Portfolio Investing with EVA

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Investment strategy using Stern Stewart & Company's EVA metric has gained popularity, particularly with *Fortune's* annual publication of the top wealth creators using MVA and EVA.[1] While many studies (Abate, Grant, and Stewart [2004] Grant [1996, 1997, 2003], and Biddle, Bowen, and Wallace [1997], among others) have presented a theoretical/empirical relationship between EVA and MVA (or stock returns), Yook and McCabe [2001] were first to create portfolios using MVAs. They found that low MVA per share led to higher average portfolio returns. This study differs from the Yook and McCabe study by investigating portfolios formed with EVAs. An examination of portfolios ranked by EVA provides added information given that Grant [1997] found a significant difference in EVA and MVA between wealth creators and wealth destroyers. His study further found that firms with negative EVA include a mix of troubled firms that may be on their way to recovery versus ones that may not. Hence the "abundance of managerial noise argument" adds to the empirical question of whether portfolio performance of these firms is a good value investment or not.

Additionally, portfolio diversification may dilute firm-specific benefits that might accrue from managerial decisions based on EVA. Hence, it becomes an empirical question if the benefits of utilizing EVA filter down to portfolio investing. Moreover, the empirical research on the relationship between EVA and stock returns is at best inconclusive. For example, O'Byrne [1999] found that EVA has greater explanatory power than net operating profits after taxes (NOPAT) once the proper regression model is defined. Garvey and Milbourn [2000, p. 209] supported O'Byrne's results with their finding that the correlation between EVA and stock returns is a "reasonably reliable guide to its value." Grant [1996, 1997, 2003] examined the EVA–MVA relationship over the 10-year period from 1990 to 2000, while Abate, Grant, and Stewart [2004] constructed a scatter plot of the MVA/capital-to-EVA/capital ratio for the top 50 wealth creators and the bottom 50 MVA firms for the year 2000. Generally, both studies found a positive relationship between EVA/capital and MVA/capital in cases where firms with a positive EVA ratio display a positive MVA ratio and firms with a negative EVA ratio exhibit a negative MVA ratio.

However, articles by Biddle, Bowen, and Wallace [1997] and Farzad, Degel, and Degner [2000], among others, have examined the correlation between EVA and abnormal stock returns, generally concluding that the relationship between EVA and stock returns is relatively weak. Biddle, Bowen, and Wallace found that a variation of the accounting residual income is more strongly correlated to stock abnormal returns than EVA, and Farzad, Degel, and Degner established that, in the short run, no relationship exists between EVA and total stock return. Even with these results, it is still important from the portfolio manager's perspective to determine whether a form of EVA or residual income serves as a better metric than accounting profits to identify value investing.

Although most past research examines the relationship between EVA and stock returns over several years, Yook and McCabe [2001] investigated portfolios formed with MVAs and found a negative relationship between MVA per share and average portfolio returns. This study examines portfolio returns stratified by the ratio of EVA to market value ratios, and attempts to determine whether the relationship between EVA and ex ante returns follows a positive relationship as expected by capital market theory or whether a negative relationship much like the one found by Yook and McCabe persists in the EVA-to-portfolio relationship. The study also contributes to the literature by determining whether firm-specific effects are diluted in portfolio returns or whether they can still benefit from managerial decisions that lead to higher EVAs.

DATA AND METHODOLOGY

The Stern Stewart & Company 2004 database is utilized in this study. Using the Stern Stewart EVA calculation, an EVA-to-market value (EVA/MV) ratio is calculated as follows:

$$EVA(t)/MV(t) \tag{1}$$

where, $EVA(t)$ is EVA as calculated by Stern Stewart & Company for year t and $MV(t)$ is the stock price for the last trading day in December for year t multiplied by the number of common stock shares outstanding in December for year t, both obtained from COMPUSTAT.

The study utilizes the portfolio formation methodology applied by Fama and French [1992, 1995]. Each year, starting in 1994, the $EVA(t)/MV(t)$ ratio is calculated for all firms in the sample and rank ordered from lowest to highest (i.e., negative to positive $EVA(t)/MV(t)$). The firms are split into deciles and 10 portfolios are formed each year. Next, stock returns are extracted from CRSP, and an average (equally weighted) portfolio holding period return is calculated for each decile using the stock returns for the next year ($t+1$). Each year 10 portfolios, P1 through P10, are formed. The portfolio P1 is composed of the lowest (negative) EVA/MV firms and P10 of the highest EVA/MV firms. This process is repeated each year and holding period returns are calculated for each of the 10 portfolios (deciles) over the 1995 to 2004 period.

