CONSTANT GROWTH INVESTMENT STRATEGIES FOR US LARGE CAP COMPANIES

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ABSTRACT

Using data from several sources, a new investment model, the Constant Growth of Expected Returns model (the CGER model) is tested as an investment strategy for individual investors. We utilize the constant growth of expected return (CGER) formula as the fundamental variable for analysis and build portfolios that we test over time compared to the Standard and Poor's 500 Index as a benchmark. The largest companies that fit our criteria (for a maximum of 49 companies) for every year for the past twenty years (based on market cap and CGER) will be examined. And then, we compare realized returns to the S&P 500 for further analysis in different holding periods (monthly, quarterly, yearly) and three different investment strategies, namely, the High CGER Portfolio (HP), the Low CGER Portfolio (LP), and the High-Low Combination Portfolio (H-L Portfolio).

We only use companies with positive earnings per share (EPS thereinafter), positive book value per share, and positive dividends. Our results show that the CGER model outperforms the S&P 500 index in various holding periods and the most impressive result came from the High CGER portfolio. By comparing the returns of the holding periods, we show that the most consistent results were garnered by utilizing both the High and Low CGER portfolios over different holding periods.

Keywords: Constant Growth Expected Returns, Large Cap, S&P 500, Dividend Yield, Earnings Per Share

Subject Terms: Constant Growth Expected Returns and Investment Strategy, Holding Periods

EXECUTIVE SUMMARY

The purpose of this paper is to test the CGER model as an investment strategy to outperform a given benchmark. To obtain the CGER, we begin with a dataset consisting of information from I/B/E/S, Compustat North America, Bloomberg, and CRSP. Data for the past twenty years (1987-2006), is collected, analyzed and evaluated by isolating companies based on market cap - only the largest 50 companies in each year that fit our criteria are used. We then solve for constant growth of expected returns from the list of companies from each respective year. This list is then ranked from largest to smallest in terms of CGER. The list is distributed into two groups where the largest half of the companies in terms of CGER are grouped together and the smallest half are grouped together. In terms of investment strategy, the groups are invested in the High CGER half, Low CGER half and a combination of High CGER minus the Low CGER companies. The mean actual realized returns in three different holding periods of the following year (monthly, quarterly, yearly) are then compared to that of the benchmark, the S&P500.

Our findings show that in general, the High CGER portfolio will consistently outperform the benchmark under all circumstances of economic stature within all holding periods, such as downturns and boom periods – though not necessarily the best. The Low CGER portfolio, when used, was effective strategy for boom periods, but performed terribly in an economic downturn. The combination of High CGER minus Low CGER, the portfolio proved it is most effective for economic downturns.

The difficulty with a project of this stature begins with creating the foundation. In our situation, the first difficulty we encountered was obtaining and using accurate data. As stated by many of the studies examined, historical data becomes increasingly harder to find as we delve further into the past. Secondly, forecasted earnings per share from I/B/E/S have several criticisms from its users, such as biases or strong optimism. In other words, many factors can detract from the strength and accuracy of our results. Our conclusion is also based on the fact that we believe what has worked in the past will continue to work unless prove otherwise.

Though these results may seem to have numerical evidence to suggest that the High CGER portfolio is undeniably stronger than the rest, it should be noted that there are many alternative approaches to investing. An examinable feat would be to test other indices and other countries can also be examined, such as the effectiveness of the CGER model in emerging markets. Another recommendation to test the effectiveness of this strategy can be to examine the effects of increasing holding periods over the one-year horizon that we have implemented. A test for small cap companies or non-dividend paying companies can shed more light on the effectiveness of using CGER as a whole. Also, comparisons with other investment strategies can yield interesting results – especially for investors who have a different set of criteria than what we have implemented - including measures such as risk tolerance and the effects of tax can also alter results.

DEDICATION

We would like to take this opportunity to dedicate this project to everyone who has cast doubt on our lives, to those who said we couldn't do it, and to those who have made our lives difficult. You are the reason why we are here. You are the reason why we continue to strive to be the best that we can ever be. You are the reason why we never gave up. You are the reason why our dreams became a reality.

This is a statement to say to the world, 'we made it.'

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GLOSSARY

Bloomberg	The Bloomberg L.P. system is a computer terminal that allows users to access the Bloomberg Professional service which allows historical and real-time monitoring of markets
I/B/E/S	The Institutional Brokers' Estimate System is currently owned by Thomson Financial and consists a collection of investment analysts' predictions and forecasts for publicly traded companies
CRSP	Centre for Research of Security Prices provides historical stock data
Compustat	Provided by Standard and Poor's, this is a data base that consists of active and inactive companies with data based on statistical, financial and market information
FPI	Fiscal period end
Market-to-Book	The ratio of the current share price to the book value per share. It measures how much a company worths at present, in comparison with the amount of capital invested by current and past shareholders into it
Realized returns	The return that is actually earned over a given investment time period with dividend payment involved
CUSIP Number	CUSIP stands for Committee on Uniform Securities Identification Procedures. CUSIP number acts as a sort of DNA for the security - uniquely identifying the company or issuer and the type of security
H-L Combination Portfolio	An investor who purchases the companies in the High CGER portfolio and sells those in the Low CGER portfolio

CHAPTER1: INTRODUCTION

This study explores a new approach in investment strategy based on the constant growth of expected returns (referred to as CGER from here in). We use a constant growth of expected returns valuation model (CGER model), and data gathered from I/B/E/S, CRSP, Bloomberg and Compustat databases to use as inputs for this model. We then implement a specific criteria-based filtration process to select a group of companies that qualify to be a part of the CGER-based portfolio.

Our primary objective is to examine whether portfolios with different holding periods and different strategies, based on the constant growth of expected returns: derived from the forecasted return on equity, forward dividend yield, market-to-book ratio, can consistently outperform our benchmark (the Standard and Poor's 500 Index). The goal is to create a methodology based on the CGER can eventually be used as a sound investment strategy. We create an understanding between the importance of CGER and actual realized returns. We construct a portfolios based on the CGER investment strategy by utilizing the CGER as a part of the valuation process, amongst other variables. We create a simple filter to eliminate companies between 1987 to 2006 that are not within the top 50 in terms of market cap, non-dividend paying, and negative in earnings per share.

In our methodology, we implement a High CGER portfolio, a Low CGER portfolio and High CGER minus Low CGER portfolio, also known as the H-L Combination portfolio – all based on the CGER. We examine the results of the CGER-based portfolios and discover that, in the run of 20-years, the High CGER portfolio is most effective when used. However, during strong market periods, the Low CGER portfolio provides the best returns (though the High CGER portfolio is a close second). It should be noted that there are several limitations that we incurred during our test of the CGER model. There are also certain other issues pertaining to data and biases that must be addressed when using the CGER valuation model.

CHAPTER 2: LITERATURE REVIEW

2.1 Uses of Growth Rate and Valuating a Company

The CGER valuation model is based on the works of George Blazenko (2008), however James A. Ohlson and Beate E. Juettner-Nauroth (2005) first relate price to a company's short-term growth (in terms of forecasts for year two compared to that of year one). They create a "parsimonious model relating a firm's price per share to, (i), next year expected earnings per share (or 12 months forward eps), (ii), short-term growth (FY-2 versus FY-1) in EPS, (iii), long-term (asymptotic) growth in EPS and (iv), cost-of-equity capital" (Ohlson, 2005). The factors that are most important to our analysis are the usage of short-term growth and the use of expected earnings per share. Ohlson and Juettner-Nauroth conclude that firms "with a relatively large price to next-year EPS ratio [would] have a relatively large growth in expected EPS" (Ohlson, 2005) which follows in line with our findings – companies with high growth in EPS would typically be the companies we include in our High CGER investment strategy. Their starting point, however, differs from Blazenko's in that they determine the present value of dividends per share is the main price determinant, and through simple algebra, determines that the present value of capitalized change in earnings with adjustment of dividends would be the equivalent of price (Ohlson, 2005). In other words, growth in earnings has significant impact in explaining price to forward-earnings ratio.

Ohlson and Gao expand on Ohlson's previous study's use of growth in earnings, "Earnings, Earnings Growth and Value," to prove that "price to forward-earnings should relate positively to the subsequent growth in expected earnings" (Ohlson, 2006). Their subsequent study shows that, though there is predicative power in the Ohlson and Juettner-Nuaroth model, there are other issues that arise, which will be touched upon in the proceeding sections.

Peter D. Easton and Steven J. Monahan, in their study, "develop an empirical method for evaluating the reliability of expected return via realized returns," and conclude that there is no positive correlation between the two (Easton, 2005). This finding is directly in line with the CGER model as it is based on realized returns. Easton and Monahan expand by utilizing other factors along with earnings per share to develop an accurate price predictor. With regression models, they use expected returns, cash flow news and return news as the main variables for price indicator, though earnings per share, via expected return, still play a significant role in price determination. They open the door for other possibilities, such as the use of other variables for price determination (Easton, 2005).

Another Easton et. al study follows the use of current stock prices, current book value of equity and short-term forecasts of accounting earnings to estimate the cost of equity capital (Easton, 2002). The conclusion hinges on a relationship between rate of growth and expected return – where, if an assumed rate of growth were implemented, a reliable expected return could be determined (depending on the forecast horizon). From this point, they also conclude that

book value of equity can only be used in a short time horizon otherwise the reliability of the estimates will dwindle (Easton, 2002).

William R. Gebhardt and Charles M. C. Lee follow a “discounted residual income model and market prices to estimate an implied cost of capital for US stocks” (Gebhardt, 2001). Their conclusion, though not directly related with the significance of estimated earnings per share or growth rate, does spawn some interesting ideas for future studies. They state that industry membership has “an important membership in cost-of-capital estimations” (Gebhardt, 2001) showing that this variable plays a significant role in price determination. Future studies can be implemented to build-on this statement by using the CGER model and running regressions across separate industries to see whether or not the CGER model’s predicative power fluctuates from industry to industry, or if industry membership has affects on the reliability of assuming constant growth rather than creating a weighted-average, as suggested by Richard Brief (1992).

While the most popular valuation model, the discounted present value model based on free cash flows, has several limitations that detract from its reliability. This model requires assumptions in growth rate and discount rates. In other words, the user of the model must create assumptions based upon assumptions created by the original analyst – error-on-error (Claus, 2001).

2.2 Results

Though no numerical evidence was given, Ohlson and Juettner-Nuaroth explain that in order for their model to function, there are two assumptions to

consider: 1) the present value of earnings per share can determine the price (an assumption that our CGER model builds from) and 2) rate of earnings per share increase depends on the dividend payout (Ohlson, 2005).

Ohlson and Gao provide the derivation of the Ohlson and Juettner-Nuaroth formula and then institute the mathematical and statistical evidence to support their claims (Ohlson, 2006). They argue that no other model can "parsimoniously explain the price to forward-earnings ratio in terms of growth in earnings" meaning that the Ohlson and Juettner-Nuaroth model uses growth in earnings to predict price – and it predicts price well (Ohlson, 2006). However, in this paper, Ohlson and Gao explain the insignificance of dividend policy, and also begin expanding the model. Ohlson and Gao mainly focus on the model's performance in empirical and practical applications. Their main findings include the limitations and issues that arise when external factors are applied to their model, such as accounting issues and dividend policy irrelevancy (Ohlson, 2006).

Not all studies agree with the fundamentals of Ohlson and Juettner-Nuaroth's growth in earnings to predict price. Richard Brief et. al state that accounting rates of return lack economic significance and that "there is no way it can infer anything about relative economic probability" (Brief, 1992). Since earnings per share are based on profitability, the rates of return, the earnings per share growth and its significance in determining price are thus hindered because of Brief's study. Brief states that accounting rates of return can still be used for valuation, but not for economic significance (Brief, 1992).

On the other hand, a supporting study for growth rates has Peter D. Easton examining the price-earnings to growth (or PEG) ratio against the price-earnings ratio, and isolate each respective variables' roles in forecasts of the following period's accounting earnings (Easton, 2004). Easton concludes that "the PEG ratio is a useful parsimonious means of ranking stocks," (Easton, 2004) which follows the ranking procedures for the CGER model. The significance of growth and its predictability power support the fundamental basis of the CGER model.

