

Question Paper

Portfolio Management and Mutual Funds – II (252): October 2005

Section D : Case Study (50 Marks)

This section consists of questions with serial number 1 - 6.

Answer all questions.

Marks are indicated against each question.

Do not spend more than 80 - 90 minutes on Section D.

Case Study

Read the case carefully and answer the following questions:

1. Identify and describe an appropriate set of investment objectives and investment constraints for Mr. Santosh. Also write an investment policy statement based on these objectives and constraints.

(8 marks) [< Answer >](#)

2. Construct an investment plan using strategy of dedication with zeros (zero coupon bonds) so that fund requirements of Mr. Santosh can be met. Estimate the duration of the resulting portfolio of zero coupon bonds.

(6 marks) [< Answer >](#)

3. Calculate duration of the savings portfolio of Mr. Santosh, if the weighted dividend yield of HDFC Nifty index fund is 8%.

(6 marks) [< Answer >](#)

4. a. Calculate downside volatility (-ve semi deviation) of HDFC Nifty Index fund's return for the period July 2004-05.
b. Calculate the tracking error of HDFC Nifty Index fund with Nifty for the period July 2004-05.

(6 + 6 = 12 marks) [< Answer >](#)

5. Calculate the information ratio for the equity portfolio consisting of five stocks as advised by Mr. Avinash, using the information from **Appendix-III**, if risk free rate is 6% p.a.

(10 marks) [< Answer >](#)

6. Inclusion of options in a portfolio shifts the return distribution from symmetrical to non-symmetrical. In case of a non-symmetrical distribution, beta and standard deviation lose their theoretical importance as performance measurement tools. Explain the alternative methods available to evaluate the performance of such a portfolio.

(8 marks) [< Answer >](#)

Mr. Santosh, a software engineer working in Infosys, is planning for different investment avenues, which help him in meeting his future liquidity requirements. His annual salary is Rs.25,00,000. He is 38 years old. His wife is a doctor working in a hospital and earning Rs.1,00,000 per month. He has a son who is 12 years old and studying in 6th class and a daughter who is 8 years old and studying in 4th class. His parents are dependent on him and he has to spend Rs.40,000 towards their food and medical expenses. As a whole, his monthly expenses are Rs.80,000. In addition to these, he is planning to establish his own software firm after 10 years, for which fund requirements are estimated to be Rs.25 crore. His wife has plans of constructing a hospital within 8 years, the fund requirements of which are estimated to be Rs.15 crore. He also has the fund requirement of Rs.2 crore towards the educational expenses of his son for sending him abroad after 9 years. His liquid

requirements for his daughter's education after 11 years are Rs.1 crore. He has to plan for Rs.5 crore towards the marriage expenses of his children after 17 years from now. Since, he has to meet all requirements, he is planning to invest in moderately risky instruments to strike a balance between safety and return.

For this purpose, he consulted one of the leading consultancy firms for the selection of investment avenues. The portfolio manager of the firm, Mr. Avinash has suggested him to invest up to 50% of his savings in bonds, which help him in meeting his essential requirements and the remaining 30% in equity based index mutual funds with growth option and 20% in stocks for capital appreciation.

After considering the risk tolerance level of Mr. Santosh, Mr. Avinash has advised the following stocks in the following proportion for investment.

Stocks	Expected dividend (Rs.)	Proportion
Wipro	18.8	0.1
ICICI Bank	15.8	0.3
IOC	13.6	0.3
Maruti	14.5	0.2
ONGC	18.4	0.1

Mr. Avinash advised Mr. Santosh to adopt dedication strategy using zero coupon bonds. For this purpose, the following highly rated bonds are selected.

Days/ Years	Market Yield (%)	Years	Market Yield (%)
0- 91 days	5.15	9 years	8.05
91-182 days	5.32	10 years	8.20
182-364 days	5.70	11 years	8.36
2 years	6.00	12 years	8.68
3 years	6.40	13 years	8.90
4 years	6.80	14 years	9.35
5 years	7.00	15 years	9.65
6 years	7.30	16 years	10.68
7 years	7.45	17 years	11.10
8 years	7.68	18 years	11.96

Mr. Santosh has already invested in the NSE Nifty based index fund of HDFC. The details of the fund are as follows.

HDFC Index Fund Nifty Plan (Growth Option)

Investment Objective

Nifty Plan:

The objective of this Plan is to generate returns that are commensurate with the performance of the Nifty, subject to tracking errors.

Basic Scheme Information

Nature of Scheme	Open Ended Index Linked Scheme
Inception Date	Jul 17, 2002
Entry Load (as a % of the Applicable NAV)	Nil
Exit Load (as a % of the Applicable NAV)	• In respect of each purchase / switch - in of Units, upto and including Rs.5 Lakh in value, an Exit Load of 1.00% is payable if Units are redeemed / switched-out within 1 year from the date of allotment. • In respect of each purchase / switch - in of Units, greater than Rs.5 Lakh in value, no Exit Load shall be payable.

