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Is a Stable Return on Equity Portfolio a Simple Rule for a Smart Beta Strategy?

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Abstract

Thematic investment portfolios have been of interest to portfolio managers for some time. They can take on a variety of titles including Smart Beta. Methods of calculating factor premiums by constructing a factor portfolio are called factor tilts. One such suggested thematic factor tilt model was suggested by Fuller, Giovinazzo, and Tung (2014). They suggested a common sense method to build a factor portfolio from stable ROE portfolios; they noted in this paper that investor "inattention" to stocks with low ROE variance over time provides excess returns in an absolute risk-return space. This paper addresses and advances this model by empirically examining market data. The Standard and Poor's 1500 was segmented into both deciles and quintiles based on a new introduced metric: Return on Equity minus Earnings Variability. This study was conducted for a fifteen year period December 31, 2002 through December 31, 2017. The suggested model had value as the Coefficient of Variation was favorable compared to the index for both the decile and quintile portfolios. Further, the segmentation of the universe into two subsets based on positive and negative ROE-EDV values likewise supported the model both before and after transaction costs.

Keywords: Smart Beta, Alpha, Beta, Alpha minus Beta, ROE, Return on Equity, ROE Variability, Factor Tilt, Market Efficiency
JEL Classification: G14, Information and Market Efficiency

I. Introduction

Among the most widely assumed paradigms in finance is the contention that the stock market is efficient. Eugene F. Fama espoused this paradigm, *The Efficient Market Hypothesis* (EMH), while studying as a doctoral student at Chicago. The core concept is simple. Stock prices change from one period to the next due to the appearance of new and unanticipated information. Since this information is revealed randomly, stock prices at all times were correctly set which is the finance definition of "efficient."

The concept of an efficient market is still paramount in investment theory, although strict interpretation of it has been challenged as time has passed. Fama (1970) noted that in an efficient market any new information would be immediately and fully reflected in equity prices. A financial market therefore quickly, if not instantaneously, discounts all available information. In an efficient market, investors should expect an asset price to reflect its true fundamental value at all times. Bruno Solnik (1996) noted that since fundamental value is unknown, the only way to test for market efficiency is to detect whether some specific news is not yet incorporated in the asset price and could therefore be used to make abnormal profit.

Those who challenge EMH suggest that available public information exists that can be more effectively incorporated in the asset price and therefore be used to make abnormal profit. They believe that stock prices are not always correctly set. This group includes most of the world's investment managers. (Fama and French 1992, 2016; Jegadeesh 1993; Hirshleifer 2007)

II. Market Efficiency

It is essential to understand the environment in which securities are priced. The signal question is how effectively investor's expectations are incorporated into security pricing. Are investor's expectations for a particular security quickly and accurately reflected in the price of the security? If they are, then the markets are efficient.

In an efficient market, the current prices of securities represent unbiased estimates of the "fair," "intrinsic," "real," "fair market," "sound," and "true" value of the securities (Williams 1938). According to Capital Market Theory if all securities are correctly valued (by whatever term), investors will earn a return on their investment appropriate for the level of risk borne by the investor. This is called the "normal return." This "normal return" will occur regardless of which securities are purchased. Thus, in a perfectly efficient market in equilibrium all securities are correctly priced, and there are no under- or over- valued securities.

The degree to which a market is efficient has a profound implication for investors. In an efficient market, the time, money, effort, required knowledge, and anxiety required to engage in security analysis becomes unnecessary on an individual basis.

The central theorem of the EMH is that the security market participants are competent and well-informed. It is the competition among these very astute market participants which results in security prices being fairly and correctly priced. These market participants immediately "compete away" any chance to earn an abnormal profit.

III. The Efficient Market Hypothesis

The framework for a discussion of the Efficient Market Hypothesis (EMH) is generally centered around Eugene Fama's May 1970 Journal of Finance paper "Efficient Capital Markets: A Review of Theory and Empirical Work." .

Fama defined efficient markets in terms of a "fair game" where security prices "fully reflect" all the information available. Consequently, if the markets are efficient, individuals cannot consistently receive abnormal risk-adjusted returns. In the framework of the Capital Asset Pricing Model, the expected value of ex-ante alpha (expected excess profits) must be zero. This implies that the complete measurement of its required return is contained in the beta of the security. Thus, expected return and required return are one and the same but actual return, of course, can be substantially different.

