

Question Paper

Portfolio Management and Mutual Funds – II (252) January 2004

Section D : Case Study (50 Marks)

- This Section consists of questions with serial number 1 - 5.
- 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. Suggest various types of active portfolio management techniques using stocks to Ms. Priya.
(10 marks) < Answer >
2. Discuss the role of benchmark in performance measurement as a means of evaluating the investment portfolios and also discuss the problem faced when comparing the performances of portfolios with the chosen benchmark.
(6 + 4 = 10 marks) < Answer >
3. Using the information provided related to three stocks, you are **required** to
 - a. Estimate the regression equation (Characteristic Line) for each of the stocks.
 - b. Calculate the standard deviation of the residuals (Unsystematic Risk) from each regression equation of all stocks.(6 + 6 = 12 marks) < Answer >
4. You are **required** to:
 - a. Calculate the total value added by the portfolio manager of Super Fund.
 - b. Calculate the total value added by his selection and allocation abilities.(2 + 6 = 8 marks) < Answer >
5.
 - a. Calculate the actual surplus/deficit of the fund requirement and bond Investment of Mr. Singh as difference between the present values of bonds and fund requirement.
 - b. Mr. Singh does not want any exposure to interest rate fluctuations and is advised by Ms. Priya to invest in 10-year zero-coupon bonds. Calculate the nominal amount of investment to be made in 10-year zero-coupon bonds so that his future fund requirements are completely immunized. (Assume that there is no change in the spot rate curve in future)(4 + 8 = 12 marks) < Answer >

The above case is prepared only for the purpose of examination and not to illustrate either effective or ineffective performance of the fund. The case contains real information adapted and combined with other information to generate discussion or analysis on the desired topics.

Ms. Priya Sharma has been recently appointed as the portfolio manager of Time Investment Ltd. Her first task calls for attending a wealthy client of her firm Mr. Sunil Singh. Mr. Sunil Singh owns a factory which manufactures iron sheets and other steel products. He has got plans to diversify his business into other related business. He is interested in investing in stocks as well as fixed income securities for accumulating wealth for his expansion plan and current needs. Although, Mr. Singh has already invested in stocks and bonds but he is ignorant about the many facets of investment management. He has heard about active equity portfolio management and role of the benchmark in assessing the performance of the mutual funds. Ms. Priya agrees with him that active equity portfolio management may suit the extra fund requirement of Mr. Singh's firm and benchmark comparison will be helpful in performance evaluation of his mutual fund investments. Mr. Singh has already invested in stocks belonging to Prime Soft, Care Pharma and KPT Steel. The returns produced by these stocks are not in commensurate with the return generated by the market index. Mr. Singh wants an answer for this. Mr. Singh has informed Ms. Priya that he has invested in government bonds for his certain specific plans but afraid of interest rate risk which may jeopardize his definite plans. Ms. Priya has analyzed the bond portfolio

of Mr. Singh and is thinking to advise him to use immunization strategy to eliminate interest rate risk. Overall, Mr. Singh wants advice on the following three issues from Ms. Priya:

- Performance Evaluation of his old investment in Super Funds
- Risk attached with investment in three stocks
- Immunization of his Bond Portfolio.

The relevant information for analyzing the above three issues is as follows:

- (A) Mr. Singh has already invested in a diversified fund called Super Fund. However, he is not very convinced with the returns produced by the fund and stocks. Therefore, he wants to know the details about the performance of his funds. He is interested in understanding the components of the various sources of returns of the fund.

The Super fund has invested in four types of asset classes: Large cap stocks, small cap stocks, corporate bonds and money market securities. The weights of the asset classes in the benchmark index and in the fund and the returns generated are as follows:

	Assets of the Super Fund (%)	Benchmark Assets (%)	Return of the Super Fund	Return of the Benchmark
Large cap stocks	45.46	35.35	5.6%	0.35%
Small cap stocks	23.25	16.29	12.35%	11.65%
Government bonds	20.75	23.25	6.25%	6.95%
Money market securities	10.54	25.11	3.43%	3.43%

- (B). The returns generated by the three stocks where Mr.Singh has invested have been given below:

Monthly	Prime Soft (%)	Care Pharma (%)	KPT Steel (%)	Market Index (%)
1	4.25	8.50	5.62	1.55
2	5.75	9.25	8.95	4.75
3	-2.50	11.50	9.95	4.25
4	11.25	2.50	-2.81	5.65
5	-1.75	4.75	12.52	9.50
6	11.50	9.75	10.52	10.25

- (C) Mr .Singh has estimated that for his business expansion plans he requires the following amount in forthcoming years:

(Rs.)	Year
15,000,000	2007
25,000,000	2009
30,000,000	2013

The funds required by him in the above years cannot be deferred therefore, he has already invested in risk –free government bonds. The bond portfolio consists only of government bonds. The face value of all the bonds is Rs.1000 and the other important features of the bonds are as follows:

Assets	Nominal Value (Rs.)	Coupon (%)	Current Market Price (Rs.)	YTM (%)	Term to Maturity (Years)
Bond X	17,000,000	5.00	1003.73	4.80	2
Bond Y	23,000,000	5.20	1008.66	5.00	5
Bond Z	10,000,000	5.30	1010.12	5.10	6

The actual spot rate curve prevailing in the market is as follows:

Maturity (Years)	1	2	3	4	5	6	7	8	9	10
Spot Rates (%)	4.75	4.82	4.92	5.00	5.06	5.15	5.19	5.26	5.36	5.45

END OF SECTION D

Section E : Caselets (50 Marks)

- This Section consists of questions with serial number 6 - 11.
- 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:

6. The caselet says that investors will benefit from investing in Passive funds rather than chasing for active funds in a bear market. Equity Index funds are most suitable example of Passive funds. Briefly describe the techniques of constructing an Equity Index fund?

