# CHAPTER 40

# ANALYSIS OF ACTIVE PORTFOLIO MANAGEMENT

1. (A) **27.44%**

**Explanation**

Combined active risk = $\sigma_C = [\sigma_1^2 - 2\sigma_1\sigma_U r_{IU} + \sigma_U^2]^{1/2}$

$= [0.13^2 + 0.025^2 - 2(0.13)(0.025)(-0.20)]^{1/2} = 0.1372$ or 13.72%

Annualized active risk = $0.1372 \times (4)^{1/2} = 0.2744$ or 27. 44%.

(Module 40.4, LOS 40.e)

**Related Material**

SchweserNotes - Book 5

2. (A) **Neither conclusion is correct.**

**Explanation**

In conclusion 1, the market timer has a breadth of 52 and the stock selector 50. In order to achieve the same information ratio, the stock selector would need to make up for the lower breadth with a higher information coefficient.

In conclusion 2, the specialist has a breadth of 400 and the selector 100. If they have the same skill level, the specialist with the larger breadth will have a higher information ratio

(Module 40.4, LOS 40.e)

**Related Material**

SchweserNotes - Book 5

3. (A) **The information ratio of a constrained active portfolio is unaffected by aggressiveness of the active weights.**

**Explanation**

Information ratio of an unconstrained active portfolio is unaffected by aggressiveness of the active weights. Sharpe ratio is unaffected by addition of cash or leverage but information ratio would be. A portfolio consisting of a combination of benchmark and an actively managed portfolio is calculated as:

$SR_p^2 = SR_B^2 + IR^2$

If the active return is positive, IR>0 and $SR_P > SR_B$.

(Module 40.2, LOS 40.b)

**Related Material**

SchweserNotes - Book 5

4. (C) **Information Coefficient**

**Explanation**

Information coefficient is the ex-ante correlation between forecasted active returns and actual active returns. It captures the skill of the manager.

(Module 40.3, LOS 40.c)

**Related Material**

SchweserNotes - Book 5

5. (A) **Transfer Coefficient**

**Explanation**

Transfer coefficient = TC = CORR ($\mu_i/\sigma_i$, $\Delta w_i \sigma_i$)

(Module 40.3, LOS 40.c)

**Related Material**

SchweserNotes - Book 5

6. (A) **Only one statement is correct.**

**Explanation**

Fox is correct that screens (e.g., minimum dividend yield) would pass stocks with similar attributes and hence would introduce dependency in the decision making process. Fox is incorrect that the decisions over time are independent. Those stocks that pass the screen in one quarter are probably more likely to pass the same screen in the next quarter and hence the decisions are not truly independent.

(Module 40.4, LOS 40.f)

**Related Material**

SchweserNotes - Book 5

7. (C) **The information ratio will decrease**

**Explanation**

Information ratio (IR) = IC x $\sqrt{BR}$

If breadth is increased by a factor of 4, this would increase the information ratio by a factor of 2. As the information coefficient is decreasing by a factor of 4, the information ratio will decrease

(Module 40.3, LOS 40.c)

**Related Material**

SchweserNotes - Book 5

Sundar Mithai, CFA, is a fund manager for Pearl Investments and makes a monthly report to the firm's partners. Mithai mentions two active managers in his report, Galab and Phasar. Exhibit 1 provides additional information on the two managers:

**Exhibit 1: Selected Information on Galab and Phasar**

| | Galab | Phasar |
|---|---|---|
| Information coefficient | 0.22 | 0.37 |
| Transfer coefficient | 0.8 | 0.73 |
| Active risk | 5.6% | 6.6% |
| Active return | 10.8% | 9.2% |

Mithai makes the following comments regarding the two active managers:

**Comment 1:** The investment mandate of Phasar appears to be less constrained relative to Galab.

**Comment 2:** Galab appears to have better skill at predicting returns.

Mithai recently decided to give all the analysts at the firm a refresher on the fundamental law of active portfolio management. Details of a hypothetical unconstrained fund is shown in Exhibit 2.

**Exhibit 2: Hypothetical Fund**

| | |
|---|---|
| Information coefficient | 0.14 |
| Monthly active bets | 5 |
| Active risk | 4.32% |

8. (B) 10.

