Valuing Technology Stocks With EVA™: A Bridge Too Far?

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ABSTRACT

The Economic Value Added (EVA™) framework has engendered a great deal of attention from American and European companies, consultants, accounting firms, security analysts, fund managers and the media for its purported utility in accurately valuing public companies. In 1996, for example, Fortune Magazine trumpeted that hundreds of companies had recently "renounced" earnings per share in favour of EVA™ as a means of measuring performance and driving stock prices. During the 1990s, investors witnessed unprecedented growth in US equity prices, particularly for technology firms. This case study critically examines the Economic Value Added EVA™ framework and attempts to rationalize the bull market in technology stocks by employing EVA™ to estimate the intrinsic value of a large proportion of the US technology sector as of 1999 and comparing this figure with contemporaneous market values for the same. We find a marked disparity between EVA™ estimates of Present Value and actual market value for the sector.

Keywords: Economic Value Added, EVA, valuation, technology stocks, R&D

1 INTRODUCTION

Between January 1990 and March of 2000, the technology-laden NASDAQ Composite Index rose in value by over one-thousand percent.[i] Evidence now suggests that profits for many technology firms during this period may have been materially inflated and/or overstated[ii]; however, much of that evidence did not come to light until several years after investors had capitalized profits that were, as originally reported, well above trend. A cursory review of these events suggests investors may have been engaged in a rational appraisal of intrinsic value for the technology sector based on information available at the time.

In an effort to rationalize the price gains garnered by technology shares in the 1990s and to gain further insight into the *ex ante* expectations of technology investors during this period, this case study will critically examine the Economic Value Added (EVA™) framework and employ it to estimate the value of a large proportion of the US technology sector as of 1999. This calculated value can then be compared with the equity market value of the sector at the time.

2 LITERATURE

Economic Value Added (EVA™) is a proprietary valuation framework developed by the consulting firm Stern Stewart and broadly introduced in G. Bennett Stewart's book *Quest for Value* (1991). EVA™ is a derivative of the traditional residual income model (see Bromwich and Walker, 1998) distinguished from the latter principally by the accounting adjustments to profits and capital specified by Stern Stewart. Indeed, Chen and Dodd (1997) note that most of the EVA™ and residual income variables are highly correlated and nearly identical in terms of the association each has to stock returns.

EVA™ has engendered a great deal of attention from American and European companies, consultants, accounting firms, security analysts, fund managers, and the media. In 1996 for example, *Fortune Magazine*[iii] trumpeted that hundreds of companies had "renounced" earnings per share in favour of EVA™ as a means of measuring performance and driving stock prices. The same article noted investment banks CS First Boston and Goldman Sachs had recently trained their research staffs in EVA™ analysis and several mutual funds had adopted EVA™ as a stock selection tool.

Stewart (1991) presents EVA™ as an economic model of valuation; a method to calculate the true intrinsic value of the firm where investors are concerned about the cash generated over the life of the business and the risk of the cash receipts.[iv] Bromwich and Walker (1998) concur with this assessment, crediting EVA™ as "…a measure of investment performance which is consistent *ex ante* with [discounted cash flow] analysis, whilst also providing a basis for *ex post* performance analysis".

EVA™ is computed by taking the spread between the rate of return on capital r and the cost of capital c^* and then multiplying by the economic book value of the capital committed to the business. Thus,

$$\text{EVA} = (r - c^*) \times \text{capital} \qquad (1)$$

which simplifies to net operating profits (after depreciation and taxes) less a charge for the use of capital:

$$\text{EVA} = \text{NOPAT} - (c^* \times \text{capital}) \qquad (2)$$

NOPAT may be calculated from an operating perspective as follows:

$$\text{NOPAT} = \text{Sales} - \text{Operating Expenses} - \text{Taxes} \qquad (3)$$

where operating expenses include depreciation, and taxes are only the actual cash operating taxes paid during the period.

NOPAT may also be calculated from a financing perspective as follows:

$$\text{NOPAT} = \text{Income available to Common} + \text{Preferred Dividend} + \text{Minority Interest Provision} + \text{Interest Expense after Taxes} \qquad (4)$$

To eliminate accounting "distortions"[12], the EVA™ calculation calls for any increase in equity equivalents, unusual losses, and R&D outlays to be added back to income.