(8 marks) < Answer >

7. According to the caselet, presently the fund-management business is busy devising products to sell in a bear market and Stable-Value and Principal-Protection funds are all the rage. How Stable Value Funds differ from Principal Protected Funds. Enumerate the advantages and disadvantages attached with these types of funds?

(5 + 5 = 10 marks) < Answer >

For most of the past century, stocks and bonds were only for the rich. Then came mutual funds. These allowed ordinary people to pool their resources with those of other small investors, which gave them access to professional fund managers and allowed them to diversify among different stocks. Mutual funds grew explosively during the 1990s, with total assets in America expanding from \$1 trillion in 1990 to \$7 trillion in 2000. In Britain, investment in unit trusts, the local equivalent of mutual funds, increased from £46 billion in 1990 to £261 billion in 2000.

Choosing a mutual fund is one of the most important financial decisions that an individual can make. Over a period of time, the difference between getting a 3% or a 5% annual return from a mutual fund becomes enormous. Sadly, most of what the fund-management industry calls retail investors are quite bad at finding suitable homes for their money.

Most fund managers try to convince investors that they will outperform the market by boasting about how well they have done in the past. This seems reasonable enough: in most areas of endeavour, human beings are judged on their track record. But fund managers themselves know quite well that in their industry past performance is no guide to the future. The head of one of the world's biggest mutual-fund companies argues privately that past performance is not only a false guide but if anything a contrary sign. However, few managers would say as much in public, because it would undermine the way in which the industry sells its products.

Numerous empirical studies have confirmed that strong performance by a fund manager seldom lasts. For fund managers, too, much of their performance comes down to luck, not skill, and the luck rarely lasts. A fund manager can use a short period of strong returns to suck in lots of new assets to manage, but that can make it even more difficult for him to outperform his peers.

It can be argued that during the bull market fund managers did nothing more sinister than meet investors' demands. Simon Davies, chief executive of London-based Threadneedle, caused a stir recently by seeming to suggest that investors should blame their losses on themselves and their greed, not on the fund-management business. He has since softened his tone, but most asset-management bosses would agree with the original interpretation. Because fund management is a fixed-cost business, says Mr. Davies, volume is the holy grail, and there is a huge temptation to offer the latest hot product.

Will the fund-management business keep offering people what they think they want, even when it knows that it is bad for them, or will it behave more responsibly in future? Certainly, fund managers are unlikely to tell their customers one basic truth that they would be better off if they put more money into passive funds and stopped chasing big active returns. In the ten years to 1999, index funds returned an annual average of 14.7% to their investors and the S&P 500 gave 12.4%, according to Morningstar, a fund-tracking company based in Chicago, whereas actively managed funds returned 10.9%. Those numbers do not take into account the negative effects of switching. Between 1984 and 2002, according to DALBAR's numbers, passive investors got about 13% a year, compared with 2.7% for those who put their money with active fund managers. Not all money can be passive, of course, because if it were, no one would be making intelligent decisions about which companies deserve capital. But at present there is plenty of room for more.

For the moment, the fund-management business is busy devising products to sell in a bear market. So-called stable-value and principal-protection funds are all the rage. These offer investors part of the return from the stockmarket, or from other asset classes, as well as guaranteeing to give back at least the nominal capital the punters have put in. According to Lipper, an American fund-tracking company, assets in stable-value funds have risen from \$264m to \$3.3 billion since the beginning of the bear market, and money in principal-protection funds has grown from \$724m to \$5.6 billion.

Caselet 2

Read the caselet carefully and answer the following questions:

8. Using the information given in the caselet, how would you construct a suitable portfolio using Tactical Asset Allocation?
- (8 marks) < Answer >
9. The caselet strongly emphasize that the average manager do not add value through Tactical Asset Allocation (TAA) strategies.
 - a. According to yttou, what should be the ideal approach of a fund manager to add value to his portfolio?
 - b. Recommend best possible ways to use Tactical Asset Allocation Strategy as effective asset allocation strategy?

(4 + 4 = 8 marks) < Answer >

Asset allocation is the single most important decision for investors. However many investors, who attempt to time the market by tilting their portfolios to favor one asset class over another, such as bonds over equities, are adding risk to their portfolios. Investors that make tactical asset allocations decisions rarely add value to a diversified portfolio — and that asset allocation should be seen as a disciplined long-term policy rather than a series of short-term tactical shifts.

Tactical Asset Allocation (TAA) strategies tend to sell asset classes that have strengthened and buy asset classes that have weakened in anticipation of the market returning to equilibrium. TAA is a difficult investment approach for consistently adding value because of its narrow focus and limited range of portfolio bets, for example being overweight equities and underweight bonds.