Fama suggested that the Efficient Market Hypothesis (EMH) can be divided into three categories. These categories are as follows:

1. **Strong-Form EMH.** The strong-form EMH represents the most extreme case of market efficiency. Under the strong-form it is argued that security prices fully reflect all information whether public or private. Fama himself thought that this form was an extreme one that, if ever adequately tested, would prove false.
2. **Semi-Strong Form EMH.** The semi-strong form EMH asserts that security prices rapidly and correctly adjust to the release of publicly available information. Thus, under the semi-strong form, current prices fully reflect not only all past price data but all other data as well. Hence, any and all information that is available to the public should be quickly, if not instantaneously, reflected in security prices so that investors cannot consistently earn abnormal returns by acting on such public information.

3. **Weak-Form EMH.** In the weak-form EMH, the type of information being considered is restricted exclusively to historical price data. If the weak-form EMH is correct, investors should not be able to consistently earn abnormal profits by simply observing the historical prices of securities. Weak-Form efficiency is, in fact, a special case of Semi-Strong form efficiency since it is dependent upon publicly available historical prices.

There have been numerous empirical studies conducted on the validity of the EMH. It is beyond the scope of this paper to conduct even a casual review of those studies. Suffice it to say, researchers have tested the EMH due to its signal importance in financial literature and their combined results indicate that the EMH as postulated by Fama is overwhelmingly supported especially in dealing with the weak and semi-strong versions of the hypothesis. The difficulty of obtaining data on undisclosed sources of information makes it an onerous task to research the strong-form hypothesis.

However, even in face of this consensus, there are a growing number of researchers who question the EMH. Among them, Robert Haugen argues in multiple books that the EMH is a paradigm that is at the extreme end of the spectrum. He has made a serious case for recognizing that the market overreacts to past records of success and failure with resulting incorrect or imprecise security prices. (Haugen 1999). Other researchers hold even more extreme views, claiming that the market is in chaos (which also implies you cannot beat the index as well) (Klioutchnikov 2017). There is also a small but growing group who believes the American stock market is now (perhaps again) manipulated by various sources including collusion by hedge fund managers (Hudson 2012).

Finally, there is a new and growing field of finance that looks at the behavioral aspect of the participants. This paper can be included within this framework as we look to the investors who have, to date, behaviorally ignored the value of a stable return on equity.

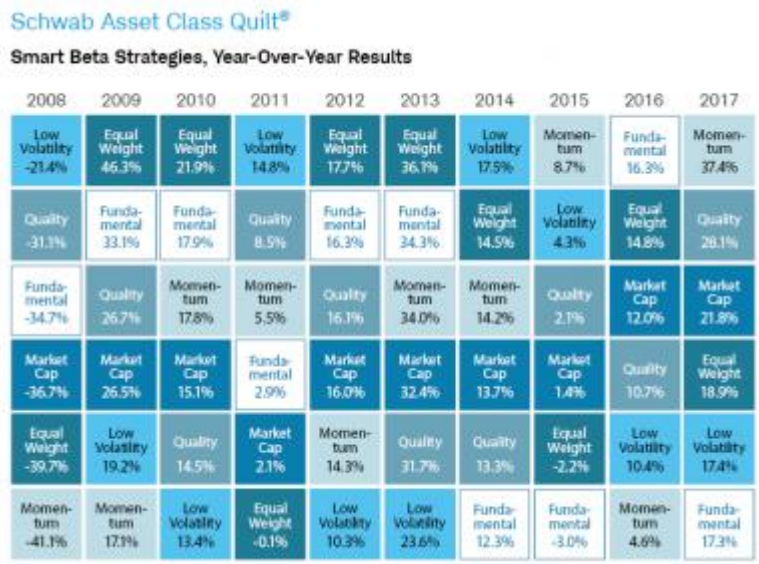
IV. Smart Beta

This paper is focused on one aspect of the Capital Market Theory Spectrum: Alpha minus Beta as a viable behavioral finance subset for the construction of a Smart Beta portfolio which should outperform on a risk-adjusted basis its benchmark. There is confusion among investors as to the definition of a smart beta portfolio. In effect, **smart beta** is a combination of efficient-market hypothesis and value investing. **Smart beta** defines a set of investment strategies that emphasize the use of alternative index construction rules to traditional market capitalization-based indices. In this sense, the concept of "**Smart**" refers to the use of an alternative methodology rather than following an index's size-based (market-cap) allocation. A **smart beta** investment **strategy** is designed to add value by strategically choosing, weighting and rebalancing the companies built into the index based upon objective factors (Kahn 2015, 2016; Science Beta 2018; Christensen 1997).

