

Suggested solutions to 3-mark and 4-mark problems contained in the Sample Paper - Exam 3 - Investment Planning (IP)

Setion II

Question 6

A buisnessman wants to achieve the goal of marriage of his daughter after 10 years. The funds required would be Rs. 25 lakh at then costs. He wants to invest monthly for the goal. You suggest an asset allocation strategy where he should invest monthly in equity and debt in ratio 65:35 for 9 years, and shift the entire accumulated amount in these funds to liquid fund in the last year. If the returns expected from equity, debt and liquid funds in this period are 12% p.a., 9% p.a. and 5% p.a., respectively, what approximate amount per month is required to be allocated to equity and debt schemes?

Solution:

Funds to be accumulated after 10 years	2,500,000	Rs.	
Returns expected from equity funds	12.00%	p.a	
Returns expected from debt funds	9.00%	p.a	
Returns expected from liquid funds	5.00%	p.a	
Amount required to be accumulated upto 9 years	2,380,952	Rs.	$2500000/(1+5\%)$
Suppose, monthly investment made is:	100.00	Rs.	
Amount invested in equity funds for 9 years	65.00	Rs.	$100*65\%$
Amount invested in debt funds for 9 years	35.00	Rs.	$100*35\%$
Accumulation in equity funds after 9 years	12,261	Rs.	$FV((1+12\%)^{(1/12)}-1,9*12,-65,0,1)$
Accumulation in debt funds after 9 years	5,732	Rs.	$FV((1+9\%)^{(1/12)}-1,9*12,-35,0,1)$
Total funds accumulated in equity and debt funds	17,993	Rs.	$12261+5732$
Required cumulative investment per month	13,233	Rs.	$(2380952/17993)*(100)$
Investments in equity per month	8,601	Rs.	$13233*0.65$
Investments in debt per month	4,631	Rs.	$13233*0.35$

Rs. 8,601 & Rs. 4,631

Setion II**Question 7**

Your client started investing Rs. 12,000 per month a year ago in an asset allocation of 30:70 in equity and debt to achieve a goal in 6 years from now by accumulating Rs. 10 lakh. You realize that he would be requiring Rs. 15 lakh for the same goal. You expect equity and debt to give returns of 11.75% p.a. and 8.25% p.a., respectively in the entire period of investment. You assess changing asset allocation to 65:35 in equity and debt by investing Rs. 2,000 additional per month to see how closer he can reach to his goal. You find that _____.

Solution:

Amount invested per month	12,000	Rs.	
Equity allocation: 30%	3,600	Rs.	12000*30%
Debt allocation : 70%	8,400	Rs.	12000*70%
Returns expected from equity funds	11.75%	p.a.	
Returns expected from debt funds	8.25%	p.a.	
Accumulation in a year's time: Equity	45,903	Rs.	FV((1+11.75%)^(1/12)-1,12,-3600,0,1)
Accumulation in a year's time: Debt	105,250	Rs.	FV((1+8.25%)^(1/12)-1,12,-8400,0,1)
Revised amount invested per month	14,000	Rs.	
Equity allocation: 65%	9,100	Rs.	14000*65%
Debt allocation : 35%	4,900	Rs.	14000*35%
Remaining period	6	years	
Equity accumulation	1,025,095	Rs.	FV((1+11.75%)^(1/12)-1,6*12,-9100,-45903,1)
Debt accumulation	622,596	Rs.	FV((1+8.25%)^(1/12)-1,6*12,-4900,-105250,1)
Total fund accumulated	1,647,691	Rs.	1025096+622596
Revised target	1,500,000	Rs.	1647691-1500000
Shortfall	147,691	Rs.	

Setion II**Question 8**

An individual has recently purchased a house worth Rs. 40 lakh for self-occupation by availing housing loan of Rs. 28 lakh at 9.25% p.a. rate of interest. The tenure of loan is 18 years. He has Rs. 12 lakh financial assets at present. He is expected to save annually Rs. 2 lakh which he investes on a quarterly basis beginning a quarter from now in an instrument which is expected to provide return of 9% p.a. What would be his net worth five years from now? The value of the house which is for consumption purposes is not considered in the net worth so arrived.