Capital is defined as:

$$\text{Common Equity} + \text{Preferred Stock} + \text{Minority Interest} + \text{All Debt} \qquad (5)$$

where equity equivalents, unusual losses, and R&D outlays are added back to common equity as they were to income in the NOPAT calculation.

The cost of capital c^* is the weighted average cost of capital to the firm, computed by adding the proportionate after-tax cost of debt with the proportionate cost of equity:

$$c^* = [(1 - t)b \times \text{D/Capital}] + [y \times \text{E/Capital}] \qquad (6)$$

where t is the marginal corporate income tax rate, b is the firm's borrowing rate and y is the cost of equity.

Stewart's (1991) examples for calculating the cost of equity propose the use of the Capital Asset Pricing Model (CAPM) for determining equity risk premiums.

Taken together, Stewart's (1991) "EVA™ Valuation Formula" is:

$$\text{Market value} = \text{capital} + \text{present value of all future EVA} \qquad (7)$$

EVA™ is grounded in orthodox financial theory which values the firm as a function of its expected, future cash flows and appropriate discount rate. Although such an economic model offers the promise of a better estimate of corporate value than a pure accounting approach that may fail to consider the time value of money and risk, the utility of EVA™ rests entirely upon the accuracy of the future cash flow forecasts and calculation of the cost of capital.

In a RoundTable discussion of EVA™ hosted by Johnson and Johnson in 1994[v], S. Abraham Ravid[vi] points out that EVA™ is subject to the same uncertainties in estimating future cash flows as conventional discounted cash flow analysis. This is particularly the case with technology firms where large operating losses early in the product life cycle are often followed by a period of competitive advantage of unpredictable duration (see Black, Wright, and Bachman, 1998; Moore, Johnson, and Kippola, 1999; Damodaran, 2001).

Computing the correct weighted average cost of capital (WACC) for the EVA™ valuation is similarly laden with uncertainty. Stewart (1991) recommends use of the CAPM introduced by Sharpe (1964) to derive the returns expected by shareholders, however this single-factor model has been extensively tested and criticised by Douglas (1969), French and Fama (1992), and others for failing to fully explain returns on equity. Moreover, as the greatest portion of EVA™ will be generated, in the majority of cases, well beyond the current operating period (Stewart, 1991), valuing the company requires an accurate calculation of the firm's forward WACC and therefore, its *forward* beta coefficient. Although betas for portfolios have been found to be stable over extended periods (Levy, 1971; Blume, 1971; Tole, 1981), the same is not always true for the betas of individual companies (Sharpe and Cooper, 1972). In a critical analysis of their own valuation framework which, like EVA™, requires a capital charge element, Black, Wright, and Bachman (1998) concede the difficulty in estimating future betas and point out that accurately determining the cost of capital requires the ability to forecast future levels of equity and debt on the balance sheet which is "… a less than straightforward task".

EVA™ is subject to criticism for its approach to calculating a company's capital base, as well. In the 1994 RoundTable discussion of EVA™ discussed earlier, Stewart acknowledges that in total, there are as many as 164 different "performance measurement issues" related to a company's accounting system which must be considered with the implementation of EVA™. Several of the most common accounting issues and adjustments include:

- Acquisitions are treated as if they involved cash outlays rather than a pooling of interests
- Goodwill related to acquisitions is not amortized.
- Deferred taxes are added back to book equity.
- R&D expenditures are added back to book equity.

Several researchers have suggested that the large number of equity adjustments incorporated in the Stern Stewart system may not be necessary to achieve the level of value-relevance found in the residual income measure (see Chen and Dodd, 1997; O'Hanlon and Peasnell, 1998).

Jerold Zimmerman, co-editor of the *Journal of Accounting and Economics*, argues that capitalization of research and development spending under EVA™ may lead to investment and valuation errors due to the failure of many R&D projects to evolve into cash-generating assets. [vii] Yet, Zimmerman simultaneously acknowledges that whereas investments in R&D (and other income producing expenditures like advertising) often have future payoffs that are not picked up by pure accounting-based measures of value, these will be appropriately reflected in EVA™.

