## CHAPTER 3: LITERATURE REVIEW

Various studies have been conducted in order to determine the extent of the relationship between EVA and MVA, and their association with other performance and valuation measures. However, these studies have produced mixed results. The financial fraternity remains divided as to whether EVA does possess value-added information over traditional accounting measures, which can be useful to managers, investors, academics and policy makers. By and large, the studies have used regression analysis and those that are conducted in U.S. rely on the Stern Stewart Performance 1,000 database.

Indeed, most of the EVA studies stem from claims made by Stewart (1991), the first to conduct a study on EVA and MVA. His study is based on 613 U.S. companies and data from 1984 to 1988. Stewart finds a striking relationship between EVA and MVA, and between changes in EVA and changes in MVA. For the group of companies with negative EVA, the correlation is less evident. Until EVA becomes positive, market values are decoupled from current internal measures of performance. Stewart points out that the potential for liquidation, recovery, recapitalization or takeover sets a floor on a company's market value. Companies can always be liquidated with owners having an option to liquidate assets if future returns look weak. Furthermore, markets may not believe that the weak returns can go on forever but instead, expect a chance for improvement in the future. However, when EVA turns positive, there is a very high significant positive relationship between EVA and MVA. Stewart claims that adopting the goal of maximizing EVA and EVA growth will ultimately build a premium into the market value of company. Stewart (1994) adds that EVA stands out well among the other key performance measures as the single best measure of wealth creation on a contemporaneous basis.

These comments from Stewart have the strong support from O'Byrne (1996) and Ehrbar (1998), both who are employees of Stern Stewart & Company. O'Byrne

(1996) studies the relationship between capitalized EVA and NOPAT (both as independent variables) with market value of the firm deflated by beginning period of capital (dependent variable), and compares the adjusted R-square for the two regression models. For the EVA regression, the adjusted R-square is 31% while the NOPAT regression produces an adjusted R-square of 33%. Through a series of adjustments made to the EVA regression, the regression models yield a higher adjusted R-square of 56% for EVA and 33% for NOPAT. O'Byrne concludes that EVA is systematically linked to market value and is a better predictor of market value than other operating performance measures.

In his book *The Real Key To Creating Wealth*, Ehrbar (1998) echoes the same views and claims that a number of empirical tests done by Stern Stewart & Company using the Stern Stewart Performance 1,000 database shows that EVA statistically explains about half (50%) of the movement in a company's MVA. According to Ehrbar, the less than perfect result is because no performance measure can possibly correlate perfectly with changes in MVA. For specific industries with tailored accounting adjustments, EVA in some cases can explain more than 70% of the changes in MVA.

Other independent studies that support the use of EVA include those by Grant (1996), Lefkowitz (1999), Lehn and Makhija (1996), and Milunovich and Tsuei (1996).

Grant (1996) states that EVA has a significant impact on a company's MVA. In his research, Grant studies the relationship between MVA-to-capital (dependent variable) and EVA-to-capital (independent variable) for the Stern Stewart Performance 1,000 database at year-end 1993. Both EVA and MVA are divided by capital in order to adjust for company size, which will then produce a percentage return that is comparable across companies. He also performs similar tests on the fifty largest U.S. wealth creators and the fifty largest U.S. wealth destroyers at year-end 1993 as listed in the Fortune magazine. Grant's

study reveals that 31.6% of the movement in MVA-to-capital for the U.S. large-capitalization companies is explained by variations in EVA-to-capital. Grant adds that with a slope coefficient at 17.14 and a t-statistic at 21.34, EVA-to-capital is a highly significant financial variable.

For the fifty largest U.S. wealth creators at year-end 1993, the percentage of MVA-to-capital movement explained by variations in EVA-to-capital is 83%. With a slope coefficient at 36.14 and a t-statistic at 15.59, EVA-to-capital is again a highly significant financial variable. For the fifty largest U.S. wealth destroyers, forty-seven out of the fifty paired MVA-to-capital and EVA-to-capital ratios occur at negative points. Grant suggests that a currently adverse EVA outlook may have negative information content about future growth prospects of a company. If this conclusion is correct, the market is anticipating a negative residual return on capital from the company. Grant concludes that the EVA induced effects arise from companies that have a positive residual return on capital, which means that the company's after-tax return on invested capital exceeds its weighted average cost of capital.