Thus smart beta strategies are an attempt to bridge the gap between active and passive investing. Smart beta strategies have become a popular alternative to investors as they are constructed based upon objective factors rather than market capitalization. They attempt to utilize a systematic, rules-based approach to portfolio construction to capture previously unnoted market inefficiencies. They can take multiple forms. There are five broad classifications: (1) Equal-Weight; (2) Low-Volatility; (3) Momentum; (4) Quality; and (5) Fundamental. It should be noted that there are more than 845 strategic beta strategies in the

Morningstar universe with various attempts to capture market inefficiencies (DaSilva 2017; Armenc 2012).

It is not the intent of this paper to justify, or even examine the validity of, smart beta strategies. There are numerous studies, both academic and practioner, devoted to such an examination. For example, the following is one review of smart beta strategies developed by Charles Schwab & Company in February of 2018 covering the period 2009 through 2017.



Source: Schwab Center for Financial Research with data provided by Morningstar Direct. Data used from January 1, 2007 through December 31, 2017. Strategy performance represented by annual total returns for the following indexes: Market Capitalization (Market Cap) - S&P 500; Fundamental - Russell RAFI U.S. Large Company; Equal Weight - S&P 500 Equal Weighted; Momentum - MSCI USA Momentum; Low Volatility - S&P 500 Low Volatility; Quality - Russell 1000 Quality Factor. Indexes are unmanaged, do not incur fees or expenses, and cannot be invested in directly. Please see disclosures for more information about the market indexes. Past performance is not indicative of future results.

Portfolio managers have found it most difficult to outperform indices consistently, especially with the S&P 500 index (large-cap), on a risk-adjusted basis. Stated another way, investors have not been able to capture positive "excess alpha" in their stock selection process.

V. Return on Equity (ROE) and Earnings Variability (EV): A New Statistic of Stability

The quest in portfolio construction to find "excess alpha" has been the goal of portfolio managers since investment management began, although not in these terms. Given this "Holy Grail" orientation, it seems only advantageous to examine the concept of constructing a portfolio in which a stable return on equity dominates since a-priori it is behaviorally believed that investors have been unaware of its importance. (Fuller 2010, 2014; Goyal 2015)

This smart beta study is oriented in this manner. It was decided to examine this statistical relationship in the development of both return on equity (herein defined as ROE or return on equity based on current twelve months cumulative earnings and the current book value per share) less the variability of earnings (EDV). Earnings variability is equal to the standard deviation of annual earnings from a normal growth curve over the past eight years, expressed as percentage of normal earnings.

Consequently, this study differs from the key article referenced (Fuller 2014) in the way ROE is examined. Their study, which followed Chow, et. al. (2011) computed the mean of each stock's trailing 20 quarters observation of ROE and then estimated the portfolio of stocks with the lowest variance around the mean. They determined individual portfolio weights based on minimizing the variance around the mean rather than minimizing the variance of stock returns

The underlying assumption of this examination of the key article referenced centers on investor's behavior. Behavioral finance has shown that investor's potential "inattention" to stocks with low ROE variance over time may be one of the main reasons this investment approach has worked. The authors of the article state that this is simply common sense. They stated that investors should place a higher value on a stock with a higher ROE because it can generate a larger amount of shareholders earnings for a given amount of equity capital (Dewing 1953). They continue with the statement that "ROE is a fundamental variable all investors should consider in determining the price they are willing to pay for a stock, relative to other stocks." Return on Equity has been noted by many a very important financial variable to investors (Vet 2007; Graham 1962; Penman 1991; Piotroski 2000; Absan 2011; Calmar 2016). They are also implying the tradeoff between risk and return where ROE is the return while low ROE variance is risk. (Rosenberg 1976).

This paper produces a statistic (ROE minus EDV) which is both positive and negative in value. Thus all stocks are ranked from the highest to lowest computed statistic. The highest ranked stock has an "excess positive" ROE that is greater than its EDV. The lowest ranked stock will have an "excess negative" ROE less than its EDV.

