STUDENT RESEARCH PROJECT

Exploring Risk Anomaly in Indian Equity Market

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Abstract

While traditional theory tells us that high returns of stocks are associated with high risks, this paper shows in that under certain conditions, a portfolio with low volatility stocks can yield higher returns than a high-volatility portfolio, a phenomenon known as 'risk-based anomaly'. The motivation behind this research paper is the relatively new phenomenon of '*Risk-based anomaly*', which has been extensively investigated in the US and a few other countries in the last few years; but not in emerging market, particularly India. Using a low-volatility portfolio strategy over a 11- year period (from 2001 to 2011) with rolling monthly iterations in the Indian market, the paper finds that as compared to a high-volatility portfolio, a low volatility portfolio produces not only higher absolute returns, but also higher risk-adjusted returns. The results have been consistent with those found by Roger Clarke (2006) for the US market.

Exploring Risk Anomaly in Indian Equity Market

I.   Introduction

"The other end of risk is reward…" Or so is the saying. According to the '***Modern Portfolio Theory***'[2], there exists a direct relationship between risk and the expected return. It means that higher the risk, the higher should be the expected return. In an efficient market, investors can expect to realize above average returns only by taking above-average risks. Risky stocks generally give higher returns than the average, while safe stocks do not. Thus, investors would expect higher returns for additional risks that they bear.

The question, then immediately comes to mind, is, "Is it possible to have portfolios which give returns greater than the market portfolio with lower risk by exploring the risk anomaly?" This is the basic premise behind "Exploring Risk Anomaly in Indian Equity markets"

Risk anomaly has drawn attention of researchers only in last five years and studies are undertaken to explore risk anomaly and how to design an investment strategy to take advantage of it in generating superior risk return trade-off. The two strategies frequently used to exploit this risk anomaly are – [a] *Low volatility (LV) portfolio* and [b] *Minimum variance (MV) portfolio*.

Here is a brief explanation of above mentioned investment strategies:

(a) Low-Volatility investing – This strategy sorts all the stocks by their volatility and/ or beta and then takes a subset, which comprises the stocks with the lowest beta and/ or volatility.

(b) Minimum-Variance investing – It relies on observations and/ or estimates of correlations of individual stocks. A portfolio created by optimal diversification so as to produce minimum risk is identified as the Minimum Variance Portfolio.

These strategies have been tested in several studies done globally where portfolios with overall lower risks have outperformed the broad index as well as the portfolios with higher risks. The

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[2] Markowitz, Harry. "Portfolio Selection." *Journal of Finance, 7, 1952, pp. 77–91*

risks have been measured either by the volatility of the stock prices or the variability of the stock prices with respect to a benchmark like the market index (i.e. beta), or both.

This study employs Low volatility (LV) investment strategy to explore risk anomaly in Indian markets.

The low volatility investment strategy based on creating equally weighted portfolio from the stocks in the lowest volatility decile is the response to the sub-optimal nature of the market capitalisation weighted portfolios. The main issue with market cap-weighted portfolios is the dominance of a few heavy weight stocks. This can subdue the superior returns that a small or medium sized company with good fundamentals can give to the portfolio. For example, in Indian markets, Reliance Industries Limited (RIL) has a lion's share of 8.69% as of 19th January 2012 in Nifty. Hence, any market-cap weighted portfolio that replicates the Nifty composition[3] would give more weight to RIL than other stocks and this may lead to sub-optimal performance of the portfolio when RIL yields lesser returns than relatively smaller Nifty companies. Low volatility investment strategy typically allocates equal weights to all the stocks in the portfolio-- thus overcoming the bias of market capitalization-weighted portfolios.

Low volatility investment strategy is noteworthy in the sense that it has been able to achieve higher absolute returns as well as risk-adjusted returns consistently, including in bearish periods. Low volatility portfolios are least hit during the bearish periods when high beta/ high volatility stocks plummet. In other words, low volatility portfolio suffers less drawdown during the bearish period. [4]

In this paper, **low-volatility portfolios** are used to explore the risk anomaly in Indian equity markets. The risk is measured using volatility of the stock prices, which is calculated using standard deviation of monthly returns.

The paper is organized as follows. Section II discusses the earlier work research done in low volatility and related topics in different markets. Section III specifies the need of this study in Indian context. Sections IV and V discuss the methodology of the study and its corresponding

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[3] June 26, 2009 onwards, the S&P CNX Nifty index is computed based on free float methodology
[4] Drawdown is defined as peak to trough decline during a specific period in the stock price.

results. Section VI describes the practical issues to be considered while implementing this strategy for actual investments. Section VI attempts to explain why people buy high-volatility stocks even though low-volatility stocks give higher returns with lesser risk. Finally, Section VIII concludes the study summarizing the results and observations.