The Boston Consulting Group (BCG) (1996) suggests that EVA™ is distorted in both the early years as well as in the later years following a new investment. The former occurs, according to BCG, when earnings rather than total cash flow are credited against book investment, and the latter occurs due to EVA™'s choice of depreciating book investments rather than the original cash investment. Specifically, BCG points out that the combination of subtracting depreciation expense from operating cash flow and subtracting accumulated depreciation from book capital may result in EVA™ rising as assets depreciate even if product prices and earnings are eroding.

A critical assumption of the EVA™ model is that of perfect capital markets and rational expectations where market value added (MVA) is always equal to the present value of all future EVA™ (Stewart, 1991). Under this assumption, corporations are always being correctly valued by the stock market based solely on their ability to deliver economic profits. As evidence that financial restructurings are producing or portending gains in economic value, Stewart (1991) cites a number of cases where firms enjoyed immediate and significant gains in their share price after announcing or undergoing recapitalizations. Without the benefit of long-term empirical studies however, it is impossible to know 1) if the stock market is bidding up share prices solely in anticipation of higher economic profits, and 2) if these restructurings actually contributed to long-term residual income, thus confirming the perfect foresight of the stock market. Without such empirical evidence, it is circular reasoning to argue that stock market gains *ex ante* prove the firm is adding permanent economic value by virtue of a recapitalization.

Each year, the *Journal of Applied Corporate Finance* (JACF), published by Stern Stewart, produces a list of the 1,000 largest publicly owned US industrial and non-financial service companies ranked by market value added (MVA).[viii] In an article drawn from the JACF, Ross (1998) asserts that MVA has "…increasingly been recognized as the best gauge of a company's success in creating (or destroying) shareholder wealth". Ross (1998) further argues, "… there is a significant correlation between MVA and EVA™". To support this argument, Ross (1998) offers a number of anecdotal "success stories" of firms who have implemented the EVA™ management program, including Harnishfeger Industries, Equifax, and Manitowoc. Harnishfeger Industries is reported to have been generating negative EVA™ prior to the advent of its EVA™ program but moves to a position of positive EVA™ within three years following implementation while its stock price more than doubles during the same period. Similarly, Equifax reports its EVA™ moving from negative $21.5 million to positive $46.1 million in the three years following program implementation while its total return to shareholders rises to 55% and 45% in years two and three, respectively, following implementation. Manitowoc calculates its EVA™ as increasing from negative $15 million to positive $10 million and its stock price rising fourfold during the same period.

Notwithstanding the aforementioned anecdotal stories, Ross (1998) offers no formal evidence demonstrating a positive association between MVA and EVA™. Indeed, based on tables published by Stern Stewart on their web site[ix], the late 1990s appear to have been a period of marked disparity between contemporaneous levels of MVA and EVA™ for many US companies, particularly technology firms. In 1996 for example, Stern Stewart reports Cisco had MVA of $38,341 million while EVA™ is calculated at a mere 2 percent of this figure or $794 million. In the same year, MVA for Intel is reported to be $86,481 million whereas EVA™ is just $3,605 million. Microsoft, which ranked third amongst all US firms with $89,957 million in MVA for 1996, generated just $1,727 million in EVA™. Motorola, which enjoyed a positive MVA of $18,758 million in 1996, actually destroyed $630 million in EVA™ for the year. Comparably wide gaps between EVA™ and MVA can be observed in 1997, 1998, and 1999 (see Table 1).

Ross (1998) and Stewart (1991) concede it is difficult to establish a precise relationship between MVA and EVA™ because market valuations often anticipate future changes in EVA™. This qualification however, only begs the question of whether financial markets are rewarding companies for higher EVA™ with a higher market value. If, for example, EVA™ were to be regressed on MVA on a lagged basis and no positive correlation found, advocates of EVA™ could always argue that *ex ante* MVA represented the market's best estimate of *ex post* EVA™ which ultimately failed to materialize. In other words, it could be argued that a weak statistical association between MVA and EVA™ is simply the result of the market's inability to perfectly forecast future EVA™.