**Explanation**

The extended law states that:

Active return = TC × IC × √(BR) × active risk

10.8% = 0.8 × 0.222 × √(BR) × 5.6%

BR = 120(annual), Galab is making 10 bets per month.

(Module 40.4, LOS 40.e)

**Related Material**

SchweserNotes - Book 5

9. (C) None.

**Explanation**

Both comments are incorrect. Phasar has higher information coefficient, which indicates better skill at predicting results. Phasar has also a lower transfer coefficient, which indicates that it is a more restrained fund.

(Module 40.3, LOS 40.c)

**Related Material**

SchweserNotes - Book 5

10. (B) **4.68%.**

**Explanation**

The expected level of active return achieved by a portfolio is calculated as follows:

$E(R_A) = TC(IC)\sqrt{(BR)}\,\sigma_A$

where:

TC = transfer co-efficient

IC = information co-efficient

BR = number of independent active bets taken per year

$\sigma_A$ = active risk

In an unconstrained portfolio, the transfer co-efficient is equal to 1. Therefore the active return generated by the fund will be:

$E(R_A) = 1 \times 0.14 \times \sqrt{60} \times 4.32\% = 4.68\%$

(Module 40.3, LOS 40.c)

**Related Material**

SchweserNotes - Book 5

11. (B) **fall.**

**Explanation**

If an actively managed portfolio is not subject to investment constraints, its transfer co-efficient will be equal to 1, reflecting the manager's ability to achieve optimal active weight in the portfolio. If constraints are imposed, the transfer co-efficient will be between 0 and 1. Given active return is positively related to the transfer co-efficient, the imposition of constraints must lead to a reduction in expected active return.

(Module 40.3, LOS 40.c)

**Related Material**

SchweserNotes - Book 5

12. (B) **A closet index fund has a low Sharpe ratio.**

**Explanation**

A closet index fund will have Sharpe ratio close to the benchmark's Sharpe ratio. The Sharpe ratio is for a portfolio is indeed unaffected by addition of cash or leverage to the portfolio. However, information ratio does change as we add cash or leverage to the actively managed portfolio. Investors can combine benchmark portfolio and active portfolio to obtain optimal level of active risk for them.

(Module 40.2, LOS 40.b)

**Related Material**

SchweserNotes - Book 5

13. (B) 2.0%

Explanation

$E(R_A) = (TC)\, IC \sqrt{BR}\, \sigma_A = (0.50)(0.08)\sqrt{100}\,(0.05) = 0.02$ or 2%

(Module 40.3, LOS 40.c)

**Related Material**

SchweserNotes - Book 5

14. (C) As Grenkin makes fewer bets per year, he requires a higher information coefficient on each bet than Fortina to achieve the same information ratio.

Explanation

$(IR) = IC \times \sqrt{BR}$

As a stock selector, Fortina makes many more bets per period and has a much larger breadth. She therefore requires a lower information coefficient than Grenkin to achieve the same information ratio. Grenkin requires a higher coefficient.

Grenkin $0.75 = IC \times 4^{1/2}$ $IC = 0.75/2 = 0.375$

Fortina $0.75 = IC \times 20^{1/2}$ $IC = 0.75/14.14 = 0.053$

(Note: Calculations are not required)

(Module 40.4, LOS 40.e)

**Related Material**

SchweserNotes - Book 5

15. (C) 0.4

Explanation

$SR_P = [SR_B^2 + IR^2]^{1/2} = [0.35^2 + 0.20^2]^{1/2} = 0.4031$

(Module 40.2, LOS 40.b)

**Related Material**

SchweserNotes - Book 5



16. (A) TC = 1

Explanation

TC = 1 if the active portfolio has no constraints.

(Module 40.3, LOS 40.c)

**Related Material**

SchweserNotes - Book 5

17. (B) –13%

Explanation

If active risk is limited to 6%, the deviation from the benchmark weights of 80% and 20% is limited to 6%/18% or 33%. Hence when Griffith is bullish about industrials, the weight to that sector will be 80% + 33% or 113% and the weight to utility sector will be 20% – 33% or –13%.