Minimum Application Amount	Rs.5000 and in multiples of Rs.100 thereof to open an account / folio. Additional purchases is Rs.1000 and in multiples of Rs.100 thereof.
Lock-In-Period	Nil
Net Asset Value Periodicity	Every Business Day
Redemption proceeds	Normally dispatched within 4 Business days
Tax Benefits (As per present Laws)	As per present tax laws. Income distributed by the Scheme will be exempt from Income-tax in the hands of investors with effect from April 01, 2003. Distribution tax, if applicable, shall be payable by the respective Scheme(s) / Plan(s). Units of the Scheme(s) are not subject to Wealth-tax and Gift-tax.

Investment Pattern

The net assets of the Plan will be invested predominantly in stocks constituting the S&P CNX Nifty and / or in exchange traded derivatives on the S&P CNX Nifty. This would be done by investing in almost all the stocks comprising the S&P CNX Nifty in approximately the same weightage that they represent in the S&P CNX Nifty Index and / or investing in derivatives including futures contracts and options contracts on the S&P CNX Nifty Index. A small portion of the net assets will be invested in money market instruments permitted by SEBI / RBI including call money market or in alternative investment for the call money market as may be provided by the RBI, to meet the liquidity requirements of the Plan.

Instruments	Normal allocation	Risk profile of the instrument
Securities covered by the Nifty	95 to 100	Medium to high
Cash & Money Market Instruments, including money at call but excluding Subscription and Redemption Cash Flow	0 to 5	Low to Medium
Subscription Cash Flow is the subscription money in transit before deployment and Redemption Cash Flow is the money kept aside for meeting redemptions.		

Investment Strategy & Risk Control

The Nifty Plan will be managed passively with investments in stocks in a proportion that is as close as possible to the weightages of these stocks in the Nifty index. The investment strategy would revolve around reducing the tracking error to the least possible through regular rebalancing of the portfolio, taking into account the change in weights of stocks in the indices as well as the incremental collections / redemptions from these Plans.

Pursuant to the SEBI Regulations, the respective Plans shall not make any investment in:

- any unlisted security of an associate or group company of the Sponsor; or
- any security issued by way of private placement by an associate or group company of the Sponsor; or
- the listed securities of group companies of the Sponsor which is in excess of 25% of the net assets.

RISK CONTROL

For the Nifty Plan, risks would be the impact cost on securities, the delayed communication of weightage changes by the index service providers and the delayed calculation of net change in assets of each of the Plans, amongst others.

It is proposed to manage the risks by placing limit orders for basket trades and other trades, proactive follow-up

with the service providers for daily change in weights in the respective indices as well as monitor daily inflows and outflows to and from the Fund closely.

While these measures are expected to mitigate the above risk to a large extent, there can be no assurance that these risks would be completely eliminated.

APPENDIX-I
(HDFC NIFTY FUND)

Date	NAV (Rs.)	Sale price (Rs.)	Repurchase price (Rs.)
30-Jun-2005	21.9217	21.9217	21.7025
31-May-2005	20.6047	20.6047	20.3987
29-Apr-2005	18.8245	18.8245	18.6363
31-Mar-2005	20.1236	20.1236	19.9224
28-Feb-2005	20.8009	20.8009	20.5929
31-Jan-2005	20.3595	20.3595	20.1559
31-Dec-2004	20.5542	20.5542	20.3487
30-Nov-2004	19.3234	19.3234	19.1302
29-Oct-2004	17.6863	17.6863	17.5094
30-Sep-2004	17.2871	17.2871	17.1142
31-Aug-2004	16.1300	16.1300	15.9687
31-Jul-2004	15.9551	15.9551	15.7955
30-Jun-2004	15.0389	15.0389	14.8885

APPENDIX-II
(NSE NIFTY)

Date	Open	High	Low	Close
30-Jun-2005	2191.55	2226.15	2189.45	2220.60
31-May-2005	2072.50	2091.75	2066.55	2087.55
29-Apr-2005	1943.20	1943.20	1896.30	1902.50
31-Mar-2005	1994.50	2043.60	1994.50	2035.65
28-Feb-2005	2061.20	2106.20	2047.70	2103.25
31-Jan-2005	2008.45	2060.40	2006.35	2057.60
31-Dec-2004	2059.85	2083.00	2059.85	2080.50
30-Nov-2004	1940.25	1963.80	1940.25	1958.80
29-Oct-2004	1800.85	1808.85	1783.10	1786.90
30-Sep-2004	1728.30	1748.20	1728.20	1745.50
31-Aug-2004	1628.50	1634.80	1618.30	1631.75
31-Jul-2004	1618.90	1638.70	1609.90	1632.30
30-Jun-2004	1518.70	1532.15	1501.70	1505.60

APPENDIX-III
(PRICES OF STOCKS)

Date	WIPRO (Rs.)	ICICI BANK	IOC (Rs.)	Maruti (Rs.)	ONGC (Rs.)
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		(Rs.)			
30-Jun-05	766.30	425.75	423.40	464.65	1027.45
31-May-05	715.75	392.05	464.05	465.45	922.75
29-Apr-05	630.80	359.95	440.50	406.40	811.20
31-Mar-05	670.95	392.80	438.00	421.30	885.30
28-Feb-05	699.50	380.90	490.85	473.10	852.70
31-Jan-05	705.35	360.90	454.25	453.75	818.60
31-Dec-04	748.80	371.35	513.20	461.90	819.95
30-Nov-04	766.40	339.75	440.90	420.10	814.90
29-Oct-04	657.50	299.05	431.15	375.75	789.50
30-Sep-04	596.80	286.25	437.20	354.25	749.30
31-Aug-04	578.50	269.80	406.45	381.75	714.15
31-Jul-04	546.85	244.50	400.45	424.50	716.90
30-Jun-04	532.10	230.40	368.20	403.20	628.90

END OF SECTION D

Section E : Caselets (50 Marks)

This section consists of questions with serial number 7 - 13.