The basic idea is that stocks will perform based on this statistic that will result in an excess alpha portfolio. This clearly enhanced excess return might result in a superior risk-adjusted smart beta portfolio based on comparisons using the coefficient of variation. Such a portfolio could stand alone (passive portfolio) which is assumed in this study or be segmented by other factors (active portfolio) such as earnings momentum.

VI. Research Hypotheses

There are three research hypotheses to this study as noted below. All three center on testing the semi-strong form of the EMH. One of the initial concerns was the size of portfolios to be examined. The sector size utilized can influence results. A study by Sapp and Yan (2008) noted that the typical mutual fund had an average of 90 stocks. The top 20% of funds with the most diversification had an average of 228 stocks. This would indicate the need for the construction of multiple portfolios with a different number of stocks. Thus the hypotheses were conducted utilizing both deciles (about 150 stocks) and quintiles (about 300 stocks).

(H_1): Research Hypothesis One

The first hypothesis is that by sectoring the S&P 1500 into ROE-EDV deciles, the top decile will, on a risk-adjusted basis before transaction costs, outperform both the S&P 1500 (Equally-Weighted) as well as the bottom decile based on the portfolio's Coefficient of Variation (CV).

The deciles are rebalanced on a monthly basis. The research period is December 31, 2002 through December 31, 2017 or fifteen years. The CV analysis for hypothesis testing was applied against intermediate or yearly period data. While the statistics for a total run period seldom vary for the intermediate period, the intermediate yearly periods are far more

important to investment managers due to the drawdown character of investment management. Only stocks that had a five year record, including an alpha and beta, were included in the study.

Dividing the S&P 1500 into ten portfolios based on ROE-EDV alone was done to assure efficient diversification. While industry and/or sector groups should be accounted for in normal portfolio construction, the ten sectored portfolios, with approximately 150 stocks, mitigates this problem. This stock total also falls within the top 50% of the most diversified mutual funds.

(H_2): Research Hypothesis Two

In order to judge the effectiveness of the ROE-EDV investment style, it was decided to re-run the same data noted above but in quintiles. This results in portfolios of approximately 300 stocks. This would clearly mitigate the question of efficient diversification. It also places the portfolios in the top 20% of diversified mutual funds.

The research hypothesis is the same as above. Specifically, the top quintile will outperform the bottom quintile as well as the universe based on the Coefficient of Variation (CV).

(H_3): Research Hypothesis Three

An additional test of the effectiveness of the ROE-EDV investment style was constructed dealing with two portfolios. These two portfolios are (1) those with an ROE-EDV greater than 0 and (2) those with an ROE-EDV less than or equal to 0. This results in two portfolios with one having a positive ROE-EDV and one with a negative ROE-EDV. The research hypothesis is that the positive ROE-EDV portfolio will outperform the negative ROE-EDV portfolio. Further, the positive portfolio will outperform the universe, and the second will underperform the universe. The number of stocks will vary by year. For December 31, 2017, there were 477 stocks in group one with 979 stocks in group two.

VII. Data And Methods

This paper will explore the total portfolio's return on a risk-adjusted basis through the above noted three hypotheses. Ford Equity Research of San Diego, a data vendor with proprietary models for investment managers globally supplied the data for this study. Ford Equity Research is affiliated with Mergent, a subsidiary of the London Stock Exchange, through stock ownership.

A review of the data and methods used by Ford Equity Research was constructed such that the three most common biases in investment data (no look-ahead bias; no restatement bias; and survivorship bias) were eliminated.

Ford Equity Research, likewise, provided all variables utilized in this study. Total return includes both price changes and dividends in the appropriate periods based on their ex-dividend date. All returns were computed on a geometric basis, as were the standard deviations. These methods are in conformity with professional investment management requirements. All returns, including the index, were calculated on a monthly basis. All returns were computed equally-weighted. All stocks were selected from the S&P 1500 Index.

The selection of the sample size is a concern for all researchers. The selection of ten portfolios of 150 stocks each reduces the impact of industry concentration, especially in short time frame studies. Ideally, the number of stocks from any specific industry should be in line

with the benchmark index. Even more ideally, the selected portfolio should be of the same industry weightings as the benchmark index. Such back-testing requires significant manual analysis and, unfortunately, introduces questions of inappropriate manipulation of results.