2.3 Issues and Limitations

Timme and Eisenmann explore the use of consensus forecasts of growth and the affects they have on the constant growth model (Timme, 1990). Their final conclusion is that a consensus forecast, using data widely available on I/B/E/S, can be appealing because the data is readily available for analysis. However, proper weightings must be assigned to each forecast because these expectations from analysts should be filtered and have a methodology implemented before use in the constant growth model (Timme, 1990). Data may be widely searchable and useable, but to what extent can they be used and how much reliance can be put in these numbers?

One issue dealt with by Richard Brief's study questions the significance of the accounting rates of return and their predictability, which directly relates to earnings per share. If single period rates of return are not constant, how can a constant growth model be established? (Brief, 1992). He suggests utilizing a weighted-average of single period rates of return to create the CGER model.

However, the study also questions the validity of the CGER due to accuracy issues (Brief, 1992). The numbers will never be entirely accurate, but how much error stems from the creation of this constant growth model is brought into question.

James Claus et. al also studied the effect of future returns, however, their topic of discussion revolves around discount rates and market valuations based on expected future flows. The basis of their data comes from the I/B/E/S information database and Compustat database, which, they believe, is the source of errors based on historical valuation. Their major difficulty comes from the fact that I/B/E/S did not provide a significant dataset for years prior to 1985 (Claus, 2001). Their focus on discount rates shifts towards the use of abnormal returns, where they conclude, are more reliable indicators as an estimator because of “hard” information (Claus, 2001). This shows that earnings per share and its respective growth may not be the best estimator available.

Easton also finds issues with the I/B/E/S dataset. In his 2002 study alongside with Gary Taylor, Pervin Shroff and Theordore Sougiannis, they claim the I/B/E/S dataset has highly optimistic figures for their forecasted earnings per share (Easton, 2002). This limitation will also hinder this project as the majority of earnings per share data was downloaded directly from the I/B/E/S dataset. This means some of the results may seem a little too optimistic due to analyst forecasts. Some of the errors stem from the fact that analysts have their own personal biases when valuating a company or their assumptions are inaccurate

and overstated. Though these errors will not affect the returns of the portfolio, they will affect the filtration process.

Continuing with Easton's work, in his study, "Use of Forecasts of Earnings to Estimate and Compare Cost of Capital Across Regimes," Easton examines the difference between growth rates that are assumed and growth rates that are estimated (Easton, 2006). His conclusion is that poor estimates will lead to poor conclusions, which is unfortunate as he reverse-engineered estimated rates of returns to find that the estimations were poorly done (Easton, 2006). The estimates are inaccurate and can have potential problems in the filtration process in our CGER model. Easton concludes that in order to properly use our CGER model, we must "understand the properties of estimates of expected rate of return and improve them" (Easton, 2006).

Easton and Monahan's conclusion states that long-term earnings are hard to predict and therefore hard to utilize because of their unreliability. Therefore, expected returns that are calculated are unreliable because of transference and other accounting-based measures must be examined (Easton, 2005). The reasons for the unreliable earnings stems from poor analysis or inaccurate forecasts (Easton, 2005). Again this will have impact on our CGER filtration process as our CGER is based on the earnings forecasted. These errors can change which companies are selected for our portfolios and which are excluded.

2.4 Why Constant Growth of Expected Returns?

Constant growth of expected returns was the cornerstone variable of the CGER valuation model because this model requires less estimated figures. Aside from forecasted earnings per share, which are available based on analysts' consensus, all other numbers needed in the CGER model are hard numbers. In other words, these numbers are actual historic values that can be found, compared, and shown as consistent across various databases and other publically accessible resources.

Individual investors can implement this technique with simple research and figures that can be provided by financial websites such as Google Finance or Yahoo! Finance. The only condition that an investor has to satisfy is that they believe that there are no growth uncertainties in the market – meaning that they will not apply momentum investing. Our formula is designed to capture long-term growth and returns of a company, helping investors with a long-term investment horizon. However, in order to prove that this formula can be effective in a long-term investment horizon, we test our theory in three investment holding periods: monthly, quarterly and annually. These three holding periods will signify short-term and long-term investing. As a point for future research, longer holding periods can be tested to review the effectiveness of the CGER model.

By utilizing hard numbers, we avoid the risk of error-on-error like James Claus observed in his research. The more certainty a model can insert, the more likely the model can be accurate and reliable. As long as the data is readily available the CGER model can be implemented for investors determining value

in the market. Also, in a world of imperfections, there is no perfectly efficient market. Because of this assumption, the CGER model can work.

2.5 The CGER Valuation Model

The CGER valuation model was derived from a basic expected return formula based on George W. Blazenko's (2008) recent paper, "Large Cap Investing" we begin with the Market/Book formula:

$$P_0/BVE = (1-b) * ROE / [CGER – b * ROE] = (1-b) * ROE / dy \qquad (3.1)$$

The variable '**dy**' refers to the forward dividend yield – which is derived from the dividend per share downloaded from Compustat North America. $\mathbf{P_0}$ refers to price for a given time period, which, again, is obtained from Compustat North America. In our situation, we used year-end prices as the value for P_0. **BVE** refers to book value of equity and **ROE** refers to forward return on equity. Here **b** refers to retention rate which means the proportion of net income that is not paid in dividends.

By rearranging the formula, we obtain:

$$(P_0/BVE)\, dy = (1-b) * ROE = ROE – b * ROE = ROE – g \qquad (3.2)$$

With this formula, we can isolate for '**g**', the growth rate, and solve via equation 3.4 or we can isolate to solve for CGER via the formula below:

$$CGER = dy + g = dy + ROE – (P_0 / BVE)\, dy \qquad (3.3)$$

CGER is the end result of the formula – which acts as the ranking system for selecting companies to enter the High CGER portfolio and Low CGER

portfolio. Though the ‘g’ – growth rate – is not given, we can use simple substitution to solve for growth rate. By utilizing book value of equity (BVE) and forward return on equity (ROE), which can be derived from information downloaded from the same database, we are able to solve for ‘g’. We are able to substitute growth with forward return on equity subtracted by the result of price divided by book value of equity all multiplied by the forward dividend yield – this is the basic formula for growth:

$$g = ROE – (P_0/BVE)\ dy \qquad (3.4)$$

Forward return on equity was calculated by:

$$ROE = EPS / BVE \qquad (3.5)$$

Where EPS is the forecasted earnings per share retrieved from I/B/E/S database. Forward dividend yield was calculated by modifying the CGER formula and removing growth rate:

$$dy = (1 + ROE / 1 + (P_0 / BVE)\ dy_0)\ dy_0 \qquad (3.6)$$

Where dy_0 was annualized dividend yield retrieved from Compustat North America’s database. The forward dividend yield and forward ROE are then inserted back into the CGER valuation model to complete the last variable required for calculation. Finally, to simplify formula 4.1, we get:

$$CGER = ROE + (1 - P_0 / BVE)\ dy \qquad (3.7)$$

After simplification, the CGER formula becomes evident. This is the formula used to calculate CGER for ranking purposes in determining the HP and LP.

To evaluate the effectiveness of CGER model, we look at Beta, Alpha, t-stat, and standard deviation of the portfolio returns against benchmark. Beta, Alpha, and t-stat were all estimated by running a regression within Microsoft Excel based excess realized returns of the CGER model against excess benchmark returns (actual return less Tbill rate).

CHAPTER 3: METHODOLOGY

3.1 Introduction

The CGER valuation model was implemented with a few simple steps that will be expanded upon in the subsequent sections.

1) We begin by collecting data – Year-End Book Value Per Share, Forecasted Earnings Per Share (for 1-year forecast to 4-year forecast), Dividend Yield, Year-End Market Cap, Year-End Price of Equity, Monthly Returns for the S&P 500 Index, and Yield on a 1-Year and 1-month US Treasury Bill – which is then inserted into each respective formula and comparison model.
2) The filtration process is based on companies that pay dividends, are within the top 50 based on market cap and have positive book value per share and earnings per share. We eliminate all companies that do not coincide with our criteria.
3) After the filtration process, we apply the CGER model for each of the companies that have passed our criteria.
4) We rank the companies based on their CGER values. The top half of the companies are grouped in the High CGER Portfolio, the remaining half is placed in the Low CGER Portfolio.
5) We implement different portfolio strategies based on holding periods: monthly, quarterly, and annually and based on investment strategies: invest in

High CGER Portfolio, Low CGER Portfolio, and the H-L Combination portfolio. We compare the realized returns of the following year based on these holding periods and investment strategies to our benchmark.

6) We compare the CGER model and its effectiveness in different economic situations such as boom periods (1997, 2003) and market downfalls (2000, 2002). These tests will give us more insight on isolated events and the effectiveness of implementing the CGER model.

7) We test the model against momentum investing, based on the same company list, however, the companies are now ranked by realized returns of the previous year-end. We also test these results in three holding periods: monthly, quarterly and annually.

8) We test the forecasted EPS with actual EPS from the period of 1998-2004 for accuracy in analyst forecasts.

9) We then base our conclusions on the realized returns of our benchmark and the CGER valuation model. We conclude that, overall, investing in the High CGER yields the best performance. However, without including historical bias, in certain economic situations the H-L Combination portfolio and the Low CGER Portfolio would yield better results.

3.2 Assumptions

The first major assumption that we consider is that the market is not perfectly efficient. In a perfectly efficient market, there are no mispriced equities and no information is withheld from the public. There is no news that can affect a

stock price that has not already been known to the public and priced into the asset. In our assumed market, there is still potential for mispriced equities and there may still be information that is non-public. If this were not true, the CGER portfolio would not be able to outperform its benchmark (S&P 500) because if all information is public and already priced to equities, buying an index would be more efficient and cost effective. However, there are no gross inefficiencies, otherwise momentum investing would have been the most effective strategy. In other words, we assume that there are only minor inefficiencies in the market.

By using both accounting and forecasted returns as part of our valuation process, we assume that there is positive correlation between the two. This assumption helps ease the flow of data and enables the use of our CGER valuation model.

The data used also presents its own set of assumptions, such as reasonable and reliable forecasts in terms of forecasted EPS. We assume that the analysts have performed their due diligence and the final estimates provided by these analysts are accurate to the best of their abilities. We make this assumption to compensate for the potential error-on-error that may occur with overly optimistic analyst forecasts. In terms of Market-to-Book ratio, we assume that year-end stock price and year-end book value per share are already available at the time forecasted EPS (closest to fiscal period end) is made. To simplify, we assume fiscal period end for all companies is December 31st. In addition, because we use CUSIP numbers to act as a bridge between the three data platforms, there were some discrepancies between the numbers used for

each platform. Most of the CUSIP numbers we applied to each of the three systems had no issues and have been verified by company names. However, there were some instances where output from the database was unavailable. In general, we assume all data collected from different platforms is reliable.

Finally, in terms of results, we look at nominal returns (without adjustment for inflation) that ignore transactions costs which can occur during purchases and sales of assets. We also ignore interest rates and other fees associated with portfolio management and transactions, for simplicity sake. We also assume there are only three possible portfolio types: High CGER, Low CGER, and H-L Combination portfolio.

3.3 Data Gathering

The data set requires forecasted earnings per share, annualized dividend yield (based on monthly dividends per share), year-end book value per share, year-end price of company share, realized monthly returns, year-end shares outstanding, and the S&P 500 index monthly returns. All of which were obtained from various data platforms, including Compustat North America, I/B/E/S, CRSP and Bloomberg L.P.

The first dataset used was Compustat North America's Price, Dividends and Earnings database. We utilized the FTP (Legacy) edition of this dataset to avoid any survivorship bias as this dataset includes active and inactive companies. Using this database, we obtain monthly dividend per share, year-end book value per share, year-end shares outstanding, year-end price of company

share, and the CUSIP numbers for companies in each year. The annualized dividend yield was calculated by using the sum of the monthly dividend yields times the shares outstanding and divided by market cap. Market cap was calculated by using the year-end price of company share multiplied by the year-end shares outstanding. The Compustat book value per share was used to calculate the forward return on equity (ROE) of each individual company. Finally, the CUSIP symbol was downloaded, not because of necessity, but because of practicality. The I/B/E/S database, CRSP database and the Compustat database are not interchangeable and the symbols used by either system are not consistent. One of the major issues is the supposed 'ticker symbol' used by all three systems. Unfortunately, the symbols are not recognizable by each individual data platform and created massive problems and delays in terms of data collection. However, the CUSIP numbers, as discovered through trial and error, remained rather consistent (minus a few errors such as missing ending numbers or zeroes).