Damodaran (2001) points out that firms can increase their EVA™ from assets in place while simultaneously seeing their market value decline under the following circumstances:

1. The increase in EVA™ is the result of a shrinking of the capital invested in the firm. Restructuring charges and stock buybacks for example, can reduce capital invested and make EVA™ a much larger figure while yielding no gain or a reduction in market value.
2. The increase in EVA™ from existing assets is generated by sacrificing future investments and the economic value that would have been created by those investments.

An illustration of the dilemma facing investigators addressing the question of the relationship between MVA and EVA™ can be found in Ross's (1998) discussion on International Multifoods. Ross indicates that the company share price increased from $15 to the "mid-$20s" just after the news release announcing the firm's implementation of the EVA™ management system. For Ross, this is *prima facie* evidence that investors expect EVA™ adopters to add to intrinsic value. Ross reveals however, that concurrent with the EVA™ announcement by

International Multifoods, analyst reports were issued containing optimistic profit forecasts for the company. Clearly, a case can be made that it was these forecasts, rather than the specific adoption of EVA™, that led to the rise in market value.

The Boston Consulting Group (BCG) (1996) argues that EVA™ is not strongly correlated with MVA due to the latter's omission of dividend income. As an alternative (and purportedly more complete) measure of changes in shareholder wealth, BCG proposes total shareholder return (TSR), a metric that explicitly includes dividend income and is unbiased by market capitalisation. Holt Value Associates (undated), another consultancy specialising in valuation frameworks, endorses TSR, and Price Waterhouse executives Black, Wright, and Bachman (1998) count dividends as well as capital appreciation in their shareholder value model (SHV). It should be noted however, that TSR is itself, marked by a low correlation with EVA™ (BCG, 1996) due to the distortions introduced by using book capital discussed earlier.

2.1 EVA and the Valuation of Technology Firms

For a variety of reasons to be discussed here, EVA™ may serve as a constructive tool when valuing technology firms. In a comparison between EVA™ and conventional discounted cash flow analysis, Stewart (1991) points out that many fast-growing technology companies will run free cash flow deficits for a number of years as they invest heavily in new projects. Negative free cash flow makes it problematic to value these type of firms with DCF in the early business stages, whereas the EVA™-prescribed alternative of deducting a capital charge from NOPAT for each operating period, and then discounting all future EVA™ to arrive at present value, appears to redress this problem.

EVA™ also appears to account for the characteristic asset base of many technology firms. As discussed earlier, Stern Stewart capitalize intangible assets like R&D and some forms of intellectual capital to more accurately gauge returns on investment for firms with significant intangible assets. A number of studies offer empirical support for the Stern Stewart approach as they demonstrate a positive association between expenditures normally accounted for as expenses, and stock market value. Ben-Zion (1978) for example, finds that firms' market values minus book values are cross-sectionally correlated with R&D and advertising expenditures. Similarly, Hirschey and Weygandt (1985) demonstrate that Tobin's *Q* values are cross-sectionally correlated with R&D to sales ratios. Lev (1996) reports that both annual net investment in R&D and accumulated R&D capital are value-relevant to investors; however, estimated R&D capital does not appear to be fully reflected contemporaneously in stock prices. Examining internet companies, Hand (2000) finds that market values are increasing and concave in R&D, selling, and marketing expenses when net income is negative, although the effect weakens after the first two fiscal quarters following the IPO. In a study of 300 companies listed on the London Stock Exchange, Stern Stewart Europe Limited (1999) divides firms into 14 industry and service sectors, further delineating them by EVA™-related performance. Their results demonstrate that market values rise when R&D expenditures are increased in certain sectors, i.e., electronics and electrical, such that the stronger the current economic performance, the greater the positive impact of increases in R&D on both MVA and share prices. Stern Stewart concludes that where companies have a track record of being able to create a defensible competitive advantage, i.e., technology firms, investors will reward increases in R&D with higher share prices.

