

Drawdown Risk in Mutual Funds' Performance

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Abstract

To many people, the terror of falling share prices is often significant, often more so than the pleasure of gains. Accordingly, investors often want to minimize downside volatility as a part of their portfolio planning. Investors already have several tools to measure downside volatility, including the lower partial moment and the maximum drawdown. The performance benchmarks use the lower partial moment as a risk measure. The lower partial moment, however, doesn't entirely describe the panic of investors facing continuously falling stock prices, and the maximum drawdown only captures a single event. A different tool is needed. Developed by Peter Martin in 1987, the Ulcer Index measures the human stress of holding a stock. Ulcer Index is a volatility measure that only captures continuous downside movements in share price, and ignores upside volatility. The more continuous and prolonged the drawdown, the higher the index and the more likely investing in it will cause ulcers or sleepless nights.

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1 Introduction

Fear is one of the most powerful emotions. So much so that supposedly sophisticated investors around the world have been caught in the panic which that fear has generated. At times like these many investors lose their discipline and almost become emotionally attached to falling prices. People get attracted to the drama and lose all sense of rationality. Instead investors need to take a deep breath, step back and take the emotion out of it. No matter the state of the market, it's important to stick to one's individual strategy. The best

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strategies are always to get good advice and keep well informed, but there are benefits in developing a strict investment strategy using specific disciplines or formulas. Their biggest advantage is taking the emotion out of investing. Records show that these approaches can be helpful in minimising the effects of market swings provided they are properly followed. There are various measures that help investors to reduce their fear of loss. Knowing the volatility of a stock would come in handier to the investors. Once a stock that is likely to move has been identified and the likely direction has been determined, an appropriate trade could be selected. Volatility in its most basic form represents daily changes in stock prices. Historic volatility is the standard deviation of the change in price of a stock or other financial instrument relative to its historic price over a period of time. Investors often want to minimize downside volatility as a part of their portfolio planning. Investors already have several tools to measure downside volatility. The performance benchmarks use the lower partial moment as a risk measure. The lower partial moment, however, doesn't entirely describe the panic of investors facing continuously falling stock prices, and the maximum drawdown only captures a single event. Ulcer Index developed by Peter Martin typically measures the measures the depth and duration of percentage drawdown in price from earlier highs.

This article presents the Ulcer Index and Ulcer Performance Index which are used to measure the human stress of holding a stock. The article explains how the components of the index capture key aspects of continuous downside movements in share price, and ignores upside volatility. The more continuous and prolonged the drawdown, the higher the index. The article also shows as to how the index provides valuable information when compared to other volatility measures. The sample taken up for the study is the Mutual Funds in India and index has been calculated for the same.

The first section of the article discusses the key risk measures used to capture the drawdown in mutual fund's Net Asset Value (NAV) and the drawbacks of these measures. The second section suggests the use of Ulcer Index and Ulcer Performance Index as an alternative to measure downside movements in fund's NAV. The third section explains how the index can be used to determine the pain of drawdown in the Mutual Fund Sector.

2 Review of Popular Risk Measures in Mutual Fund Industry

Stock market volatility is the fluctuation in price of broad stock market indexes over a defined period. However, different measures of this volatility exist, each with important nuances. This brief is intended to serve as a primer to help in the understanding of these stock market volatility measures.

2.1 Standard Deviation

When people associated with the investment industry talk about stock market volatility, often they are referring to the standard deviation of a stock market index's returns. Standard Deviation is a measure of the depth and duration of drawdown in prices from earlier highs.

The standard deviation essentially reports a fund's volatility, which indicates the tendency of the returns to rise or fall drastically in a short period of time. A security that is volatile is also considered higher risk because its performance may change quickly in either

direction at any moment. The standard deviation of a fund measures this risk by measuring the degree to which the fund fluctuates in relation to its mean return, the average return of a fund over a period of time.

A note to remember is that, because volatility is only one indicator of the risk affecting a security, a stable past performance of a fund is not necessarily a guarantee of future stability. Since unforeseen market factors can influence volatility, a fund with a standard deviation close or equal to zero this year may behave differently in the following year.

2.1.1 What's wrong with standard deviation (SD) of return?

Standard deviation is a statistical measure of the variability or unpredictability of an investment's return. It suffers from a number of serious drawbacks: Both upward and downward changes in value add to the calculated SD. Real investors' associate risk only with the downside. Rising prices create profits, not risk. The calculated value of SD is not affected by the sequences in which gains and losses occur. Thus, SD does not recognize the strings of losses that result in significant drawdown in value. The three hypothetical investments in the chart below have the same annualized return and the same SD, but no rational investor would consider them as having the same risk.

i) When SD is used to measure the risk of a market timing strategy, it will reflect roughly how often the investor were out of the market, but nothing about whether the investor was out at the right times. SD doesn't tell if the investor's strategy reduced risk by avoiding market downturns.

ii) The calculated value of SD depends on the time period used. For most investments, the SD of annual return is roughly 7.2 times the SD of weekly return (7.2 is the square root of 52 weeks per year). Since the time period is often unstated, this creates an opportunity for misunderstandings.

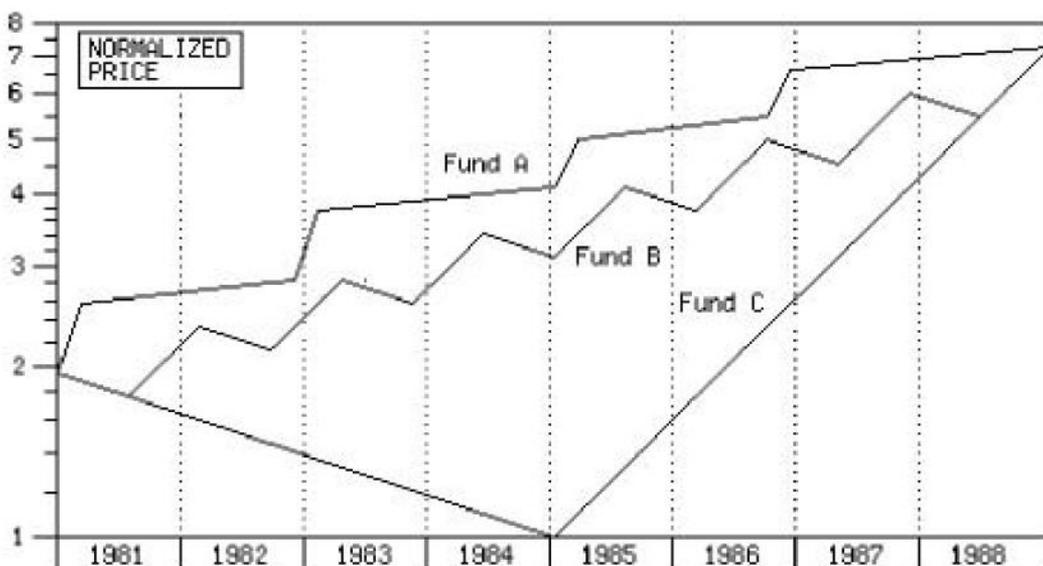


Figure 1: Hypothetical Funds with same Annualized Return and the same SD

As a result of these weaknesses, SD does not reward an investment strategy for avoiding market downturns. Using Ulcer Index as a risk measure avoids all of these problems.