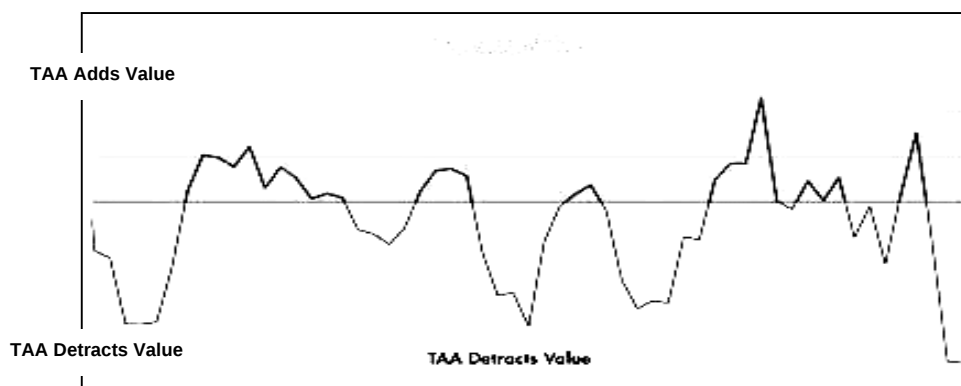
It is also a high-risk approach, as it inherently requires greater accuracy for success than bottom up stock selection strategies, where managers spread their insights over a much broader set of investment decisions such as stock research, portfolio construction and organisational stability. Given that tactical strategies rely upon fewer forecasts, a manager has fewer opportunities to diversify away unavoidable forecast errors.

It is common practice in the Australian market place for TAA managers to incorporate a large element of investment intuition and experience in making asset-mix changes. This requires not only good economic and political analysis but also an interpretation of what impact these will have on the stock market.

Here we will look at both the US environment, where TAA has been a prominent strategy, and then consider the Australian evidence.

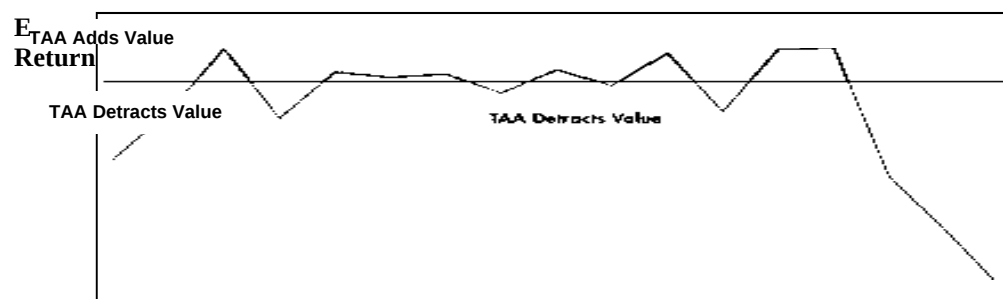
CHART 1: VALUE ADDED BY ASSET ALLOCATION US TAA UNIVERSE MEAN, ROLLING 1 YEAR EXCESS RETURNS TO BENCHMARK

**Excess
Return**



The chart above illustrates the average level of excess returns for TAA managers in the U.S. universe. The universe is based on a peer group of products with a 60% equities and 40% fixed interest benchmark. Overall, these managers have underperformed their benchmark. From December 1988, the universe mean underperformed the benchmark by 1.0% on an annual basis. From 1995 onwards this has increased to 1.4% pa. In addition, the chart illustrates that TAA adds value in relatively few large episodes, such as September 1999 and March 2002, rather than in smaller, more consistent amounts. Similarly, in Australia over the last 5 years, the average manager has added value through asset allocation only 47% of the time over rolling 1 year periods. The chart below is based on monthly data for the Mercers pooled balanced and growth fund universe for the five years ending December 2002. The deviations from the strategic asset allocation have been multiplied by index returns to estimate the effect of making tactical asset allocations.

**CHART 2: VALUE ADDED BY ASSET ALLOCATION
AVERAGE MANAGE
ROLLING 1 YR EXCESS RETURNS TO BENCHMARK**



Also interesting to note, is the recent period of underperformance. The average manager has moved money out of defensive assets to growth assets, perhaps in expectation of a rebound. Regardless of each manager's reasons (as they will differ) this illustrates that the ability of the average manager to add value through TAA strategies is low and that wrong decisions can potentially lead to significant underperformance. All the time and effort we put in to the selection of managers may be in vain if the manager makes the wrong TAA decision. And if you need further evidence, the Towers Perrin Superannuation Pooled Funds Survey illustrates that only 10 out of 34 funds added value through TAA for the three years to 31 December 2002. Of these ten managers, five added less than 0.3% pa through TAA.

Caselet 3

Read the caselet carefully and answer the following questions:

10. According to the caselet, issue of cross ownership should be addressed for better implementation of free float methodology for index construction. Discuss.
11. What could be the impact of this change on the existing index funds? How free float indices will affect the role of index fund managers?

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

(6 + 4 = 10 marks) < [Answer](#) >

For a market that is constantly looking for stability and liquidity, the concept of a 'free-float' based index could be a more 'weighted' option. The debate was kicked off at a round table on free-float index by the Bombay Stock Exchange (BSE). What is interesting was ample support to the new concept but many were apprehensive over the implementation of the concept. Free-float based index, also known as the modified market capitalization methodology, includes only those shares that are readily available in the market for purchase by investors. Currently, most equity indices in the country are based on the 'full market capitalization' methodology in which the total number of issued shares by the company is considered for computing the index. This essentially means that a yardstick could be created for fund managers to benchmark the fund returns on investible index. Most fund managers are of the opinion that this could benefit the investor community, particularly mutual funds since they would have a clear idea as to the amount of shares that are available.