Solution:

Housing loan liability	2,800,000	Rs.	
Tenure	18	years	
Rate of interest	9.25%	p.a.	
Financial assets	1,200,000	Rs.	
Annual savings	200,000	Rs.	
Rate of investment growth in assets	9%	p.a.	
EMI on housing loan	26,659	Rs.	PMT(9.25%/12,18*12,-2800000,0,0)
<u>After 5 years:</u>			
Outstanding housing loan	2,414,624	Rs.	PV(9.25%/12,(18-5)*12,-26659,0,0)
Financial assets	3,082,962	Rs.	FV((1+9%)^(1/4)-1,5*4,-200000/4,-1200000,0)
Net worth of the individual after 5 years	668,338	Rs.	3082962-2414624

Setion II

Question 9

Your client starts investing immediately for 10 years annually Rs. 60,000 in the ratio of 80:20 in equity and debt products. You expects return from equity and debt to be 11.75% p.a. and 8.25% p.a. during this period. To protect the wealth, he rebalances the portfolio in 40:60 ratio of equity and debt after 10 years and invests in the same ratio annually Rs. 60,000 for the next 5 years. The return expected from equity and debt in this period subsides to 9% p.a. and 7% p.a., respectively. What rate of return is expected on his total investments? How would this return fare when seen from average inflation of 6% during the entire period?

Solution:

Annual investment for the first 10 years	60,000	Rs. p.a.	
Asset allocation to equity - 80%	48,000	Rs. p.a.	$60000*80\%$
Asset allocation to debt - 20%	12,000	Rs. p.a.	$60000*20\%$
Rate of return - 1st 10 years - Equity products	11.75%	p.a.	
Rate of return - 1st 10 years - Debt products	8.25%	p.a.	
Accumulation - End of 10 years - Equity	930,010	Rs.	$FV(11.75\%,10,-48000,0,1)$
Accumulation - End of 10 years - Debt	190,429	Rs.	$FV(8.25\%,10,-12000,0,1)$
Total funds accumulated	1,120,439	Rs.	$930010+190429$
<u>Subsequent 5-year period</u>			
Rebalanced Asset Allocation to Equity - 40%	448,176	Rs.	$1120439*40\%$
Rebalanced Asset Allocation to Debt - 60%	672,263	Rs.	$1120439*60\%$
Annual investment for the next 5 years	60,000	Rs.	
Revised Asset allocation to equity - 40%	24,000	Rs.	$60000*40\%$
Revised Asset allocation to debt - 60%	36,000	Rs.	$60000*60\%$
Rate of return - next 5 years - Equity products	9.00%	p.a.	
Rate of return - next 5 years - Debt products	7.00%	p.a.	
Accumulation - End of 15 years - Equity	846,134	Rs.	$FV(9\%,5,-24000,-448176,1)$
Accumulation - End of 15 years - Debt	1,164,403	Rs.	$FV(7\%,5,-36000,-672263,1)$
Total funds accumulated - End of 15 years	2,010,536	Rs.	$1164402+846134$
Rate of return on investing Rs. 1 lakh p.a.for 15 years	9.52%	p.a.	$RATE(15,-60000,,2010536,1)$
Real rate expected on considering 6% p.a. inflation	3.32%	p.a.	$(1+9.52\%)/(1+6\%)-1$

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Setion III

Question 3

The average inflation over the last three years is 8.5 % p.a. You invested Rs. 1 lakh in a security 3 years ago which you have redeemed for Rs. 1.3 lakh. What real return have you obtained from investment?

Invested amount	100,000	Rs.	
Redemed amount	130,000	Rs.	
Period of invetment	3	years	
Rate of return obtained on investment	9.14%	p.a.	$RATE(3,0,-100000,130000,1)$
Inflation prevelant in period	8.50%	p.a.	
Real rate of return received	0.59%	p.a.	$(1+9.14\%)/(1+8.5\%)-1$

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Setion III

Question 4

Mr. A's portfolio consists of two stocks A and B in which he has invested Rs. 75,000 and Rs. 67,000, respectively. Stock A has beta of 1.4 and stock B has beta of 0.80. The return expected from the market in current scenario is 12% while the return on Treasury bonds is 7%. What is the expected return from the portfolio?