2.2. Worst Trade and Maximum Drawdown (MDD)

The drawdown refers to the peak-to-trough decline during a specific record period of an investment, fund or commodity. A drawdown is usually quoted as the percentage between the peak and the trough. A drawdown is measured from the time a retrenchment begins to when a new high is reached. This method is used because a valley can't be measured until a new high occurs. Once the new high is reached, the percentage change from the old high to the smallest trough is recorded.

Maximum Drawdown (Figure 2) measures the worst loss of the investor who follows a simple trading strategy of buying and subsequently selling a given asset within a certain time frame. MDD is becoming a popular performance measure since it can capture the size of the maximum drops. One can view the maximum drawdown as a contingent claim and price and hedge it accordingly as a derivative contract. The maximum drawdown is the largest percentage drop in asset price over a specified time period. In other words, it is the greatest peak-to-trough of the asset returns. It is a measure of downside risk, and is used when calculating the Calmar Ratio.

However, investors need to be careful when making trading decisions based on this downside risk measure.

- Maximum drawdown only quantifies the worst-possible loss over an actual period of time, and is of limited value when describing future potential losses
- Investments with a longer history will tend to have larger maximum drawdown; hence care must be taken when comparing drawdown values for different assets
- Maximum drawdown needs to be closely allied with the time to recovery when analyzing potential or current investments. Without the latter, the former loses much of its analytical value

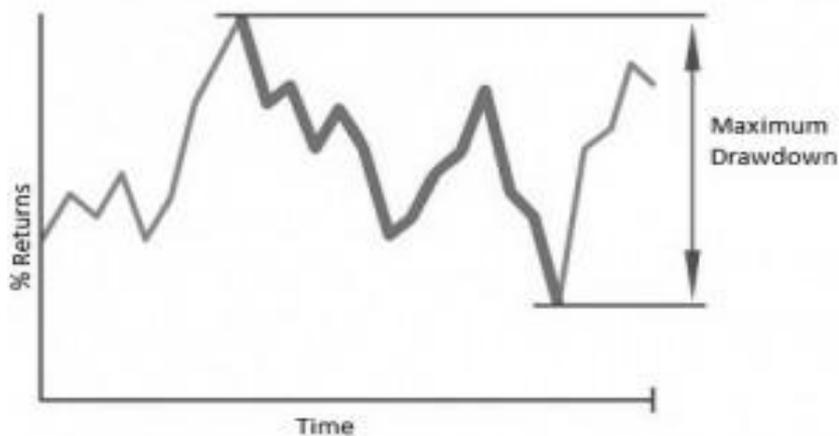


Figure 2: Maximum Drawdown in returns

These measures are based on the single worst event over a time period, which by definition has no statistical significance.

2.3. Average Maximum Retracement

Return Retracement Ratio is another reward to risk measure. A major distinction between this measure and the Sharpe ratio is the use of equity retracement versus variability of returns as a measure of risk. The Return Retracement Ratio places more emphasis on downside volatility. Specifically, this ratio is the average annualized compounded return divided by an average maximum retracement measure. This measure is based on absolute rather than percentage price changes, which distorts results over periods with strong price trends.

2.4 Percentage Losing Trade

This measure cannot be used to compare investment alternatives. Percentage Losing Trades cannot be used to compare a market timing strategy with a buy-and-hold approach, because the latter has no trades.

2.5 Beta

Beta ratios are used to measure the risk of an investment relative to the risk of a comparable market benchmark. Betas are often used in the industry as a relative benchmark for risk analysis.

While standard deviation determines the volatility of a fund according to the disparity of its returns over a period of time, beta, another useful statistical measure, determines the volatility (or risk) of a fund in comparison to that of its index or benchmark. A fund with a beta very close to 1 means the fund's performance closely matches the index or benchmark. A beta greater than 1 indicates greater volatility than the overall market, and a beta less than 1 indicates less volatility than the benchmark.

3 The Ulcer Index

Developed by Peter G. Martin and Byron B. McCann and described in detail in their book, "The Investor's Guide to Fidelity Funds" (1989), the ulcer index is a very effective risk indicator. Risk means many things to many people but it is inherent to investing. The higher an investment's ulcer index, the more likely investing in it will cause ulcers or sleepless nights.

3.1. What Does Ulcer Index Measure?

Ulcer Index (UI) measures the depth and duration of percentage drawdown in price from earlier highs. Technically, it is the square root of the mean of the squared percentage drops in value. The greater a drawdown in value, and the longer it takes to recover to earlier highs, the higher the UI. The squaring effect penalizes large drawdown proportionately more than small drawdown (just as it does in the SD calculation). In effect, UI measures the "severity" of drawdown, as represented by the arrows in the Figure 3 below:

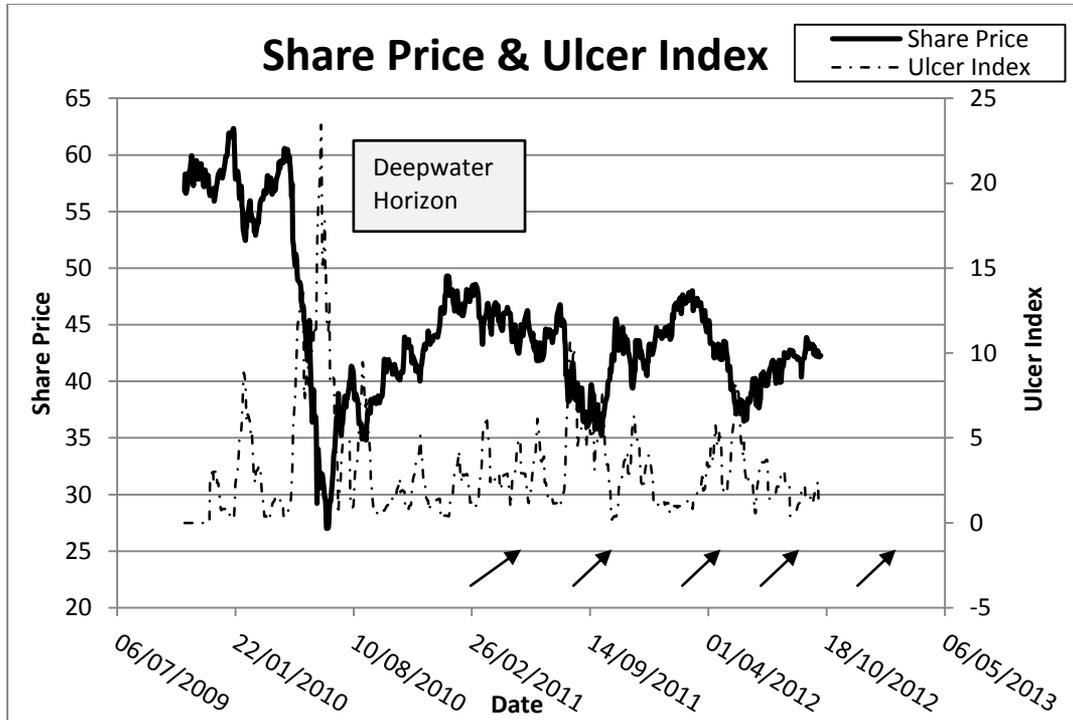


Figure 3: Share Price and Ulcer Index

The index is based on a given past period of N days. Working from oldest to newest a highest price (highest closing price) seen so-far is maintained, and any close below that is a retracement, expressed as a percentage

$$R_i = 100 * \frac{\text{price}_i - \text{maxprice}}{\text{maxprice}}$$

For example if the high so far is \$5.00 then a price of \$4.50 is a retracement of -10% . The first R is always 0, there being no drawdown from a single price. The quadratic mean (or root mean square) of these values is taken, similar to a standard deviation calculation.

$$\text{Ulcer} = \sqrt{\frac{R_1^2 + R_2^2 + \dots + R_N^2}{N}}$$

The squares mean it doesn't matter if the R values are expressed as positives or negatives; both come out as a positive Ulcer Index.

The calculation is relatively immune to the sampling rate used. It gives similar results when calculated on weekly prices as it does on daily prices. Martin advises against sampling less often than weekly though, since for instance with quarterly prices a fall and recovery could take place entirely within such a period and thereby not appear in the index.

3.2 Ulcer Performance Index or Martin Ratio

3.2.1 Measuring investment performance

The Sharpe, Treynor information ratios are familiar measures used by the industry for

decades; they take the familiar form of reward divided by risk. More recently hedge funds have encouraged the use of additional risk measures designed to accommodate the risk concerns of different types of investors. These measures can be categorized as based on normal measures of risk, regression, higher or lower partial moments, drawdown or value at risk (VaR) as follows:

Table 1: Investment Performance Measures

Type	Combined Return and Risk Ratio
Normal	Sharpe & Information, Modified Information
Regression	Appraisal & Treynor
Higher or lower partial moments	Sortino, Omega, Upside Potential, Omega-Sharpe & Prospect
Drawdown	Calmar, Sterling, Burke, Sterling-Calmar, Ulcer Performance Index (Martin Ratio)
Value at Risk	Reward to VaR, Conditional Sharpe, Modified Sharpe

A popular method for measuring investment "performance" is to divide the excess return of an investment by its risk. (Excess return is total return minus the return offered by risk-free investments). This calculation provides a single number that accounts for both return and risk. It reports the additional return achieved per unit of risk assumed. Traditionally the Sharpe Ratio is used, where risk is again represented by the standard deviation of return:

$$\text{Sharpe Ratio} = (\text{Total return} - \text{Risk-free return}) / \text{SD}$$

Just as SD is a poor risk measure, so is this formula a poor performance measure. This problem is solved by simply replacing SD with UI. This new performance measure has been dubbed the "Martin Ratio" or "Ulcer Performance Index" (UPI).

$$\text{Ulcer Performance Index} = (\text{Total return} - \text{Risk-free return}) / \text{UI}$$

In either case, compounded annual returns should be used for consistency. These figures should include reinvestment of dividends and other distributions; and should be net of all recurring fees, transaction costs and trading slippage. When plotting investments on a risk vs. return chart, UI can be used instead of SD for the horizontal (risk) axis.

The Ulcer Performance Index (UPI) measures how well a fund or portfolio outperformed a money market index (a risk free investment) over a 12 month period compared with its associated downside risk (as measured by the Ulcer Index). Essentially, UPI is the measure of the performance of a fund or portfolio per unit of risk taken by that fund or portfolio. The higher the UPI numbers the better. A high UPI further endorses a stated high investment return.

3.3 Ulcer Index and Ulcer Performance Index

Ulcer Index and UPI serve two different purposes. Both measure sickening drops. Ulcer Index is used with a mix of securities to determine which is the most likely to give you an ulcer. Ulcer Performance Index is used to rate a group of related securities (like the

GROWTH family of funds) when compared to the low basis risk return. UPI is a relative rating comparing another fund.

4 Ulcer Index and Ulcer Performance Index of Selected Mutual Funds

The objective of this article is to suggest an index capturing the pain of drawdown in the Mutual Fund Sector. This section describes the sample taken for the study and the methodology used in the study.

Mutual funds, especially equity funds, are long-term investments, but a yearly review of the funds' performance is highly recommended. The mutual fund ranking is an effort to keep the investor updated about the performance of funds invested in.

The rankings of the funds are based on three-year (ended 30 October 2012) performance of 25 equity, debt and balanced funds from the mutual fund sector in India. The 25 funds were randomly chosen across five fund categories. The five fund categories chosen were Hybrid Balanced Funds, Equity Diversified, Debt Income, Gilt Long Term and Equity Index.

4.1 Comparing Funds

4.1.1. Ulcer index

As a statistical measure, investors can compare Ulcer Index values to determine relative risk of two categories of fund. Given below is the Ulcer Index for funds from two categories namely Hybrid Balanced Fund and Debt – Income fund. The funds chosen from each category are ICICI Prudential Child Care Plan - Gift Plan (Hybrid Balanced Fund) and the SBI Magnum Children Benefit Plan (Debt-Income fund) respectively.

The Figure 4 & 5 presents the ulcer index of two funds ICICI Prudential Child Care Plan _ Gift Plan and the SBI Magnum Children Benefit Plan. A comparison on the performance of funds has also been done.

Based on weekly closing prices, the Ulcer Index measures volatility based on price depreciation from its high over a specific look-back period. The index is zero if prices close higher each period. This means there is no downside risk because prices are steadily rising. Prices, of course, do not steadily rise and there will be declines along the way. Using a default setting of 14 periods, the Ulcer Index reflects the expected percentage drawdown over this period. Ulcer Index works well with weekly data.

The Figure 4 of ICICI Prudential Child Care Plan - Gift Plan below shows the spike of the ulcer index as the market drops. Figure 4 uses the closing NAV of the fund with the 14-period Ulcer Index. The figure 5 reflects the ulcer index for the year 2011 and 2012. A 52-period moving average (1.20) was added to smooth the index and show a long-term average. There were four spikes above 2.05 (safe level) in the year 2012. The largest spike was seen in the year 2011 and it seems to moderate in the year 2012. The balance of the chart shows smaller moves above the 'safe line' with the price of ICICI Prudential Child Care Plan - Gift Plan fund dropping gradually over a period of a number of weeks. The UI for the ICICI Prudential Child Care Plan - Gift Plan fund was computed to be 2.51 which is the highest in the Hybrid Balanced Fund Category.