The I/B/E/S data platform was used to obtain forecasted earnings per share for each company based on CUSIP numbers obtained from the Compustat system. The CUSIP numbers were partially edited and verified by company names, as some of the numbers provided by the system were incomplete. Four different sets of forecasted earnings per share for each respective company with the potential to be on the CGER portfolio were downloaded from the I/B/E/S data platform. The forecasted earnings per share used are: forecasted EPS for year-end, forecasted EPS for the following year-end, forecasted EPS for the year-end

two years from now and forecasted EPS for the year-end three years from now. For example, if the forecasted earnings per share we are using for the year 1987 is the three year and four year estimates, then the estimates will have occurred in 1989 year-end and 1990 year-end, respectively. In contrast, the one-year estimate will have occurred sometime prior to the fiscal period end of the 1987 year.

Each of the forecasted EPS figures are predictors determined on different dates. We filtered the data available to select the data figures that are closest fiscal period end, 80% of which are at end of December (for example: for companies with a fiscal period end on Dec. 31, the EPS data examined would be the figures reported closest to Dec. 31 and not after – most of the data collected was estimated in mid-December). The final EPS figure used in our project is the median of all estimates reported by I/B/E/S for each forecasted EPS and its respective year (for example: if there are eight forecasted EPS numbers for the same reporting period in 1998, then the median of the eight figures will be the one used for our project).

The time-horizon for realized returns we are using is from 1988 until 2007. The reason for this is because the CGER model will give us a portfolio of companies for the end of 1987; however we apply the realized returns for the end of 1988 to eliminate any historical biases. It should be noted that the time horizon of 1988 to 2007 can only be applied to the CGER forecasted one-year model because of data limitations. Therefore, all realized returns are based on portfolios that have been assembled for the previous year-end.

Based on the data we have gathered, we can only compare the four separate forecasted EPS for the years 2003 and earlier, because the forecasted data does no exist for the fourth year in 2004. The forecasted data diminishes with each year that passes as well. This limits our comparisons for returns to only the years from 1988-2004. However, as a compromise, we can still compare forecasted EPS of year one for all the years available (up to 2007). Therefore, the years after 2004, we will only be comparing one CGER value and its respective portfolio holding periods instead of four. We will also explain this situation in the 'Limitations and Advantages in CGER Investment Strategy.'

Again, using the CUSIP numbers provided by Compustat, we are able to obtain data from a third data platform, CRSP. This data platform was utilized to download realized monthly returns for each company in each different year on the CGER portfolio. The returns downloaded from CRSP include dividend payments. The realized monthly returns for each company is used to calculate expected returns for the CGER portfolio based on different holding periods. This data is essential to formulating an investment strategy based on different holding periods.

Lastly, for our benchmark, we chose the S&P 500 returns on a monthly basis from 1987 until the end of October 2008, but the data for our other variables was only available from January 1987 to December 2006. This data was downloaded directly from Bloomberg L.P. based on the ticker code: SPX Index, via the Bloomberg L.P. terminal. Though returns were not readily available, we simply downloaded closing prices of each month for each

respective year and calculated the returns based on the difference between its preceding one. This number would then provide us with an accurate value for the actual returns of the S&P 500 index on a monthly basis. We used the 'field search' function from Bloomberg L.P. to obtain closing prices of each month end from January 1987 until October 2008.

Table 1: Company List

Company List

Year	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Companies Available	32	32	33	31	34	**33**	34	36	37	35

Year	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Companies Available	40	38	41	40	39	43	45	45	46	49

3.4 Process

First, with the Compustat North America database platform, we retrieve data for all companies available, active or inactive (over 10,000), and locate values based on price and shares outstanding for each of the twenty years being analyzed. The purpose for doing this is to eliminate any survivorship bias – we include companies that have merged, been bought out or have gone bankrupt, on a year-to-year basis. Beginning with the figures pulled from Compustat database platform, we must calculate market cap, as that is one of the few variables not available for download. To make up for this shortfall, we simply take the price of the share at the end of the year and multiply with the number of shares outstanding – also taken at the end of the year. With the market cap now available, we rank the companies in terms of market cap, from largest to

smallest. With the companies ranked, we remove any companies that have negative book value per share (or no data available) and any company that does not pay dividends (or no data available). We then filter companies without positive book value to equity.

Once companies that are out of our criteria have been filtered out, we proceed to rank the top 50 companies (or however many have available data) via market cap, again. Then, we retrieve forecasted EPS from I/B/E/S based on the CUSIP numbers of the company list for each year, and exclude any company with negative actual earnings per share. Every earnings per share downloaded are used to calculate the ROE of the company. The four different earnings per share (year one, year two, year three, and year four) expand the horizon for ROE and their predicative power. The EPS is the key component to calculating ROE (refer to formula 3.2).

Table 2: Filtering Criteria

Variables for Filter	Condition for Removal
Book Value Per Share	Negative or Data Unavailable
Market Cap	Not Within the Top 50
Dividend Yield	Non-Existent or Data Unavailable
Earnings Per Share	Negative or Data Unavailable

Based on CGER model, we can obtain the CGER for each respective year and we proceed to rank the companies based on the calculated CGER values. Now, we download realized monthly returns for the following year from CRSP for each of the company on our lists, and the importance of realized returns comes

into play as the average returns of HP and LP based on the CGER ranking, respectively, are calculated and compared to one another, and to the benchmark.

Based on ranked company lists according to CGER, the top 50% of companies are then grouped together as the ‘High CGER portfolio’ or HP. The remaining half will compromise the ‘Low CGER portfolio’ or LP. We create three different portfolio strategies: one based entirely on the HP, one on the LP and one with HP subtracted by the LP, the H-L Combination portfolio. Any company list with odd number, the median company will be defaulted as part of the HP. We look at three different holding periods, which are monthly returns, quarterly returns, and annual returns, and test which holding period will outperform based on the mean actual realized returns for HP, LP and H-L Combination portfolio for each year. We can determine whether the new CGER portfolio will exceed the returns of the S&P 500. The difference between the two portfolios will be the return of the H-L Combination portfolio.

As an example, if there were only two companies that fit the criteria set out by our CGER valuation model, then one would be part of the HP and the remaining will be part of the LP. In order to determine which joins the HP, we examine CGER calculated by the CGER model and the company with the highest CGER value of the two would be part of the HP. In order to compare with the benchmark, we examine the realized return of the HP with that of the LP (in this case the average is not needed as the example only has two companies). The difference between the HP and LP realized returns would then become the returns of the H-L Combination portfolio. Within these three portfolios we

implement four different CGER numerical values. We create these four CGER values based on the forecasted earnings per share figures for each different forecasted period (ie: one year, two years, three years and four years).

The different portfolio strategies are compared against the returns of the S&P 500 to determine whether the CGER portfolio can outperform. Also, after one comparison is made, we consider alternative investment styles in terms of investment lengths or holding periods. We examine the following holding periods: monthly, quarterly, and annually. We are then able to determine the effectiveness of long-term and short-term investing versus the benchmark and whether or not a sound investment strategy can be developed from these results. The conclusion will be based on returns, downloaded directly from CRSP. We then compare the four different CGER models against one another to determine which one is better suited for forecasting returns. Again this result is ultimately based on the actual realized returns for the companies selected. We will also choose certain specific years such as a boom market (1997, 2003) and economic downturn (2000, 2002) as additional research for event-specific results. For these time-specific tests, we continued to use the portfolios obtained by ranking the CGER values of companies. We compare the various holding periods as well as the portfolio strategies of High CGER investing, Low CGER investing and H-L Combination investing for a conclusion. We will determine whether all strategies have application in profitable investing especially in time-specific investments.

We also compare the forecasted EPS with the actual EPS for the period of 1987-2003 for the four CGER models. This analysis will give us a better

understanding of the inaccuracies that may occur by following analyst estimates. The time period was chosen because this was the middle of a boom period and also covers an economic downturn, which can prove how effective an analyst was at predicting market trends. Via transference, we are able to determine how accurate the CGER model is and whether the resulting portfolio was based on analyst errors or if the CGER model can use analyst forecasts accurately to create an effective portfolio investment strategy.

CHAPTER 4: RESULTS

4.1 Introduction

The High CGER portfolio performed the best, especially with long-term investment strategy, and both High CGER and Low CGER portfolios can outperform our benchmark. As shown by the CGER forecasted one-year model, we see that the H-L Combination portfolio performs the poorest out of all available portfolios. However, The H-L Combination portfolio is a naturally hedged portfolio, which, despite its lower returns compared to its counterparts, actually might be a strong portfolio for a hedge fund manager to have, considering its low volatility (see Table 9).

Table 3: Portfolio Return vs. Benchmark (CGER1)

	1988-2007		
	Monthly	Quarterly	Annual
High	1.177%	3.661%	15.478%
Low	1.007%	2.918%	13.173%
High-Low	0.169%	0.742%	2.306%
SP500	0.821%	2.500%	10.714%

The R-squared is the explanatory power of the CGER model. Below are the R-squared values for our CGER are as follows:

Table 4: Mean Return with R-square

Mean Returns for 1988-2007 (CGER_1 as example)		
	12 months	**Adjusted R^2 (12 month)**
High	15.478%	**0.763**
Low	13.173%	**0.864**
High-Low	2.306%	**-0.035**
SP500	10.714%	

4.2 Implementation

The High CGER portfolio and a Low CGER portfolio are created based on the CGER valuation model after the implementation of strenuous filters. The HP is then compared against the LP, with the difference between the average realized returns being the returns of the third, H-L Combination portfolio. However, the CGER valuation model allows room for flexibility and certain situations may arise where HP and LP are not as clearly defined as one would think.

The first test done was the simple HP, LP, and H-L combination portfolio versus the S&P 500 benchmark. There are economic situations, such as a down market, where a H-L Combination CGER portfolio could yield better returns than any other portfolio. In a credit crisis, (we used a period before and after the tech bubble as a historical simulation) an H-L Combination portfolio would have been the best choice, as we show the relatively consistent results from the returns of the benchmark versus our High CGER portfolio and Low CGER portfolio in 2000 and 2002.

The current credit crisis is similar situation to that of the tech bubble, though data for the current period was not readily available as of this writing. One thing to consider is that these assumptions all require historical bias – we know the results and the time period where events occur. A bias occurs that allows us to invest in the High, Low or H-L Combination we desire because of foreseen knowledge. Otherwise, we are unable to accurately determine the future economic state of the market and its duration.

In order to avoid this bias, we remain arbitrary in our selection of companies for our CGER portfolio and use numbers as evidence. We select the companies based on first their market cap and then their CGER value. Again, the top 50% of CGER values will be used in the HP and the bottom 50% will be used in the LP, based on a total of 50 companies. There are no biases or personal attachments to any of these companies collected. They are being used simply because the numbers dictate that we use them.

4.3 High CGER, Low CGER, and H-L Combination Portfolios

Through our tests, we find that the mean returns of the High CGER portfolio, over 20 years, has consistently outperformed the S&P 500 benchmark in all period holdings and in all four EPS-based CGER values. In certain situations, the Low CGER portfolio (boom markets) and the H-L Combination portfolio (economic downturn) were the best.

The correlation charts show the correlation between realized returns based on four CGER models and benchmark. All High CGER and Low CGER portfolios with different holding periods, respectively, have correlation less than one with the S&P 500, but are positive, and increases along with holding period. However, the H-L Combination portfolio mostly has a negative correlation with S&P 500. Due to the negative correlation of H-L Combination portfolio, it can be used as an alternative investment strategy when the short-term market return is going down, such as the tech bubble in 2001.

The higher correlation between Low CGER portfolio and benchmark can be explained partially the better-than-market performance, which shows that during economic booms, despite holding the lower CGER position, the portfolio would still move with the market *and* outperform the benchmark. During an economic downturn, the Low CGER portfolio can deviate slightly to yield higher returns than the benchmark – though it fails to create a viable investment strategy for an economic downturn. However, the negative correlation of the H-L Combination portfolio seems to be the better choice of investment strategy for an off-year. It should be noted that it is impossible to determine which strategy to implement without historical bias. We do not know which specific years would be bad, only trusting indicators, analyst reports and other news sources to help us make educated guesses and implement portfolio strategies.