Issues such as compliance to disclosure norms, cross ownership of promoters and implementation would gain significance if the major indices in the country were to adopt the free-float concept. Disclosure norms for companies would become far more stringent if free-float is implemented giving an idea as to the portion of paid-up equity that rests with strategic investors, Government, associate companies and directors. Thus, the investor will have a clear idea as to the exact number of shares available for trading. Similarly, the cross ownership of companies on the index having interest in or holding stake in other index companies was also fairly rampant now this issue could be adequately addressed. If the free-float concept were introduced, these shares would not be considered.

Most Indian companies have a larger promoter shareholding including that of associate companies and directors' holding. Hence, there is very less floating stock available in the market that could be actively traded. Companies such as Wipro has promoter's holding at close to 70 per cent. Though firms such as BSES, ITC, Larsen & Toubro (L&T), Associated Cement Companies (ACC), State Bank of India, ICICI and HDFC report 100 per cent non-promoter holding, they have large holdings by strategic investors that includes Government and other corporate bodies.

Dr Manoj Vaish, Deputy Executive Director, BSE said, "The issue we see is the availability of authentic data on free float levels of various companies that would benefit the investor." Mr Gul Teckchandani, Chief Investment officer, Sun F&C Asset Management (I) Pvt Ltd, said "It all depends on the concentration of shares being considered in computing the index. Also, on the issue of cross ownership, it has to be ascertained as to what the purpose it is being held that way?" But, what could it mean for an average investor? "For the average investor, it would mean better transparency levels, less volatility in the indices which would in turn generate more interest and instil faith in the capital market," said a fund manager from an Indian broking firm.

Mr Mark Makepeace, Chief Executive of FTSE agrees. "The small investor is often hit hard and pays a price, especially after a bull-run where companies touch unrealistically high prices. This could be curtailed with free-float," he said.

END OF SECTION E

END OF QUESTION PAPER

Suggested Answers Portfolio Management and Mutual Funds – II (252) : January 2004

Section D: Case Study

1. **Specific Stock Selection:** The source of active return is linked to the specific return of the stocks. The portfolio manager should overweight a given stock if he predicts that its specific reward will be positive. He should underweight a given stock if he predicts that its specific reward will be negative.

Industry Rotation: The source of active return is the difference of weight between the portfolio and the benchmark for a given industry. The portfolio manager should overweight the given industry if he predicts that this industry is going to exhibit a positive excess return. He should underweight the given industry if he predicts that it is going to exhibit a negative excess return.

Risk Factor Selection: The source of active return is the difference of both the portfolio's and the benchmark's exposure to the risk factors. The portfolio manager should overexpose the portfolio to the risk factor if he predicts that this factor is going to exhibit a positive excess return. He should underexpose the portfolio to the risk factor if he predicts that this factor is going to exhibit a negative excess return.

Benchmark Timing: A divergence between the betas of the portfolio and the benchmark is source of active return. The manager should increase the beta of the portfolio with respect to the benchmark if he forecasts that the benchmark's return will be large than the risk free rate. Similarly he should lower the beta of the portfolio with respect to the benchmark if he forecasts that the benchmark's return will be lower than the risk free rate.)

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2. Benchmarks play an important role in performance measurement as a means of evaluating investment results. When reporting the performance of mutual funds, for example, investment management companies are required to use specific, industry-accepted indices or benchmarks that correspond to the appropriate fund category. This is a prudent regulation, as it limits the potential for fund companies to manipulate relative performance by "cherry-picking" an index. However for management of separate, customized portfolios for individuals, families and trusts with varying performance objectives and unique circumstances, a variety of benchmarks should be constructed to accurately compare performance results with the broad markets as well as with other investment managers. It is important to differentiate between an index and a benchmark. An index is simply a means of approximating the valuation of the market. By contrast, a benchmark serves to measure investment performance and reflects the risk characteristics and asset allocation strategies that an investor and a portfolio manager are seeking. For example, to compare investment strategies, one might relate the return of a growth and income fund to the Sensex but since the fund's goal is to provide both capital appreciation and income, a better benchmark might include an appropriately weighted combination of both stock and bond indices. Over-reliance on a particular index can also lead to a distorted view of performance. Again, consider the example of the Sensex, contrary to popular perception, the Sensex does not represent the broad stock market. It is merely a weighted index of 30 large-capitalization stocks, with the biggest companies driving a proportionately larger share of the index's price movements. The Sensex gives relatively little weight to the performance of smaller companies, and it does not at all reflect the performance of the thousands of small-cap companies that trade on the nation's exchanges or over the counter. If one's goal were to accurately gauge the performance of the market, it would be more logical to use a broader index such as the S&P CNX 500 which includes 500 stocks. Similarly, the most popular international equity index is the EAFE (Europe, Australasia, Far East) Index from Morgan Stanley Capital International (MSCI). Most mutual funds and pension funds that invest internationally are benchmarked to the EAFE. As the name implies, EAFE covers a lot of ground, but it does not include regions with well-established markets such as Canada, South Africa and South America. Therefore, we prefer to use the EAFE in combination with the ACWI Free, ex-U.S. Index (All-Country World Index, freely traded, excluding the U.S.), which includes emerging markets as well as Canada. While it is necessary to use EAFE because of its wide acceptance, we believe the ACWI Free, ex-U.S. Index, reflects the broad set of investment opportunities available internationally more accurately. In many cases, a combination of indices is most appropriate for gauging the performance of a portfolio that includes several asset classes. While standardization may be desirable for comparing one portfolio manager to another, it would be incorrect if one compares return of his portfolio with a benchmark that had little or no relevance to the individual goals driving the management of their portfolios. Ultimately, if a benchmark is to provide valid information, the measurement must fit the investment.