II.   Literature Review

Across the world, in different markets there have been many instances of low-volatility stocks giving higher risk-adjusted returns. Robert Haugen (1967) noted an abnormality—lower-risk portfolios provided superior returns to the supposedly efficient market portfolio. Nevertheless, this insight has had limited empirical support and was not verified until the last decade.

It was only recently that Roger Clarke, Harvin de Silva, and Steven Thorley (2006) carried out an interesting study on the characteristics of minimum-variance (MV) portfolios. These authors found that MV portfolios, based on the 1,000 largest U.S. stocks over the period 1968-2005 achieved a volatility reduction of about 25% while delivering comparable or even higher average returns than the broad market portfolio. [5] They found that MV portfolios gave on average a 6.5% excess return above T-Bills with a volatility of 11.7% whereas the market index gave average excess return of 5.6% with a volatility of 15.4%.

Blitz and Vliet (2007) presented that portfolios of stocks with the lowest historical volatility are associated with Sharpe-ratio improvements that are even greater than those documented by Clarke et al (2006), and have a statistically significant positive alpha. Blitz et al (2007) found that low volatility stocks have superior risk-adjusted returns relative to the FTSE World Development Index. They also found that low beta stocks had higher returns than predicted while the reverse held for high beta stocks.

State Street (2009) used the monthly returns for Russell 3000 Universe from December 1986 to October 2007 to note that low beta stocks outperform high beta stocks. According to this study,

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[5] Here, broad market portfolio refers to a broad benchmark index.

lowest beta stocks do not necessarily produce the highest returns, thus implying that some success can be attributed to portfolio construction.

III.   Need for the study

'Risk-based Anomaly' is a relatively new phenomenon in the context of equity anomalies. As mentioned above, it was noted very early in 1967 by Robert Haugen, but there was no significant development on it until the mid-2000s. Now it has been extensively verified in the developed markets like the US markets and with the global stock indices; but remains to be tested in emerging markets like India.

In the US markets, low-volatility investing for the long term has become the latest investment philosophy after the 'Value', 'Size' and "Momentum' investing philosophies that have been fully explored. In fact the index provider MSCI offers several MV indices as benchmarks for financial institutions. S&P has just announced the next launch of S&P500 LV index[6]. Many big investment houses such as the Deutsche Bank in Europe and Canada, Martingale Asset management[7], Morgan Stanley, Analytic Investors LLC[8] for US and Global markets, etc. have already launched funds to benefit from this strategy. Russell and iShare and have already launched low volatility exchange traded funds (ETFs).

The sole motivation behind this research paper is to empirically test this phenomenon in the Indian market and thereby, explore the usefulness of such a long-term investment strategy in the Indian context.

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[6] http://www.standardandpoors.com/indices/sp-500-low-volatility/en/us/?indexId=spusa-500-usdw-lop-us-l--
[7] http://www.mgale.com/strategies/low-volatility/130-30-largecap-core.html
[8] https://www.aninvestor.com/lowvol/

IV. Data and Methodology

Sampling

The sample for the study consists of the constituent stocks from S&P CNX 500 index. The S&P CNX 500 is the first broad-based benchmark of the Indian capital market. It represents about 94.92% of the free-float market capitalization and about 91.68% of the total turnover on the NSE as on June 30, 2011. The S&P CNX 500 companies are disaggregated into 71 industry indices viz. S&P CNX Industry Indices (Source: NSE website). The reason behind selecting S&P CNX 500 constituents stocks as sample is that in addition to the index representing almost the entire market, it also helps avoiding issues associated with small and illiquid stocks dominating the results.

Data Collection

Adjusted monthly closing prices [9] of the stocks on NSE for the sample stocks for the period January 2001-June 2011 were obtained from the *Capitaline* database, with the analysis period being January 2004-June 2011. The period from 2001 to mid-2011 is used for several reasons: the beginning of 21st century brought number of significant changes in Indian stock market, a significant example being the introduction of futures and options trading in major indices. This period also covers both bullish and bearish phases: the bear phase following the major secondary market scam in India in early 2000s, the strong '*Bull Run'* between 2004 to January 2008, the global financial meltdown of 2008-2009 and then the recovery period which started thereafter. Thus, this period signifies all the recent ups and downs in the Indian equity markets.

Out of the total available list of 500 companies of S&P CNX 500, following companies are excluded from the final sample:

• Companies for which data for 36 months historical data was not available and hence their volatility could not be calculated.

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[9] Stock price is adjusted for stock splits, dividends/distributions, etc. which facilitates calculation of return without any difficulty i.e.if current price of a stock is Rs. 100, the company has just gone ex bonus with bonus of 1:1, which means price before the bonus may be say Rs.200. Now if we go by absolute price then in that case the last month closing price may be somewhere around Rs. 200 and this month closing price is around Rs.100, which means negative returns. However, that may not be true as the stock has gone ex-bonus and therefore the price should be adjusted backwards to half of the price prevailing before the bonus of 1:1 to make it comparable of price now.