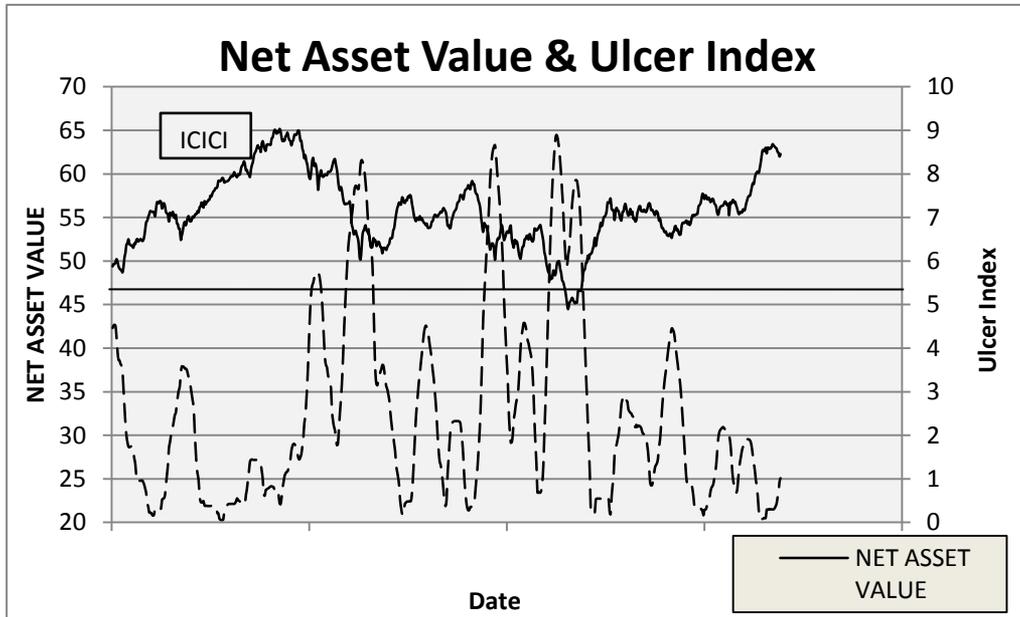


Figure 4: Net Asset Value and Ulcer Index for ICICI Prudential Child Care Plan - Gift Plan

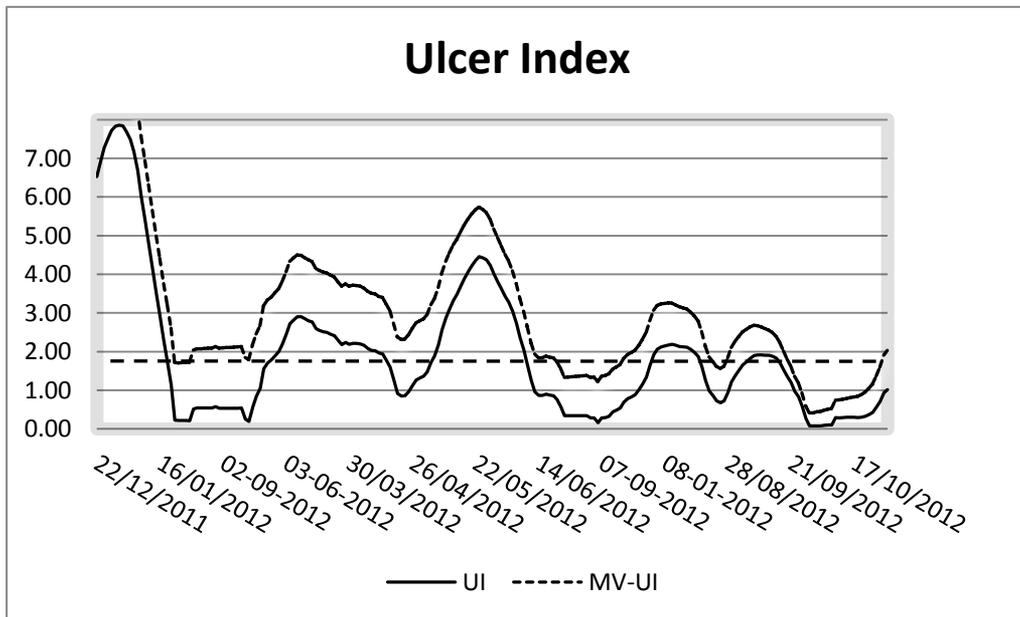


Figure 5: Ulcer Index and Moving Average Ulcer Index for ICICI Prudential Child Care Plan - Gift Plan

The Figure 6 shows the SBI Magnum Children Benefit Plan with the same chart features. In Figure 7 the Ulcer Index breached 1.02 twice in 2012. The 52-week moving average is at 0.50, which is lower than the moving average for the ICICI Child Care fund. This means the

Debt – Income fund (SBI Magnum Children Benefit Plan) has less or drawdown potential than the hybrid balanced fund (ICICI Child Care fund).