Exhibit 1 displays the EVA/MV ratios for each year t from 1994 to 2003 and provides sample size, number of positive and negative EVAs, range of EVA/MV ratios, and average EVA/MV ratios. By merging firms which appear in both COMPUSTAT and CRSP data, the sample reduces to 931 firms. The sample size decreases further due to missing values for EVA, and ranges from 689 to 908 for the study. Because the database initially starts with 1,000 firms in the most current year (2004 for this study), a survivorship bias may exist. This bias is evidenced by the shrinkage of the sample size from 1,000 to 689, and may particularly apply to negative EVA firms that continue to exist over the period from 1994 to 2003.

Data are reported for three representative portfolios—P1, P5, and P10—where P1 is composed of firms with the greatest negative EVA/MV ratios, P5 of firms with median EVA/MV ratios, and P10 of firms with the highest EVA/MV ratios. The average EVA of firms in P5, which is composed of firms with median EVA/MV ratios, is likely to be close to zero given that the ratios range between negative and positive values. The number of firms with positive EVA/MV ratios outnumber firms with negative ratios, except in the more recent years of 2001 to 2003 when the ratios are almost equal (468/438, 443/464 and 489/402). Moreover, the highest range of EVA/MV ratios for P1 occurs in 2002, and for the other two portfolios, P5 and P10, in 2000. An average EVA/MV ratio is calculated for each portfolio, P1, P5, and P10. Over the 10-year period, the highest average (i.e., least negative) occurs in 1995 for P1 (–0.1286) and for P5 (+0.0117), and in 2000 for P10 (+0.1965).

Exhibit 2 displays the lowest, median, highest, and average annual stock returns for the firms in the sample as well as the annual S&P 500 return for each year. Interestingly, the average annual return of the Stern Stewart database is greater than the S&P 500 annual return for every year of the sample except 1998. In some years, the average is much higher for the Stern Stewart database. For example, in 2003, the average annual return for the Stern Stewart data is 51.02% compared to the average annual return for the S&P 500 Index of 26.38%. However, the median annual return in 2003 is 34.6%, indicating that many large outliers are skewing the sample to the right. Median returns for other years are closer to the S&P 500 return, but generally still higher, with the exception of

EXHIBIT 1
Sample Description of EVA, 1994–2003

Year	Sample Size	Number of +/– EVAs	EVA Range for:			Average EVA for:		
			P1	P5	P10	P1	P5	P10
1994	689	331/242	−1.8444 to −0.0693	0.0000 to 0.0000	0.0362 to 0.3219	−0.2191	0.0000	0.0581
1995	722	487/226	−0.8020 to −0.0508	0.0084 to 0.0149	0.0437 to 0.2419	−0.1286	0.0117	0.0718
1996	762	514/236	−0.5693 to −0.0519	0.0076 to 0.0138	0.0404 to 0.1857	−0.1349	0.0106	0.0604
1997	795	511/278	−0.4968 to −0.0496	0.0045 to 0.0113	0.0355 to 0.1345	−0.1460	0.0082	0.0542
1998	823	549/269	−6.5342 to −0.0599	0.0050 to 0.0129	0.0427 to 0.1276	−0.2860	0.0096	0.0682
1999	857	527/323	−1.1435 to −0.0629	0.0008 to 0.0083	0.0478 to 0.2781	−0.1505	0.0044	0.0868
2000	886	536/347	−6.5233 to −0.0745	−0.0126 to +0.0085	+0.0527 to +8.8214	−0.3193	−0.0005	0.1965
2001	907	468/438	−2.923 to −0.1200	−0.0021 to 0.0012	0.0439 to 6.4240	−0.3619	−0.0098	0.1446
2002	908	443/464	−6.719 to −0.1796	−0.0191 to −0.0027	0.0418 to 0.4675	−0.7801	−0.0107	0.0776
2003	892	489/402	−1.8026 to −0.1069	−0.0067 to 0.0054	0.0378 to 0.1674	−0.2897	−0.0006	0.0639

Note: The EVA data are lagged by one year for each portfolio where 1994 EVA data are used to form the portfolios for 1995. The EVA data are defined as EVA divided by market value of equity or EVA/MV ratio. Sample size does not equal the number of +/– EVAs, because some of the EVA/MV ratios equal zero, rounded to the fourth decimal.