3. a.

R_p	R_c	R_K	R_m	$(R_p - \bar{R}_p)$ A	$(R_c - \bar{R}_c)$ B	$(R_K - \bar{R}_K)$ C	$(R_m - \bar{R}_m)$ D	A*D	B*D	C*D	$(R_m - \bar{R}_m)^2$
4.25	8.5	5.62	1.55	-0.5	0.792	-1.838	-4.44	2.22	-3.516	8.16	19.71
5.75	9.25	8.95	4.75	1	1.542	1.492	-1.24	-1.2	-1.912	-1.85	1.538
-2.5	11.5	9.95	4.25	-7.25	3.792	2.492	-1.74	12.6	-6.598	-4.34	3.028
11.25	2.5	-2.81	5.65	6.5	-5.208	-10.27	-0.34	-2.2	1.771	3.49	0.116
-1.75	4.75	12.52	9.5	-6.5	-2.958	5.062	3.51	-23	-10.38	17.8	12.32
11.5	9.75	10.52	10.3	6.75	2.042	3.062	4.26	28.8	8.699	13	18.15
4.75	7.71	7.458	5.99					17.3	-11.94	36.3	54.86

Beta of the stocks

Prime Soft = $17.3/54.86 = 0.3153$

Care Phrama = $-11.94/54.86 = -0.218$

KPT = $36.3/54.86 = 0.662$

Alpha of the three stocks

Prime Soft = $4.75 - 0.3153 \times 5.99 = 2.54 \%$

Care Pharma = $7.71 - (-0.218 \times 5.99) = 9.016$

KPT = $7.458 - 0.662 \times 5.99 = 3.492 \%$

Regression Equation of the three stocks

$R_i = 2.54 + 0.3153R_m$

$R_i = 9.016 - 0.218R_m$

$R_i = 3.492 + 0.662R_m$

b.

R_p A	R_c B	R_K C	R_m D	Return based on Regression Equations E F G			A-E (1)	B-F (2)	C-G (3)	(1) × (1)	(2) × (2)	(3) × (3)
11.5	9.75	10.52	10.3	5.77	6.7815	10.28	5.73	2.97	0.243	32.8	8.812	0.059
-1.75	4.75	12.52	9.5	5.54	6.945	9.781	-7.29	-2.2	2.739	53.1	4.818	7.502
11.25	2.5	-2.81	5.65	4.32	7.7843	7.232	6.93	-5.3	-10.04	48	27.92	100.8
5.75	9.25	8.95	4.75	4.04	7.9805	6.637	1.71	1.27	2.314	2.93	1.612	5.352
-2.5	11.5	9.95	4.25	3.88	8.0895	6.306	-6.38	3.41	3.645	40.7	11.63	13.28
4.25	8.5	5.62	1.55	3.03	8.6781	4.518	1.22	-0.2	1.102	1.49	0.032	1.214
										35.8	10.97	25.65

Standard Deviation of Residual Return

Prime soft = $(35.8/5)^{1/2} = 2.675\%$

Care Pharma = $(10.97/5)^{1/2} = 1.481\%$

KPT Steel = $(25.65/5)^{1/2} = 2.265\%$

4. a.

Asset class	W_{pj}	W_{ij}	Return R_{pj} (%)	Return R_{ij} (%)	$W_{ij} R_{ij}$	$W_{pj} R_{pj}$
Large Cap Stocks	45.46	35.35	5.6	0.35	0.1237	2.5458
Small Cap Stocks	23.25	16.29	12.35	11.65	1.8978	2.8714
Government Bonds	20.75	23.25	6.25	6.95	1.6158	1.2969
Money Market Securities	10.54	25.11	3.43	3.43	0.8613	0.3615
	100	100			I = 4.4986	7.0756

Total Value added = 7.0756 – 4.4986 = 2.577%

Asset class	Allocation		
$(W_{pj} - W_{ij})(R_{ij} - I)$	Security Selection $W_{pj}(R_{pj} - R_{ij})$	Total	
Large Cap Stocks	$(0.4546 - 0.3535)(0.35 - 4.4986)$ = -0.4027	$0.4546(5.6 - 0.35)$ = 2.38665	1.98395
Small Cap Stocks	$(0.2325 - 0.1629)(11.65 - 4.4986)$ = 0.5092	$0.2325(12.35 - 11.65)$ = 0.16275	0.67195
Government Bonds	$(0.2075 - 0.2325)(6.95 - 4.4986)$ = -0.0654	$0.2075(6.25 - 6.95)$ = -0.14525	-0.21065
Money Market Securities	$(0.1054 - 0.2511)(3.43 - 4.4986)$ = 0.13172	$0.1054(3.43 - 3.43)$ = 0	0.13172
Total	0.17198	2.40415	2.57697