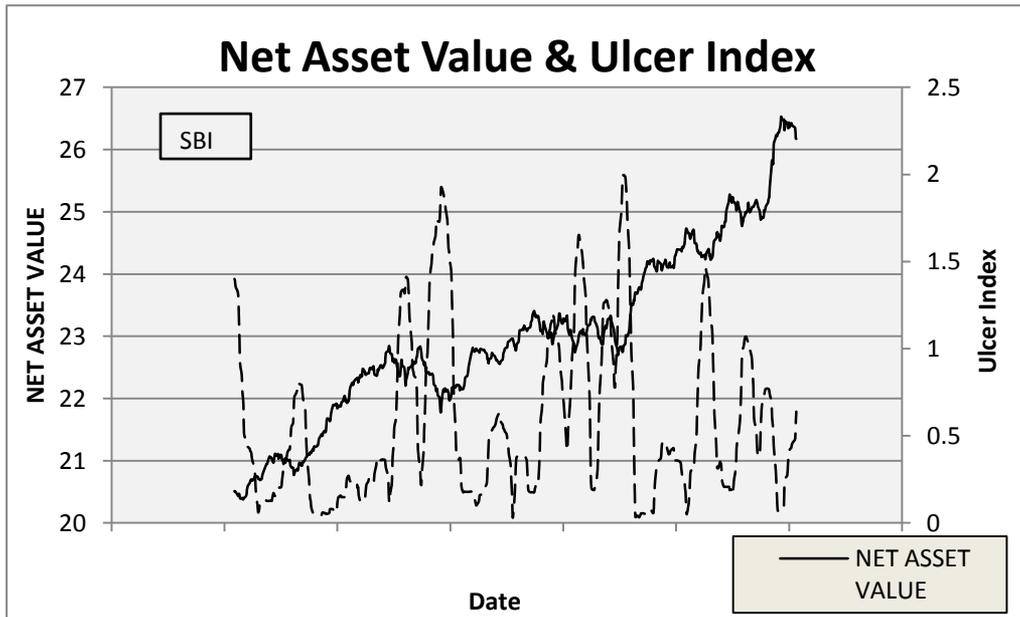


Figure 6: Net Asset Value and Ulcer Index for SBI Magnum Children Benefit Plan

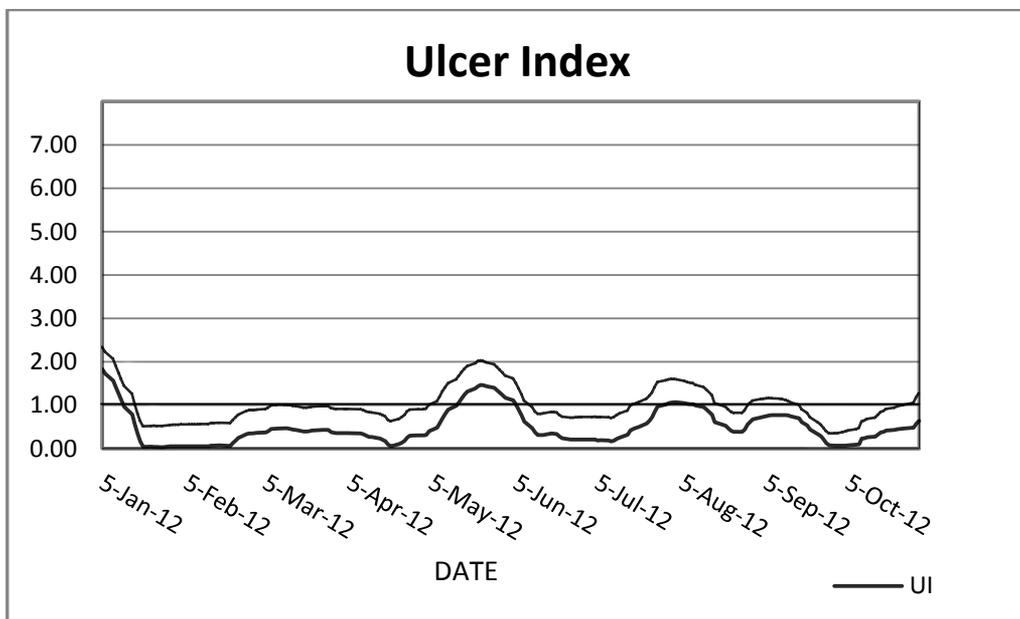


Figure 7: Ulcer Index and Moving Average Ulcer Index for SBI Magnum Children Benefit Plan

It is safe to say that the ulcer index is a good indicator of short-term performance or non-performance. The ulcer index measures change from the previous high of an issue and not from an average price of an issue over a period of time. The measurement includes every drop in performance in the period being studied. Funds or trading systems

with high ulcer-index readings should be avoided unless they have such exceptionally high returns that the risks are justified."The higher an investment's ulcer index, the more likely investing in it will cause ulcers or sleepless nights." This means the Debt – Income fund (SBI Magnum Children Benefit Plan) has less or drawdown potential than the hybrid balanced fund (ICICI Child Care fund). ICICI child care fund with high ulcer index has high risk or drawdown potential hence it could cause ulcers or sleepless nights to the investors.

4.1.2. Ulcer performance index

UPI is used to rate a group of related securities (like the GROWTH family of funds) when compared to the low basis risk return. UPI is a relative rating comparing another fund. Given below is the Ulcer Performance Index for funds from Hybrid Balanced Category. The funds chosen from the category are ICICI Prudential Child Care Plan - Gift Plan, TATA Balanced Fund Growth and the Baroda Pioneer Balanced Fund Growth respectively. The goal is to find funds with the highest UPI, which means the highest risk-adjusted return.

Table 2: ULCER PERFORMANCE INDEX FOR HYBRID FUNDS

FUND NAME	Total Return	Risk –Free Rate	Ulcer Index	ULCER PERFORMANCE INDEX
ICICI Prudential Child Care Plan - Gift Plan	8.04 %	4%	2.51	1.58
TATA Balanced Fund Growth	7.53%	4%	1.77	1.99
Baroda Pioneer Balanced Fund Growth	3.05 %	4%	2.05	-0.46

The 3-year 90-day Treasury Yield represents the risk-free rate. The Ulcer Index is a 52-week average of the 14-week Ulcer Index. The expected return is based on the 3 year total return data. The Ulcer Index is high for the TATA Balanced fund growth. Based on the higher UPI, the TATA BL fund appears to provide a better risk-adjusted return than the technology fund.

Both of these indicators have a place in the overall of any savvy trader, and applying these indicators to the technical charts may help one to determine the effectiveness for one’s own individual investing philosophies and programs.

4.1.3. Overall ranking of sample funds

4.1.3.1. Ranking of fund among categories’ using Ulcer Performance Index

The ranking of sample funds based on Ulcer Performance Index using three year return for five fund categories were done. The same is presented in the Figure 8 & 9 below:

1. HYBRID FUNDS: Hybrid funds aim to generate income by creating a portfolio that is invested in equity and equity related securities and debt, money market instruments. Ranking of the sample funds based on Ulcer Performance Index is given in Figure 8.

2. **EQUITY DIVERSIFIED:** The investment objective is to achieve long term capital gain by investing predominantly in equity oriented instruments. Few funds also aim to generate long term capital appreciation through a judicious mix of quality debt and equity instruments at relatively low risk levels.
3. **DEBT-INCOME FUNDS:** The investment objective of these is to generate regular income through investment in a portfolio comprising substantially of floating & fixed rate debt & money market instruments swapped for floating rate returns and fixed rate debt securities and money market instruments.