Table 5: Correlation Charts (1988-2004)

Correlation Charts (1988-2004)			
Monthly	**High-Low**	**High**	**Low**
CGER 1 VS. SP500	-0.021	0.864	0.895
CGER 2 VS. SP500	0.043	0.876	0.889
CGER 3 VS. SP500	-0.032	0.865	0.891
CGER 4 VS. SP500	0.099	0.906	0.882
Quarterly	**High-Low**	**High**	**Low**
CGER 1 VS. SP500	-0.048	0.875	0.901
CGER 2 VS. SP500	-0.068	0.886	0.903
CGER 3 VS. SP500	-0.076	0.881	0.899
CGER 4 VS. SP500	0.015	0.920	0.910
Annual	**High-Low**	**High**	**Low**
CGER 1 VS. SP500	-0.117	0.884	0.936
CGER 2 VS. SP500	0.146	0.929	0.931
CGER 3 VS. SP500	0.172	0.909	0.932
CGER 4 VS. SP500	0.117	0.926	0.939

The following chart shows the average mean returns for the years 1988 to 2004 for all four CGER models. It is clear that over the long-run the High CGER portfolio has the highest returns, where as the H-L Combination portfolio does not surpass the benchmark. However, as shown in the Mean Returns for a Specific Year, the H-L Combination portfolio performs the best in 2000 and 2002, an economic slowdown.

Table 6: Performance Comparison between CGERs

Comparison between CGERs

Mean Returns for 1988-2004

Monthly		**High-Low**	**High**	**Low**
CGER 1		0.138%	1.192%	1.054%
CGER 2		0.382%	1.312%	0.930%
CGER 3		0.489%	1.364%	0.875%
CGER 4		0.473%	1.356%	0.883%
SP500	0.867%			
Quarterly		**High-Low**	**High**	**Low**
CGER 1		0.701%	3.733%	3.032%
CGER 2		1.156%	3.957%	2.801%
CGER 3		1.415%	4.084%	2.669%
CGER 4		1.382%	4.066%	2.685%
SP500	2.648%			
Annual		**High-Low**	**High**	**Low**
CGER 1		2.213%	15.870%	13.657%
CGER 2		3.727%	16.617%	12.890%
CGER 3		5.291%	17.382%	12.090%
CGER 4		5.252%	17.359%	12.107%
SP500	11.419%			

We also compare forecasted EPS and actual EPS in order to determine the accuracy of analyst predictions (see Table 8). The CGER based on EPS projected one-year in the future is very accurate; however, the accuracy depreciates as the time-horizon increases. Another point to note is that according Easton, the forecasted EPS are typically optimistic. According to our study, the forecasted EPS is actually pessimistic and is increasingly pessimistic as time-horizon is increased.

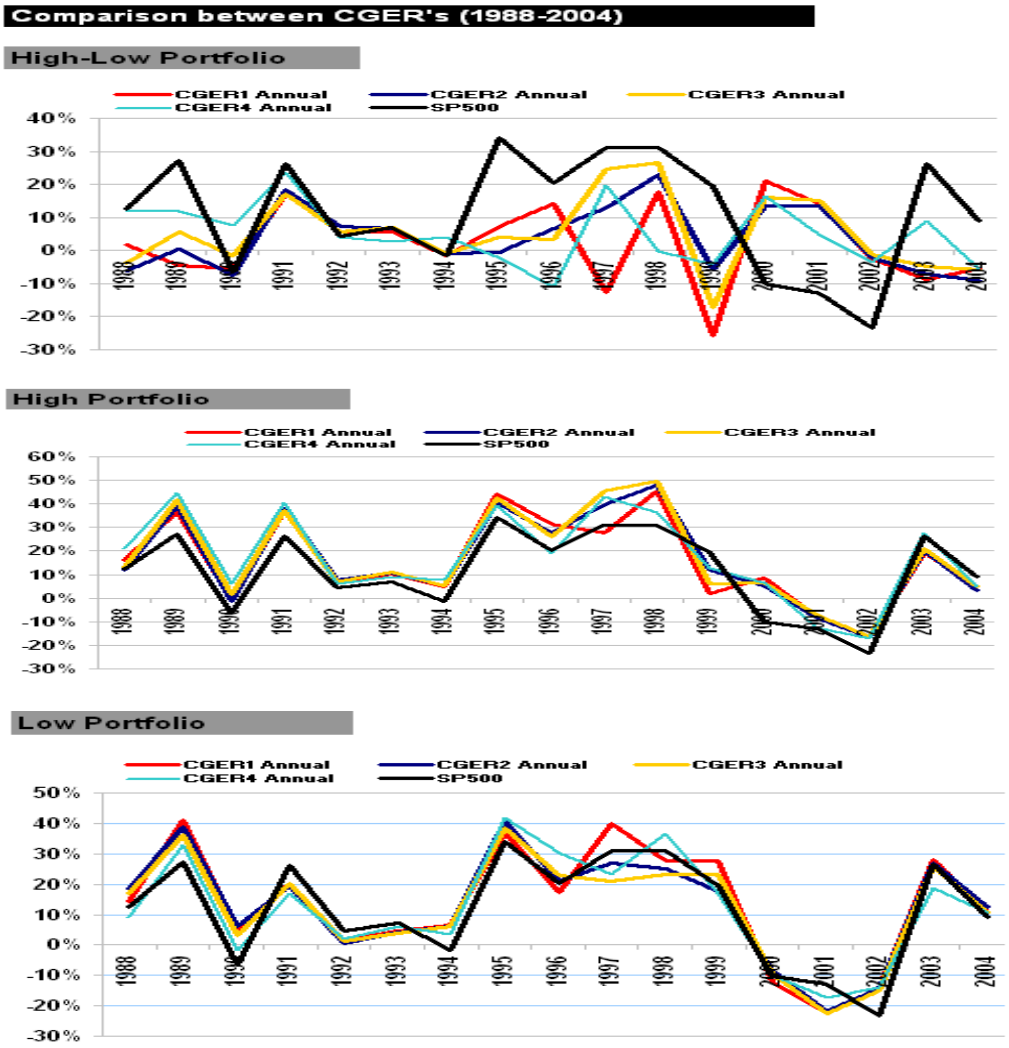
The H-L Combination portfolio is a naturally hedged portfolio. Because of its hedged position, an annual return of 2%-5% (depending on the CGER value

used and holding period), is very encouraging for a hedge fund manager and can be something explored in further detail in the future. This return is relatively low risk and is an astounding return for the given amount of risk.

4.4 CGER Value Comparison

The four different CGER values were based on forecasted earnings per share for year one, year two, year three and year four. The High CGER portfolio is the best overall investment strategy, and the CGER for year three yields the highest return.

Table 7: Comparison Graph between CGERs



We are unable to locate forecasted EPS data for the year 2004 and onwards. In terms of available data, year one forecasted earnings per share had 100% data availability, year two had 98%, year three had 80-90%, but year four only had a disappointing 50-70% availability rate. The availability rate is based on the available amount of data for the 50 companies determined first by our filters and then ordered in terms of CGER.

Within the remaining three CGER models, we believe the one based on first year forecasted earnings per share will be more appropriate to use, because:

1) It has the most complete dataset and allows us to compare all the holding periods for 1988 through 2007.

2) It has minimal deviation from the actual EPS, which gives the most accurate results.

3) Year two, three, and four forecasted EPS will be less accurate because of bigger deviations, less data sufficiency and these will result in bringing more volatility to the CGER model.

Table 8: Comparison between Forecasted EPS and Actual EPS (1987-2003)

Mean Forecasted EPS vs. Actual EPS (1987-2003)

Annual	Forecasted EPS	Actual EPS	Difference
CGER 1	1.74956	1.74200	0.00756
CGER 2	1.68612	1.83970	(0.15358)
CGER 3	1.44666	1.92937	(0.48271)
CGER 4	1.17005	2.07375	(0.90370)

4.5 Statistical Results

Because of the availability of data, we determine only the alphas and betas for CGER based on one year forecasted EPS and find that only few of the results have statistical significance via the t-test.

The alphas, betas and t-stat values listed in Table 9 are estimated by running regression in Excel derived from the formula below.

$$r_{jt} - r_{ft} = \alpha_j + \beta_j (r_{mt} - r_{ft}) + e_{jt}$$

Where r_{jt} is the rate of return on asset (or portfolio) j at time t, r_{ft} is the risk-free rate of interest at time t, and r_{mt} is the rate of return on the market portfolio at time t. While here r_{jt} is the portfolio realized return at time t, r_{ft} is the US Treasury bill rate, and r_{mt} is the return on the S&P 500 index.

In general, beta, in terms of finance and investing, describes how the expected return of a stock or portfolio is correlated to the return of the financial market as a whole. While alpha is the measure of risk-adjusted performance. It is usually generated by regressing the security's excess return on the benchmark's excess return as shown in the regression equation above. In our study, beta shows how much the realized return based on CGER model is correlated to S&P 500 index and alpha tells the portfolio risk-adjusted performance compared with S&P 500 index. Lastly, t-stat tests the statistical significance of the portfolio returns at 95% confidence interval with critical value at 1.96. Any t-stat with an absolute value greater than 1.96 will be deemed as statistical significance.

All standard deviation values are calculated via Excel, which is a measure of volatility: the more stock's returns vary from the stock's average return, the more volatile the stock.

Table 9: Statistical Results

Statistical Results

		Alpha	Beta	t-stat	Standard Deviation
Monthly	High	(0.00391)	0.87900	(1.57532)	0.03984
	*Low	(0.00467)	0.89407	(2.21123)	0.03890
	High-Low	0.00182	(0.01507)	0.96762	0.02842
	SP500				0.03891
Quarterly	High	0.00597	0.86821	1.27517	0.07084
	Low	0.00051	0.91412	0.12419	0.07164
	High-Low	0.00857	(0.04591)	1.37068	0.05245
	SP500				0.07060
Annually	*High	0.05026	0.91490	2.66662	0.17003
(12 months)	Low	0.02411	1.01572	1.60926	0.17814
	High-Low	0.03386	(0.10082)	1.05555	0.11708
	SP500				0.16366

Note: * indicates statistical significance

With the above table, we see that within the monthly holding period only the Low CGER portfolio has statistical significance. There is no statistical significance in the quarterly holding period. We only consider excess returns High CGER and Low CGER portfolios, which means we have removed the risk-free rate, and are compared with excess benchmark returns (SP500 index return less risk-free rate). We consider the H-L Combination portfolio to be a hedged portfolio. Therefore we do not remove the risk-free rate and compare it directly to the S&P 500. Taking dividend payments into consideration, the S&P 500 return

does not include dividends. Therefore the impact from the dividends should reduce the alphas by about 2%. After this is accounted for, then we can compare the CGER model to our benchmark properly, however we have not adjusted for dividends on the S&P500 for our project.

By examining the standard deviation, we are able to account for risk on each of the holding periods and respective portfolio investment strategies. We deemed the H-L Combination portfolio to have the lowest returns, but in reality, this is because this strategy is a natural hedged strategy. As evidenced by the standard deviation, the H-L Combination portfolio does have the lowest risk. Over each holding period, this result holds true as the H-L Combination portfolio has the lowest risk and strengthens the claim that the H-L Combination portfolio works well in an economic downturn. Furthermore, standard deviation increases along with holding periods, which is not surprising because longer holding period bring higher risk to the portfolio.

In an interesting note, by using a monthly holding period, alphas for both the High and Low CGER portfolios are negative, meaning that the investment would not be profitable, whereas the H-L Combination portfolio remains positive. However the beta for the H-L Combination portfolio is consistently negative, which is useful during a market downturn as it works against current market trends.

4.6 Holding Strategy

By using the any of the forecasted EPS years, the High CGER portfolio strategy consistently yields the best returns and outperforms the benchmark, especially with long-term strategy. The Low CGER portfolio performed best in strong market growth periods whereas the H-L Combination portfolio will yield the best results in for an economic downturn. The realized returns are the mean returns based on the previous twenty years on the S&P 500. It should be noted that the mean returns would remove any extraneous deviations from the mean.

	1988-2007		
	Monthly	Quarterly	Annual
High	1.177%	3.661%	15.478%
Low	1.007%	2.918%	13.173%
High-Low	0.169%	0.742%	2.306%
SP500	0.821%	2.500%	10.714%

The above chart shows the effectiveness of the High CGER portfolio and its stunning results against the S&P 500 benchmark. Both the High CGER and the Low CGER portfolios on their own exceed the returns of the S&P 500. Partial explanation of the success of both the High CGER and Low CGER portfolio over the H-L Combination portfolio can be placed on correlation. However, we also explore the possibility that the portfolios were affected by years with stronger returns or weaker returns. In other words, there could be skewed numbers due to stronger or weaker years.