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5. a. The liability portfolio consists of 3 time fund requirements occurring at the end of the 4th, 6th and 10th year.

$$\text{PV of the fund requirement} = P_1 = 15000000/(1 + 0.05)^4 = 12340537.12$$

$$P_2 = 25000000/(1 + 0.0515)^6 = 18496278.1$$

$$P_3 = 30000000/(1 + 0.0545)^{10} = 17646371.34$$

Present value of the fund requirements = Rs 48483186.56

Present value of investments in bond = 17000000 × 1003.73/1000 = 17063410

Present value of investments in bond = 23000000 × 1008.66/1000 = 23199180

Present value of investments in bond = 10000000 × 1010.12/1000 = 10101200

Total present value of investment in bonds = 50363790

Surplus = 50363790 – 48483186.56 = Rs.1880603.44

- b. First we need to estimate the duration of three bonds

Bond X

$$\begin{aligned} \text{Current yield of the bond (rc)} &= \frac{\text{Coupon Interest}}{\text{Market Price}} \\ &= \frac{50}{1003.73} = 4.98\% \end{aligned}$$

Duration of the bond

$$= \frac{r_c}{r_d} \times \text{PVIFA}(r_{d,n}) \times (1 + r_d) + \left(1 - \frac{r_c}{r_d}\right)n$$

Where symbols are in standard use.

$$\begin{aligned} \text{Duration} &= \frac{0.0498}{0.0480} \times \text{PVIFA}(4.80, 2) \times (1.048) + \left(1 - \frac{0.0498}{0.048}\right)2 \\ &= 1.95 \text{ years} \end{aligned}$$

Bond Y

$$\begin{aligned} \text{Current yield of the bond (rc)} &= \frac{\text{Coupon Interest}}{\text{Market Price}} \\ &= \frac{52}{1008.66} = 5.16\% \end{aligned}$$

Duration of the bond

$$= \frac{r_c}{r_d} \times \text{PVIFA}(r_{d,n}) \times (1 + r_d) + \left(1 - \frac{r_c}{r_d}\right)n$$

Where symbols are in standard use.

$$\begin{aligned} \text{Duration} &= \frac{0.0516}{0.050} \times \text{PVIFA}(5, 5) \times (1.05) + \left(1 - \frac{0.0516}{0.05}\right)5 \\ &= 4.53 \text{ years} \end{aligned}$$

Bond Z

$$\begin{aligned} \text{Current yield of the bond (rc)} &= \frac{\text{Coupon Interest}}{\text{Market Price}} \\ &= \frac{53}{1010.12} = 5.25\% \end{aligned}$$

Duration of the bond

$$= \frac{r_c}{r_d} \times \text{PVIFA}(r_{d,n}) \times (1 + r_d) + \left(1 - \frac{r_c}{r_d}\right)n$$

Where symbols are in standard use.

$$\begin{aligned} \text{Duration} &= \frac{0.0525}{0.053} \times \text{PVIFA}(5.3, 6) \times (1.053) + \left(1 - \frac{0.0525}{0.053}\right)6 \\ &= 5.30 \text{ years} \end{aligned}$$

Duration of liability using the spot rates prevailing in the relevant year.

Year	Cash outflow	P.V. of C.F. at prevailing spot rates	(P.V. of C.F. x year)
2004	-	-	-
2005	-	-	-
2006	-	-	-
2007	15000000	12340537.12	49362148.48
2008	-	-	-
2009	25000000	18496278.1	110977668.6
2010	-	-	-
2011	-	-	-
2012	-	-	-
2013	30000000	17646371.34	176463713.40

$$\begin{aligned} \text{Duration of fund liability} &= \frac{336803530.5}{48483186.56} = 6.95 \text{ years} \\ \text{Duration of assets} &= \frac{17000000}{50000000}(1.95) + \frac{23000000}{50000000}(4.53) \\ &\quad + \frac{1000000}{50000000}(5.30) \\ &= 3.8068 \text{ years} \end{aligned}$$

We need to calculate the amount of the investment to be made in 10 year zero coupon bonds so that liability of fund requirement is perfectly immunized.

To be immunized we need to have

Duration of Assets * Invest Amount + Duration of zero coupon bond * Invest amount in zero coupon bond = Duration of liability * Investment amount in liability

$$= 50000000 \times 3.8068 + X \times 10 = 6.95 \times 48483186.56$$

$$X = 14661814.66$$

$$\text{Nominal amount in zero coupon bond} = 14661814.66 \times (1.0545)^{10} = \text{Rs. } 249260559.8.$$

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Section E: Caselets

Caselet 1

6. There are several techniques used in building index funds based on Equity indices. These techniques fall into three categories: full replication, sampling and optimization. Full replication is the most straightforward approach as its name implies, all of the securities in the benchmark are purchased in the index fund in their proportionate weightings. An Index fund based on Sensex or Nifty that is created by using full replication will hold position in all 30 or 50 stocks in amounts proportionate to their value relative to the market value of all stocks in the index. Proponents of this approach argue that only by holding all the securities in an index can one ensure close tracking of the actual index.