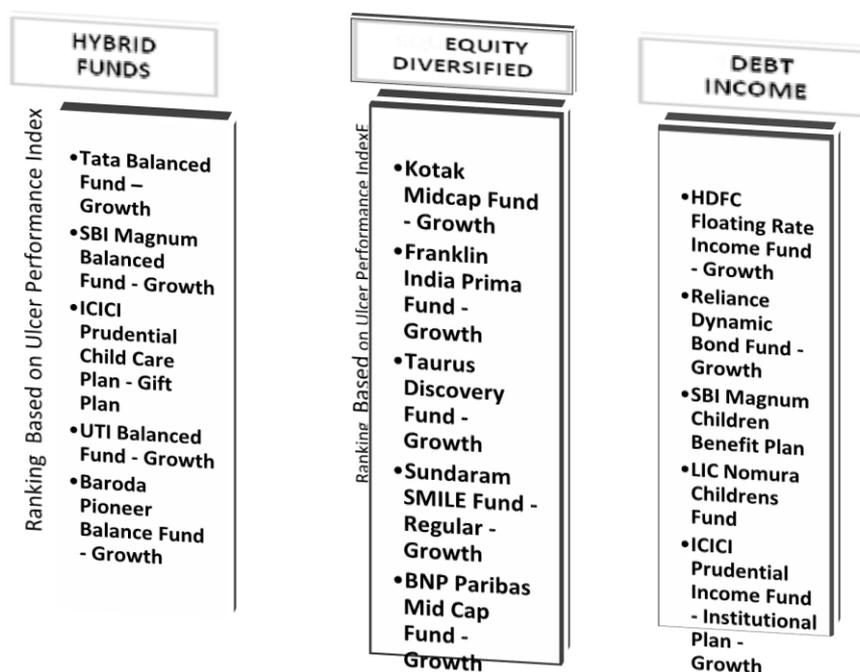


Figure 8: Ranking of Mutual Funds Using Ulcer Index Based On 3- Year Return

The funds are ranked from the highest to the lowest order. Highly placed funds have obtained the highest UPI, which means the highest risk-adjusted return and low placed funds have recorded the lowest UPI, which means the lowest risk-adjusted return. The UPI of the sample is provided in the Appendix 2.

The top performers in the Hybrid Category are: Tata BI Fund –Growth and SBI Magnum BI Fund- Growth; in the Equity Diversified Category are: Kotak MidCap –Growth and Franklin India Prima Fund Growth and in the Debt Income Category are: HDFC Floating Rate Income Fund- Growth and Reliance Dynamic Bond Fund Growth.

4. **GILT FUND:** The investment objective of these funds is to generate risk-free returns through investments in sovereign securities issued by the Central Government and/or a State Government and/or reverse repos in such securities.
5. **EQUITY INDEX:** These fund operations aim to provide investment return that closely corresponds to the returns of the securities as represented by a chosen Index (CNX Bank Index, S & P CNX Nifty Index, Sensex...)

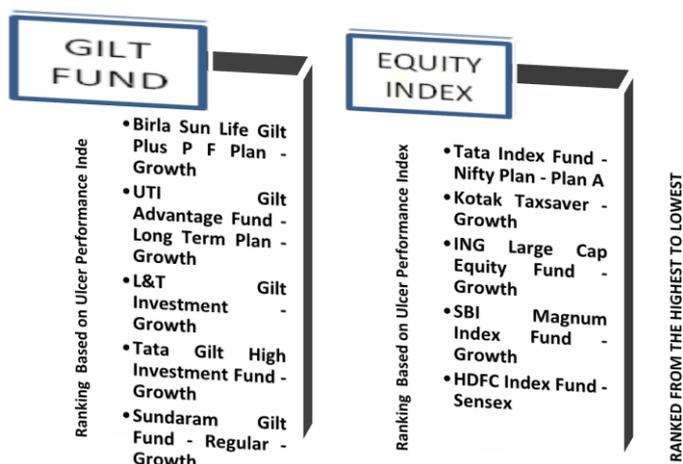


Figure 9: Ranking of Mutual Funds Using Ulcer Index Based On 3- Year Return

According to Figure 9 -the top performers in the GILT Fund Category are: Birla Sun Life Gilt Plus–Growth and UTI Gilt Adv – Long Term Plan- Growth and in the Equity Index Category are: Tata Index-Nifty Plan and Kotak Tax Saver-Growth.

4.1.3.2. Ranking of fund across categories' using Ulcer Index

The overall ranking of sample funds based on Ulcer Index using 3-year return from various categories was done. The same is presented in the Figure 10 below:

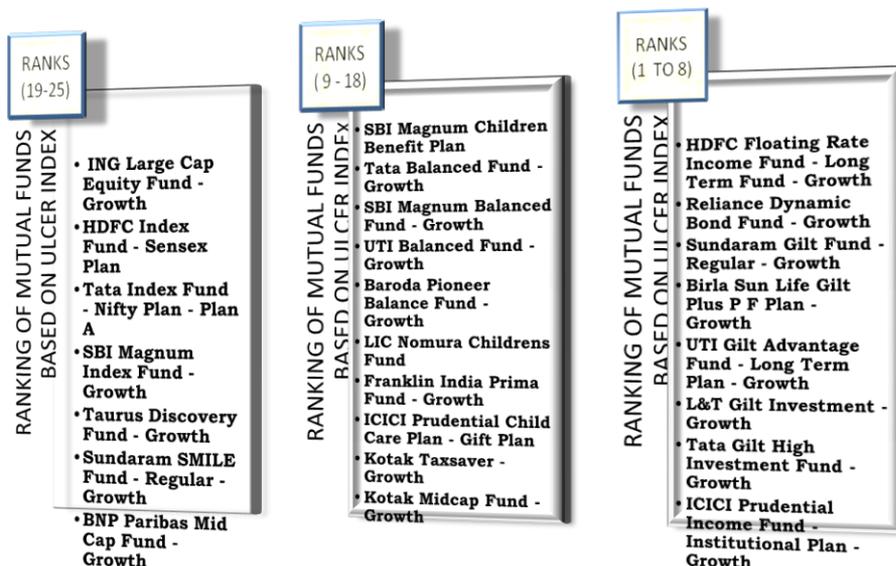


Figure 10: Ranking of Mutual Funds across Fund Categories using Ulcer Index based on 3-year return

The funds that top the list are Debt-Income funds GILT FUNDS. The top Debt-Income funds are from Asset Management Companies (AMC) namely HDFC & RELIANCE. The

best GILT –FUND operators are Sundaram, Birla, UTI and TATA. The mediocre ranked are Hybrid balanced funds and few Debt-Income Funds. These mid-ranked funds are from AMC’s namely SBI, TATA & LIC. The least ranked are Equity Index funds. The entire equity index taken for the study is ranked least.

The overall ranking shows that DEBT-INCOME and GILT-FUNDS are with less ulcer index has less risk or drawdown potential hence it could cause less ulcers or less sleepless nights to the investors. On the other hand funds with high ulcer index and have high risk or drawdown potential is the Equity Index, hence it could cause ulcers or sleepless nights to the investors.

4.1.3.3. Ranking of mutual funds for the year 2012 using Ulcer Index

The overall ranking of sample funds for the year 2012 was done based on Ulcer Index. The same is presented in the Figure 11 below: The funds that top the list are Debt-Income funds GILT FUNDS. The top Debt-Income funds are from Asset Management Companies (AMC) namely HDFC & RELIANCE. The best GILT –FUND operators are Sundaram, Birla, UTI and TATA. The mediocre ranked are Hybrid balanced funds and few Debt-Income Funds. These mid-ranked funds are from AMC’s namely SBI, TATA & LIC. The least ranked are Equity Index funds.