Answer **all** questions.

Marks are indicated against each question.

Do not spend more than 80 - 90 minutes on Section E.

Caselet 1

Read the caselet carefully and answer the following questions:

7. According to you, to hedge from the risk, what are factors to be considered before including the equity funds in the retirement portfolio?

(7 marks) [< Answer >](#)

8. What are the common investment mistakes to be avoided, while selecting equity funds for investment in retirement portfolio?

(7 marks) [< Answer >](#)

9. What are the various investment avenues to be included in the retirement portfolio, before adding equity funds to the portfolio?

(7 marks) [< Answer >](#)

Investors, who have traditionally squirreled away their savings in bank deposits, government savings schemes and company fixed deposits, are beginning to seriously consider stocks as an option for long-term investment.

With interest rates edging up, debt investments once again look poised to deliver inflation-beating returns. But adding equities to your portfolio could make sure that you can afford the many small (and not-so-small!) luxuries that you look forward to enjoying, in your retirement.

Equity funds can provide a “kicker” to the returns from your retirement portfolio, especially if your holding period is fairly long. But you cannot count on equity investments to meet your basic living expenses, pay your medical bills or meet your fixed monthly commitments.

Empirical evidence over the past 10-15 years shows that equity investments have managed to deliver a 12-15% annual return over this holding period, most of the time. And actively managed equity funds do manage to handsomely outpace the markets, as captured by the Sensex or the Nifty, over a five-year holding period.

But such rules are not cast in stone. If you got your timing badly wrong, and invested in the Indian stock market at the height of the bull run in 1992 or 1994, your stock market investments could have earned you just a single digit return, after a ten-year wait!

What is more, the “long-term” return numbers of 12-15% may not give you a real sense of the roller coaster ride that the equity market (and equity funds) offers each year.

This is why you may not like to rely on stocks to fund your basic living expenses or pay your medical bills post-retirement. The closer you are to retirement, the more conservative you should be with your equity exposure.

Caselet 2

Read the caselet carefully and answer the following questions:

10. According to the caselet, bubbles do matter, as they tempt many investors to enter the asset market at the very height of the boom and leave them impoverished. Discuss the characteristics of such bubbles.

(8 marks) [< Answer >](#)

11. According to the caselet, behavioral finance is one of the plausible explanations for the existence of bubbles. How does behavioral finance explain this?

(6 marks) [< Answer >](#)

Why do bubbles matter? It is because they catch the fancy of a large number of investors, tempting them to enter the asset market at the very height of the boom. They matter because when the inevitable bust follows, it leaves many an investor impoverished.

They matter more in today's world, where it is easier to acquire and hold on to assets for the retail investor than in the bygone years. They matter, for they are not isolated events; they have a strong relationship with the economy and its developments. The dangerous bubbles exist in stocks and property given their widespread ownership.

Bubbles follow a discernible pattern. There is an external event called displacement, which changes the investment landscape and seems to open up a new opportunity. This could be a new technology or the end of the war etc. This is the source of the biggest variation among bubbles since the trigger is different each time, making it very difficult to identify a bubble early.

The displacement, if strong enough, generates an economic boom as investment grows into the new area. During this phase, banks generally fuel the bubble by relaxing the lending norms. In addition, new investment too floods the booming sector, pushing up prices and opening up profit opportunities. The process leads up to a stage where genuine investment dries up and speculative investment takes hold with expectations for potential returns reaching wild heights.

The strong market performance that would have been witnessed in the earlier years would be extrapolated endlessly, and fundamental criteria for valuation are swept aside. Just about everybody is interested in investing and does invest in the lure of making quick money. The one-off warnings that do come out are unheeded to.

The market rise slows as people make profits, and there could be an external event slowing

down the market further. This is followed by ‘revulsion’, when prices fall, financial distress rises and bankruptcies increase and banks tighten credit. There is a general fall in investment along with a slowdown in the economy. Consumers postpone big expenditure since they perceive the risks to their jobs.

The successor would be in a ‘panic’ phase, during which there is a rush to sell, as everybody tries to sell before others and nobody wants to buy. The turnaround from this phase occurs when prices fall to such an extent that people consider them as cheap enough to buy. Consumers’ response to rising asset prices is governed by the wealth effect, wherein small change in prices does not have a major impact. But larger changes in the asset prices lead people to spend more or reduce their customary savings or by taking over more debt than they would otherwise do (given the highly optimistic expectations about the future) and so on.

Companies, on the other hand, are concerned about their valuation, and depending on the market capitalization most companies tend to expand their investments during the boom period. Huge investments by companies may in effect exaggerate the affects of the bubble.