1998 and 1999. In 1998, the median return of the sample is 8.75% compared to the S&P 500 return of 26.67%, and, in 1999, the median return is 0.07% compared to 19.53% for the S&P 500. The remaining years have median returns that are higher than those of the S&P 500 Index by more than 1% to 25%.

EMPIRICAL RESULTS

The results generate some surprises and some expected outcomes. Of the 10 portfolios ranked from lowest to highest, only 3 representative portfolios (P1, P5, and P10) are displayed in Exhibit 3.[2] The graph shows that P1's annual returns are most volatile over the 10-year

EXHIBIT 2

Sample Description of Annual Stock Returns in Each Portfolio, 1995–2004

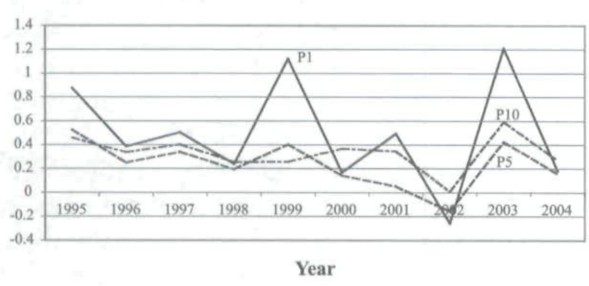
Year	Annual Stock Return for Each Year			Average Annual Return of all Stocks	S&P 500 Annual Return
	Lowest	Median	Highest		
1995	−0.6982	0.3617	9.7312	0.4387	0.3411
1996	−0.7399	0.2130	3.7568	0.2745	0.2026
1997	−0.7343	0.3481	5.1100	0.3720	0.3101
1998	−0.9080	0.0875	9.6639	0.2029	0.2667
1999	−0.7848	0.0007	26.1942	0.3726	0.1953
2000	−0.9357	0.1442	3.7729	0.2251	−0.1014
2001	−0.9381	0.0477	12.4494	0.1368	−0.1304
2002	−0.9450	−0.0977	1.3632	−0.1161	−0.2337
2003	−0.3625	0.3460	8.7732	0.5102	0.2638
2004	−0.7382	0.1520	4.2957	0.1863	0.0899

Note: For each year, monthly returns were obtained from CRSP and annualized for each firm by compounding its 12 monthly returns. Then, the average annual return of all stocks in the sample was calculated based on the sample of firms in that year. For example, the average annual return for 1995 was based on the annual returns of 689 firms.

period from 1995 to 2004. Exhibit 4 reports the annual returns for the portfolios. The annual returns of P1 range from −25.7% to 121.0%, while the returns of P5 are more stable ranging from −15.6% to 52.6%. P10's annual returns range from 0.9% to 59.4%, generally fluctuating between the other two portfolios' returns. However, the annual return of P10 is not always between the returns of the other two portfolios. For example, in 1995, P10 has the lowest return (45.77%) compared to the returns of the two other portfolios (87.53% for P1 and 52.56% for P5), but in 2000 has the highest return (36.75%) compared to

EXHIBIT 3

Portfolio Annual Returns, 1995–2004



the returns of P1 (16.65%) and P5 (13.89%). Also, the results in Exhibit 4 illustrate a general nonlinear pattern of annual returns. For example, in 1996, P1 has the highest portfolio return with an annual return of 38.5%, P10 is second with a 33.7% return, and P5 has the lowest with an annual return of 24.7%. A similar nonlinear pattern persists in every year but 2002. In 2002, a linear pattern exists such that P1 exhibits a negative annual return of −25.7%, P5 displays a smaller negative return of −15.6%, and P10's return becomes positive, albeit only minimally, at +0.9%.

Despite the volatility, P1 exhibits the highest cumulative holding period return. Exhibit 5 displays a graph of the cumulative portfolio returns for portfolios P1, P5, and P10 depicting a dramatic gain in P1's return over the 10-year period, followed by the gain of P10, and then P5. Compared to the S&P 500 Index, the graph shows that the portfolios generated higher cumulative returns than the index. Exhibit 6 presents the cumulative portfolio returns for the entire sample of 10 portfolios. P1's return equals 3,369.51% over the 10-year period, while the cumulative returns for P2 through P9 range from 386.80% to 705.66% and the cumulative return for P10 is 1,505.52%. P1 exhibits, by far, the highest cumulative return, P10 displays the second-highest cumulative return, while the other portfolios display much lower performance. All 10 portfolios, however, earn returns higher than the 163.88% return of the S&P 500 Index.