- Companies for which price and volume data for the test period is not available.
- Stocks replaced during the study period and not part of S&P CNX 500 index now.

Portfolio Formation

Stock returns are measured on a monthly basis on adjusted [10] monthly **average price of the** companies by using the formula *ln (P1/P0)* where *P1* is the current month's average stock price, *P0* is previous month's average stock price. The main advantage of using logarithmic returns is that it is not affected by the base effect problem. For example, an investment of Rs.100 that yields an arithmetic return of 20% followed by an arithmetic return of -20% results in a return value of Rs. 96; while an investment of Rs.100 that yields a logarithmic return of 20% followed by a logarithmic return of -20% results in Rs. 100.

In this paper, the risk of a stock is represented by its volatility, which is defined as the standard deviation of monthly returns over a period of 36 months. This period of 36 months is called the *formation period* of the portfolio. Stocks with more than 36 months data are considered for portfolio formation and are called *eligible* stocks.

Stocks are selected for the portfolios depending on their riskiness, which is represented by the volatility in the formation period. The eligible stocks are arranged in descending order of their volatility and then divided into 10 portfolios. Thus Portfolio 1 (Decile 1) will have the top decile volatility stocks (HV portfolio comprising most volatile stocks) and the Portfolio 10 (Decile 10) will have the bottom decile volatility (LV portfolio comprising least volatile stocks). For each month, performance of a decile portfolio is measured as the simple average of returns of all the stocks in the portfolio for that month, implying that the portfolios are equal weighted portfolios.

Frequency of transaction

The composition of a portfolio changes every month depending on the selection criterion, that is, the volatility of the stocks in previous 36 months. Hence, for the first portfolio of Jan 2004, formation is over the 36-month period starting from January 2001 to December 2003. The price movements in this period are used to calculate the volatility. Now for Feb 2004, the formation period is Feb 2001 to Jan 2004 and price movements in this period will be used to calculate the

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[10] As explained in footnote 9.

volatility of stock in Feb 2004. After calculating the volatility, the portfolios are formed in the way described above for each month. Returns of the portfolios for each month are then calculated on a rolling basis. Portfolios have been constructed till June 2011 using this iterative process, and in total there are 90 such iterations used for the analysis. [11]

V. Results and Analysis

Annexure-1 presents the statistics of the monthly returns for all the ten decile portfolios as well as the monthly returns for S&P CNX 500 index over the analysis period. This is the set of primary results used to confirm the anomaly and its associated arguments. The average of these monthly returns for each portfolio has been calculated in Table 1, which also shows the volatility of the monthly returns over the 90 months. The same has been depicted in Chart 1.

Chart 1:Average monthly returns of Decile portfolios (Jan 2004 to June 2011) and its volatility
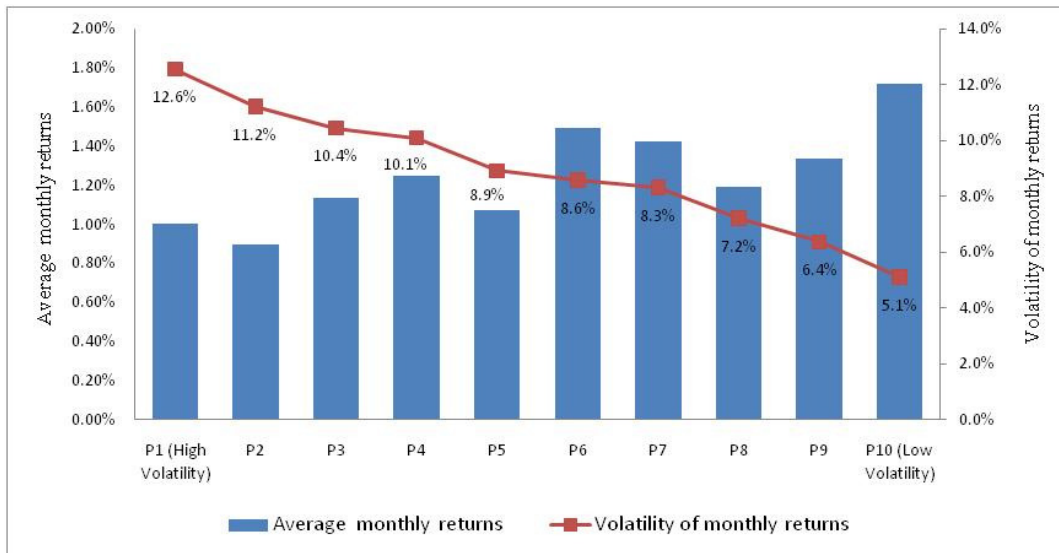
Decile Portfolios

As seen from Chart 1, the LV portfolio delivered absolute average monthly returns of 1.7% while the HV portfolio delivered absolute average monthly returns of 1.0%. In the same period

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[11] One iteration corresponds to one month. Monthly portfolios starting from January 2004 to June 2011 are taken, making it 90 months which corresponds to 90 iterations.