Most economic theory and financial theory assume that investors are rational and work further from there. If one follows the efficient market hypothesis, there should not be any scope for a bubble to form in the first place, as valuations would never move away from actual valuations.

However, the recurring episodes of booms and busts prove beyond doubt that it is not so. So, what could be the plausible explanations? Probably behavioral finance is one of them. There is yet another competing theory called the theory of a “rational bubble”. The theory puts forward that “if enough investors do not have a long-term approach to the market, it may be rational for others to ignore fundamentals too. So, the “smart” move may be to run the bubble and aim to get out before it bursts”.

Given that most professional managers are evaluated on a short-term basis, this seems to be their attitude to stock market bubbles. Another theory that has emerged in recent times is the critical state theory, also known as the theory of complex systems and of critical phenomenon, which explains bubbles using complex mathematics.

The fundamentals of market valuation have to be always kept in mind, and the present valuations should be compared with long-term averages. It has to be remembered that there is mean, and while prices tend to move away from mean they often revert to it.

From a policy level, can governments do anything to prevent bubbles, in fact should they even attempt such a thing? There is no clear answer. Moreover, given the complex inter-linkages between interest rates and asset markets, it would be a tough task.

Most market participants have a stake in keeping the markets buoyant and asset prices high; hence, their advices too would be colored and affected by the inherent conflict of interests.

Bubbles are a fact of life. As of now, there is no mechanism to avoid them. The best investors can do is to equip themselves to deal with bubbles in a profitable way, or at the very least to avoid losses from bubbles.

Caselet 3

Read the caselet carefully and answer the following questions:

12. As mentioned in caselet, Finance Minister, P.Chidambaram, in his budget proposed for the introduction of Gold Exchange Traded Funds (ETFs) in India. Define Gold ETFs.

(6 marks) < [Answer](#) >

13. What are the problems involved in direct investment in gold. How do Gold ETFs help in overcoming these problems?

(9 marks) < [Answer](#) >

Finance Minister, P. Chidambaram, in his Union Budget for 2005-06 proposed to the market regulator Sebi, in consultation with the Reserve Bank, to permit mutual funds to introduce Gold Exchange Traded Funds (GOLD ETFs) with “gold” as the underlying asset. According to the Budget proposal, the scheme would enable households to buy and sell gold in units for as little as Rs. 100 and such units could be traded in the same manner as units of mutual funds.

Investing in gold is one way of imparting stability to the investors’ portfolio. Investment in gold is recommended for diversifying the portfolio as gold has proved its value. Gold is also the preferred investment in times of political and economic uncertainties. Investment in gold is done in many ways: Buying gold certificates, gold coins, gold bullion, gold futures and options and buying stakes in gold mining companies. Gold is valued by Indian investors as a savings and investment vehicle. India is the world’s largest consumer for gold and about 90% of its gold is in the form of jewelry.

According to unofficial reports, gold stocks in India are estimated to be about 13,000 tonnes, while the world stock according to World Gold Council (WGC) is estimated to be 145,000 tonnes. That means India has about 9% of the world’s gold stocks. India is also a major exporter of gold in the world market. The Indian jewelry market is growing at an average growth rate of 15-20% each year. The Indian domestic market for gold jewelry is estimated at around Rs. 400-500 cr.

How are Gold ETFs Created?

The fund house (Trustee) launching a Gold ETF appoints an authorized participant, who initially buys the Gold ETF from the fund house by exchanging actual pure gold for the units of Gold ETF. The gold is then deposited with the custodian bank. The deposited gold must meet the requirements of certain trade associations, for example, the London Bullion Market Association (LBMA) or COMEX. Authorized participants may either purchase the gold themselves or request the trustee to purchase the gold on their behalf, for which the trustee may charge a fee. After the Custodian Bank confirms that it has received the gold to the fund house account, the issuance of Gold ETFs is made. The issuance of Gold ETFs will be made only in baskets of shares (say 50,000 shares) or multiples thereof (basket aggregation). The investor will purchase or sell Gold ETFs through the authorized participant.

The introduction of Gold ETFs is supposed to increase the investment avenues and broaden the capital markets. The Union Budget proposal to allow the mutual funds industry to float Gold ETFs has been welcomed with open arms. A P Kurien, Chairman, Association of Mutual Funds in India (AMFI), while speaking to the press, said that the budget proposal will allow mutual funds to venture into commodity-backed products and now mutual funds will launch the Gold ETFs schemes once Securities and Exchange Board of India (Sebi) and Reserve Bank of India (RBI) work out the norms.

END OF SECTION E

END OF QUESTION PAPER

Suggested Answers

Portfolio Management and Mutual Funds – II (252): October 2005

Section D: Case Study

1. Investment Objectives

Mr. Santosh is 38 years old and is quite rich. His liquidity requirements are high because he has to cater to the needs of his parent's medical expenses and children's education. He would like to invest in moderately risky instruments and his risk taking capacity would not be very high. Mr. Santosh has a sizeable working life left for him. An ideal investment policy statement for Mr. Santosh should be a blend of safety of capital and capital appreciation. He will be interested in parking his funds in avenues that would generate above average returns.

Investment Constraints

Liquidity: The liquidity requirements of Mr. Santosh are quite high, as his parents are dependent on him and he has to spend for his children.