In order to better understand the behaviour of the High CGER and Low CGER portfolio, we examine the extreme portfolio returns of 1997, 2000, 2002,

and 2003, which are the midst of the boom period for stocks due to the rise in technology stocks and then the fallout of the tech bubble. We examine the one-year forward forecasted EPS as our basis point because of its historical accuracy.

In 1997, we are in the midst of the technology boom. Stocks are at an all-time high and anyone investing in the market could seemingly do no wrong. Without question, the High CGER portfolio out performs the others based on monthly, quarterly and annual mean returns. Again, these returns are actual realized annual returns based on the CGER1 model. No matter what holding period we choose, the High CGER portfolio will outperform the other two potential investment strategies. 2003 is the return of the market where the economy is on an upward trend.

Table 10: Portfolio Return for Specific Years (CGER 1)

Mean Returns for Specific Year (CGER_1 as example)

Boom Market

	1997		
	Monthly	Quarterly	Annual
High	2.215%	6.488%	27.454%
Low	2.934%	8.781%	39.988%
High-Low	-0.719%	-2.293%	-12.534%
SP500	2.373%	7.146%	31.008%

	2003		
	Monthly	Quarterly	Annual
High	1.596%	4.833%	19.150%
Low	2.119%	6.668%	27.969%
High-Low	-0.523%	-1.834%	-8.819%
SP500	2.018%	6.285%	26.380%

Market Downturn

	2000		
	Monthly	Quarterly	Annual
High	0.666%	2.143%	8.698%
Low	-1.096%	-3.332%	-12.169%
High-Low	1.761%	5.475%	20.867%
SP500	-0.776%	-2.568%	-10.139%

	2002		
	Monthly	Quarterly	Annual
High	-1.325%	-3.877%	-16.831%
Low	-1.080%	-3.240%	-14.344%
High-Low	-0.245%	-0.637%	-2.487%
SP500	-2.029%	-5.878%	-23.366%

In an interesting change, the H-L Combination portfolio performs better in all three scenarios, monthly, quarterly and annually during this economic crisis (2002). However both the Low CGER portfolio and the High CGER portfolio perform very poorly. The H-L Combination portfolio performs better due to its negative correlation with the market. This is the only situation where the combination portfolio outperformed both the High CGER portfolio and the Low CGER portfolio. However without accurate predicators or historical bias, the combination portfolio would be very hard to implement and is rendered useless compared to the universal application of the High CGER portfolio. Both the years 2000 and 2002 are economic downturns due to the burst of the tech bubble.

Based on our findings, the High CGER portfolio performs the best overall and is the only portfolio to consistently beat the benchmark in terms of actual realized returns. Therefore the best CGER model, based on the S&P 500, would be to invest in the top 50% of companies ranked via CGER after filtering with our criteria – must be dividend-paying, must have positive earnings per share, and must be in the top 50 in terms of market cap. And the key estimator variable to run CGER, the forecasted EPS, should be the year one forecasted EPS. The High CGER portfolio would be our recommended investment strategy. However, the succeeding section will discuss limitations and inaccuracies that hinder the effectiveness of the CGER model.

The CGER model is primarily driven by two variables: EPS and Price-to-Book Value per Share. These two variables also have applications in determining company type. In general, a company with a low EPS and high Price-to-Book

Value per Share would be labelled as a ‘growth company.’ For us, we sort companies that match this criterion as the Low CGER portfolio. Conversely, companies with a high EPS and low Price-to-Book Value per Share would be labelled as a ‘value company.’ In our CGER model, these companies would belong in the High CGER portfolio. It is understandable, that overtime the High CGER portfolio performs the best and exceeds the benchmark. It is also understandable that the Low CGER portfolio performs the best in times of economic growth.

CHAPTER 5: MOMENTUM INVESTING

5.1 Introduction to Momentum Investing

In Thomas J. George and Chuan-Yang Hwang's "The 52-Week High and Momentum Investing," they compare three different momentum investing strategies to obtain returns on the market. Their strategies include: 1) shorting the bottom 30% of companies and longing the top 30% of companies based on returns (based on Jegadeesh and Titman), 2) longing the top 30% of companies based on performance of an industry (based on Moskowitz and Grinblatt) and 3) longing a company based on their current price and how close it is to their 52-week high and shorting a company if the price is far from the 52-week high (George, 2004).

As with the CGER valuation model, George and Hwang assume a semi-strong efficient market and have discovered that the 52-week high momentum investing strategy can yield double the returns (based on winners and losers) than those of the long and short strategies mentioned above (George, 2004). Their final conclusion, based on their results, show that equity prices are non-random walk and that the 52-week high price does in fact have predictive power though still require refinement in theory and technique (George, 2004). Their article attributes the momentum of prices to be essential in creating a viable portfolio – proving that momentum investments do work and do provide positive results.

5.2 Methodology

We examine momentum investing by utilizing the same company list that was created from our original filter. However, instead of ranking the companies based on CGER, we will be ranking companies based on realized returns from the previous year-end. For example, we will rank companies based on realized returns for December 31, 1998 and then invest in the top-ranked companies for three holding periods: monthly, quarterly and annually. We then obtain the realized returns for the holding periods during the following year, 1999. We compare these results with those of the CGER model to determine whether momentum investing adds any more benefit for the common investor than the CGER model.

Compared to the CGER valuation model, using the 52-week high (in terms of prices) is much simpler to implement and can be used by the casual investor on a daily basis. However, the time-frame for this investment strategy is short and requires active-management – which can lead to higher transaction costs. Again, for our momentum simulation, we substituted the CGER variable with realized returns. We kept all other criteria the same from the CGER model, but only looked at annual portfolio returns instead of monthly and quarterly as well. Our results show that, in general, the best performing portfolio is the High CGER portfolio and the worst would be the H-L Combination portfolio. We test these results against those of the momentum portfolio.

5.3 Results

Momentum investing utilized the same portfolio defined by the filters in place for our CGER models. We based our momentum strategy on the CGER1 model and used the mean returns from 1988 to 2007. What we discover is that the CGER model generally outperforms the momentum strategy. Again, the strongest performance came from the High CGER portfolio, but the Momentum Low portfolio outperformed that of the Low CGER portfolio. This can be partially being attributed to the lower correlation between the Low Momentum portfolio and the S&P 500.

Table 11: Portfolio Return with CGER Model vs. Momentum Strategy (1988-2007)

CGER1 vs. Momentum (1988-2007)	
Mean Returns	
CGER High-Low	2.306%
CGER High	15.478%
CGER Low	13.173%
Momentum High-Low	0.497%
Momentum High	14.610%
Momentum Low	14.113%
SP500	10.714%
Correlation	
CGER High-Low vs.SP500	-0.141
High vs.SP500	0.881
Low vs.SP500	0.933
Momentum High-Low vs.SP500	0.365
High vs.SP500	0.927
Low vs.SP500	0.861

Looking at the overall results, the H-L Combination portfolio for both CGER and Momentum performed the poorest overall. Regardless of investment stance, both the HP and the LP outperformed the benchmark over a 20-year horizon.

CHAPTER 6: LIMITATIONS AND ADVANTAGES

There are several limitations, but also a fair number of advantages, for using the CGER valuation model as an investment strategy. The CGER valuation model can be used as both a value investment tool and an aid for momentum investors. Though the characteristics and fundamentals root the CGER valuation model into the value investment philosophy, there are characteristics that allow the CGER valuation model to be used by active investors in a momentum strategy. For example, should the market begin a downturn and news is available that a recession is looming, then Low CGER a portfolio would be the optimal solution or the harder to implement H-L combination portfolio could be another alternative for investors. The CGER valuation model can then be used to put numbers and a time horizons to this strategy after implementation. This strategy then becomes a synergy of momentum investing (the initial investment) and value investing (the length of holding, the empirical data and mispricing of assets).

However, there are several detractors that make the CGER valuation model unreliable and faulty. The model runs well for historical data during the 1990s and 2000s, however, data that is too recent cannot be accurately used or obtained. Contrary, the difficulties in finding data for the model to use from the 1980s and earlier are inefficiently difficult. Despite having three database platforms available for use, locating data in 1980s was challenging, and

sometimes, non-existent. These ‘holes’ in information will impact the accuracy of our findings as there are some years that only feature 30 companies versus the 2000s with 50 companies present with all information readily available. This will unfortunately create a ripple effect and show higher volatility in our final results, the returns. For example, the 1987 data set only has 32 companies with readily available data. The results will now be based on the High CGER of sixteen companies and the Low CGER of the remaining sixteen companies, rather than the 25 for each respective half. This means that the sixteen companies of each portfolio will have the same effect on the realized returns as the 25 companies. The individual companies within the group of sixteen companies have a more profound effect on the realized returns. In addition, the most recent data that can be obtained is only December 2006, while the market condition has changed dramatically since 2007. The CGER model may also encounter severe challenges after applying the latest market data once available.

An issue that also arises from the database platform usage occurs when transferring information between the three sets: I/B/E/S, Compustat and CRSP. Since the three datasets are not interchangeable and are not interlinked, issues arise when locating data for the companies that we have already filtered because of issues dealing with ticker symbols and CUSIP numbers. Some of the ticker symbols used by I/B/E/S do not match those used by Compustat. When dealing with 50 companies, using the Compustat ticker symbols on the I/B/E/S system yields approximately 75% of the companies required. However, when using CUSIP numbers, the number increases from 75% to 90-95%. With a few

modifications and quick assumptions, the CUSIP numbers pull all the companies required for our research. Though, the lack of interaction between the three platforms becomes severely time consuming and can only hinder the desire for casual investors to implement the CGER valuation model. Without subscriptions to these three investment platforms, historical data of certain key variables, like forecasted EPS, would be near impossible to obtain – which also hinders a casual investor's ability to accurately implement the CGER valuation model.

The CGER valuation model is based on forecasted earnings per share and, as stated in the assumptions, issues can arise if the forecasted EPS numbers are not accurate or have personal biases factored in. Analysts may be creating error-on-error. These irregularities can skew our results and we may not even be able to detect it. As shown by several other studies, we show that the forecasted EPS data from the I/B/E/S data system has potential issues, namely its optimistic figures.

In regards to I/B/E/S, we are also unable to locate complete forecasted figures for EPS for the year 2004 and onwards. We are only able to download data until the third forecasted year and this diminishes with each subsequent year. In the end, however, we can still compare forecasted EPS for one year, meaning we do have one CGER model we can still use to compare with our benchmark. However, this detracts from the reliability and accuracy of our findings, especially recent years, as the more tests and comparisons we do will sufficiently justify our findings.

We eliminate the survivorship bias by using the time consuming method of filtering through all North American companies via Compustat's database. However, in order to avoid a historical bias or data mining, we arbitrarily select the final companies for the HP and LP based on CGER rankings. This may not be the best or most effective way to allocate our assets, but it is a guaranteed method for eliminating any of the aforementioned biases. Another bias we avoid, especially when working with historical data, is the historical bias. For example, we know exactly when the tech bubble starts and ends, which means an investment in the Low CGER portfolio in the late 1990s and an investment in the H-L Combination portfolio in the early 2000s would produce a better return result than the combination portfolio. However, because of the arbitrary asset selection for the HP and LP, we avoid this bias. We are unable to skew our numbers to increase our historical performance, even though momentum investing during these time periods may have yielded better results and better overall performance.

For a future study, an in-depth review on the industry effect in terms of the realized returns on the CGER valuation model could further prove the effectiveness of this investment strategy. If the companies selected via the CGER model filtration process has not been affected by the industry effect, then the CGER valuation model has become that much more effective. However, if the CGER valuation model is only effective because of the industry effect, then, obviously, the effectiveness of the model will be severely hindered.

Another limitation to the model is the use of the Fama and French model. We have accounted for the Price to Book Value per Share, however, there are other factors in the Fama and French model that can be taken into deeper consideration for future research. For example, there are fundamental risks that can be observed and contained – otherwise are we really comparing the same things together? In the Fama and French model, they explain portfolio returns by considering the size of a company, which is one of those factors that can help make proper broad comparisons across companies. Otherwise, some of the companies selected via the CGER model may not accurately reflect the end result, the realized returns.

CHAPTER 7: CONCLUSION

Limitations withstanding, our results determine that the best overall investment strategy for a long-term value-oriented investor would be the High CGER portfolio strategy and consistency makes it one of the more attractive alternatives.