In their best-selling 1998 book *The Gorilla Game,* Moore, Johnson, and Kippola rely heavily on the EVA™ framework to rationalize the market values awarded to large technology firms like Cisco, Microsoft, and Intel during the 1990s. These authors suggest that by virtue of their competitive advantage in a new product or sector niche, the above firms were able to command a superior spread between returns on capital and their cost of capital (*Competitive Advantage Gap*) over an extended interval (*Competitive Advantage Period*). At the same time, intense market demand for their products drove these companies to maximize new investment in a quest to maximize output. These factors – a rise in the spread between the return on capital and the cost of capital along with a large increase in the capital base – directly contributed to substantially higher EVA™ and consequently, a higher share price for market leaders.

Notwithstanding these endorsements, EVA™ does not provide a ready solution to the valuation of technology companies. Capital investment and cash flow growth rates must still be forecast by the appraiser so as to fix the period of competitive advantage during which the firm can be expected to earn a positive spread between returns on capital and the cost of capital. As discussed earlier, this is traditionally difficult to do in the case of technology firms. Further, over optimism associated with the number of companies who can be expected to maintain a competitive advantage may bias the estimating process across an entire sector.

Moore, Johnson, and Kippola (1998) for example, suggest that share prices for technology firms were driven primarily by industry "hypergrowth" in the 1990s as consumers and investors rushed to embrace new technologies. Yet, these authors simultaneously acknowledge that only one company in each market segment will be perceived by investors as ultimately coming to dominate that segment and receive a value premium therefore, that reflects the expectation of large and increasing EVA™ over time. While this notion may have applied to a quasi-monopoly like Microsoft, it fails to explain how dozens of technology companies competing within each segment could have been awarded the EVA™ growth premiums seen in the 1990s.

Damodaran (2001) underscores another weakness of EVA™ as a tool for valuing technology issues when he notes that companies who buy back company stock can increase EVA™ simply by reducing the amount of capital invested in the business. As a large number of technology firms undertook substantial share repurchases to accommodate employee stock option programs during the 1990s[x], we might expect measures of EVA™, and therefore estimated corporate values, to be overstated in many cases.

Other writers have suggested that EVA™ is ultimately limited in its ability to capture the value of knowledge-intensive firms like those in the technology sector. Equipped with empirical "stories" drawn from industry, Mouritsen (1998) argues that whereas EVA™ is framed around a calculation of value based upon risk assessment and quantities taken from financial statements, intellectual capital is a more qualitative endeavour which resists measurement. For Mouritsen, "…people rather than things are decisive growth drivers" and "…growth is the outcome of skilfully managing the relationship between tangible and intangible assets".

Mouritsen's criticisms of EVA™ may be overstated. While it is true that EVA™ seeks to measure value in terms of economic profits, the Stern Stewart framework explicitly or implicitly accounts for many of the intangible assets owned by the firm, the goodwill of customers, and the knowledge and competence of its employees from which economic profits are ultimately derived.

3 METHODOLOGY

In an effort to rationalize the price gains garnered by technology shares during the stock market boom of the late 1990s, and to gain further insight into the *ex ante* expectations of technology investors during this period, one can employ EVA™ to estimate the value of a large segment of the US technology sector as of 1999. This calculated value can then be compared with the equity market value of the sector at the time.

The data sample reflects three discrete industrial segments within the technology sector. 1999 calendar-year financial information for each industry is drawn from the Value Line database which aggregates and reports accounting data for large public firms in 110 industries. Research and development expenditures for the same industries are drawn from the National Science Foundation's primary sourcebook: *Research and Development in Industry: 1999*[xi] which surveys public and private companies annually for their R&D expenditures. As the Value Line database addresses itself primarily to large, publicly-traded firms, companies with R&D programs of less than $10 million are eliminated from the composite sample. This filter also enables the analyst to more closely match the total number of companies within each industry reported by the two data sources.