Solution:

investment in sock A	75,000	Rs.	
investment in sock B	67,000	Rs.	
weight of stock A	52.82%		$75000/(75000+67000)$
weight of stock B	47.18%		$67000/(75000+67000)$
Beta of Stock A	1.40		
Beta of Stock B	0.80		
Beta of the Portfolio	1.117		$(52.82\%*1.4)+(47.18%*0.8)$
market rate of return	12%	p.a	
risk free rate	7%	p.a	
required rate of return	12.58%	p.a	$7%+(12%-7%)*1.117$

Setion III

Question 5

For an investment product guaranteeing a fixed cash flow of Rs. 4 lakh per annum for 20 years beginning four years from the date of investment, what price should be fixed if the same can be invested in financial instruments which can yield 8.25 % p.a. for the four years and 7.5% p.a. for the remaining period of the product?

Solution:

Fixed Cash flows required for 20 years	400,000	Rs. p.a.	
Period of cash flows	20	years	
Rate of investment	7.50%	p.a.	
Present Value of cash flow from the time they begin	4,383,631	Rs.	$PV(7.5\%,20,-400000,0,1)$
Time until begin of cash flows	4	years	
Rate of investment from today until beginning of c/flow	8.25%	p.a.	
Present Value of cash flows today	3,192,437	Rs.	$4383631/(1+8.25\%)^4$

Setion III

Question 6

A 15-year, 9% corporate bond with Face Value Rs. 1,000 and interest payable semi-annually matures after 6 years. The bond is available at a yield to maturity of 7%. If the record date for the last coupon has just passed, at what value 50 bonds of the corporate are likely to be quoted in the market?

Solution:

Face Value of the bond	1,000.00	Rs.	
Coupon rate	9.00%	p.a. - hy	
Maturity from today (outstanding tenure)	6	years	
Yield to maturity (YTM)	7.00%	p.a.	
PV of the bond	1,096.63	Rs.	$PV(7\%/2,6*2,45,1000,0)$
Value of 50 bonds	54,832	Rs.	$1096.63*50$

Setion III

Question 7

Your manage a Rs. 10,00,000 portfolio. You are expecting to receive an additional Rs. 6,50,000 from a new client. The existing portfolio has a required return of 10.25 percent. The risk-free rate is 5 percent and the return on the market is 9.5 percent. If you want required return on the new portfolio to be 11 percent, what should be the average beta for the new stocks added to the portfolio?

Solution:

Existing portfolio:-

required rate	10.25%	p.a
risk free rate	5.00%	p.a
return on market	9.50%	p.a
Existing beta	1.17	

$$\text{solution of equation : } 10.25=5+(9.5-5)*x$$

New beta:-

Required rate	11.00%	p.a
Beta(new)	1.33	

$$\text{solution of equation: } 11=5+(9.5-5)*x$$

Beta of added stocks:-

old investement amount	1,000,000	Rs.
new investment amount	650,000	Rs.
total invetment	1,650,000	Rs.
Beta of added stocks	1.59	

$$\text{solution of equation : } 1.33=(650000/1650000)*x+(1000000/1650000)*1.17$$

Setion III**Question 8**

Mr. A purchased a flat worth Rs. 50 lakh in January 2007 by availing a housing loan of Rs. 35 lakh for tenure 15 years at the rate of 9% p.a. The value of his flat as in January 2013 has appreciated to Rs. 90 lakh. What approximate value of home equity can he consider in his flat towards his unencumbered interest after also setting aside 15% of the appreciation value towards taxes and other costs to be discharged on selling the unit?