. The High CGER portfolio has consistently outperformed our benchmark and finishes near the top in terms of actual realized returns. The Low CGER was a close second behind the High CGER portfolio. However, a Low CGER portfolio performs best in a high-growth economy. Finally, the H-L Combination portfolio only performs adamantly within a poor short-term economic outlook and it is hard to predict whether or not the economy will rise or fall as the nature of business is rather unpredictable. Nevertheless, the H-L Combination portfolio would be very encouraging for a hedge fund manager as a naturally hedged portfolio.

There are many other areas that can be explored with the CGER model, such as different indices and countries. Currently, we are using a mature country with a mature index. However, would results vary if an emerging market were used? How would this market affect the model and would the High CGER portfolio still be the best investment strategy? What if we were to use the most up to date data? What about recent market turmoil? There are many questions that need to still be addressed on the CGER model. However with each question answered, we open a new window of opportunity for the CGER model. There are

many potential uses for this model in terms of return prediction and investing benefits.

The strategies for investing remain abundant, with no clear-cut winner or outright loser. The CGER model is an idea that can help remove some of the uncertainty that surrounds valuation. The CGER model, though experimental at this stage, can be one of the stepping stones to making sense of economic nonsense.

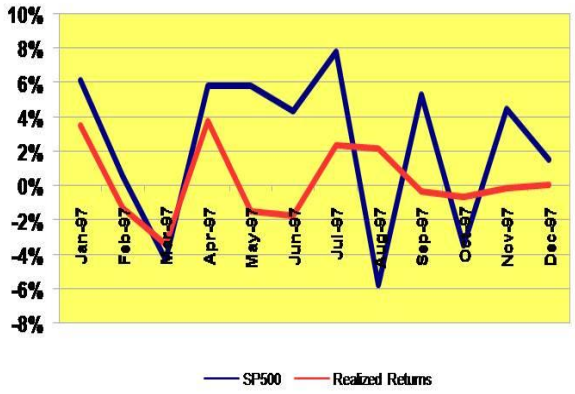
APPENDICES

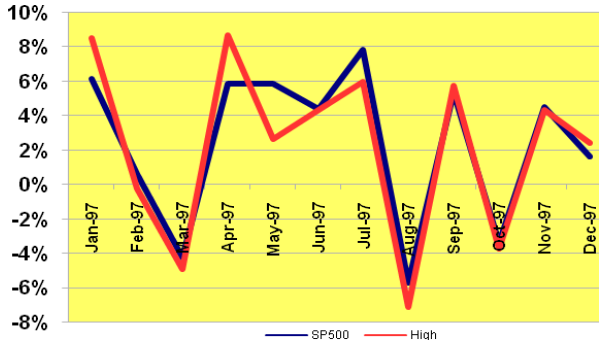
Appendix A – Raw Dataset (Four annual CGER portfolio returns)

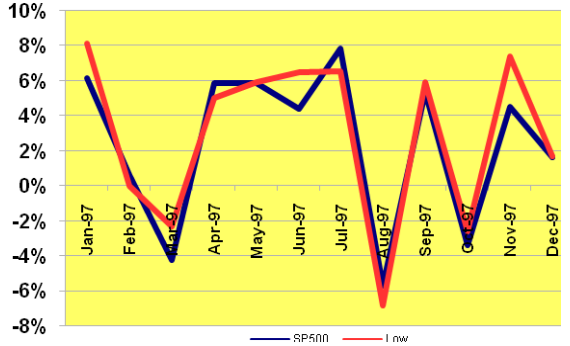
CGER1 Annual																				
Date	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
High	15.910%	36.675%	-0.490%	37.248%	7.060%	10.207%	4.806%	44.155%	31.320%	27.454%	45.317%	1.931%	8.698%	-7.836%	-16.831%	19.150%	5.016%	8.172%	16.641%	14.966%
Low	14.317%	41.139%	5.032%	20.106%	1.262%	4.629%	6.384%	36.986%	17.169%	39.988%	27.592%	27.734%	-12.169%	-22.113%	-14.344%	27.969%	10.488%	1.403%	23.112%	6.771%
High-Low	1.593%	-4.463%	-5.522%	17.142%	5.799%	5.578%	-1.579%	7.169%	14.151%	-12.534%	17.725%	-25.803%	20.867%	14.276%	-2.487%	-8.819%	-5.472%	6.770%	-6.471%	8.195%
SP500	12.401%	27.250%	-6.559%	26.307%	4.464%	7.055%	-1.539%	34.111%	20.264%	31.008%	31.008%	19.526%	-10.139%	-13.043%	-23.366%	26.380%	8.993%	3.001%	13.619%	3.530%
CGER2 Annual																				
High	12.029%	39.132%	-1.387%	37.917%	7.884%	10.742%	5.198%	40.301%	27.660%	39.746%	47.881%	11.931%	5.171%	-8.283%	-16.663%	20.010%	3.227%	8.228%	20.148%	3.880%
Low	18.198%	38.683%	5.985%	19.392%	0.438%	4.061%	5.991%	40.839%	21.032%	26.973%	25.027%	17.734%	-8.465%	-21.666%	-14.521%	27.069%	12.359%	1.345%	19.605%	18.318%
High-Low	-6.170%	0.449%	-7.372%	18.525%	7.446%	6.680%	-0.793%	-0.538%	6.627%	12.772%	22.855%	-5.803%	13.636%	13.383%	-2.142%	-7.059%	-9.133%	6.883%	0.544%	-14.437%
CGER3 Annual																				
High	13.170%	41.678%	1.456%	37.171%	6.913%	10.861%	5.198%	42.634%	26.026%	45.502%	49.760%	6.273%	6.335%	-7.366%	-16.173%	21.156%	4.895%	4.704%	15.012%	3.880%
Low	17.058%	36.136%	2.964%	20.189%	1.409%	3.935%	5.991%	38.506%	22.757%	20.878%	23.148%	23.391%	-9.687%	-22.583%	-15.036%	25.867%	10.615%	5.029%	24.742%	18.318%
High-Low	-3.888%	5.542%	-1.508%	16.982%	5.504%	6.927%	-0.793%	4.128%	3.268%	24.623%	26.612%	-17.118%	16.022%	15.218%	-1.137%	-4.711%	-5.719%	-0.324%	-9.730%	-14.437%
CGER4 Annual																				
High	21.032%	44.775%	5.927%	40.359%	6.236%	8.846%	7.653%	39.407%	19.027%	43.165%	36.419%	12.740%	6.559%	-12.562%	-17.305%	27.805%	5.023%	8.574%	15.012%	3.880%
Low	9.196%	33.040%	-1.785%	16.788%	2.086%	6.076%	3.536%	41.734%	30.145%	23.353%	36.490%	16.925%	-9.922%	-17.387%	-13.845%	18.902%	10.482%	0.983%	24.742%	18.318%
High-Low	11.836%	11.735%	7.712%	23.571%	4.150%	2.769%	4.117%	-2.327%	-11.118%	19.812%	-0.071%	-4.185%	16.481%	4.825%	-3.460%	8.903%	-5.459%	7.591%	-9.730%	-14.437%

Appendix B – Portfolio annual returns for Boom Market (1997 & 2003) (CGER 1)

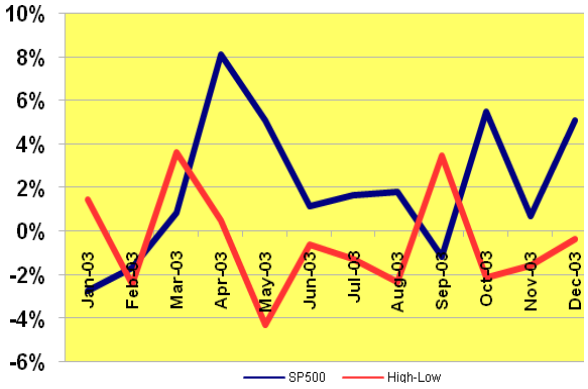
1997 vs. SP500 (in sequence: H-L, High, Low)

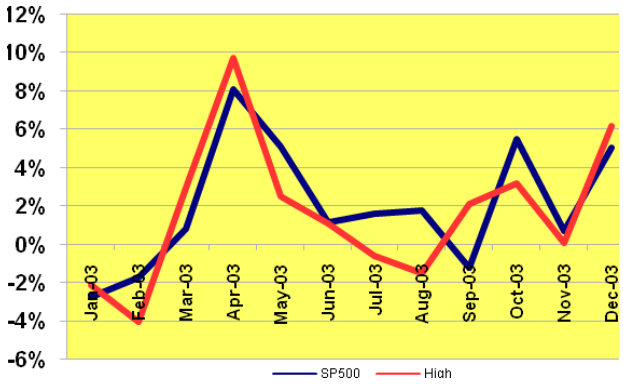


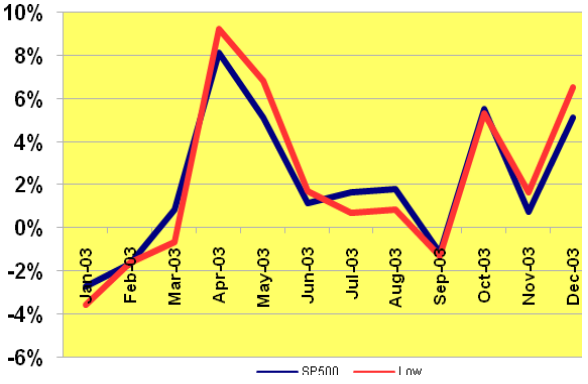




2003 vs. SP500 (in sequence: H-L, High, Low)

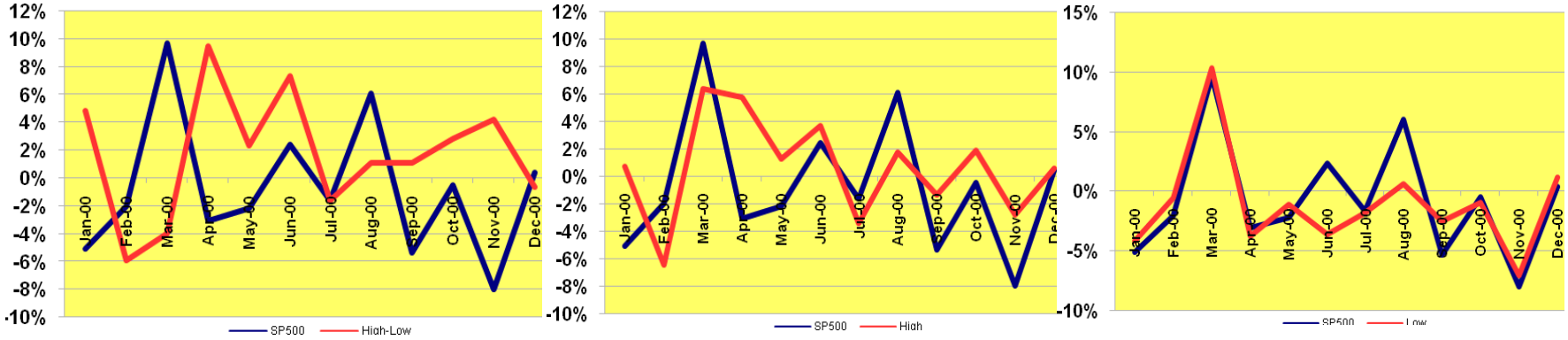




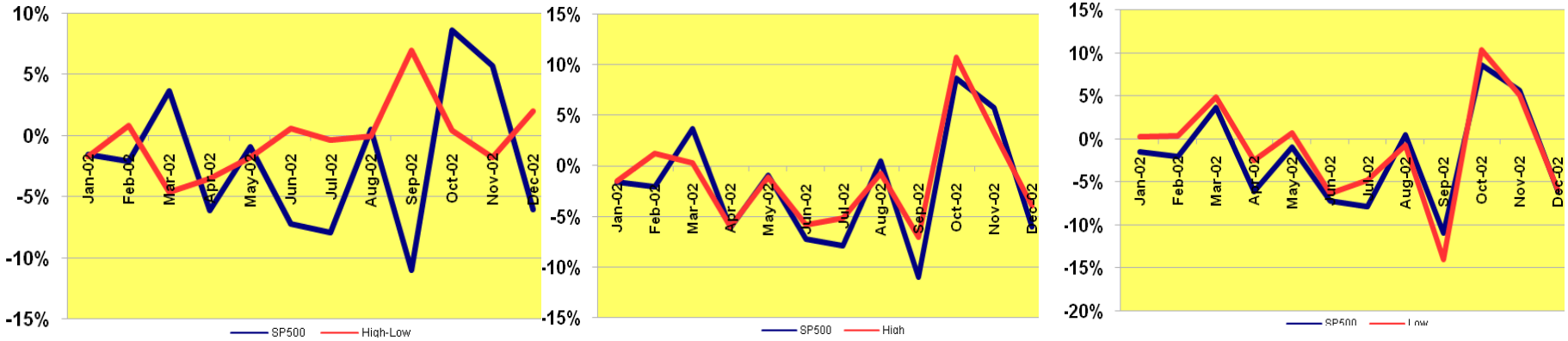


Appendix C – Portfolio annual returns for Market Downturn (2000 & 2002) (CGER 1)