VIII. Data Results

The results of the investigation can be found in Appendix I which contains four tables. Table 1 presents the results on a risk-adjusted basis *before* transaction costs of Hypothesis One (ROE-EDV deciles). Table 2 presents the results on a risk-adjusted basis *before* transaction costs for Hypothesis Two (ROE-EDV Quintiles). Tables 3 and 4 refers to Hypothesis Three. Table 3 presents the results for ROE-EDV greater than 0 or those stocks with a positive number. Table 4 presents the results for ROE-EDV less than or equal to 0 or those stocks with a negative number. It was decided that Hypothesis Three should include turnover and transaction costs. The performance, again, was computed on a monthly basis.

IX. Data Analysis

Hypothesis One (H_1) was confirmed. The top decile based on the ROE-EDV statistic outperformed the bottom decile as well as the universe. The top decile had a CV of 1.14 while the bottom quintile had a CV of 2.02 with a correlation of +0.86. The top quintile also outperformed the universe which had a CV of 1.40. The correlation between the top quintile and the universe was +0.96.

Hypothesis Two (H_2) was confirmed. The top quintile of the top S&P 1500 quintile based on the ROE-EDV statistic outperformed both the bottom quintile as well as the universe. The top quintile had a CV of 1.16 clearly superior to the bottom quintile with a CV of 2.02 with a correlation of +0.90. The top quintile outperformed the universe (1.16 vs 1.40) with a correlation of +0.97.

Hypothesis Three (H_3) was confirmed. The positive portfolio (ROE-EDV > 0) had a CV of 1.16 superior to the universe which had a CV of 1.40. The correlation between the two was +0.98. This relationship was further subjected to turnover and transaction costs. The resulting CV was 1.19 again superior to the CV of the universe at 1.40. The annual portfolio turnover was 33.7%.

The negative portfolio (ROE-EDV LE 0) resulted in a CV of 1.57 clearly inferior to both the positive portfolio of 1.16 and the universe with a CV of 1.40. The correlation to the universe was +0.998. After transaction costs, the CV of the negative portfolio was 1.54. The annual portfolio turnover was 19.5%.

The portfolio turnover and resulting transaction costs are important to note. It is noted that stable ROE portfolios do have more turnover than fundamental indexing. Many believe that they can outperform alternative equity indices net of transaction fees. Hypothesis Three (H_3) clearly addresses this concern and concluded that, indeed, these portfolios can outperform alternative equity indices net of transaction fees.

Investment managers generally accept the performance of portfolios based on CVs without relying on statistical significance. Perhaps one of the explanations is that there is currently no reliable published statistical test for coefficient of variation.

X. Conclusion

This study examined the semi-strong form of the EMH utilizing key fundamental elements. Specifically, this study examined the value of a unique equation: ROE minus EDV. Three hypotheses were tested by sectoring the S&P 1500 based on this unique statistic. The hypotheses were confirmed with the portfolios outperforming the universe on a CV basis. This was also the case for the two portfolios examined after transaction costs. This results in a portfolio that could well be developed into a Smart Beta construct as a passive portfolio. The study did not look any methodology of stock selection that would result in a more favorable active portfolio. This situation remains to be investigated and represents a limitation to this study.

The concept of a stable ROE portfolio (ROE-EDV) appears to have merit for investment managers and individual investors. This study also provides additional support to the primary referenced authors Fuller, Giovinazzo, and Tung paper.

Primary Reference

The Stable Roe Portfolio: *An Alternative Equity Index*
Strategy Based on Common Sense Security Analysis
Russell J. Fuller, Raife Giovinazzo and Yining Tung
The Journal of Portfolio Management Special 40th Anniversary Issue 2014, 40 (5) 135-145; DOI: https://doi.org/10.3905/jpm.2014.40.5.135

Abstract

Alternative equity index strategies are a variation of passive indexing, where the "index" is based on initial active decisions as to how to create the universe of stocks, the stocks' weights, and the rebalance procedure, and then passively follow these procedures forward through time. The authors of this article replicate prior research that shows popular alternative indexes, such as fundamental indexing and minimum volatility, have higher returns and Sharpe ratios than the S&P 500. They present a new alternative index that creates a portfolio with the lowest predicted volatility of return on equity (ROE), the "stable ROE portfolio." The stable ROE portfolio delivers higher and more stable earnings, and higher returns and Sharpe ratios than other alternative indexes or the S&P 500.
See also: www.fullerthaler.com