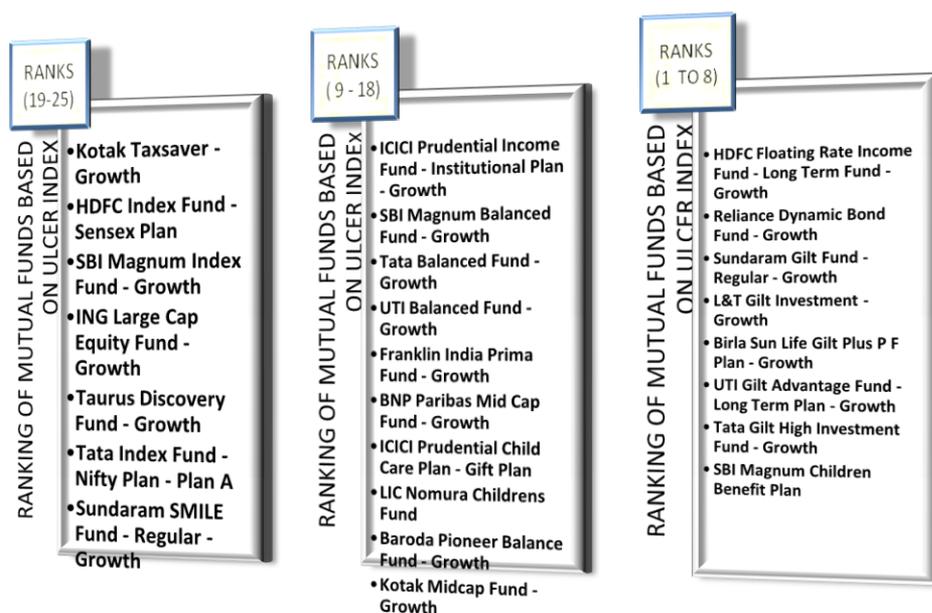


Figure 11: Mutual Funds Ranking for the Year 2012 Using Ulcer Index

4.1.3.4 Ranking of mutual funds for the year 2012 using Ulcer Performance Index

Stepping back and taking the annual view is the most relevant because investors tend to take a medium to long-term view and invest in quality funds.

The overall ranking of sample funds for the year 2012 was done based on Ulcer Performance Index. The same is presented in the Figure 12 below: The top performers in the Hybrid Category are: SBI Magnum BI Fund- Growth ,ICICI Pru Child Care; in the Equity Diversified Category are: Taurus Discovery Fund –Growth and Franklin India Prima Fund Growth and in the Debt Income Category are: HDFC Floating Rate Income

Fund- Growth and Reliance Dynamic Bond Fund Growth. The top performers in the GILT Fund Category are: L&T Gilt Investment Growth, Sundaram Gilt Fund and in the Equity Index Category are: Kotak Tax Saver-Growth and ING Large Cap Equity Fund.

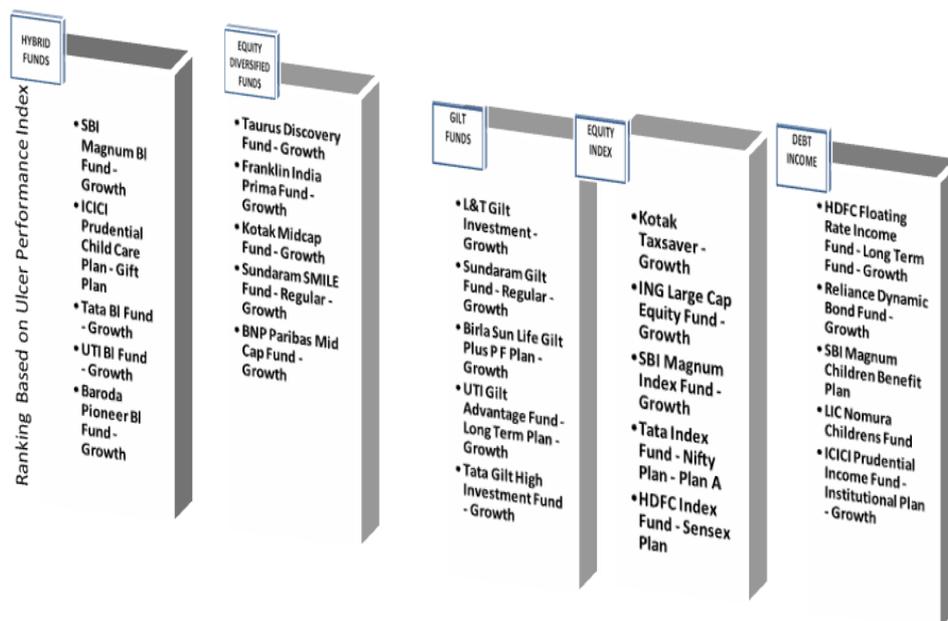


Figure 12: Ranking of Funds for the Year 2012 using Ulcer Performance Index

It is safe to say that the ulcer index is a good indicator of short-term performance or non-performance. Ranking of mutual funds using ulcer performance index will enable investors to identify funds with high risk-adjusted return. Funds or trading systems with high ulcer-index readings should be avoided unless they have such exceptionally high returns that the risks are justified."The higher a fund is placed in the ulcer performance index, the less likely investing in it will cause ulcers or sleepless nights."

5 Conclusion

An investor has different measurements of risk. Which one is best to use? The answer is, it is always better to use more than one measure to analyze risk. Real investors associate risk only with the downside of prices. The Ulcer Index explained in the paper is one such measure of downside volatility. As it is evident from the discussions, the index measures the human stress of holding a stock. It is a volatility measure that captures the severity of drawdown. The Ulcer Index and Ulcer Performance Index is one of the best measures to determine the pain of drawdown in the Mutual Fund Sector. A high ulcer index marks the risk of maximum drawdown and investors are cautioned to avoid such funds. On the other hand a low Ulcer Performance Index denotes low risk-adjusted return of the fund and likely to cause ulcers or sleepless nights to the investor.

Risk occurs to some degree in all investment markets, and volatility is one reflection of this risk. Contrary to popular opinion, volatility should not be feared; it should be recognized as a necessary part of the risk and reward relationship. A reasonable amount of

volatility in an investment is the trade-off for higher long-term return expectations. Investors should not alter their asset allocation plan in response to short-term changes in volatility, but should review the reasonable long-term expectations for volatility when creating their strategic asset allocation. Any investor who takes the time to go through these steps will be more comfortable with the investment choices they make. Remember it's your money - invest it wisely.