In order to determine the reward-to-risk tradeoff, Sharpe measures are calculated using annualized geometric portfolio returns. The results in Exhibit 6 demonstrate that the Sharpe measure is higher for P10 (1.994) than for P1 (0.897), indicating that the high return for P1 does not adequately compensate for its higher risk. Moreover, the Sharpe measures are linear with the Sharpe measure being highest for P10, second highest for P9, and lowest for P1. These results demonstrate that EVA may proxy for risk.

Regardless of the fact that the market utilizes EVA as a measure of risk, the negative relationship between EVA/MV and portfolio returns is troubling because it defies capital market theory. Grant [1997, 2003] showed that in an efficient capital market, firm value (or MVA) equals the NPV of the firm and, in turn, NPV equals the present value of the firm's expected EVAs, creating a positive relationship between EVA and value (or returns). The finding that the negative EVA/MV portfolio has the highest cumulative return is an anomaly which defies

EXHIBIT 4
Portfolio Annual Returns, 1995–2004

Portfolio	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
P1	**0.8753**	**0.3850**	**0.5042**	**0.2368**	**1.1210**	**0.1665**	**0.4947**	**−0.2566**	**1.2103**	**0.1817**
P2	0.3315	0.2727	0.2255	0.1721	0.5103	0.2616	0.1083	−0.2106	0.6203	0.1634
P3	0.3078	0.2714	0.4323	0.1836	0.5451	0.1259	0.0813	−0.1586	0.4983	0.2052
P4	0.3899	0.2434	0.2864	0.2704	0.6735	0.0809	−0.0577	−0.1345	0.3911	0.1408
P5	**0.5256**	**0.2468**	**0.3370**	**0.1928**	**0.4026**	**0.1389**	**0.0531**	**−0.1555**	**0.4241**	**0.1552**
P6	0.5005	0.2528	0.3007	0.1617	0.2488	0.2716	0.0429	−0.1151	0.3440	0.1877
P7	0.3232	0.2659	0.3028	0.1855	−0.0135	0.2833	0.0237	−0.0744	0.3618	0.1518
P8	0.3659	0.2462	0.4620	0.1931	0.0183	0.2057	0.1498	−0.0559	0.3431	0.1719
P9	0.3075	0.2229	0.4667	0.1775	−0.0307	0.3371	0.1143	−0.0177	0.3070	0.2367
P10	**0.4577**	**0.3366**	**0.4017**	**0.2523**	**0.2544**	**0.3675**	**0.3436**	**0.0087**	**0.5943**	**0.2666**

EXHIBIT 5
Cumulative Portfolio Returns over 10-Year Period, 1995–2004

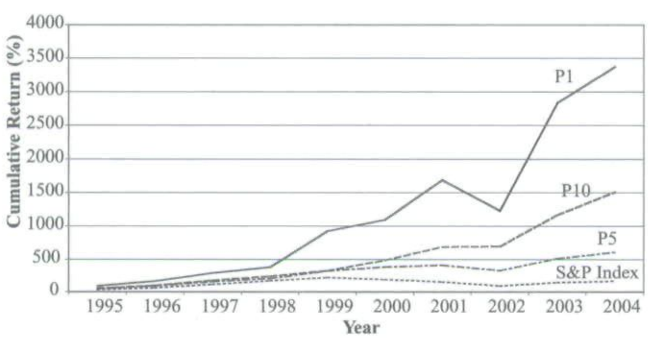


EXHIBIT 6
Portfolio Geometric Average Annual Return, Standard Deviation, and Sharpe Measure