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Appendix

Table 1
Decile Monthly Performance
ROE-EDV

Intermediate Periods

	D1 Sector 1	D2 Sector 2	D3 Sector 3	D4 Sector 4	D5 Sector 5	D6 Sector 6	D7 Sector 7	D8 Sector 8	D9 Sector 9	D10 Sector 10	
Year	Perf	Perf	Perf	Perf	Perf	Perf	Perf	Perf	Perf	Perf	Perf
2003	33.5	33.2	32.6	35	38.8	39.7	46	50.8	52.2	87.1	44.4
2004	20.9	15.6	19.4	18.9	20.8	27	21.5	14.6	18.1	9.8	18.7
2005	3.9	7.1	11.3	6	10.6	9.4	12.4	6.9	4.1	3.3	7.5
2006	8.7	13.1	14.3	18.7	15.5	19.1	18.1	20.6	21	13.9	16.3
2007	5.3	-2.9	-3.5	-2.4	0.3	-3.3	-2.7	0.5	-4.9	-4.3	-1.8
2008	-31	-29	-31	-30	-32	-33	-33	-42	-48	-52	-36
2009	39.1	27.7	37.6	26.6	38.2	36.3	46	57	60.1	106	46.7
2010	23.1	21.8	25.8	25.1	23.9	26.3	28.7	31.1	31.9	34.7	27.4
2011	4.4	7.9	3.8	0.1	2.2	-0.7	-2.8	-3.6	-7.8	-17	-1.5
2012	12	17.1	16.6	18.9	15	15.7	16.6	16.9	17.2	32.3	17.8
2013	35.9	38.4	35.8	33.6	36.5	33.6	40.5	44.7	41.5	51	39.1
2014	13.7	11.5	14.1	12.2	10.4	12.8	5.8	4.7	4.6	0.9	9
2015	0.4	1.5	-1.5	1	0.5	-1	-3.4	-4.9	-16	-15	-3.8
2016	12.7	14.4	22.5	23	20.9	27.7	23.7	26.1	27.7	40.5	23.9
2017	21.7	20.6	17.1	14.5	14	10.3	12.4	15.1	11.9	2.8	14

Total Cumulative for Intermediate Periods

	Sector 1	Sector 2	Sector 3	Sector 4	Sector 5	Sector 6	Sector 7	Sector 8	Sector 9	Sector 10	Univ.
	Perf	Perf	Perf	Perf	Perf	Perf	Perf	Perf	Perf	Perf	Perf
Total	466	448	513	456	510	524	558	528	356	539	499
Annual	12.3	12	12.9	12.1	12.8	13	13.4	13	10.7	13.2	12.7
AnnualSD	14	14.2	14.6	15.4	17.1	17.8	19	20.5	22.3	26.6	17.8
CV	1.14	1.18	1.13	1.27	1.34	1.37	1.42	1.58	2.08	2.02	1.4

Correlation Matrix

	D1	*D2*	*D3*	*D4*	*D5*	*D6*	*D7*	*D8*	*D9*	*D10*	*Univ.*
D1	1										
D2	0.96	1									
D3	0.96	0.97	1								
D4	0.93	0.97	0.98	1							
D5	0.97	0.97	0.99	0.98	1						
D6	0.93	0.93	0.98	0.98	0.98	1					
D7	0.94	0.94	0.98	0.96	0.99	0.98	1				
D8	0.95	0.94	0.97	0.95	0.98	0.96	0.99	1			
D9	0.94	0.92	0.97	0.95	0.98	0.97	0.99	0.99	1		
D10	0.86	0.83	0.89	0.86	0.91	0.89	0.94	0.96	0.96	1	
Univ.	0.96	0.95	0.98	0.97	0.99	0.98	0.99	0.99	0.99	0.94	1