Meanwhile, Lefkowitz (1999) examines the correlation between the annual EVA of companies and the annual market value changes of companies using the Stern Stewart Performance 1,000 database. Lefkowitz's research is quite similar to that of Grant except that the annual change in MVA-to-capital is used as the dependent variable instead of MVA-to-capital. Also, Lefkowitz's study is based on 1996 and preceding years' data while Grant uses 1993 and preceding years' data. Furthermore, Lefkowitz did not perform the same regression test on the fifty largest U.S. wealth creators and the fifty largest U.S. wealth destroyers, which Grant did.

Lefkowitz's study reveals that for individual companies, 16.4% of the movement in the annual change in MVA-to-capital is explained by variations in the EVA-to-capital factor. For companies grouped into 56 industries, 35.2% of the

movement in the annual change in MVA-to capital is accounted for by variations in EVA-to-capital. Statistically, there is evidence of a significant positive linear relationship (slope coefficient = 8.99, t-statistic = 13.69 for individual companies, slope coefficient = 6.26, t-statistic = 5.42 for industries) between EVA-to-capital and the annual change in MVA-to-capital.

Despite the unimpressive adjusted R-square of 16.4% for individual companies, Lefkowitz explains that the market values of securities are influenced by future expectations while EVA pertains to the past. Lefkowitz concludes that economic profit measures are among the factors that influence stocks' values.

Lehn and Makhija (1996) support the view that EVA and MVA, like the traditional accounting measures, are effective measures of performance and signals for strategic change. Their study centres on 241 U.S. companies and data in 1987-1988 and 1992-1993. Though not by a large difference, the correlations of both EVA and MVA with stock returns is slightly higher than the correlation of the other traditional accounting measures like ROE, return on assets (ROA) and return on sales (ROS). They conclude that EVA has a slight edge as a performance measure.

In studying the computer industry, Milunovich and Tsuei (1996) find that EVA correlates better with MVA (adjusted R-square = 42%) than other accounting measures like EPS growth (adjusted R-square = 34%) and EPS (adjusted R-square = 29%). Milunovich and Tsuei add that although EVA is not a panacea, it can become an essential management tool. When properly implemented, EVA forms the backbone of a powerful management approach.

On the other hand, there is a group of researchers who do not support or agree with Stewart's claims that EVA is a superior corporate performance and valuation measure. They include Biddle, Bowen and Wallace (1997, 1999), Chen and

Dodd (1997a, 1997b), Clinton and Chen (1998), Yau (1996), Peterson and Peterson (1996), and Kramer and Pusher (1997).

Biddle, Bowen and Wallace (1999) state that relative information content tests reveal NI to be more highly associated with stock returns and firm values than EVA, RI or cash flow from operations. Incremental tests suggest that EVA components (like cash flow from operations, operating accruals, capital charge and net accounting adjustments) add marginally to information content beyond NI. They conclude that their results do not support the claims that EVA dominates NI in relative information content. Instead, NI generally outperforms EVA.

Using a sample of 6,174 firm-years over the period 1984-1993, Biddle, Bowen and Wallace find that NI (adjusted R-square = 12.8%) is significantly higher associated with market-adjusted annual returns than are RI (adjusted R-square = 7.3%), EVA (adjusted R-square = 6.5%) and cash flow from operations (adjusted R-square = 2.8%). Replicating and extending O'Byrne's study, Biddle, Bowen and Wallace note that when the same adjustments are extended to the NOPAT regression (as what O'Byrne did for EVA) to ensure level playing field and by examining NI, EVA's superiority disappears. The NI regression has a significantly higher association with firm value (adjusted R-square = 53%) than the EVA regression (adjusted R-square = 50%) and the NOPAT regression (adjusted R-square = 49%). These results do not support the claim that EVA outperforms NI in explaining firm values. Contrary, the evidence suggests that NI more often dominates EVA in value relevance to market participants. Biddle, Bowen and Wallace (1997) add that while the charge for capital and Stern Stewart's adjustments for accounting distortions show some marginal evidence of being incrementally important, this difference does not appear to be economically significant.