2000 vs. SP500 (in sequence: H-L, High, Low)

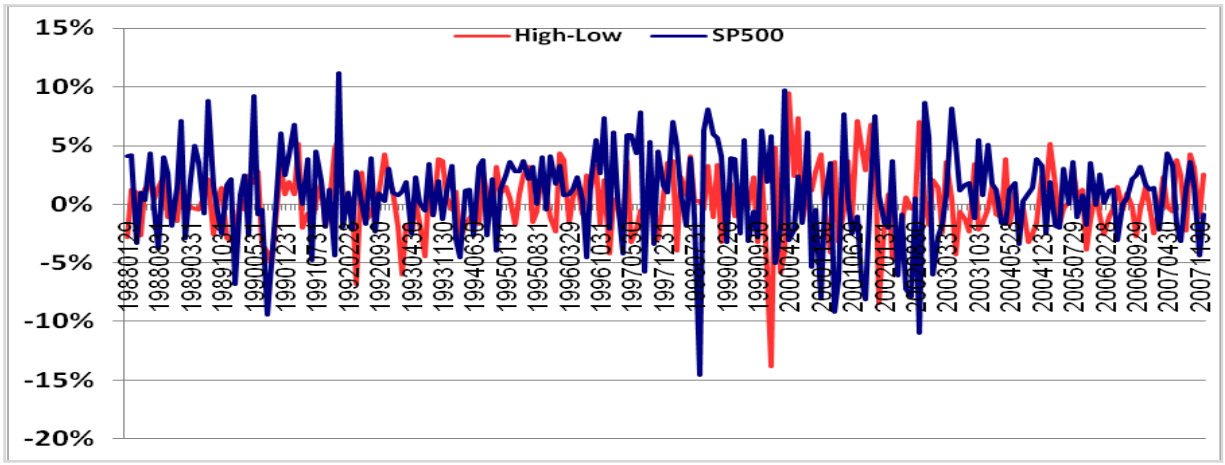


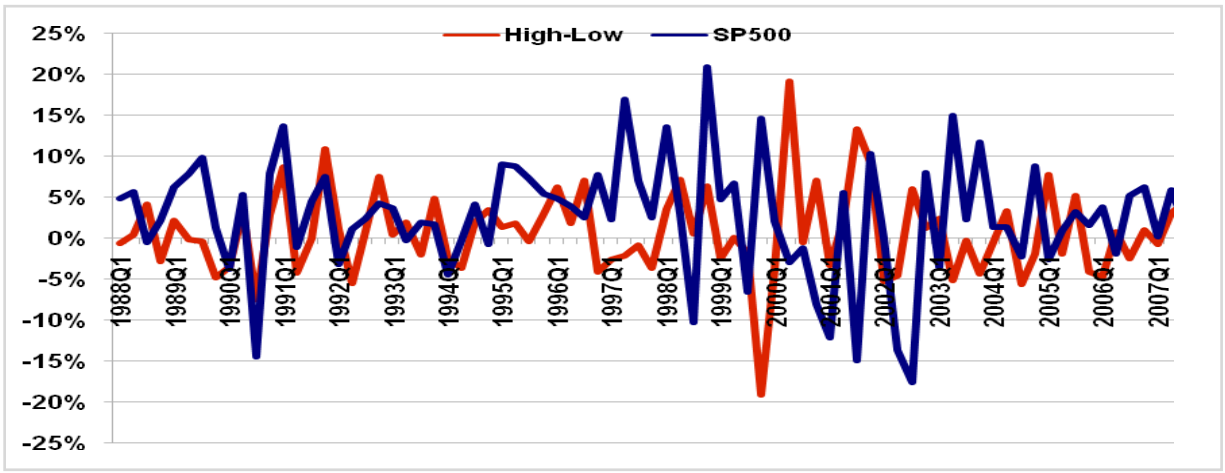
2002 vs. SP500 (in sequence: H-L, High, Low)

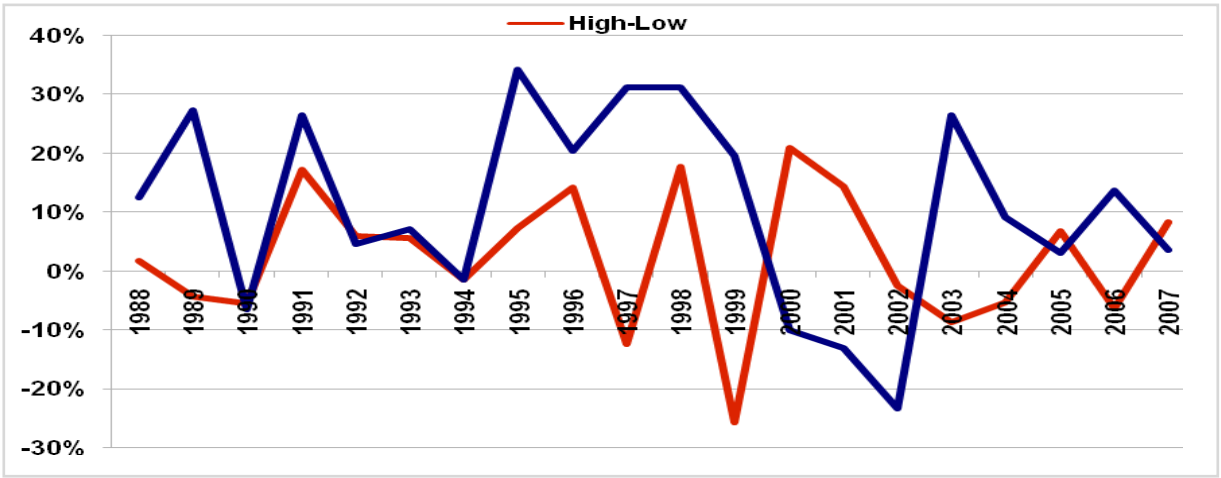


Appendix D – Portfolio Returns vs. SP500 (CGER 1)

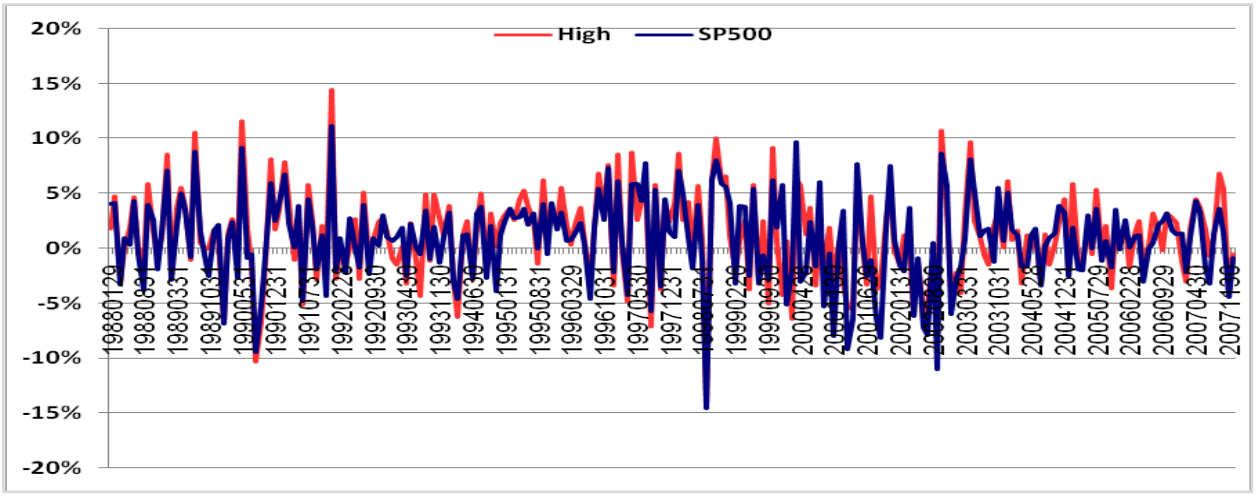
H-L Strategy (in sequence: monthly, quarterly, annually)