Table 1: EVA™ and MVA for Large Technology Firms (in millions $)

Firm	1997 EVA™	1997 MVA	1998 EVA™	1998 MVA	1999 EVA™	1999 MVA
Cisco	794	38,341	1,472	50,422	1,849	135,650
Intel	3,605	86,481	4,821	90,010	4,280	166,902
IBM	(2,743)	22,944	(1,561)	49,101	(1,058)	116,572
Microsoft	1,727	89,957	2,781	143,740	3,776	328,257
Motorola	(630)	18,758	(742)	14,045	(2,830)	17,254

Source: Stern Stewart & Co.

Table 2: EVA Inputs

CMT 10-Year Bond Rate: 5.65%											
Equity Risk Premium: 4.75%											
Industry Sector	**Firms**	**NOPAT**	**Book Value of Equity**	**Beta**	**Cost of Equity**	**R&D**	**R&D less Deprec @10%**	**NOPAT (Adjusted)**	**BV of Equity (Adjusted)**	**ROE (Adjusted)**	**(ROE-COE) (Adjusted)**
Computers & Peripherals	161	$18,579	$93,223	1.14	11.08%	$3,867	$3,480	$22,060	$ 96,703	22.81%	11.73%
Semicon & Semicon Cap Equip	88	$9,029	$68,818	1.36	12.11%	$10,131	$9,118	$18,147	$ 77,936	23.28%	11.17%
Computer Software & Svcs	368	$16,508	$76,594	1.22	11.45%	$11,189	$10,070	$26,578	$ 86,664	30.67%	19.22%
All figures in millions $											

Equity EVA™ for each industry can be computed as per equations 1- 7 above with equity values substituted for capital values, e.g., return on equity rather than return on capital. As discussed earlier, there are as many as 164 different accounting issues and adjustments made by Stern Stewart in their calculation of EVA™ many of which are not publicly disclosed and cannot therefore, be performed in the exercise presented here. One can however, add estimated annual R&D expenditures, less a charge for amortization or depreciation, to aggregate NOPAT and to the aggregate book value of equity for each industrial sector. Consistent with IRS rules, aggregate R&D expenditures have been added back to these accounts less depreciation of 10 percent reflecting a 10-year ratable schedule. Cost of equity is calculated using the CAPM with a risk-free rate equal to the average constant maturity rate for 10-year US Treasury bonds in 1999 (5.30 percent), a long-term historical risk premium for the stock market of 4.75 percent[xii], and measured average beta for each sector drawn from the Value Line database. As many influential analysts and economists in the late 1990s had forecast earnings for technology firms to grow by an average 25 percent per year in the immediately subsequent ten year period[xiii], annual increases in NOPAT of 25 percent are projected extending out to 2009. Beyond 2009, sectors are assumed to generate returns on equity equal to their cost of equity and thus, no new EVA is created. All EVA™ inputs for base year 1999 are provided in Table 2.

4 RESULTS/SOLUTION

Results for the EVA™ valuations are presented in Tables 3 - 5. As can be seen, notwithstanding the adjusted recovery of research and development expenditures and the assumption of enormous compound growth in net operating profits, calculated equity values for each industry based on EVA™ are significantly less than concurrent market values for the same. Shareholders awarded the *Semiconductor and Semiconductor Capital Equipment* industry a market value nearly double that of its intrinsic value. The market value for the *Computer Software and Services* segment was over 144 percent of its EVA™ calculated value and the *Computers and Peripherals* segment carried a market premium of over 175 percent.

Table 3: PV of EVA vs Market Value for Semiconductor and Semiconductor Capital Equipment Sector