(Module 40.4, LOS 40.e)

**Related Material**

SchweserNotes - Book 5

18. (C) **A market timer who uses independent information to make predictions about market movements on a monthly basis and has an information ratio of 0.20 must have an information coefficient higher than a stock selector with the same information ratio who follows 10 stocks and revises his forecast quarterly**

**Explanation**

Unconstrained Information ratio (IR) = IC x $\sqrt{BR}$

Market timer: $0.20 = IC \times 12^{1/2}$ IC = 0.20 / 3.464 IC = 0.058

Selector: $0.20 = IC \times 40^{1/2}$ IC = 0.20 / 6.325 IC = 0.032

The market timer has a lower breadth. In order to achieve the same information ratio he must have a higher information coefficient. Note calculations not required.

(Module 40.4, LOS 40.e)

**Related Material**

SchweserNotes - Book 5

19. (C) **6%**

**Explanation**

Information ratio (IR) = 1.6% /8% = 0.2

Optimal level of active risk = $\sigma^*_A = \frac{IR}{SR_B}\sigma_B = \frac{0.2}{0.35}(10.5) = 6\%$

Active risk of Zeta fund = 8%

Weight of Zeta fund = 6% / 8% = 0.75

Weight of benchmark = 0.25

(Module 40.2, LOS 40.b)

**Related Material**

SchweserNotes - Book 5

20. (A) **1.26%**

**Explanation**

Portfolio return = $R_P = \Sigma(w_{Pi}) \times E(_{Ri})$ = 11.70%

Benchmark return = $R_B = \Sigma(w_{Bi}) \times E(R_i)$ = 10.44%

Active return = $R_P - R_B$ = 11.70% – 10.44% = 1.26

(Module 40.1, LOS 40.a)

**Related Material**

SchweserNotes - Book 5

21. (B) **0.25**

**Explanation**

Information Ratio = active return / active risk = 1.6% / 8% = 0.2

Optimal level of active risk = $\sigma^*_A \frac{IR}{SR_B}\sigma_B = \frac{0.2}{0.35}(10.5) = 6\%$

Active risk of Zeta fund = 8%

Weight of Zeta fund = 6% / 8% = 0.75

Weight of benchmark = 0.25

(Module 40.2, LOS 40.b)

**Related Material**

SchweserNotes - Book 5

**22. (A) 0.23**

**Explanation**

Information ratio =

IR = (TC) IC $\sqrt{BR}$ = (0.75) (0.05) $\sqrt{36}$ = 0.225

(Module 40.3, LOS 40.c)

**Related Material**

SchweserNotes - Book 5

**23. (C) will choose the manager with the highest information ratio.**

**Explanation**

Value added is independent of the level of risk aversion. All investors will choose the manager with the highest information ratio. Those with higher levels of risk aversion will implement the strategy less aggressively (i.e., invest a larger proportion in the benchmark portfolio).

(Module 40.3, LOS 40.d)

**Related Material**

SchweserNotes - Book 5

**24. (B) 86%**

**Explanation**

Grieve's breadth assuming independent bets = 10 x 12 = 120

Information ratio assuming independent bets = IC$\sqrt{BR}$ = 0.20 x $\sqrt{120}$ = 2.19

If the bets are correlated, BR = $\frac{N}{1+(N-1)r} = \frac{120}{1+(120-1)0.45} = 2.20$

New information ratio assuming correlated bets IC$\sqrt{BR}$ = 0.20 x $\sqrt{2.20}$ = 0.30 % reduction = 1 – 0.30/2.19 = 86.4%

(Module 40.4, LOS 40.f)

**Related Material**

SchweserNotes - Book 5

**25. (B) 5.48%**

**Explanation**

IC = 2(0.55) – 1 = 0.10

Combined active risk = $\sigma_C = [\sigma_1^2 - 2\sigma_1\sigma_U r_{IU} + \sigma_U^2]^{1/2}$

$= [0.13^2 + 0.025^2 - 2\,(0.13)(0.025)(-0.20)]^{1/2} = 0.1372$ or 13.72%

Annualized active risk = $0.1372 \times (4)^{1/2} = 0.2744$ or 24.44%

Annualized active return = IC x $\sqrt{BR} \times \sigma_A = 0.10 \times (4)^{1/2} \times 0.2744$

= 0.0548 or 5.48%

Alternatively,

Active return from this strategy using a probability weighted average (given Griffith makes correct calls 55% of time) of combined risk is:

(0.55)(0.1372) + (0.45)(–0.1372) = 0.0137 or 1.37% per quarter.