Time Horizon: The time horizon of investment for Mr. Santosh is medium to long term because his major monetary requirements like children's education and marriages, constructing a hospital and software firm etc. are medium to long-term needs.

Tax considerations: Tax considerations are very important for Mr. Santosh and he is falling in the highest tax bracket. Therefore, proper care should be taken while making investment decisions for him. His investment avenues should be such that the more and more long-term capital gains are realized from his portfolio.

Risk Consideration: The risk tolerance level of Mr. Santosh is moderate. Although he has got a sufficient working life left but liabilities of his parents and children will prevent him to invest in risky assets. But, as both Mr. and Mrs. Santosh earning, they can devote a part of their income or savings in risky assets to gain extra returns.

Investment Policy Statement

An ideal investment policy statement will call for growth of wealth as well as availability of funds when required in the context of medium to long-term time horizon. There should be more emphasis on growth of capital.

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2.

Year	Fund Requirement (Rs. crore)	Current Purchases (Rs. crore)	Maturity value (Rs. crore)	Yield locked
8	15.00	8.2987	15.00	7.68
9	2.00	0.9963	2.00	8.05
10	25.00	11.3676	25.00	8.20
11	1.00	0.4135	1.00	8.36
17	5.00	0.8353	5.00	11.10
		21.9114		

The duration can be calculated as follows

Duration of Zero coupon bond	Amount	Proportion	Weighted duration
8	8.2987	0.3787	3.0296
9	0.9963	0.0455	0.4095
10	11.3676	0.5188	5.1880
11	0.4135	0.0189	0.2079
17	0.8353	0.0381	0.6477
	21.9114		9.4827

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3. Duration of bond portfolio = 9.4827 years

For calculation of Duration of equity, we should calculate dividend yield of the equity portfolio of stocks suggested

Individual dividend yield of stocks Div / Price

Wipro	–	18.8/766.3	=	0.0245
ICICI Bank	–	15.8/425.75	=	0.0371
IOC	–	13.6/423.4	=	0.0321
Maruti	–	14.5/464.65	=	0.0312
ONGC	–	18.4/1027.45	=	0.0179

Weighted dividend yield

$$= 0.1 \times 0.0245 + 0.3 \times 0.0371 + 0.3 \times 0.0321 + 0.2 \times 0.0312 + 0.1 \times 0.0179 = 0.03124$$

$$\text{Duration of equity portfolio} = \frac{1}{\text{Dividend yield}} = \frac{1}{0.03124} = 32.01 \text{ years}$$

$$\text{Duration of HDFC Nifty Index Fund} = \frac{1}{\text{Dividend yield}} = \frac{1}{0.08} = 12.5 \text{ years}$$

Duration of the savings portfolio

$$= 9.4827 \times 0.50 + 12.5 \times 0.30 + 32.01 \times 0.20$$

$$= 14.98695 = 14.89 \text{ years.}$$

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4. a.

Period	HDFC Nifty Fund	Return on Fund (R_f %)	$(R_f - \bar{R}_f)$ only for –ve deviation	$(R_i - \bar{R}_i)^2$
30-Jun-2004	15.0389	–	–	–
31-Jul-2004	15.9551	6.092201	–	–

31-Aug-2004	16.1300	1.096201	-2.20835	4.876826
30-Sep-2004	17.2871	7.17359	—	—
29-Oct-2004	17.6863	2.309236	-0.99532	0.990659
30-Nov-2004	19.3234	9.256317	—	—
31-Dec-2004	20.5542	6.369479	—	—
31-Jan-2005	20.3595	-0.94725	-4.25181	18.07786
28-Feb-2005	20.8009	2.16803	-1.13653	1.29169
31-Mar-2005	20.1236	-3.25611	-6.56066	43.04231
29-Apr-2005	18.8245	-6.4556	-9.76016	95.26071
31-May-2005	20.6047	9.456825	—	—
30-Jun-2005	21.9217	6.391746		
		39.65466		163.5401

$$\bar{R}_f = 39.65466 / 12 = 3.304555\%$$

$$(-ve) \text{ Semi variance} = 163.5401 / 11 = 14.87$$

$$\text{Semi deviation} = (14.87)^{1/2} = 3.86\%$$

- b. Tracking error is the standard deviation of the difference between a fund's return and the benchmark index.

	Monthly returns (%) on HDFC Index Fund (X)	NIFTY	Monthly returns (%) on Nifty (Y)	(X-Y)	$(X - Y) - (\bar{X} - \bar{Y})$	$[(X - Y) - (\bar{X} - \bar{Y})]^2$
Jun 04		1505.60				
Jul 04	6.092201	1632.30	8.41525	-2.32305	-2.20923	4.880689
Aug 04	1.096201	1631.75	-0.03369	1.129896	1.243716	1.54683
Sep 04	7.17359	1745.50	6.971043	0.202547	0.316367	0.100088
Oct 04	2.309236	1786.90	2.371813	-0.06258	0.051243	0.002626
Nov 04	9.256317	1958.80	9.620012	-0.3637	-0.24987	0.062437
Dec 04	6.369479	2080.50	6.212988	0.156491	0.270312	0.073069
Jan 05	-0.94725	2057.60	-1.1007	0.153447	0.267268	0.071432