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
NOPAT	18,147	22,684	28,355	35,443	44,304	55,380	69,225	86,532	108,165	135,206	169,007
Beg Equity Capital	77,936	96,083	118,767	147,121	182,565	226,869	282,249	351,475	438,006	546,171	681,376
ROE	23.28%	23.61%	23.87%	24.09%	24.27%	24.41%	24.53%	24.62%	24.69%	24.76%	24.80%
COE	12.11%	12.11%	12.11%	12.11%	12.11%	12.11%	12.11%	12.11%	12.11%	12.11%	12.11%
Spread	11.17%	11.50%	11.76%	11.98%	12.16%	12.30%	12.42%	12.51%	12.58%	12.65%	12.69%
Beg Equity Capital	$77,936	$96,083	$118,767	$147,121	$182,565	$226,869	$282,249	$351,475	$438,006	$546,171	$681,376
EVA	$8,709	$11,048	$13,972	$17,627	$22,196	$27,906	$35,045	$43,968	$55,122	$69,064	$86,492
PV of EVA	$7,768	$8,790	$9,916	$11,158	$12,533	$14,055	$15,744	$17,619	$19,703	$22,020	$24,597
Cum PV of EVA	$7,768	$16,558	$26,474	$37,633	$50,165	$64,220	$79,964	$97,584	$117,286	$139,306	$163,903
Equity Capital											$77,936
1999 Calculated Value of Equity											$241,839
1999 Market Value of Equity											$473,322
Market Premium											95.72%
all figures in 000s $											

Table 4: PV of EVA vs Market Value for Computer Software and Services Sector

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
NOPAT	26,578	33,223	41,528	51,910	64,888	81,110	101,387	126,734	158,417	198,022	247,527
Beg Equity Capital	86,664	113,242	146,465	187,993	239,903	304,790	385,900	487,287	614,021	772,438	970,460
ROE	30.67%	29.34%	28.35%	27.61%	27.05%	26.61%	26.27%	26.01%	25.80%	25.64%	25.51%
COE	11.45%	11.45%	11.45%	11.45%	11.45%	11.45%	11.45%	11.45%	11.45%	11.45%	11.45%
Spread	19.22%	17.89%	16.90%	16.16%	15.60%	15.16%	14.82%	14.56%	14.35%	14.19%	14.06%
Beg Equity Capital	$86,664	$113,242	$146,465	$187,993	$239,903	$304,790	$385,900	$487,287	$614,021	$772,438	$970,460
EVA	$16,655	$20,256	$24,758	$30,385	$37,419	$46,211	$57,201	$70,939	$88,112	$109,577	$136,409
PV of EVA	$14,944	$16,308	$17,884	$19,694	$21,762	$24,114	$26,782	$29,802	$33,213	$37,061	$41,396
Cum PV of EVA	$14,944	$31,252	$49,136	$68,830	$90,592	$114,706	$141,488	$171,290	$204,504	$241,565	$282,961
Equity Capital											$86,664
1999 Calculated Value of Equity											$369,625
1999 Market Value of Equity											$904,909
Market Premium											144.82%
all figures in 000s $											

Table 5: PV of EVA vs Market Value for Computers & Peripherals Sector

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
NOPAT	22,060	27,575	34,469	43,086	53,857	67,322	84,152	105,190	131,488	164,360	205,450
Beg Equity Capital	96,703	118,763	146,338	180,807	223,893	277,750	345,072	429,224	534,414	665,902	830,262
ROE	22.81%	23.22%	23.55%	23.83%	24.06%	24.24%	24.39%	24.51%	24.60%	24.68%	24.75%
COE	11.08%	11.08%	11.08%	11.08%	11.08%	11.08%	11.08%	11.08%	11.08%	11.08%	11.08%
Spread	11.73%	12.14%	12.47%	12.75%	12.98%	13.16%	13.31%	13.43%	13.52%	13.60%	13.67%
Beg Equity Capital	$96,703	$118,763	$146,338	$180,807	$223,893	$277,750	$345,072	$429,224	$534,414	$665,902	$830,262
EVA	$11,345	$14,416	$18,254	$23,053	$29,050	$36,547	$45,918	$57,632	$72,275	$90,578	$113,457
PV of EVA	$10,214	$11,684	$13,319	$15,142	$17,178	$19,455	$22,006	$24,864	$28,071	$31,671	$35,714
Cum PV of EVA	$10,214	$21,897	$35,216	$50,358	$67,535	$86,991	$108,996	$133,861	$161,932	$193,603	$229,317
Equity Capital											$96,703
1999 Calculated Value of Equity											$326,020
1999 Market Value of Equity											$899,297
Market Premium											175.84%
all figures in 000s $											

5 DISCUSSION AND CONCLUSION

This case study critically examines the Economic Value Added (EVA™) framework and employs EVA™ to estimate the intrinsic value of a large proportion of the US technology sector as of 1999. The results underscore data published by Stern Stewart on their website, which depicts a marked disparity between contemporaneous levels of MVA and EVA™ for technology firms in the late 1990s (see Table 1). Stewart (1991) suggests that such gaps may simply reflect market expectations of increasing EVA™ over time; however, the assumptions built into the model presented here; i.e., 25 percent annual increases in NOPAT over a ten-year period, accompanied by substantial spreads between returns on equity and the cost of equity, amply allow for this prospect.