Chen and Dodd write two articles on EVA. Their study is also based on the Stern Stewart Performance 1,000 database spanning over a ten-year period from 1983 to 1992. To reduce short-term fluctuations, Chen and Dodd calculate the variables using a ten-year average basis.

In the latter article, Chen and Dodd (1997b) agree that while improving EVA performance is associated with higher stock returns, the association is not a strong as suggested in anecdotal EVA stories. Not a single EVA measure is able to explain more than 26% of the variation in stock return. Collectively, the regression model containing the four EVA variables (EVA per share, change of standardized EVA, average spread between return on capital and cost of capital, and the average annual compound rate of capital growth) yields an adjusted R-square of 41.5%. To Chen and Dodd, this is a large percentage of unexplained variation in stock return. Chen and Dodd add that companies should be cautioned against any unrealistic expectations about the potential effect of EVA on stock performance and they do not deny or support the claim that improving EVA is what a company needs to achieve superior stock returns.

However, Chen and Dodd acknowledge that EVA measures provide relatively more information than traditional accounting measures in terms of the strength of their associations with stock returns. Using regression analysis, 36.5% of the variation in stock return can be explained by accounting measures while 47% of the variation in stock return can be accounted for by EVA measures. Comparing the adjusted R-squares of the two regressions, the EVA measures contribute a 10.5% absolute increase in explaining the variation of stock return in addition to the accounting measures. They add that this absolute increase translates to a relative increase of more than 28% in the explanatory power of the accounting measures. Despite these results, they write that accounting profit measures still provide significant information value even if EVA is in use. Instead of completely replacing accounting measures as a performance measure, companies should

continue monitoring the traditional accounting measures like EPS, ROE and ROA.

Chen and Dodd also state that not only is EVA akin to RI in concept, they are empirically comparable. Most of the EVA and RI variables are highly correlated and they are almost identical in terms of association to stock return. Although a partial F test indicates a significant incremental contribution by adding the EVA variable to the RI based model, the absolute increase in the adjusted R-square is a marginal 2.9%. They feel that the practical gain is too small to be meaningful. Because EVA differs from RI in that EVA adjusts NI and equity for the equity equivalent reserves, their study suggests that companies may not need to make these adjustments in order to adopt an EVA paradigm. Implementing performance measures based on RI may be more than adequate and bring about the same benefits at a lower cost.

The findings from Chen's and Dodd's study above are in contrast with another study conducted by them. In this other study, Chen and Dodd (1997a) examine the relationship of three different measures of profitability, that is operating income, RI and EVA with stock returns. Chen and Dodd find that EVA is significantly associated with annual stock returns but it demonstrates relatively low explanatory power with an adjusted R-square of 2.3%. EVA also exhibits lower explanatory power than the more traditional accounting measures of RI (adjusted R-square = 5%) and operating income (adjusted R-square = 6.2%). Statistical analysis finds there is not a significant difference between any of the measures in their association with stock returns.

In another study, Clinton and Chen (1998) focus on the relationship of EVA, CFROI (used by the Boston Consulting Group) and residual cash flow (RCF) with stock returns. Clinton and Chen report that evidence seems to suggest that instead of making the costly EVA adjustments, companies may be better off focusing on simple cash flow measures as reported. The ordinary cash flow

measure produces results as good as the adjusted operating income measure in terms of its association with stock value. They conclude that companies that have adopted or are intending to adopt EVA or CFROI as their main performance measure should consider RCF as an alternative.

Elsewhere, Yau (1996) studies the EVA and MVA of ten property companies listed on the Stock Exchange of Singapore from 1991 to 1993 using the Wilcoxon statistical test. The latter is a nonparametric test. Yau finds that both EVA and traditional accounting measures produce relatively similar results and hence, concludes that there would be no value added in using EVA and MVA measures over traditional accounting measures.