Funds can also be constructed using a sampling approach. A fund constructed in such a way usually holds positions in all of the larger securities in the benchmark, but samples the smaller companies such that the characteristics of the fund closely match those of the benchmark. A simple approach to constructing S&P 500 index fund would be to buy the larger companies' stock in their exact proportion while sampling the smaller stocks in such manner so that industry breakdown of the portfolio mirrors that of the index. If one believes that securities within given industries tend to move in a similar manner, then controlling for industry diversification should lead to good tracking. In practice, the criteria for sampling can be far more complex than this, and one can control for any number of factors such as industry breakdown, market capitalization, yield, growth orientation and the like. Proponents of sampling argue that if one can create a portfolio that captures the essential characteristics of a benchmark, without holding positions in each and every security, one can approximate the performance of the benchmark quite closely while keeping administrative and trading costs down.

The third approach to constructing an equity index fund is to use quadratic optimization model. Given data on securities, such a model attempts to create a portfolio with the minimum possible residual risk vis-à-vis the selected benchmark (i.e. return variability not explained by the benchmark itself). The attraction of this approach is that a portfolio can be constructed with a fewer securities than one would use in full replication or even sampling, and with a very low prospective tracking error. A potential problem however, is that data used to derive this type of model are historic in nature and if the future does not replicate the past as is usually the case, the prospective tracking error on these funds can differ significantly from the actual tracking error.

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7. Stable value funds and principal protected funds differ greatly in how they achieve their objective of preserving principal. Stable value funds generally give investor access to their investment without the loss of principal and accumulated earnings or penalty. Stable value does not require a set holding period. Even though stable value funds give an investor access to their money, some funds may restrict transfers to competing funds such as a money market or bond fund by requiring that money transferred out of stable value be first invested in a stock fund before it can be invested in a bond or money market fund. Principal protected funds do not permit access without imposition of penalties until an investor fulfills the specific period of time required by the fund, usually 5 to 10 years according to the National Association of Security Dealers. Additionally, if an investor takes his/her money out of a principal-protected fund before the term of the fund is met, the investor loses the principal protection on his/her investment. Since stable value funds are primarily offered as part of company's traditional defined contribution plan, their costs tend to be lower.

Some key features of stable-value funds and principal-protection funds include:

Stable-Value Funds:

- Guarantee the principal investment and maintain a stable net asset value (NAV).
- Are similar to a money-market fund because the NAV never fluctuates, but they aim to deliver a slightly higher return.
- Typically own short-to-intermediate-maturity bonds spread across different sectors.
- Expensive fees can erode stable-value funds' potential advantage over most bond funds.
- Redemption fees, found on most stable-value funds, can make it difficult to move cash easily when better opportunities call.
- The private sector, not the government, guarantees the funds, so investors need to double-check who's insuring the fund.

Principal-Protection Funds:

- Comprised of hybrid (stock and bond) portfolios with insurance that guarantees the principal after several years.
- Usually an "offering period" when investors can register, and then a "guarantee period" when everyone's money is invested on the same day and is locked away, typically for five or seven years.
- Weighted heavily toward bonds, sometimes entirely, creating limited upside.
- Expenses can be extremely high (climbing above 2 percent), especially relative to super-cheap government bond funds.
- The insurance company providing the guarantee can usurp asset-allocation duties if it thinks management is taking on too much risk.
- In its efforts to manage risk, funds can drop investment performance out of the equation.
- The prospectus can be annoyingly opaque.

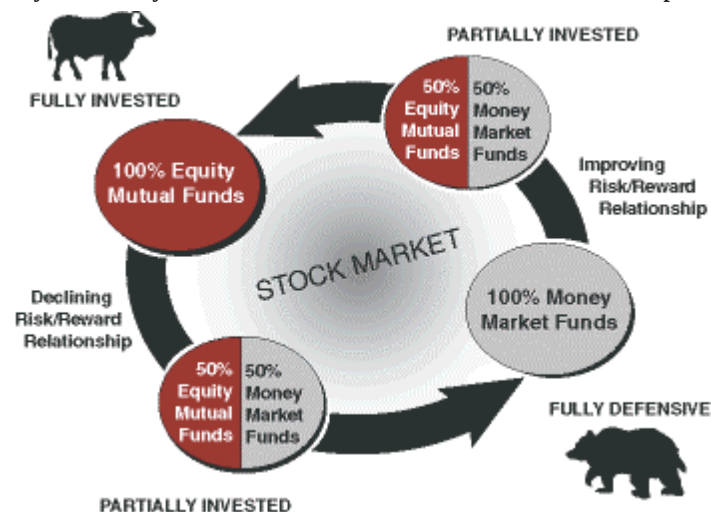
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Caselet 2

8. Investors often over-value existing information that has become common knowledge. And they tend to under-value new information that may be unfamiliar to them. An investment discipline that is adaptive can consistently uncover assets that are mispriced as a result of these patterns of investor behavior. Tactical asset Allocation (TAA) strategy seeks to identify and capitalize on these misvaluations through a combination of value, economic, and technical factors. In fact a proprietary econometric model can be devised to forecast different economic scenarios, which will be used in the formation of portfolio based on tactical asset allocation for shifting opportunistically among the various asset classes. Given the market's dynamic, evolving, and complex nature, this model incorporates value, economic, and technical factors to recommend the best asset allocation mix.