S&P CNX 500 index, the broad market index, gave absolute average monthly returns of 1.2%. Comparing P1, P10 and S&P CNX 500 index, it is seen that the risk associated with P10 (measured as the standard deviation of the monthly logarithmic returns for the entire period) is the lowest with 5.11% as against 12.6% and 8.7% for P1 and S&P CNX 500 respectively, even though P10 gives the highest absolute returns. Also, the Sharpe-ratio (Table 1) of P10 is highest with 0.21 compared to 0.06 of S&P CNX 500 index and 0.03 of P1. The Sharpe ratio is a measure of excess return[12] per unit of risk deviation, This ratio is also called as risk-to-reward ratio. This ratio is often used by mutual funds to compare their performances and it can be appropriately used here to compare the performances of the decile portfolios. In this case, the risk-free rate is taken as 8% on yearly basis which translates to a 0.64% monthly rate on continuous basis. Table-1 provides this information for all the ten portfolios.

Table 1: Average of Monthly returns, Volatility of monthly returns over the testing period and Sharpe ratios of the portfolios.

	P1 (HV)	P2	P3	P4	P5	P6	P7	P8	P9	P10 (LV)	S&P CNX 500 index
Average of monthly returns	1.00%	0.89%	1.14%	1.25%	1.07%	1.49%	1.43%	1.19%	1.34%	1.72%	1.2%
Volatility of monthly returns	12.6%	11.2%	10.4%	10.1%	8.9%	8.6%	8.3%	7.2%	6.4%	5.1%	8.7%
Sharpe Ratio	0.03	0.02	0.05	0.06	0.05	0.10	0.09	0.08	0.11	0.21	0.06

Investing Rs.100 in HV, LV and S&P CNX 500 index portfolios

Imagine investing Rs.100 in each of HV, LV and S&P CNX 500 index portfolios and rebalancing them as per the criteria of the portfolios on the monthly basis. In such a case, the following chart (Chart 2) is obtained. One thing to be noted here is that the cost of rebalancing the portfolios is not included, which if considered will give similar chart but with lower values.

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[12] Excess return equals absolute return less risk free rate of return.

Chart 2: **Value of Rs.100 portfolios over 90 months**
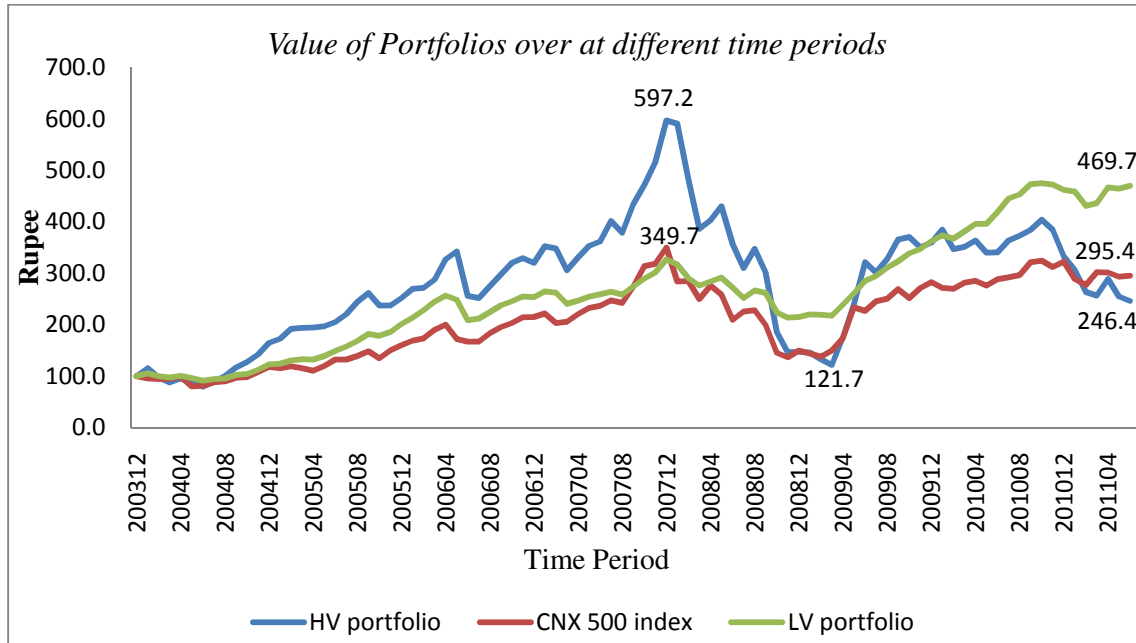
The HV portfolio reached a high of Rs.597.2 during the bull run which was almost 2 and half times higherthan the index and close to 3 times higher than LV portfolio. It was also the HV portfolio which fell the most during the economic recession while the index and LV portfolios fell to a much lesser extent. This phenomenon is called the 'draw-down' effect. As seen from chart 2, the HV portfolios are the worst hit when the broad markets fall. Thus LV portfolios give a cushion against the adverse effects of the bear markets. Note further that the HV portfolio had the fastest recovery after the economic turmoil.