Table 2
Quintile Monthly Performance
ROE-EDV

Intermediate Periods

Year	Sector 1 Perf	Sector 2 Perf	Sector 3 Perf	Sector 4 Perf	Sector 5 Perf	Comp Universe Perf
2003	33.4	33.9	39.3	48.4	68.9	44.4
2004	18.2	19.2	23.9	18	14	18.7
2005	5.5	8.6	10	9.6	3.7	7.5
2006	10.9	16.5	17.3	19.4	17.5	16.3
2007	1.2	-2.9	-1.5	-1.1	-4.6	-1.8
2008	-29.7	-30.5	-32.6	-37.5	-49.7	-36.4
2009	33.3	32	37.3	51.5	82.2	46.7
2010	22.5	25.4	25.1	29.9	33.4	27.4
2011	6.1	1.9	0.8	-3.2	-12.7	-1.5
2012	14.5	17.7	15.3	16.8	24.5	17.8
2013	37.1	34.7	35.1	42.6	46.2	39.1
2014	12.6	13.1	11.6	5.3	2.8	9
2015	1	-0.2	-0.3	-4.1	-15.2	-3.8
2016	13.6	22.8	24.3	24.9	34.1	23.9
2017	21.2	15.8	12.1	13.7	7.4	14

Total Cumulative for Intermediate Periods

	Sector 1 Perf	Sector 2 Perf	Sector 3 Perf	Sector 4 Perf	Sector 5 Perf	Comp Universe Perf
Total	458.2	485.1	518	545.3	445.9	499.1
Annual%	12.1	12.5	12.9	13.2	12	12.7
AnnualSD	14	14.9	17.4	19.6	24.2	17.8
CV	1.16	1.19	1.35	1.48	2.02	1.4

Correlation Matrix

	Q1	*Q2*	*Q3*	*Q4*	*Q5*	*Universe*
Q1	1					
Q2	0.972972	1				
Q3	0.961698	0.991226	1			
Q4	0.953728	0.972298	0.983102	1		
Q5	0.9004	0.924497	0.944602	0.980101	1	
Universe	0.966513	0.983834	0.990301	0.996954	0.975024	1

Table 3
ROE-EDV >0

Intermediate Period

Year	Portfolio Perf	Comp Universe Perf	Portfolio Perf w/trans	Portfolio % Turnover
2003	33.5	44.4	33.1	32.2
2004	17.9	18.7	17.5	35.4
2005	7.2	7.5	6.8	32.3
2006	12.3	16.3	11.9	35.6
2007	-0.6	-1.8	-0.9	37.6
2008	-30.5	-36.4	-30.8	42.8
2009	33.8	46.7	33.2	45.7
2010	22.5	27.4	22	40.9
2011	6.6	-1.5	6.2	29.4
2012	14.4	17.8	14.1	23.8
2013	36.7	39.1	36.3	25
2014	12.7	9	12.4	26.4
2015	0.2	-3.8	-0.1	33
2016	16.5	23.9	16.1	30.7
2017	19.1	14	18.7	35.5

Total Cumulative for Intermediate Periods

	Portfolio Perf	Comp Universe Perf	Portfolio Perf w/trans	Portfolio % Turnover
12/02-12/17	459.7	499.1	432.3	
Annual%	12.2	12.7	11.8	33.7
AnnualSD	14.1	17.8	14.1	
CV	1.16	1.4	1.19	

Correlation Matrix

	Portfolio	*Universe*
Portfolio	1	
Universe	0.976586	1

Table 4
ROE-EDV LE 0

Intermediate Period

Year	Portfolio Perf	Comp Universe Perf	Portfolio Perf w/trans	Portfolio % Turnover
2003	49	44.4	48.7	17
2004	18.8	18.7	18.6	17.9
2005	8.1	7.5	7.9	19.8
2006	18.4	16.3	18.2	22.8
2007	-2.3	-1.8	-2.6	28.4
2008	-38.9	-36.4	-39.1	28.9
2009	51.2	46.7	50.8	23.9
2010	29	27.4	28.8	17.6
2011	-4.3	-1.5	-4.5	15.3
2012	19.2	17.8	19	13.2
2013	39.9	39.1	39.8	12.9
2014	7.8	9	7.7	14.1
2015	-5.5	-3.8	-5.7	18.6
2016	26.7	23.9	26.5	19.1
2017	11.8	14	11.5	22.8

Total Cumulative for Intermediate Periods

	Portfolio Perf	Comp Universe Perf	Portfolio Perf w/trans	Portfolio % Turnover
12/02-12/17	506.9	499.1	489.6	
Annual%	12.8	12.7	12.6	19.5
AnnualSD	19.4	17.8	19.4	
CV	1.52	1.4	1.54	

Correlation Matrix

	Portfolio	*Universe*
Portfolio	1	
Universe	0.99818	1

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