Feb 05	2.16803	2103.25	2.218604	-0.05057	0.063246	0.004
Mar 05	-3.25611	2035.65	-3.21407	-0.04204	0.071784	0.005153
Apr 05	-6.4556	1902.50	-6.54091	0.085308	0.199129	0.039652
May 05	9.456825	2087.55	9.726675	-0.26985	-0.15603	0.024345
Jun 05	6.391746	2220.60	6.3735	0.018246	0.132067	0.017442
Total				-1.36585		6.827764
Average				-0.11382		

From the table, it is clear that the variance of the difference between the return

on HDFC Nifty index fund and the Nifty $\sigma^2 = \frac{6.827764}{11} = 0.620706(\%)^2$

$\therefore$ Tracking error = $\sqrt{0.620706} = 0.787849$

Annualized Tracking Error = $0.787849 \times \sqrt{12} = 2.7292\%$

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5. Information Ratio = $\frac{\text{Alpha}}{\text{Residual Risk}}$

Return on equity portfolio

Date	Equity Portfolio Return (%)	Wipro (0.1)		ICICI Bank (0.3)		IOC (0.3)		Maruti (0.2)		ONGC (0.1)	
		Price (Rs.)	Return (%)	Price (Rs.)	Return (%)	Price (Rs.)	Return (%)	Price (Rs.)	Return (%)	Price (Rs.)	Return (%)
Jun 04	-	532.1	-	230.4	-	368.2	-	403.2	-	628.9	-
Jul 04	7.196606	546.85	2.772035	244.5	6.119792	400.45	8.758827	424.5	5.282738	716.9	13.99269
Aug 04	2.080059	578.5	5.787693	269.8	10.34765	406.45	1.498314	381.75	-10.0707	714.15	-0.3836
Sep 04	3.466579	596.8	3.163354	286.25	6.097109	437.2	7.565506	354.25	-7.20367	749.3	4.921935
Oct 04	3.693766	657.5	10.17091	299.05	4.471616	431.15	-1.38381	375.75	6.06916	789.5	5.365007
Nov 04	9.099955	766.4	16.56274	339.75	13.60976	440.9	2.261394	420.1	11.80306	814.9	3.217226
Dec 04	9.532099	748.8	-2.29645	371.35	9.300957	513.2	16.39828	461.9	9.950012	819.95	0.619708
Jan 05	-5.23984	705.35	-5.80262	360.9	-2.81406	454.25	-11.4867	453.75	-1.76445	818.6	-0.16464
Feb 05	5.266201	699.5	-0.82938	380.9	5.541701	490.85	8.057237	473.1	4.264463	852.7	4.165649
Mar 05	-4.5085	670.95	-4.08149	392.8	3.12418	438	-10.767	421.3	-10.9491	885.3	3.82315
Apr 05	-4.48042	630.8	-5.98405	359.95	-8.36303	440.5	0.570776	406.4	-3.53667	811.2	-8.37004
May 05	9.907061	715.75	13.46703	392.05	8.917905	464.05	5.346198	465.45	14.53002	922.75	13.75123
Jun 05	1.757332	766.3	7.062522	425.75	8.595842	423.4	-8.75983	464.65	-0.17188	1027.45	11.34652

Date	Return on Nifty % (X)	Return on Equity portfolio % (Y)	$(X - \bar{X})$	$(X - \bar{X})^2$	$(Y - \bar{Y})$	$(Y - \bar{Y})^2$	$(X - \bar{X})(Y - \bar{Y})$
Jul 04	8.41525	7.196606	4.996874	24.96875	4.049031	16.39465	20.2325
Aug 04	-0.03369	2.080059	-3.45207	11.91676	-1.06752	1.13959	3.685135
Sep 04	6.971043	3.466579	3.552667	12.62144	0.319004	0.101764	1.133315
Oct 04	2.371813	3.693766	-1.04656	1.095295	0.546191	0.298325	-0.57162
Nov 04	9.620012	9.099955	6.201636	38.46029	5.95238	35.43083	36.91449
Dec 04	6.212988	9.532099	2.794612	7.809855	6.384524	40.76215	17.84227
Jan 05	-1.1007	-5.23984	-4.51908	20.42205	-8.38741	70.34873	37.90337
Feb 05	2.218604	5.266201	-1.19977	1.439453	2.118626	4.488577	-2.54187
Mar 05	-3.21407	-4.5085	-6.63245	43.98934	-7.65607	58.61548	50.7785

Apr 05	-6.54091	-4.48042	-9.95929	99.18738	-7.62799	58.18631	75.96938
May 05	9.726675	9.907061	6.308299	39.79463	6.759486	45.69065	42.64086
Jun 05	6.3735	1.757332	2.955124	8.732756	-1.39024	1.932775	-4.10834
Total	41.02052	37.7709		310.438		333.3898	279.878
	$\bar{X} =$ 3.418376	$\bar{Y} =$ 3.147575		Var (X) =28.22164		Var (Y) = 30.30817	Cov XY = 25.44345

Beta of the equity portfolio = $\text{Cov}(xy) / \text{Var}(x) = 25.44345 / 28.22164 = 0.901558$