Solution:

Purchase cost of flat	5,000,000	Rs.	
Loan amount	3,500,000	Rs.	
Tenure	180	months	
Rate of interest	9.00%	p.a.	
EMI	35,499	Rs.	$PMT(9\%/12,180,-3500000,0,0)$
Installments discharged till January 2013	72		
Oustanding loan amount in January 2013	2,621,249	Rs.	$PV(9\%/12,180-72,-35499,0,0)$
Current value of the flat	9,000,000	Rs.	
Appreciation value of the flat	4,000,000	Rs.	$9000000-5000000$
Amount towards taxes	600,000	Rs.	$4000000*15\%$
Home Equity in the flat	5,778,751	Rs.	$9000000-2621249-600000$

Setion III**Question 9**

A stock of face value Rs. 10 is currently piced at Rs. 175. The company paid a dividend of 125% in the previous fiscal year and the absolute amount of dividend is expected to grow by on an average 5% year-on-year. It has a beta of 0.8 . You expect the market to give a return of 12% while the risk-free rate is 5%. You find out the extent of undervaluation or overvaluation of the stock by dividend discount method, and state that _____.

Solution:

Market returns	12%	p.a.	
risk free rate	5.00%	p.a.	
Absolute amount of dividend	12.50	Rs.	$10*125\%$
Rate of growth of dividend	5%	p.a.	
Dividend expected in the next fiscal year	13.13	Rs.	$12.5*1.05$
Beta of the stock	0.80		
Expected rate of return from stock	10.60%		$5\%+(12\%-5%)*0.8$
Value of the stock by dividend discount method	234.38		$13.13/(10.6\%-5\%)$
Current price of share	175.00	Rs.	
Extent of undervaluation	-25%	Rs.	$(175-234)/234$

Setion IV

Question 6

Your client Mr A. has his Rs. 50 lakh portfolio in three asset classes as on 1st April 2009 comprised of Equity and Debt each in 35 % allocation with the rest of the portfolio invested in Gold ETF. Over the period upto 1st January 2013, Gold has given a total return of 90 % in the portfolio whereas equity and debt have returned 11% and 15%, respectively. You rebalance the portfolio today and change its allocation to 60% in equity with the other two classes equally sharing the balance. What should be the transfer of money amongst asset classes.

Solution:

Size of the portfolio as on 1-Apr-2009	5,000,000	Rs.	
Equity : 35% of portfolio	1,750,000	Rs.	$5000000 * 35\%$
Debt : 35% of portfolio	1,750,000	Rs.	$5000000 * 35\%$
Gold ETF: 30% of portfolio	1,500,000	Rs.	$5000000 * 30\%$
<u>As on 1-Jan-2013</u>			
Value of Equity	1,942,500	Rs.	$1750000 * (1+11\%)$
Value of Debt	2,012,500	Rs.	$1750000 * (1+15\%)$
Value of Gold ETF	2,850,000	Rs.	$1500000 * (1+90\%)$
Total portfolio size	6,805,000	Rs.	$1942500+2012500+2850000$
<u>Revised allocation 1-Jan-2013</u>			
Equity : 60% of the portfolio	4,083,000	Rs.	$6805000 * 60\%$
Debt : 20% of the portfolio	1,361,000	Rs.	$6805000 * 20\%$
Gold ETF: 20% of the portfolio	1,361,000	Rs.	$6805000 * 20\%$
Shift from Debt to Equity	651,500	Rs.	$2012500-1361000$
Shift from Gold ETF to Equity	1,489,000	Rs.	$2850000-1361000$
Shift from Debt to Gold ETF	-		

Setion IV
Question 7

You are evaluating the rankings based on Treynor Ratio of three funds A, B and C . The average returns obtained from funds A, B and C have been 16%, 19% and 14%, respectively against the market return of 13%. The standard deviations of fund returns have been 17, 22 and 16, respectively versus the market return standard deviation of 15. If the beta reported of these funds is 1.2, 1.4 and 1.1, respectively and the risk-free rate of return is 5.5%, what are your rankings in the order of best to worst?

Solution:

Average Returns (%)

A	16
B	19
C	14
Market	13

Standard Deviation (%)

A	17
B	22
C	16
Market	15

Beta

A	1.2
B	1.4
C	1.1
Market	1
risk free rate	5.5

Treynor Ratio

A	8.8	$(16-5.5)/1.2$
B	9.6	$(19-5.5)/1.4$
C	7.7	$(14-5.5)/1.1$

Ranking **B,A,C**