Also, over the long term, it is the LV portfolios which give higher returns than the index and HV portfolios. Despite the positive run of the Indian markets over the period considered, the LV strategy has given positive returns. This fact would ensure that LV investing can be used as a good long-term strategy in volatile markets to beat the HV portfolios and more so, the broad index.

Table 2 gives a comparison with regards to the number of months for which LV portfolio gave higher returns than HV portfolio. It can be clearly seen that in spite of the long bull run that the Indian markets saw from January 2004 to December 2007, LV portfolio outperformed HV portfolio in 47 out of the 90 months of the testing period and that too with significantly lesser

risk. In comparison to S&P CNX 500 index returns, it is seen that HV and LV gave higher returns for roughly the same number of months.

Table 2: Comparison of LV portfolio, HV portfolio and S&P CNX 500 index in terms of number of months with higher returns.

Comparison of Returns	Months	Total Months
LV returns > CNX returns	47	90
LV returns < CNX returns	43	
HV returns > CNX returns	48	90
HV returns < CNX returns	42	
LV returns > HV returns	47	90
LV returns < HV returns	43	

VI. Implementation issues/considerations

Before drawing conclusion from this study with respect to the efficacy of the LV strategy in Indian market for higher risk-adjusted long-term returns, the following aspects of the study need to be noted.

Transaction costs

The calculation of the average monthly returns for the portfolios has not considered transaction costs. While the relative results between the HV and LV portfolios will be the same, the actual returns for both will be lower than the ones observed.

Monthly rebalancing

Many would question the feasibility of changing the portfolio combination every month especially in view of the high associated costs of doing this so frequently. Even though monthly rebalancing is considered in this study, the results of this study will not change when the frequency of rebalancing is reduced. In fact, monthly rebalancing is used for robustness of

statistical tests by having more iterations. In practice, when funds are started based on this strategy, the rebalancing period can be longer than one month.

Back testing using quantitative analysis

The LV approach explored in this paper is purely based on the historical data. One needs to take into considerations issues such as liquidity and other implementation issues by using real-time simulation before launching portfolios based on this strategy.

Long-term strategy

This strategy always generates superior risk-adjusted returns in the long-run as compared to a high-volatility portfolio and the market portfolio. The success of this strategy depends on investment horizon of an investor. This strategy may work better in the long run over a full investment cycle or during a bear phase of the market as compared to a typical bull run where high volatility stocks tend to generate superior returns.

VII. Behavioural Aspects

Even though our results show that even with low risks superior returns can be obtained, in the real world, high-volatility stocks are still preferred. It may therefore be useful to understand why high-volatility stocks are preferred to low-volatility stocks in spite of the unexpected higher returns of low-volatility vis-à-vis high-volatility portfolios.

The most common explanation for higher interest in the high-volatility stocks is a phenomenon called as the 'Lottery Effect', where investors overpay for risk in a small set of stocks they feel would provide supernormal returns, and thus miss out the benefits of diversification. The lottery effect thus leads to effective lower returns in high-volatility stocks. This effect is similar to a lottery in which a large number of risk taking investors participate in very risky bets to make quick money.

Investors who tend to focus more on tracking error rather than the overall risk of the portfolio prefer stocks with high risk. Low-volatility portfolios usually have a higher tracking error as compared to the benchmark and hence are not preferred by such investors.

Further, many people are swayed by the bull-run experience. During a bull-run, as we have seen, high volatility portfolios generally tend to give higher returns.

Last major explanation is the '*Winner's Curse*'. In this, due to asymmetric information with the investors, the highest bidding buyer often pays more for a stock than its true intrinsic value. The winner's curse applies more to high-volatile stocks than to low-volatile stocks.

These behavioural aspects explain the greater interest of the investors in higher-risk portfolios and their tendency to neglect safer and less volatile portfolios, which in turn explains the existence of Low-Volatility anomaly in equity markets.

VIII. Conclusion

The results found in the Indian markets are similar to those found in some other countries such as the US: the low-volatility portfolio strategy gives a higher absolute return over a long period than both the high-volatility portfolio as well as the broad market index and it requires patience to reap its benefits.

Not only does LV give higher absolute returns, but it also gives higher risk-adjusted returns, as seen from its higher Sharpe ratio. It also provides a useful cushion against the 'draw-down effect'. Thus, it can be considered a very good strategy when the markets do not exhibit any specific direction and the volatility in general is relatively high. In such situations, it ensures minimum erosion of wealth while ensuring that an investor does not miss the upside returns entirely. The study provides empirical support to the usefulness of this strategy in the Indian context.