Thus, one is left with the question of how to bridge an immense divide between calculated intrinsic values for the technology sector and concurrent market values for the same. It is possible, of course, that the gap observed is a result of limitations in our application of EVA™ – the inability, for example, to issue all of the accounting adjustments prescribed by Stern Stewart. As noted earlier, however, several researchers report that these adjustments are not necessary to achieve the level of value-relevance found in the standard residual income measure (see Chen and Dodd, 1997; O'Hanlon and Peasnell, 1998).

Alternatively, it may be, as Biddle, Bowen, and Wallace (1996) find, that earnings are more strongly associated with market values than is EVA™. Both contemporaneous and forecast earnings growth for large technology firms were well above historical norms when share prices were rising strongly in the late 1990s. This might support record MVA. Yet Shiller (2000) points out that earnings growth on a similar scale had occurred several times prior to the 1990s with no comparable boom in equity prices. Moreover, in January of 2000, a point when technology shares constituted over 30 percent of the S&P 500 Index (contributing substantially to the overall value of the Index), the price-earnings ratio for the S&P 500 hit a record high of 44.3[xiv] reflecting a similarly wide gap between earnings and market values to that of EVA™ and market values.

AUTHOR INFORMATION

Henry I. Silverman is an Assistant Professor of Finance at Roosevelt University in Chicago and a director of an asset management firm based in London. Engaged in research on investment companies, their return objectives, investment strategies, and risk-taking behavior, Dr. Silverman has conducted numerous interviews with US and European fund managers and performed analytic work on their disclosure practices and documents. Dr. Silverman's findings were presented to the Chairman of the British Government's Financial Ombudsman Service in 2003. Dr. Silverman is author of the academic text *Theory and Practice of Fund Management* and a member of the CFA Institute.

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ENDNOTES

[i] Retrieved from NASDAQ.com
[ii] See Schlit, Howard. Financial Shenanigans. New York: McGraw-Hill, 2002 and Magrath, Lorraine and Leonard G. Weld. "Case Histories of Fraud and Abusive Earnings Management." *Ohio CPA Journal*, 61(2) (April-June 2002): 25-
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[iv] Stewart (1991) argues that common accounting measures of performance and value including earnings per share, earnings growth, and net assets are subject to distortion and fail to reliably measure the economic profits being generated by the firm. For Stewart, sunk costs are irrelevant and therefore, "a company's book value cannot be a measure of its market value".
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[vi] Associate Professor of Management, Rutgers University
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[viii] MVA is defined by Stern Stewart as the difference between a company's total market value (debt + equity) and its economic book value, or the amount that investors have contributed to produce that value.
[ix] Stern Stewart & Co. Retrieved from http://www.sternstewart.com/
[x] See Fenn, G. and N. Lang. "Good News and Bad News About Share Repurchases." Working Paper, Board of Governors of the Federal Reserve, 1997.

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[xii] See Ibbotson, Roger G. *Stocks Bonds Bills and Inflation: 1999 Yearbook (Stocks, Bonds, Bills & Inflation Yearbook).* 1999.
[xiii] See Yardeni, Edward. "Irrational Exuberance: Earnings Growth & Stock Valuation" Topical Study #46. (September 20, 1999). Deutsche Banc Alex Brown. Retrieved from www.yardeni.com
[xiv] Although difficult to compute accurately due to the large number of companies reporting accounting losses at the time, the price-earnings ratio for the NASDAQ Composite Index reached a peak of 61 in January of 2000. Source: Ned Davis Research. Retrieved from http://www.comstockfunds.com/files/NLPP00000%5C025.pdf

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