Annual active return = 1.37% x 4 = 5.48%.

(Module 40.4, LOS 40.e)

**Related Material**

SchweserNotes - Book 5

**26. (B) 14%**

**Explanation**

IR = (TC) IC $\sqrt{BR}$ = (0.90) (0.07) $\sqrt{49}$ = 0.441

For a constrained portfolio, the optimal level of residual risk can be computed as:

$\sigma^*_A = (IR/SB_B)\sigma_B = (0.441 / 0.40)(0.12) = 13.23\%$

(Module 40.3, LOS 40.c)

**Related Material**

SchweserNotes - Book 5

**27. (C) Breadth**

**Explanation**

Breadth is the number of independent bets (based on unique information) made per year by the active manager.

(Module 40.3, LOS 40.c)

**Related Material**

SchweserNotes - Book 5

Ufton Wealth Management's Ranger fund has proved popular with clients. An extract from the prospectus of the Ranger fund is shown in Exhibit 1.

**Exhibit 1: Ranger Fund**

| Asset | Portfolio weight | Benchmark weight | Expected portfolio return | Expected benchmark return |
|---|---|---|---|---|
| U.S. equities | 15% | 20% | 11% | 9% |
| U.S. corporate bonds | 35% | 35% | 8% | 7% |
| International equities | 8% | 40% | 14% | 10% |
| U.S. real estate | 42% | 5% | 7% | 7% |

Ufton awards its best performing fund manager with a large cash bonus each year. Details of the performance of three funds is shown in Exhibit 2. Risk-free rate is 2%.

**Exhibit 2: Selected Fund Performance**

| Fund | Portfolio return | Benchmark return | Portfolio standard deviation | Benchmark standard deviation | Sharpe ratio | Tracking error |
|---|---|---|---|---|---|---|
| Saltire | 8.46% | 5.80% | 6.13% | 4.50% | 1.05 | 1.58% |
| Dragon | 13.01% | 11.56% | 7.64% | 5.15% | 1.44 | 2.12% |
| Rose | 11.39% | 11.37% | 11.01% | 11.14% | 0.85 | 0.21% |

**28. (B) –0.09%.**

**Explanation**

The expected active return achieved by a portfolio are calculated as the difference between the expected return on the portfolio and the expected return on the benchmark:

$E(R_A) = \Sigma w_{Pi} \times E(R_{Pi}) - \Sigma w_{Bi} \times E(R_{Bi}) = E(R_P) - E(R_B)$

**Exhibit 1: Ranger Fund**

| Asset | Portfolio weight | Benchmark weight | Expected portfolio return | Expected benchmark return |
|---|---|---|---|---|
| U.S. equities | 15% | 20% | 11% | 9% |
| U.S. corporate bonds | 35% | 35% | 8% | 7% |
| International equities | 8% | 40% | 14% | 10% |
| U.S. real estate | 42% | 5% | 7% | 7% |

$E(R_P) = (0.15 \times 11\%) + (0.35 \times 8\%) + (0.08 \times 14\%) + (0.42 \times 7\%) = 8.51\%$

$E(R_B) = (0.20 \text{ x } 9\%) + (0.35 \text{ x } 7\%) + (0.40 \text{ x } 10\%) + (0.05 \text{ x } 7\%) = 8.60\%$

$E(R_A) = -0.09\%$

(Module 40.1, LOS 40.a)

**Related Material**

SchweserNotes - Book 5

29. (A) **security selection.**

**Explanation**

The active return on a portfolio can be deconstructed to assess how much of the active return comes from active weighting, and how much comes from security selection.