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Annexure:1

Monthly returns of decile portfolios and S&P CNX500 over the testing period. P1 is the portfolio with the HV while P10 is the portfolio with the LV.

Portfolio month	P1 (HV)	P2	P3	P4	P5	P6	P7	P8	P9	P10 (LV)	S&P CNX 500 index
200401	14.3%	5.4%	1.9%	4.0%	3.4%	5.3%	6.5%	3.8%	1.5%	5.7%	-4.8%
200402	-16.5%	-13.0%	-12.7%	-12.8%	-8.7%	-7.5%	-9.4%	-4.8%	-8.2%	-5.4%	-1.2%
200403	-10.8%	-11.8%	-5.9%	-8.2%	-5.9%	-5.3%	-5.6%	-6.1%	-5.3%	-2.8%	1.0%
200404	8.4%	8.0%	9.3%	9.6%	10.1%	9.6%	10.2%	6.0%	8.8%	3.4%	3.4%
200405	-9.0%	-7.3%	-5.0%	-9.4%	-5.6%	-8.7%	-4.6%	-6.0%	-2.9%	-5.0%	-20.6%
200406	-9.5%	-11.4%	-11.2%	-8.6%	-12.3%	-10.1%	-9.8%	-6.4%	-6.9%	-4.9%	1.7%
200407	11.9%	9.5%	4.7%	8.6%	5.2%	7.3%	4.4%	3.8%	2.7%	3.1%	8.0%
200408	11.2%	11.4%	7.6%	7.6%	6.6%	10.8%	6.2%	2.4%	4.6%	1.1%	1.9%
200409	15.3%	10.2%	12.8%	11.4%	7.8%	9.5%	10.0%	9.4%	9.2%	7.4%	7.1%
200410	9.0%	10.6%	2.4%	5.9%	2.4%	8.4%	4.8%	5.1%	2.6%	1.7%	1.6%
200411	10.8%	7.5%	7.8%	9.9%	10.4%	8.5%	8.4%	6.6%	5.0%	7.6%	9.6%
200412	14.5%	9.3%	15.1%	12.7%	14.1%	12.7%	9.5%	9.6%	9.3%	8.8%	8.8%
200501	5.0%	3.4%	1.5%	3.1%	4.6%	-0.8%	0.6%	-0.6%	-1.0%	1.0%	-2.1%
200502	10.6%	8.6%	8.8%	5.6%	4.2%	4.9%	6.1%	7.1%	5.0%	4.7%	3.3%
200503	1.1%	4.3%	1.6%	3.4%	1.3%	1.5%	2.0%	2.0%	0.4%	2.2%	-3.0%
200504	0.2%	2.8%	-0.5%	-1.1%	0.8%	-1.5%	-1.8%	1.2%	-1.8%	-0.4%	-4.9%
200505	1.4%	4.7%	2.9%	5.4%	6.7%	6.6%	4.6%	3.7%	6.5%	5.0%	8.3%
200506	4.0%	4.8%	3.9%	6.7%	3.6%	3.0%	5.1%	5.6%	5.2%	6.6%	10.0%
200507	7.2%	5.1%	4.5%	11.4%	7.5%	5.3%	4.6%	6.3%	4.5%	6.0%	0.0%
200508	10.4%	10.6%	12.0%	10.0%	8.3%	7.1%	9.6%	6.6%	6.0%	6.3%	4.8%
200509	6.7%	7.3%	9.3%	8.3%	6.2%	8.9%	7.5%	5.5%	5.8%	7.7%	6.7%
200510	-9.8%	-6.9%	-6.9%	-6.4%	-4.1%	-5.1%	-4.6%	-3.3%	-1.7%	-1.9%	-9.5%
200511	0.1%	0.7%	2.1%	2.1%	-1.4%	0.8%	0.8%	2.3%	3.9%	4.1%	10.9%
200512	5.8%	4.1%	5.1%	7.8%	5.6%	5.8%	8.6%	7.1%	8.0%	8.1%	6.4%
200601	7.0%	4.4%	7.5%	9.1%	5.1%	5.7%	6.4%	6.5%	6.0%	5.9%	5.0%
200602	0.7%	1.5%	3.2%	0.9%	-1.3%	1.7%	0.7%	2.5%	3.8%	6.6%	2.8%
200603	5.8%	4.4%	5.9%	1.5%	1.3%	3.7%	6.0%	4.6%	3.5%	7.0%	9.0%
200604	12.6%	11.5%	9.4%	7.6%	6.1%	7.6%	3.0%	6.1%	6.3%	4.8%	5.2%
200605	4.7%	0.6%	-2.5%	-1.9%	0.2%	-1.1%	-4.3%	-2.1%	-3.2%	-3.2%	-15.1%
200606	-29.0%	-29.0%	-29.9%	-24.1%	-23.6%	-23.1%	-23.3%	-20.5%	-19.4%	-17.5%	-2.8%
200607	-1.7%	-2.2%	-1.9%	2.0%	-2.0%	-2.6%	2.8%	-1.2%	2.1%	1.4%	0.0%
200608	8.8%	8.7%	11.4%	11.6%	10.5%	8.2%	7.3%	7.6%	6.1%	5.8%	9.1%
200609	7.8%	6.6%	6.4%	7.3%	6.6%	7.1%	6.9%	6.9%	4.3%	5.6%	6.2%
200610	7.4%	2.6%	4.8%	6.2%	6.0%	6.7%	5.4%	4.1%	3.3%	3.4%	4.1%
200611	2.9%	-0.7%	0.0%	3.3%	2.8%	2.1%	1.8%	1.0%	0.0%	3.6%	5.2%
200612	-2.8%	-0.7%	0.3%	-0.3%	-0.4%	-1.5%	0.5%	0.6%	-0.4%	-0.5%	0.4%
200701	9.6%	11.1%	6.8%	2.8%	5.9%	3.8%	6.4%	4.1%	2.6%	4.4%	2.9%
200702	-1.3%	-1.0%	-2.4%	-2.1%	1.8%	-3.7%	-2.1%	-1.8%	-1.7%	-1.0%	-8.8%
200703	-12.9%	-15.6%	-11.8%	-12.5%	-11.5%	-12.2%	-9.1%	-9.3%	-7.3%	-8.7%	1.2%
200704	7.8%	5.2%	5.8%	5.9%	4.0%	5.8%	4.6%	3.8%	4.5%	2.6%	7.2%
200705	6.6%	5.9%	7.8%	7.1%	7.3%	8.4%	8.4%	5.2%	4.8%	2.9%	5.3%
200706	2.4%	4.2%	1.1%	3.1%	4.1%	2.2%	4.7%	-0.6%	1.2%	2.0%	1.7%
200707	10.4%	5.4%	10.1%	8.3%	7.7%	6.0%	4.8%	4.2%	4.6%	1.9%	4.3%
200708	-5.9%	-8.4%	-5.8%	-6.6%	-5.2%	-5.1%	-6.1%	-5.1%	-2.7%	-2.0%	-1.9%

