intangibles is outpacing the investment in tangibles. Despite this well established trend, the accounting treatment of intangible investments that generally immediately expenses them, makes

it very difficult for investors and board members to: assess the rate of return intangibles; evaluate shifts in the basic characteristics of intangible investments such as research and development; determine the value of the firm's intangible capital; and, ascertain the extent to which reported research and development expenditure includes non-research and development items such as maintenance engineering and quality control expenses.

Lev (1997b) further contends that it is ironic that accounting is the last vestige of those who believe that things are assets and that ideas are expendable. According to him, in recent decades the usefulness of financial reports of public companies has steadily declined, despite their increased gloss and girth. As an indicator of this, Lev reports that in the 1960s and 1970s about 25% of the differences in stock price changes could be attributed to differences in reported earnings, but that by the 1980s and early 1990s, this figure had dropped to less than 10%. Since reliable financial reporting helps guide capital to the most promising investments, poor or outdated reporting can lead to inefficient and misallocations of capital as well as excessive market volatility. As a result of this Lev contends that deficiencies in the accounting treatment of intangibles contribute to stock market volatility (Laing, 2000).

In January 2000, Federal Reserve Board Chairman Alan Greenspan complained that accounting was not tracking investment in knowledge assets and warned that there would be many problems in the future (Stewart, 2001). Former SEC Chairman Arthur Levitt told the Economic Club of New York that as intangible assets grow in size and scope, more and more people question whether the true value and the drivers of true value are being reflected in publicly available disclosure (Stewart, 2001). The Financial Accounting Standards Board says that accounting's fundamental purpose is to provide information that is useful in making rational investment, credit, and similar decisions. Yet, when it comes to shedding light on what a company is worth, market value should not be poles apart from the value ascribed by accountants. Arthur Andersen consultants Richard

Boulton, Barry Libert and Steve Samek compared market value with book value for 3 500 U.S.A. companies over a period of two decades, from 1978 to 1998. In 1978 book value and market value were rather well matched, with book value at 95% of market value. Twenty years later, book value was just 28% of market value (Stewart, 2001). Evidence that shows that the usefulness of reported earnings, cash flows, and book (equity) values has been deteriorating over the past 20 years is also provided by Lev and Zarowin (1999). Can the inference be drawn that investors do not value what accountants count?

In May 2000 the average book-to-market ratio of the S&P 500 companies exceeded 6.0 thus indicating that of every six dollars of market value only one dollar represented the value of physical assets. The remaining five dollars reflect knowledge (intangible or intellectual) assets. Even though knowledge assets are very valuable, and though they are the major drivers of corporate value, they are not reported by accountants (Lev, 2000). Firms' research and development capital is associated with their subsequent stock returns, and in the case of research and development intensive firms, this research and development effect subsumes the book-to-market effect (Lev, 1999).

Intellectual property rights and the means of creating them are presenting big challenges to contemporary financial reporting because in the main financial reporting acknowledges an expenditure but usually does not acknowledge the assets created by these expenditures (Robertson and Lanfrconi, 2001). Moreover, Lev shows that the difference between what the financial statements disclose as the net book value of a company and the market capitalization of the company's equity increases as the importance of intellectual property increases.

The empirical relationship between the independent variables (earnings, price, intrinsic value) and the dependent variable (stock price) suggests that variables not yet part of reported accounting information have a powerful impact on stock prices and returns.

5. Rule 702 of the Federal Rules of Evidence and the EVA criterion

In 1993, the U.S. Supreme Court issued its ruling in *Daubert v. Merrell Dow Pharmaceuticals Inc.*, which had a notable impact on the admissibility of expert witness testimony and the role played by the trial court. The Daubert Principle, as it came to be known, concerns all types of expert witness testimony, including scientific and technical evidence. In addition to assessing the reliability of expert witness testimony, the Daubert Principle requires the trial court to consider the relevancy of the proposed testimony.

On 1 December 2000, some seven years after *Daubert* and cases interpreting *Daubert*, *Rule 702 of the Federal Rules of Evidence*, which was amended in response to the *Daubert* holding, became effective. As already stated, the new rule now in force, reads:

If scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training or education, may testify thereto in the form of an opinion or otherwise, if:

- (4) *the testimony is based upon sufficient facts or data [empirical evidence]*
- (5) *the testimony is the product of reliable principles and methods [sound methodology] and*
- (6) *the witness has applied the principles and methods reliably to the facts of the case.*

Clearly, Rule 702 requires the showing of reliable methodology, sufficient basis for application, and the proper (judicious) application of the methodology to the facts of the case in question.

First Requirement of Rule 702: *the testimony is based upon sufficient facts or data [empirical evidence]*

The empirical evidence supporting the claim of EVA[®] to be the superior metric is inconclusive. Empirical evidence shows clearly that the CAPM, upon which the calculation of EVA[®] is dependent, is mis-specified and austere.

Second Requirement of Rule 702: *the testimony is the product of reliable principles and methods [sound methodology]*

Epistemologically, EVA[®] is a non-sequitur. From the perspective of sound research methodological basis, EVA[®] does not satisfy the requirements of being reliable and valid.

Third Requirement of Rule 702: *the witness has applied the principles and methods reliably to the facts of the case (proper application of the metric)*

It is not possible to properly apply a metric that is invalid, unreliable, is questionable epistemologically, and for which there is little supporting empirical evidence.

6. Conclusion

In the current environment in the U.S.A., the activities of accountants, consultants, financial advisors, stockbrokers and managers are being scrutinized with a sense of vigor unparalleled since the enquiries following the stock market crash that began in 1929 and continued during the early years of the 1930s. Corporate executives are being arrested, handcuffed, publicly paraded and are being required to make restitution to the victims of their errors of commission and omission. The enquiries in the late 1920s and early 1930s that gave rise to the formation of the S.E.C., the most powerful commission of its kind in the U.S.A., and that enabled the creation of GAAP, will perhaps only be equalled (and perhaps exceeded) by the present efforts of the Justice Department, S.E.C. and other regulatory bodies today.

The volatility of stock markets since 2000 has been extreme, and the reported business scandals have also been of extreme proportions. In this heated type of environment it would seem that the continued injudicious application of a performance metric that is reliant on the CAPM and WACC, especially when alternative computational approaches exist, should be tempered with caution, especially as the EVA criterion in its current format is unlikely to satisfy the require-

ments of Rule 702 of the Federal Rules of Evidence. If EVA is inadmissible as expert testimony as a performance metric that enhances management and enables value maximization, it is questionable whether it can be legally endorsed as an authentic and defensible practice on the part of financial professionals. This is not to say that EVA has no place in textbooks as part of a normative theoretical expose. Professional practitioners and experts have a positive obligation to deliver more than mere theoretical models and academic illustrations based on restrictive and abstract assumptions; their contribution in the real world within which they work includes the reliable and valid operationalisation of theories and abstract models.

In consideration of the inherent weaknesses of the processes upon which the EVA criterion is based, professionals who continue to apply EVA in its current format are placing themselves at unnecessary risk especially in the post *Arthur Andersen/ENRON/WorldCom/Merrill Lynch* environment. This is an environment in which tighter regulatory and reporting requirements as well as explanations are being demanded across the board by powerful regulatory agencies and commissions, such as the Securities and Exchange Commission, Financial Accounting Standards Board, New York Stock Exchange, and National Association of Securities Dealers (Boyer, 2002). The judiciary is becoming increasingly pro-active, vocal and public in the way in which it attempts to ensure that the managerial, financial and accounting excesses and mal-practices that featured so prominently in the stock market bubble of the 1990s are discontinued.

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