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Appendices

Appendix 1: Ranking of mutual funds – using Ulcer Index

Rank	UI-3 YEAR	Fund Name	Rank	UI -2012	Fund Name
1	0.1	HDFC Floating Rate Income Fund - Long Term Fund - Growth	1	0.01	HDFC Floating Rate Income Fund - Long Term Fund - Growth
2	0.14	Reliance Dynamic Bond Fund - Growth	2	0.11	Reliance Dynamic Bond Fund - Growth
3	0.17	Sundaram Gilt Fund - Regular - Growth	3	0.13	Sundaram Gilt Fund - Regular - Growth
4	0.22	Birla Sun Life Gilt Plus P F Plan - Growth	4	0.2	L&T Gilt Investment - Growth
5	0.26	UTI Gilt Advantage Fund - Long Term Plan - Growth	5	0.23	Birla Sun Life Gilt Plus P F Plan - Growth
6	0.29	L&T Gilt Investment - Growth	6	0.25	UTI Gilt Advantage Fund - Long Term Plan – Growth
7	0.36	Tata Gilt High Investment Fund - Growth	7	0.37	Tata Gilt High Investment Fund – Growth
8	0.41	ICICI Prudential Income Fund - Institutional Plan - Growth	8	0.53	SBI Magnum Children Benefit Plan
9	0.58	SBI Magnum Children Benefit Plan	9	0.57	ICICI Prudential Income Fund - Institutional Plan – Growth
10	1.77	Tata Balanced Fund - Growth	10	1.19	SBI Magnum Balanced Fund – Growth
11	1.93	SBI Magnum Balanced Fund - Growth	11	1.29	Tata Balanced Fund – Growth
12	1.97	UTI Balanced Fund - Growth	12	1.52	UTI Balanced Fund – Growth
13	2.05	Baroda Pioneer Balance Fund - Growth	13	1.53	Franklin India Prima Fund – Growth
14	2.19	LIC Nomura Childrens Fund	14	1.54	BNP Paribas Mid Cap Fund – Growth
15	2.38	Franklin India Prima Fund - Growth	15	1.71	ICICI Prudential Child Care Plan - Gift Plan
16	2.51	ICICI Prudential Child Care Plan - Gift Plan	16	1.74	LIC Nomura Children's Fund
17	2.57	Kotak TaxSaver - Growth	17	1.93	Baroda Pioneer Balance Fund – Growth
18	2.61	Kotak Midcap Fund - Growth	18	1.97	Kotak Midcap Fund – Growth
19	2.67	ING Large Cap Equity Fund - Growth	19	2.04	Kotak TaxSaver - Growth
20	2.84	HDFC Index Fund - Sensex Plan	20	2.2	HDFC Index Fund - Sensex Plan
21	2.87	Tata Index Fund - Nifty Plan - Plan A	21	2.26	SBI Magnum Index Fund - Growth
22	2.87	SBI Magnum Index Fund - Growth	22	2.28	ING Large Cap Equity Fund - Growth
23	2.98	Taurus Discovery Fund - Growth	23	2.3	Taurus Discovery Fund – Growth
24	3.28	Sundaram SMILE Fund - Regular - Growth	24	2.31	Tata Index Fund - Nifty Plan - Plan A
25	4.01	BNP Paribas Mid Cap Fund - Growth	25	2.47	Sundaram SMILE Fund - Regular – Growth

Appendix 2: Categorical ranking of mutual funds – using Ulcer performance

RANK	UPI 2012	HYBRID FUND	RANK	HYBRID FUND	UPI-3 YEAR
1	21.8	SBI Magnum Balanced Fund - Growth	1	1.99	Tata Balanced Fund - Growth
2	19.7	ICICI Prudential Child Care Plan - Gift Plan	2	1.7	SBI Magnum Balanced Fund - Growth
3	14.4	Tata Balanced Fund - Growth	3	1.58	ICICI Prudential Child Care Plan - Gift Plan
4	10.5	UTI Balanced Fund - Growth	4	0.21	UTI Balanced Fund - Growth
5	5.8	Baroda Pioneer Balance Fund - Growth	5	-0.46	Baroda Pioneer Balance Fund - Growth
RANK	UPI 2012	EQUITY DIVERSIFIED FUND	RANK	UPI-3 YEAR	EQUITY DIVERSIFIED FUND
1	13.9	Taurus Discovery Fund - Growth	1	1.5	Kotak Midcap Fund - Growth
2	15.8	Franklin India Prima Fund - Growth	2	0.9	Franklin India Prima Fund - Growth
3	15.8	Kotak Midcap Fund - Growth	3	-0.5	Taurus Discovery Fund - Growth
4	12.6	Sundaram SMILE Fund - Regular - Growth	4	-1.4	Sundaram SMILE Fund - Regular - Growth
5	2.3	BNP Paribas Mid Cap Fund - Growth	5	-7.3	BNP
RANK	UPI 2012	DEBT INCOME FUND	RANK	UPI-3 YEAR	DEBT INCOME FUND
1	35.0	HDFC Floating Rate Income Fund - L.T Fund - Growth	1	32.0	HDFC Floating Rate Income Fund - Long Term Fund - Growth
2	28.4	Reliance Dynamic Bond Fund - Growth	2	28.4	Reliance Dynamic Bond Fund - Growth
3	19.6	SBI Magnum Children Benefit Plan	3	7.3	SBI Magnum Children Benefit Plan
4	5.3	LIC Nomura Children's Fund	4	-3.0	LIC Nomura Children's Fund
5	-8.0	ICICI Prudential Income Fund - Inst Plan - Growth	5	-4.5	ICICI Prudential Income Fund - Institutional Plan - Growth
RANK	UPI 2012	GILT FUND	RANK	UPI-3 YEAR	GILT FUND
1	27.4	L&T Gilt Investment - Growth	1	13.0	Birla Sun Life Gilt Plus P F Plan - Growth
2	21.1	Sundaram Gilt Fund - Regular - Growth	2	10.0	UTI Gilt Advantage Fund - Long Term Plan - Growth
3	9.0	Birla Sun Life Gilt Plus P F Plan - Growth	3	8.4	L&T Gilt Investment - Growth
4	5.7	UTI Gilt Advantage Fund – L.T. - Growth	4	4.4	Tata Gilt High Investment Fund - Growth
5	2.9	Tata Gilt High Investment Fund - Growth	5	1.5	Sundaram Gilt Fund - Regular -
RANK	UPI 2012	EQUITY INDEX FUND	RANK	UPI-3 YEAR	EQUITY INDEX FUND
1	10.1	Kotak TaxSaver - Growth	1	1.0	Tata Index Fund - Nifty Plan - Plan A
2	7.3	ING Large Cap Equity Fund - Growth	2	-0.2	Kotak TaxSaver - Growth
3	7.0	SBI Magnum Index Fund - Growth	3	-0.3	ING Large Cap Equity Fund - Growth
4	6.9	Tata Index Fund - Nifty Plan - Plan A	4	-0.5	SBI Magnum Index Fund - Growth
5	6.4	HDFC Index Fund - Sensex Plan	5	-0.8	HDFC Index Fund - Sensex Plan