The active return from active weighting is calculated by taking the sum of the active weights of each asset class multiplied by the benchmark return of the asset class:-

$R_{A(\text{from active weights})} = \Sigma\Delta_{wi}R_{Bi}$

For the Ranger fund:

$R_{A(\text{from active weighs})} = (-0.05 \times 9\%) + (0 \times 7\%) + (-0.32 \times 10\%) + (0.37 \times 7\%)$

$= -1.06\%$

The active return from security selection is calculated by taking the sum of the weight each asset class in the portfolio multiplied by the difference in portfolio return on the asset class and the benchmark return on the asset class:

$R_{A\ (\text{from security selection})} = \Sigma_{wi}(R_{Pi} - R_{Bi})$

For the Ranger fund:

$R_{A(\text{from security selection})} = (0.15 \times 2\%) + (0.35 \times 1\ \%) + (0.08 \times 4\%) + (0.42 \times 0\%) = 0.97\%$

Of the total active return of –0.09%, active weighting has a negative contribution (1.06%), whereas security selection has a positive impact of 1.06%.

(Module 40.1, LOS 40.a)

**Related Material**

SchweserNotes - Book 5

30. (A) **Saltire.**

**Explanation**

The information ratio measures the active return ($R_P - R_B$) per unit of active risk (tracking error).

The information ratio for each fund is calculated as follows:

Saltire: (8.46% – 5.80%) / 1.58% = 1.68

Dragon: (13.01 – 11.56%) / 2.12% = 0.68

Rose: (11.39% – 11.37%) / 0.21% = 0.10

(Module 40.2, LOS 40.b)

**Related Material**

SchweserNotes - Book 5

31. (C) **Rose.**

**Explanation**

A closet index fund is a fund, which is presented as being actively managed but covertly tracks the underlying benchmark index. It will achieve little active return and be exposed to little active risk, will have a low information ratio, and will have a Sharpe ratio close to the Sharpe ratio of the underlying benchmark. The Sharpe ratio is calculated as excess return over the risk-free asset per unit of portfolio risk: $(R_P - R_F) / \sigma_p$. Sharpe ratios for each fund's benchmark are calculated below $(R_B - R_F) / \sigma_B$:

Saltire: (5.80% – 2%) / (4.50%) = 0.84

Dragon: (11.56% – 2%) / (5.15%) = 1.86

Rose: (11.37% – 2%) / (11.14%) = 0.84

The Rose fund has the lowest information ratio of the three funds, and its Sharpe ratio (0.85) is very close to that of its benchmark (0.84). It is therefore most likely to be a closet index fund.

(Module 40.2, LOS 40.b)

**Related Material**

SchweserNotes - Book 5

Radina Radichkova, CFA, is considering investing in one of three actively managed funds whose benchmark is the FTSE 100. The Sharpe ratio and standard deviation of the benchmark are 0.50 and 15%, respectively.

| | Alpha | Bankso | Crystal |
|---|---|---|---|
| Active return | 3.2% | 2.8% | 12.5% |
| Active risk | 4.1% | 3.6% | 15.5% |

Radichkova is also analysing an actively managed portfolio consisting of financials and pharmaceuticals. The following table shows the weight and returns of the benchmark and portfolio:

| Sector | WB | WP | RB | RP |
|---|---|---|---|---|
| Financials | 50% | 70% | 9.2% | 17.8% |
| Pharmaceuticals | 50% | 30% | 8.1% | 6.3% |

Radichkova makes the following comments about the two-sector portfolio:

**Comment 1:** The value added is 5.7%.

**Comment 2:** The asset allocation decision only accounts for 0.22% of the value added.

Radichkova is writing a summary of the fundamental law of active management. In that section of the report, she states that the transfer coefficient can be viewed as the correlation between:

1. ex-ante active returns and actual active weights
2. risk-weighted optimal active weights and risk-weighted actual active weights
3. ex-ante active returns and realized active returns

32. (C) 0.95.

**Explanation**

First, find out which fund has the highest information ratio (IR) as IR = active return / active risk. This would be Crystal with an IR of 0.806. Then apply the following formula to discover the + combined Sharpe ratio (SR):

$SR^2_P = SR^2_B + IR^2$

$SR_P^2 = 0.52 + 0.8062 = 0.8996, SR_P = 0.9485$

(Module 40.2, LOS 40.b)

**Related Material**

SchweserNotes - Book 5

33. (C) 156%.