Portfolio month	P1 (HV)	P2	P3	P4	P5	P6	P7	P8	P9	P10 (LV)	S&P CNX 500 index
200709	13.5%	11.0%	10.6%	5.9%	7.3%	7.3%	8.0%	6.7%	3.7%	5.9%	12.1%
200710	8.4%	9.7%	8.5%	5.2%	3.9%	5.3%	4.4%	2.2%	3.1%	5.4%	13.8%
200711	8.9%	13.1%	7.2%	12.5%	4.3%	8.7%	5.8%	2.3%	3.0%	4.1%	1.3%
200712	14.7%	14.6%	12.1%	13.0%	7.2%	11.8%	13.5%	8.7%	9.2%	8.1%	9.5%
200801	-1.1%	-3.3%	-2.7%	-1.7%	-5.6%	6.1%	-1.6%	-2.9%	-0.9%	-3.1%	-20.8%
200802	-20.3%	-20.6%	-19.4%	-18.2%	-17.2%	-18.2%	-12.8%	-15.6%	-11.3%	-8.9%	0.3%
200803	-22.3%	-20.0%	-15.5%	-15.9%	-13.5%	-11.7%	-13.5%	-12.2%	-9.0%	-5.0%	-13.1%
200804	4.3%	6.7%	4.1%	3.4%	3.8%	0.8%	2.9%	1.6%	2.7%	2.9%	9.9%
200805	6.6%	3.5%	2.7%	2.7%	3.9%	0.7%	1.4%	2.3%	2.8%	2.6%	-6.4%
200806	-18.8%	-17.9%	-13.9%	-11.8%	-11.7%	-10.5%	-12.0%	-9.6%	-8.1%	-6.7%	-21.2%
200807	-14.1%	-9.3%	-12.4%	-16.0%	-8.0%	-8.2%	-9.8%	-8.4%	-7.5%	-7.9%	7.6%
200808	11.4%	9.7%	7.7%	7.2%	8.2%	9.1%	7.5%	5.5%	6.3%	5.7%	0.9%
200809	-14.2%	-10.6%	-8.9%	-8.5%	-8.7%	-6.4%	-4.3%	-6.1%	-4.5%	-1.9%	-13.2%
200810	-48.4%	-44.7%	-43.5%	-40.9%	-34.7%	-26.8%	-31.7%	-28.4%	-24.2%	-15.7%	-31.8%
200811	-23.7%	-19.0%	-16.4%	-16.9%	-15.6%	-18.0%	-15.3%	-11.2%	-10.5%	-4.4%	-6.1%
200812	0.5%	-2.8%	-5.9%	-3.8%	-4.6%	-1.5%	-2.5%	-0.8%	-0.9%	0.5%	9.2%
200901	-0.7%	-0.3%	-2.8%	-0.8%	-0.6%	2.0%	0.3%	-0.4%	1.9%	2.3%	-3.8%
200902	-9.6%	-8.9%	-6.0%	-8.1%	-7.5%	-8.1%	-7.6%	-4.9%	-4.7%	-0.3%	-4.5%
200903	-8.7%	-4.9%	-3.0%	-5.7%	-5.7%	-6.6%	-4.8%	-3.3%	-1.2%	-0.9%	8.3%
200904	37.2%	29.8%	25.7%	26.7%	21.6%	23.2%	19.6%	18.4%	15.5%	9.6%	14.9%
200905	30.2%	28.1%	23.3%	24.2%	23.0%	21.3%	20.9%	15.7%	12.6%	8.6%	29.6%
200906	29.7%	24.1%	22.7%	21.5%	18.8%	17.5%	17.1%	14.8%	11.1%	8.9%	-3.1%