Using econometric model, we can generate portfolio mix recommendations that are monitored daily and implemented as needed. Buy and sell decisions are influenced by the model's recommended allocation that incorporates the client's benchmark allocation, risk tolerance, and desired allocation ranges to stocks, bonds, and cash. Since market psychology and conditions vary substantially during expansionary and restrictive times, Tactical Asset allocation (TAA) devises a different approach during each type of economic scenarios.

When it is believed the risk/reward relationships of the stock market are favorable, portfolio will be allocating larger funds to stock or stock funds from preferred mutual fund family of an investor. However when it is expected that the risks of the stock market outweigh the potential rewards, the investment of portfolio should be made "defensively" by allocating funds in money market funds until conditions in the equity market improve. For portfolios with a fixed income component, the same Tactical Asset Allocation approach is applied by investing in bond funds when the risk/reward relationships are favorable and investing "defensively" in money market funds when the risk/reward relationships are unfavorable.



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9. a. TAA and other market timing strategies are typically less stable sources of active return. It has been found that stock selection strategies typically offer both significant expected excess return and, critically, that the drivers of this excess return (stock research, portfolio construction, organizational stability, investment personnel and processes) are relatively stable. For this reason, the best chance of adding value to a fund is by maintaining a long-term strategic asset allocation through a disciplined rebalancing strategy, and by employing active stock selection within each asset sector.
- b. Although Tactical Asset Allocation (TAA) driven returns have been low in recent years, the method still remains beneficial. TAA can be used to keep managers disciplined, even in the aftermath of a major market move. When historical fundamentals fail to proxy current conditions. Following are the possible recommendations for best possible use of TAA strategies:
- Portfolio Managers should not commit additional assets to TAA if TAA does not address any institutional issues.
 - Portfolio Manager should implement TAA using an overlay strategy to minimize transaction costs.
 - Performance-based fee structure, should be designed to portfolio managers who will be using tactical asset allocation.
 - An appropriate passive benchmark for the fund should be chosen which would be helpful in monitoring managers' excess returns and tracking error.

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Caselet 3

10. Cross-ownership refers to the stakes held by index companies amongst other index companies. Cross ownership is widely prevalent in the emerging markets. This can be gauged from the fact that in the Hong Kong's premier benchmark index - Hang Seng 33, 17 of its 33 constituents have cross ownerships. Even in BSE-SENSEX, 7 index companies hold stakes in other index companies. The issue of cross-ownership has to be addressed to avoid overstating the market capitalisation of a company and hence its investibility. For instance, in the BSE- SENSEX, Reliance Industries Ltd. holds around 30% in BSES Ltd. However, for the purpose of calculation of the index the entire market capitalisation of both the companies is considered. Once the concept of free-float is implemented in index construction, such mutual stakes would be deducted to arrive at the true investability of a stock.

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11. Index funds based on the sensitive index (Sensex) of the Bombay Stock Exchange, which is based on free float, will need to rebalance portfolios in order to align them with the changed weightages. "Free float will exclude all kinds of promoter holdings, holdings by group companies of the promoter, strategic investments by corporate bodies and ESOP shares with lock-in of more than one year. The decision to go free float by BSE Sensex should not lead to a major impact on index funds. The movement in the index will be lower if weighted by free-float instead of market cap. Essentially, then, the BSE is stating that funds benchmarked to the Sensex will be better off because the tracking error will be lower; tracking error is the standard deviation of the difference in monthly returns between the index funds and the benchmark index. That is, perhaps, why better replication of the benchmark is cited as one reason for shifting to a free-float index. Most stocks that constitute the index have a free float factor less than one. The tracking error based on the free-float benchmark will, therefore, be lower, or so the argument goes. But that need not be true. The free-float factor can change frequently. For instance, the free-float will increase after lock-in period expires on shares underlying the employee stock options. This will increase the tracking error for funds benchmarked to the Sensex. Of course, funds can adjust their portfolio whenever there is a change in the free-float factor; this can be as frequent as every quarter when the companies report their shareholding structure to the BSE. But frequent changes in portfolio would only increase the tracking error because of the higher transaction costs. That apart, a free-float index cannot help funds replicate the index portfolio. Replication refers to constructing a portfolio that mirrors the benchmark. The primary cost that funds incur in replicating a benchmark portfolio is the impact cost. Index Funds tracking a full-market capitalization weighted index may find difficulties in replicating the index. Due to sensitivity of price movement of closely held companies, inclusion of such companies in the index may lead to higher impact cost for index funds. In an extreme case, full market capitalization weighted indices may be forced to keep closely held blue chip companies out of the index in order to maintain their index investability. In such a situation, shifting to free-float methodology would not only lead to improving the benchmarking characteristics of indices but will also facilitate inclusion of closely held companies in the indices.

Due to this change, fund managers will have some work to do. In the case of index funds based on the Sensex, fund managers will have to sell the required quantity of scrips that have lost weight and buy the required quantity of scrips that have gained weight in the new scheme of things. This sell and buy activity in select scrips could have an impact on the market prices of these scrips today. This rebalancing requires to be done in the case of Index Funds as they have to precisely replicate the underlying index. With the change in weightings, the current holdings of these funds would have got misaligned with the new Sensex. Such changes also have to be done in Index Funds when scrips are added or deleted from the index.

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