Portfolio	10-Year Cum Return	Geometric Ave (Annualized)	Standard Deviation	Sharpe Measure
P1	3369.51%	0.425695607	0.4592	0.8965
P2	664.88%	0.225629677	0.2257	0.9378
P3	705.66%	0.232012717	0.2116	1.0302
P4	561.25%	0.207914721	0.2354	0.8236
P5	608.93%	0.216354327	0.2005	1.0095
P6	564.42%	0.208492911	0.1677	1.1595
P7	386.80%	0.171480188	0.1543	1.0209
P8	522.78%	0.200697617	0.1562	1.1951
P9	533.17%	0.202685868	0.1570	1.2020
P10	1505.52%	0.319962336	0.1534	1.9940
S&P Index	163.88%	0.1019	0.2048	0.4292
US Tbill		0.0140		

capital market theory. Nevertheless, they appear to support studies by Biddle, Bowen, and Wallace [1997] and Farzad, Degel, and Degner [2000] in which a weak relationship between EVA and value were found. It directly refutes the findings of Abate, Grant, and Stewart [2004], Garvey and Milbourn [2000], and O'Byrne [1999] which uncovered evidence of a strong positive relationship between EVA and value.

These results lead to a U-shaped relationship between portfolio return and the EVA/MV ratio, as shown in Exhibit 7, and add new light to the research on the relationship of EVA to value. Past studies on the EVA–MVA relationship assumed that a linear relationship rather than U-shaped relationship existed, thus leading to inconclusive results. If studies used samples with a relatively greater number of wealth creators (positive MVA) and positive EVA firms, the correlation between MVA and EVA was strong, but when the entire sample was used, the relationship weakened significantly. For example, Abate, Grant, and Stewart found an 80% correlation between the top 50 wealth creators (MVA/capital) and EVA/capital. Grant [1996] found similar results, showing that the top 50 MVA firms in the 1993 Stern Stewart database were strongly correlated to EVA (R^2 = 83%), but the entire sample of firms exhibited a much weaker correlation to EVA (R^2 = 32%). Zaima, Turetsky, and Cochran [2005] utilized the entire 1998 Stern Stewart database and found the regression R^2 to equal 19%. When the sample was split by wealth creators versus wealth destroyers, the R^2 improved to 38%.

EXHIBIT 7

Portfolio Decile versus Cumulative Portfolio Returns

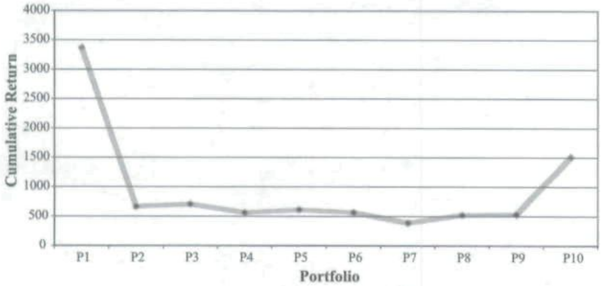
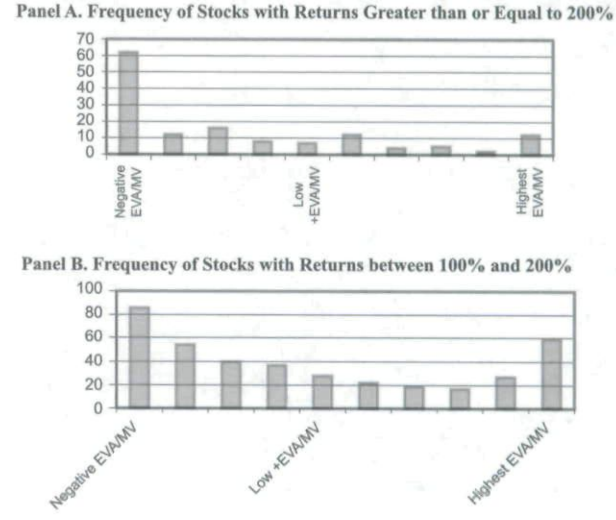


EXHIBIT 8

Frequency of Number of Stocks with Returns ≤ 200% and 100%–200%.



Although studies by Grant, O'Byrne, and Abate, Grant, and Stewart provided support for a strong EVA–MVA relationship, they also found some inconsistencies. Grant was first to point out that financially troubled firms, those with negative EVAs, suffer from "managerial noise" which makes it difficult for investors to detect the difference between firms that are turning around and firms that are unable to improve. Thus, the improving firms "must make a concerted effort to convince the shareholders that the managerial actions ... will enhance the troubled firm's overall market value-added" (Grant [1997, pp. 53–54]). Alternatively, in interpreting negative EVAs, Abate, Grant, and Stewart observed that "[t]his seemingly anomalous finding for U.S. wealth creators is explained (in an efficient markets context) by saying that investors were confident about the future ability of the firms to generate positive economic profit—even though the current EVA-to-capital ratios were negative" [2004, p. 66]. O'Byrne also noted that "the explanatory power of the EVA model can be improved by using separate variables for positive and negative EVA" [1999, p. 95]. This study adds to the extant literature through the finding that not only are negative EVA firms different from highly positive EVA firms, but the relationship between EVA and stock returns is U-shaped.