200907	-6.3%	-6.3%	-2.6%	-1.8%	-3.2%	-1.6%	-2.4%	-0.3%	0.6%	3.3%	8.1%
200908	8.3%	12.8%	14.2%	10.3%	13.2%	10.4%	9.6%	10.4%	8.6%	5.4%	2.0%
200909	10.9%	8.6%	13.3%	11.3%	9.2%	8.3%	9.8%	7.4%	8.7%	3.9%	7.0%
200910	1.3%	3.8%	7.3%	2.7%	3.5%	3.1%	3.8%	4.6%	4.6%	4.6%	-6.7%
200911	-5.4%	-3.6%	1.1%	-1.3%	-0.7%	1.4%	1.5%	1.4%	2.2%	2.3%	7.3%
200912	2.4%	5.2%	8.3%	5.8%	7.1%	6.1%	7.7%	5.7%	7.1%	4.4%	4.3%
201001	6.9%	8.0%	7.3%	8.3%	7.2%	8.6%	4.8%	6.2%	3.8%	3.1%	-4.1%
201002	-10.4%	-7.3%	-8.0%	-8.2%	-6.0%	-4.9%	-5.6%	-5.2%	-4.0%	-1.8%	-0.7%
201003	1.3%	2.1%	3.8%	1.6%	4.4%	2.6%	5.2%	3.9%	4.1%	3.7%	4.4%
201004	3.5%	3.6%	5.3%	5.2%	5.6%	4.4%	6.0%	6.6%	5.5%	3.8%	1.3%
201005	-6.7%	-9.2%	-6.8%	-5.6%	-4.1%	-2.7%	-2.2%	-0.5%	-0.7%	0.0%	-3.3%
201006	0.2%	-1.0%	0.3%	1.3%	0.7%	2.0%	2.2%	1.6%	3.9%	5.7%	4.5%
201007	6.5%	5.9%	6.0%	7.5%	4.1%	5.9%	6.4%	5.8%	5.7%	6.0%	1.2%
201008	2.6%	2.2%	1.4%	2.0%	3.1%	5.6%	4.4%	5.2%	4.0%	1.8%	1.4%
201009	3.0%	4.5%	2.4%	4.4%	6.2%	6.8%	5.4%	5.8%	6.3%	4.3%	8.2%
201010	4.9%	4.0%	3.3%	3.9%	4.8%	4.9%	5.1%	3.5%	3.3%	0.4%	1.0%
201011	-4.8%	-2.0%	-3.6%	-1.5%	-5.0%	-1.4%	-0.8%	-0.9%	-1.1%	-0.5%	-3.9%
201012	-14.6%	-9.0%	-9.6%	-9.7%	-7.8%	-7.4%	-6.0%	-5.8%	-4.2%	-2.3%	3.3%
201101	-8.1%	-2.9%	-3.2%	-3.3%	-4.4%	-3.7%	-4.4%	-3.1%	-3.1%	-0.6%	-11.0%
201102	-15.2%	-17.4%	-13.0%	-11.2%	-10.8%	-10.4%	-9.3%	-8.1%	-8.2%	-6.3%	-4.1%
201103	-2.5%	-1.7%	0.3%	-1.4%	-0.8%	-0.3%	0.7%	1.6%	1.5%	1.2%	8.6%
201104	11.8%	9.8%	11.4%	9.1%	9.4%	8.6%	8.3%	8.4%	7.3%	6.7%	-0.2%
201105	-12.5%	-8.8%	-6.2%	-7.4%	-4.9%	-6.8%	-5.1%	-5.0%	-3.2%	-0.5%	-2.7%
201106	-3.4%	-1.2%	-1.5%	0.1%	0.1%	0.1%	-0.9%	0.1%	-1.0%	1.2%	0.7%