Residual risk of the portfolio = Total risk – Systematic risk = $\text{Var}(Y) - \beta^2 \times \text{Var}(X)$

$$= 30.30817 - (0.901558)^2 \times 28.22164$$

$$e_f^2 = 7.369407$$

$$e_f = \sqrt{7.369407} = 2.714665173$$

Alpha of the portfolio = Return on portfolio – $[R_f + (R_m - R_f) \times \beta]$

$$= 3.147575 - 0.5 + (3.418376 - 0.5) \times 0.901558$$

$$= 0.016488$$

Information ratio $= \alpha / e_f = 0.016488 / 2.714665173 = 0.0060736$

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6. Two alternative methods to evaluate the performance of a portfolio containing options:

- Incremental Risk-Adjusted Return (IRAR) from options
- Residual Option Spread (ROS).

Incremental Risk-Adjusted Return (IRAR) from Options

The incremental risk-adjusted return approach specifies the role of an options strategy with the overall portfolio performance. According to this approach, a positive IRAR reflects above average performance while a negative IRAR shows that the portfolio would have performed better in absence of options. The following formula can be used to measure IRAR.

$$\text{IRAR} = (SH_o - SH_u)\sigma_o$$

Where,

SH_o = Sharpe ratio of the optioned portfolio

SH_u = Sharpe ratio of the unoptioned portfolio

σ_o = Standard deviation of optioned portfolio

As we know that there is a direct relationship between risk and return of a portfolio, if any manager generates a return greater than the expected level for a given amount of risk, his performance will be viewed as a superior performance. For a portfolio consisting of options, an unoptioned portfolio can be fixed as a benchmark. Its risk and return can be plotted and a line connecting the risk-free rate and unoptioned return can be treated as expected return per unit of risk. A portfolio with higher standard deviations should earn more returns than a portfolio possessing lower standard deviation. Accordingly, all the suitable values will lie on the benchmark line. Any point falling above this line indicates superior performance and the return greater than the expected return is the incremental Risk-Adjusted Return (IRAR).

Residual Option Spread (ROS)

The residual option spread is another performance measure that can be applied to the optioned portfolios.

The use of an option may result in higher terminal wealth if a positive residual option spread is observed. It is important to note that a positive ROS does not indicate that incremental return is suitable for a specific level of risk of the optioned portfolio. However, this is not a big problem. A positive ROS will always indicate a superior risk-adjusted performance measure in the case of a covered call strategy because covered call strategy necessarily lessens the total variance of return of a portfolio. On the other hand, put overwriting will always enhance the portfolio's overall variance. This suggests that no common statement can be proclaimed about a positive ROS in the case of put overwriting. Moreover, we can say that a negative ROS indicates a poor performance in a put overwriting program and if ROS is positive, calculation of IRA is also required to arrive at any conclusion. The following formulae are used while calculating the residual option spread.

$$\text{ROS} = \sum_{t=1}^n \pi G_{ot} - \sum_{t=1}^n \pi G_{ut}$$

Where,

$$G_t = V_t / V_{t-1}$$

V_t = value of portfolio in period t .

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Section E: Caselets

Caselet 1

7. Diversified equity funds with a track record of consistently beating the market over its different phases are the best bet for any fund portfolio that one hopes to build. While crafting the portfolio of equity funds, the following factors have to be considered.

Opt for Diversified Equity Funds: Equity funds which piggyback on hot investment “themes” or sectors may deliver outsize returns while they are the flavor of the stock market. But the tricky part of riding such themes is that one do not know when exactly the market will cool off.

Most sectoral themes play out in short time spans of two/three years, and do not last for a 10- or 15-year period—the typical investment horizon for retirement. Stay away from sectoral or theme funds when building the retirement portfolio. Trust the manager of the diversified equity fund to take advantage of market opportunities.

Invest on Track Record: Choose funds on the basis of their track record spanning different market cycles across five or more years.

Do not Ignore Mid-cap Stocks: Many of the big money-making opportunities in the Indian context exist outside of the basket of index stocks and large-cap companies. The experience over the past five years also suggests that mid- and large-cap stocks follow considerably different boom-bust cycles.

Inclusion of funds that allocate either the whole or a part of their portfolio to mid-cap stocks is advisable, so that no investment opportunity is missed out. But it should be

remembered to confine mid-caps to 20% of the total investment portfolio.

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8. If you are hoping to line your retirement portfolio with equity funds, stay away from these common mistakes that many investors seem to make:

Holding Too Many Funds: Investors often seem to shovel some money into a different fund each year, in the process building up an unwieldy portfolio of 10 or 15 equity funds. This increases paperwork, makes tracking difficult and may prevent you from noticing laggards in your portfolio when you should.

Our analysis shows that holding more than three equity funds in your portfolio does not substantially add value to it or reduce its risks. So choose the three funds carefully and add to your positions in these each year.

Investing at Random: Paying no particular attention to the timing of your investment in equity funds can be as disastrous as deliberately trying to call peaks and troughs in a choppy market.

Bad timing can be particularly wealth-destroying in the Indian context, where the market has registered negative returns more frequently than they have in the US. A badly-timed investment can greatly reduce your chances of earning that respectable 15% that you expect from your equity portfolio after a 10- or 15-year wait.