**Explanation**

We first compute the optimal level of risk:

$$\sigma_A = \frac{IR}{SR_B}\sigma_B, \text{ therfore}, \sigma_A = \frac{0.806}{0.5} = 0.15 = 0.242$$

This implies a weight in Crystal of 0.242 / 0.155 = 156%.

(Module 40.2, LOS 40.b)

**Related Material**

SchweserNotes - Book 5

34. (B) Both.

**Explanation**

Both comments are correct.

The return of the portfolio is 70% × 17.8 + 30% + 6.3% = 14.35%.

The return of the benchmark is 50% × 9.2% + 50% × 8.1% = 8.65%

Value added = 14.35 – 8.65 = 5.7%.

Return from asset allocation is (70% – 50%) x 9.2% + (30% – 50%) x 8.1% = 0.22% (i.e., active weights times benchmark returns).

This implies that return from stock selection is 5.7 – 0.22 = 5.48%.

Let us check that:

70% × (17.8% – 9.2%) + 30% x (6.3% – 8.1%) = 5.48% (i.e., portfolio weights times active returns).

(Module 40.1, LOS 40.a)

**Related Material**

SchweserNotes - Book 5

**35. (A) 1 and 2.**

**Explanation**

The first two are correct definitions whereas number 3 is the definition of the information coefficient.

(Module 40.3, LOS 40.c)

**Related Material**

SchweserNotes - Book 5

**36. (B) – 0.80%**

**Explanation**

Portfolio return = $R_P = \Sigma(w_{Pi}) \times E(R_{Pi}) = 9.10\%$

Benchmark return = $R_B = \Sigma(w_{Bi}) \times E(R_{Bi}) = 9.90\%$

Active return = $R_P – R_B$ = 9.10% - 9.90% = –0.80%

(Module 40.1, LOS 40.a)

**Related Material**

SchweserNotes - Book 5

**37. (B) 13.75%**

**Explanation**

Darent will select the manager with the highest information ratio – or Alfred.

IR (Alfred) = 3/12 = 0.25

R(Brad) = 2.2/11 = 0.20

IR(Charles) = 2.0/10.50 = 0.19

Expected active return = $E(R_A) = IR \times \sigma_A$ = 0.25 x 11 = 2.75%.

Expected return = $E(R_B) + E(R_A)$ = 11% + 2.75% = 13.75%

(Module 40.3, LOS 40.d)

**Related Material**

SchweserNotes - Book 5

**38. (C) – 1.40%**

**Explanation**

| Asset Class (i) | Portfolio Weight ($w_{Pi}$) | Benchmark Weight ($w_{Bi}$) | Benchmark Return $E(R_{Bi})$ | Active Return Weight($\Delta w_i$) | ($\Delta w_i$) ($E(R_{Bi})$) |
|---|---|---|---|---|---|
| Industrials | 30% | 40% | 12% | – 10% | – 1.20% |
| Financials | 50% | 30% | 5% | 20% | 1.00% |
| Utilities | 20% | 30% | 12% | – 10% | – 1.20% |

(Module 40.1, LOS 40.a)

**Related Material**

SchweserNotes - Book 5

39. (C) **The information ratio will fall by approximately 30%**

**Explanation**

Information ratio (IR) = IC x $\sqrt{BE}$

Hence a reduction in the breadth from 160 (40 x 4) to 80 (40 x 2) will cause an approximate 30% drop in the IR

With quarterly predictions IR = IC x $160^{1/2}$ = 12.65 (IC)

With semi-annual forecasts IR = IC x $80^{1/2}$ = 8.94 (IC)

8.94IC / 12.65IC = 0.701

Hence the Information Ratio will fall by approximately 30%. Note that full calculation is not required. Given that IR changes with the square root of breadth, a 50% drop in breadth must cause a less than 50% drop in IR. Note that it does not matter if the portfolio is constrained or unconstrained.

(Module 40.3, LOS 40.c)

**Related Material**

SchweserNotes - Book 5

40. (B) TC<1

**Explanation**

When we impose constraints on portfolios, the actual active weights ($\Delta w_i$) will differ from optimal active weights ($\Delta w_i^*$) and TC<1.

(Module 40.3, LOS 40.c)

**Related Material**

SchweserNotes - Book 5