Exhibit 8 provides further evidence in support of the contention that higher returns accrue to negative EVA firms and that a U-shaped relationship results. It shows that more stocks with high returns cluster in portfolios P1 and P10. Panel A of Exhibit 8 presents a frequency chart of the number of stocks with returns greater than 200% over the 1995–2004 period and shows that P1 contains 62 firms with stock returns exceeding 200%, while P5 has 7 such firms and P10 has 12. The high occurrence of large return stocks clustering in portfolios P1 and P10 contributes to the U-shaped results. Panel B of Exhibit 8 displays the frequency of stocks with returns between 100% and 200%. Again, P1 has 86 firms with stock returns between 100% and 200%, while P5 has only 28 such firms and P10 has 59 over the 10-year period.

The seemingly anomalous results could be explained by the conjecture that EVA is a proxy for risk. To explore this point, standard deviations from Exhibit 6 are examined. The standard deviation of P1 at 0.4592 is more than double that of the others. The next highest is 0.2354 for P4. The standard deviation for P10 is 0.1534. If one posits that negative EVA/MV proxies for risk, it provides evidence that higher risk is associated with higher returns. These results are consistent with the Yook and McCabe [2001] study in which average portfolio returns exhibited a U-shaped relationship when stocks were sorted by beta, and then by MVA per share, adding further support to the conjecture that negative EVA is a proxy for risk.

CONCLUSION

An investment strategy using the EVA metric presents some interesting results. The study provides evidence that on a long-term basis, a portfolio (P1) created with the most negative EVA/MV ratios outperforms nine other portfolios and the S&P 500 Index. Additionally, the results show that the second-best performer is the most positive EVA/MV ratio portfolio (P10), thereby creating a U-shaped relationship between portfolio ex ante return and the EVA/MV ratio.

At first glance the two major findings of this study appear to be controversial. The finding of a U-shaped relationship and the finding that negative EVA/MV firms outperform positive EVA/MV firms seem to contradict capital market theory. However, after adjusting for risk, the portfolios follow a linear positive risk–return relationship. That is, negative EVA/MV firms are riskier than positive EVA/MV firms; hence, negative EVA/MV firms require higher returns for bearing higher risk. It is consistent with the finding of Abate, Grant, and Stewart [2004, p. 66] that "the capital market is more willing to take a chance on the future EVA-generating abilities of wealth-creating firms with currently negative EVA." Investors appear to invest in negative EVA firms because they are willing to take higher risk to earn higher expected returns. Yook and McCabe [2001] found similar results in which the smallest decile (negative) MVA per share generates the highest portfolio return when sorted by beta, then MVA. Therefore, the EVA/MV ratio appears to be a proxy for risk. Moreover, when portfolio performance is measured by Sharpe ratios, P1's reward-to-risk performance falls below that of P10, and the Sharpe ratios of P1 through P10 follow a linear relationship.

Future research could make a further contribution to the literature by exploring the factors that separate negative EVA firms with future high-growth potential from negative EVA firms which are making poor managerial decisions. A more detailed study in this area will provide insights, not only into investing with EVAs, but into managerial decision making.

ENDNOTES

The author gratefully acknowledges helpful comments by Frank Jones, Maretno Agus Harjoto, and the anonymous referee, and research assistance by Tushar Mazumder.

[1]EVA™ is a trademark registered by Stern Stewart & Company. They define economic value added (EVA) as NOPAT – *k* * Capital +/– Adjustments, where NOPAT is net operating profits after taxes, *k* is weighted-average cost of capital, and adjustments include various changes to the accounting data to conform to economic cash flows. Additionally, market value added (MVA) is defined as the market value of a firm minus total capital where the market value of a firm equals the market value of equity and debt, and total capital equals total capital invested in the firm.

[2]P1 is the negative EVA/MV portfolio representing the firms with the lowest ranking EVA/MV ratios, P5 is the EVA/MV portfolio containing firms with approximately zero EVA/MV ratios, and P10 is the EVA/MV portfolio consisting of firms with the highest EVA/MV ratios.

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