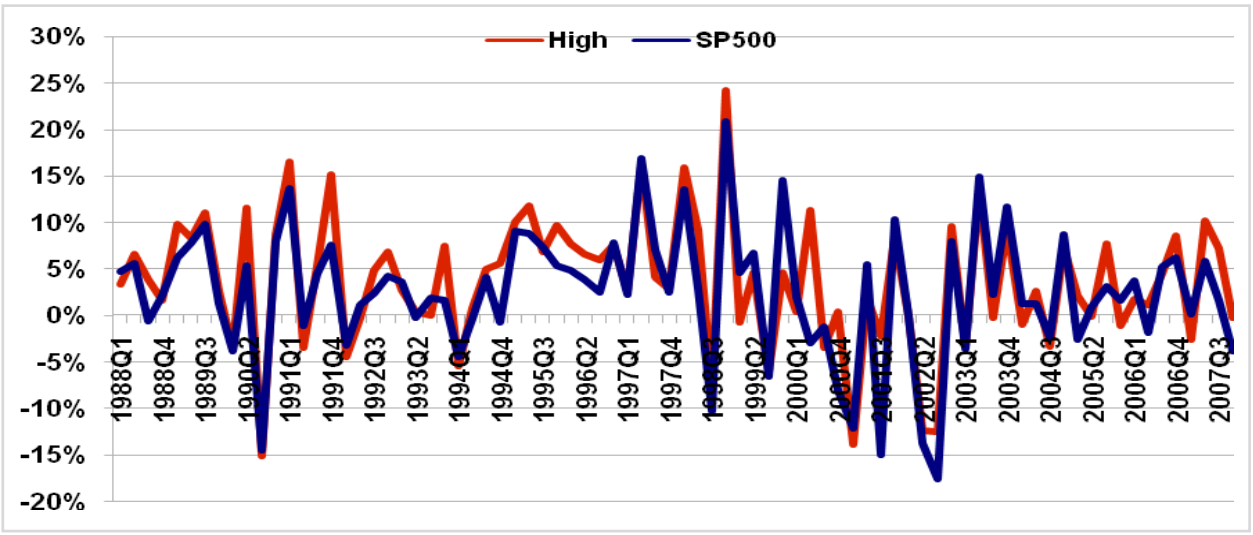


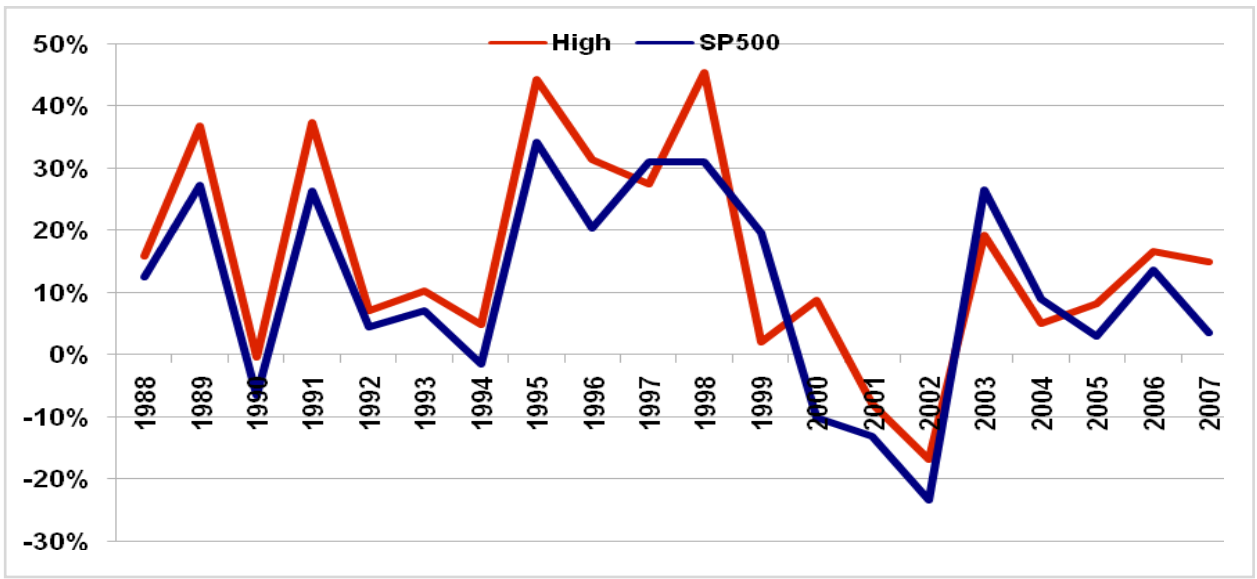




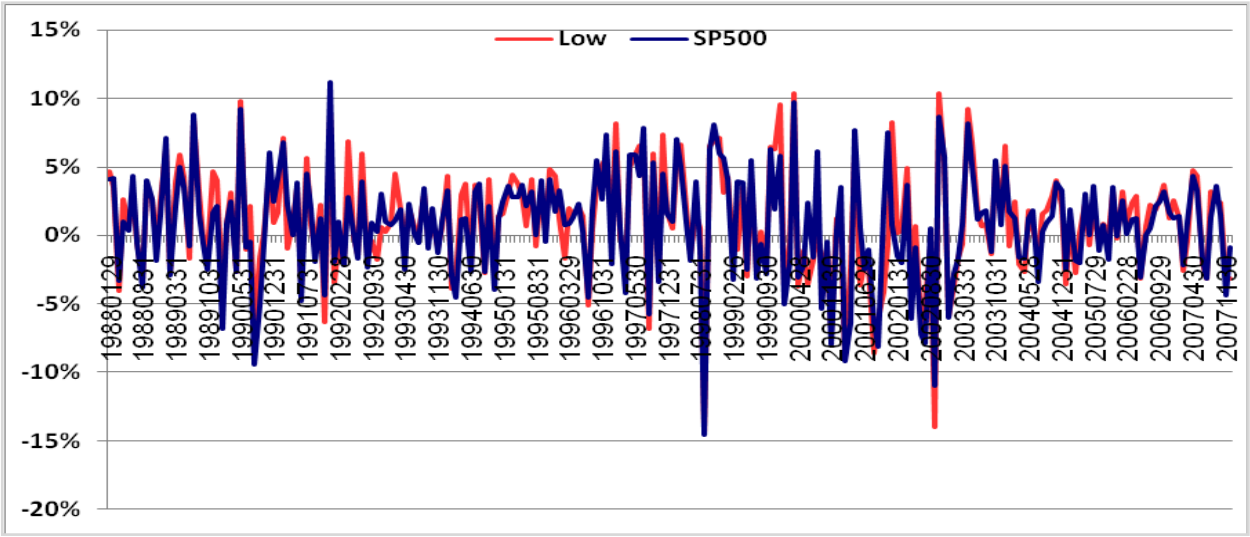
High Strategy (in sequence: monthly, quarterly, annually)

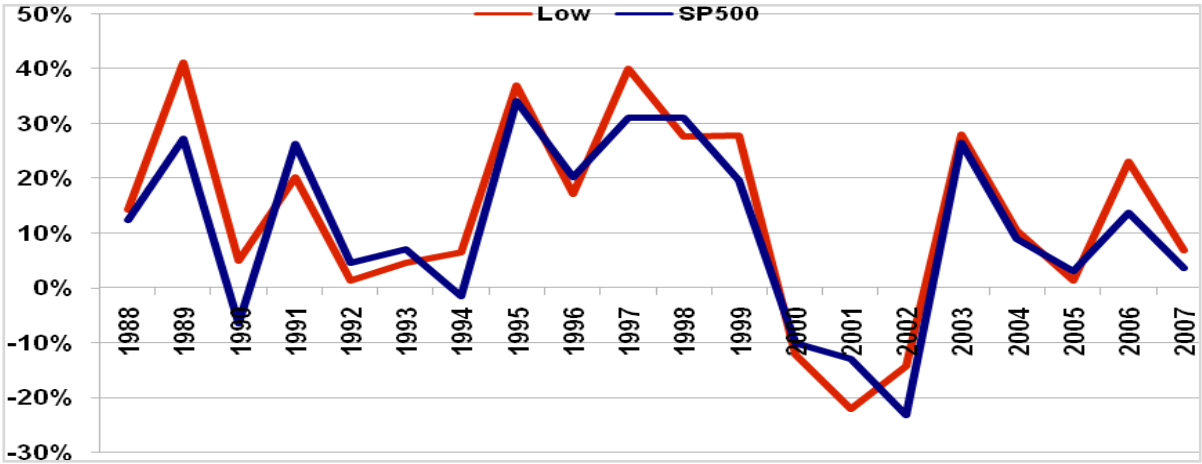


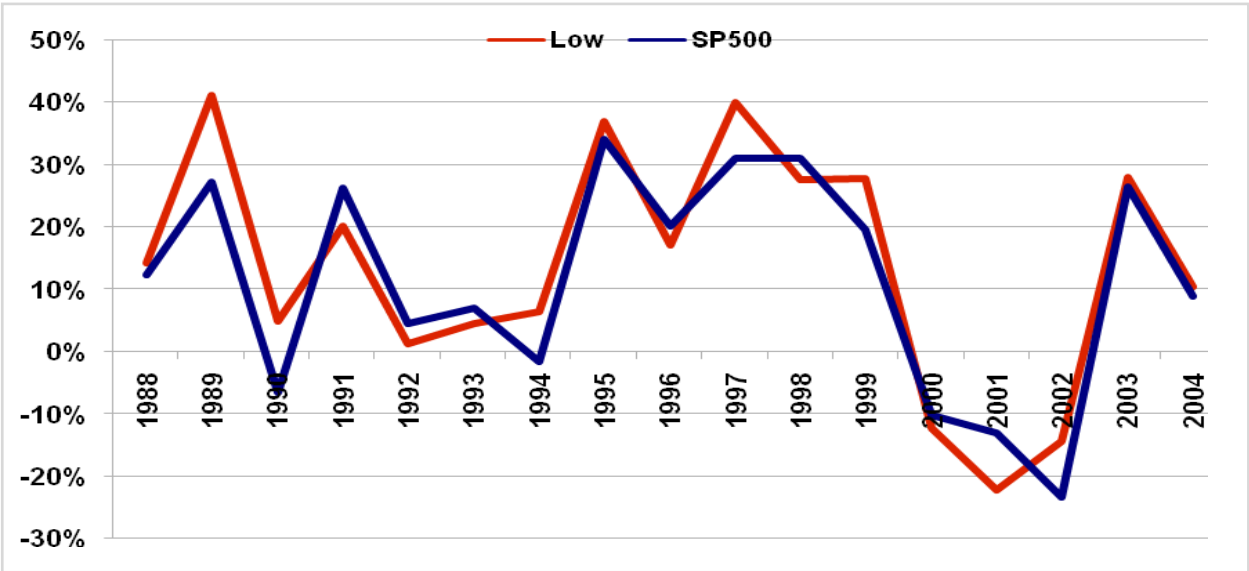




Low Strategy (in sequence: monthly, quarterly, annually)



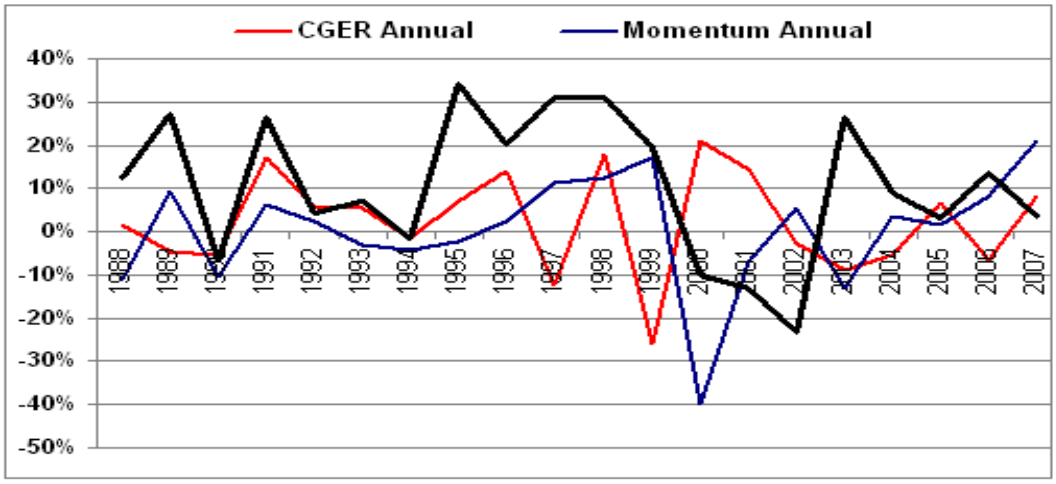




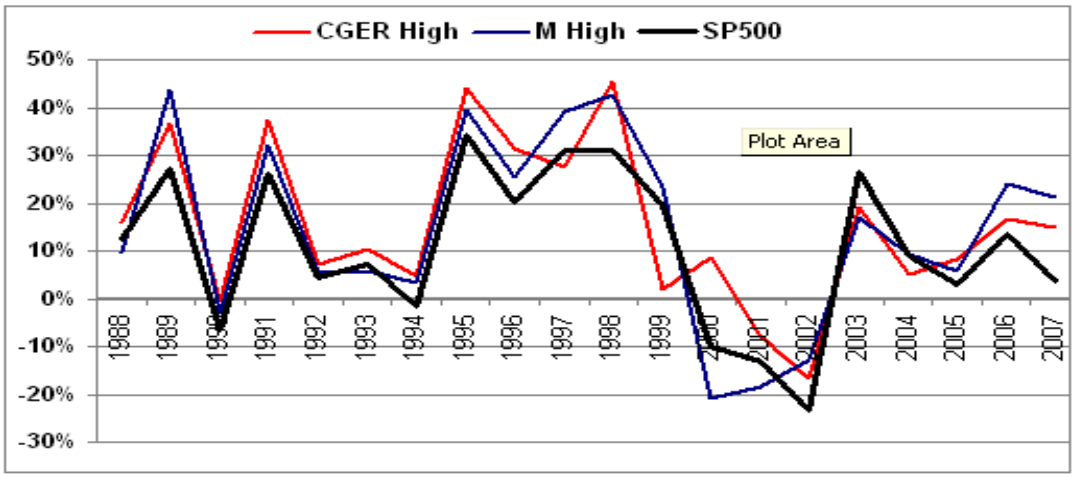
Appendix E – CGER vs. Momentum (CGER 1)

CGER 1 vs. Momentum (1988-2007)

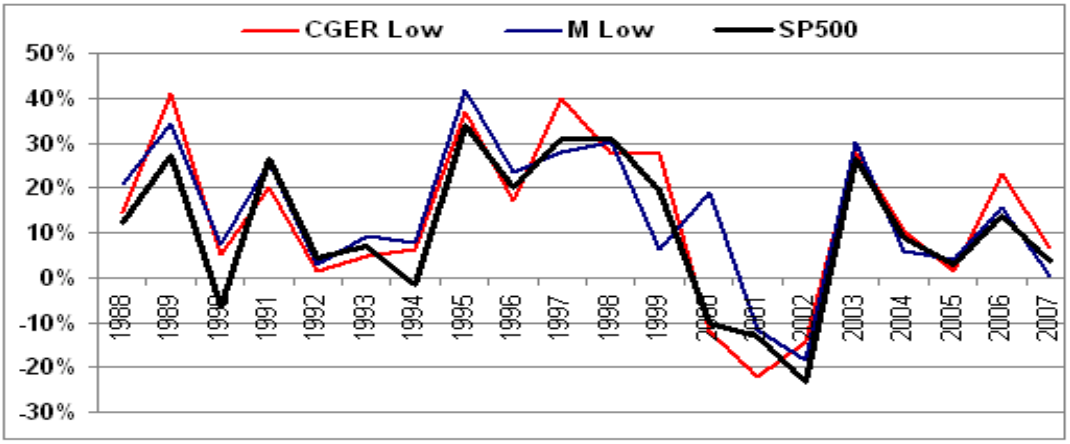
High-Low



High



Low



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