Not Keeping Track: If you are planning for a retirement 10, 15 or 20 years hence, remember that a lot can change over this time frame. The key drivers that you hope will push stock values inexorably upward can go completely awry.

Fund managers could find it increasingly difficult to beat the stock market indices. The fund house or the manager who runs your equity fund may change. Or the equity fund that you selected for its track record may begin to slip up.

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9. Must-haves in Your Portfolio

The following are must-haves in your retirement portfolio before you opt to add equity funds:

- A debt portfolio which will meet your basic living expenses post-retirement. If you plan to retire at 60, budget for at least a 25-year life expectancy post-retirement.
Invest this fund in cast-iron investments such as the National Savings Certificates, Post Office Monthly Income Scheme, RBI Relief Bonds and, of course, the Employee Provident Fund provided at your workplace. Prefer investments that get favorable tax treatment on the initial investment as well as withdrawals over those which do not.
- A term insurance policy which will cover you for 8-10 times your gross annual salary. Take the term insurance for as long a period as possible, as your premia will climb if you try to renew it post-retirement.
- A medical insurance policy to cover you and your spouse for major health expenses post-retirement. Also supplement this with a separate investment, in fixed income investments, in case some medical problems are not covered by your policy.

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Caselet 2

10. Typical characteristics of a bubble

- Rapidly rising prices.
- High expectations for continuing rapid rises.
- Overvaluation compared to historical averages.
- Overvaluation compared to reasonable levels.
- Several years into an economic upswing.
- Some underlying reason or reasons for higher prices.
- A new element, e.g., technology for stocks or immigration for housing.
- Subjective “paradigm shift”.
- New investors drawn in.
- New entrepreneurs in the area.
- Considerable popular and media interest.
- Major rise in lending.
- Increase in indebtedness.
- New lenders of lending policies.
- Consumer price inflation often subdued (so central banks relaxed).
- Relaxed monetary policy.
- Falling household savings rate.
- A strong exchange rate.
- Typically, bubbles develop after several years of solid, encouraging economic growth and rising confidence. The traumas of past recessions and bubble crises (at least in the same market) have faded away.
- A strong characteristic of most bubbles is a strong exchange rate, or if the currency is fixed, an inflow of resources. During the bubble, money flow into the country either is attracted by the booming asset or is drawn in by the strength of the accompanying economic boom.

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11. As per the explanation given behavioral finance, investors do not always act rationally; they are guided by the factors other than the risk-reward consideration while making decision, including cognitive biases and emotions. In fact, investors would do exactly the opposite of the rational action. Thus, investor psychology and decision making behavior could explain the reason for the existence bubbles.

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Caselet 3

12. Gold Exchange Trade Funds

Gold Exchange Traded Fund (Gold ETF) is an exchange traded mutual fund where the underlying asset is gold bullion only and not a basket of stocks like ETFs. Gold ETFs are shares or units of gold that are owned by investors and are fully backed by gold bullion bars held by a custodian. Like ETFs, they are traded on a stock exchange.

Gold ETFs will allow investors to buy gold in small increments. In the global market, one unit represents one-tenth of an ounce fine gold (1 oz – 28.35 grams). If an investor in the fund holds 100 units, the fund

must have physical gold worth 10 ozs. The value of the unit will move in accordance with the price of gold. Just like mutual funds, the value per unit will be the total value of the gold held, divided by the number of units, minus the expenses of the fund. Gold ETFs, like any share, can be traded and bought by the investors through their stockbrokers. They can be used for speculating in the short-term for betting on the price of gold, or it can be used for long-term investing. Just like the ETFs, Gold ETFs can be open-ended funds or closed ended funds.

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13. Investing in gold may not be feasible for small retail investors due to the high cost associated with purchasing, transporting and safe storing. Investors have to approach a banker or a broker for safe storage where a fee is charged. With poor enforcement of certification standards, quality of physical gold is also uncertain for many investors. Investors can use gold futures to achieve the required exposure in gold, but it will be difficult to maintain long-term interest and for the lay investors, it will be difficult to comprehend the risks and rewards associated with derivative products. Another option for exposure in gold is by investing in gold mining corporations, if those stocks are accessible.

Considering the above options for investing in gold, investing in Gold ETFs would be a better option. Through ETFs, claims to gold are available in small units which can be easily traded and stored in electronic form. There are no risks like counter party risk and other risks associated with quality and storage. Gold ETFs can be an interesting instrument of Indian investors as it allows investing in gold without incurring the cost of physical storage, insurance and transportation. Gold is special class of asset for an average retail investor. Buying physical gold involves dealer markup also. The dealer adds transportation charges and storage costs. As a result, there is a difference between the bid price and ask price. Gold ETFs, being liquid, will decrease the spread and make investment in gold attractive. Further, Gold ETFs will eliminate counter party risk and maintenance cost.

Because of poor hallmarking facilities, investors are not sure of the quality of the gold that they invest in. Gold ETFs will eliminate such problems. Further, gold is insignificantly or negatively correlated with major asset classes. If considered in the portfolio, diversification benefits of Gold ETFs would increase the return per unit of risk.

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