Interpretation of Information ratio with illustrations covering few scenarios

Information Ratio is useful to measure the consistency of superior risk-adjusted returns generated by the fund as compared to its benchmark.

To calculate the information ratio, we first consider 3-year monthly returns. We break the 3 year period in to 36 monthly returns observations.

Step 1: Gather Portfolio and Benchmark Returns

To start, collect historical return data for both the portfolio and the benchmark. Since we are working with monthly returns over three years, we should have 36 data points (months).

Marahla	Portfolio Return	Benchmark Return	
Month	(%)	(%)	
1	-2.34	-3.11	
2	3.45	4.03	
3	-1.56	-0.81	
4	-3.19	-3.52	
5	-4.37	-5.05	
6	8.99	9.68	
7	3.78	4.15	
8	-2.40	-3.54	
9	5.34	4.83	
10	3.31	3.81	
11	-2.98	-3.44	
12	-2.51	-2.63	
13	-1.43	-2.05	
14	-0.75	0.38	
15	3.88	4.17	
16	4.25	3.51	
17	4.28	3.72	
18	3.37	3.09	
19	-0.55	-1.70	
20	2.76	1.82	
21	-1.75	-2.72	
22	7.33	6.09	
23	6.97	8.07	
24	0.98	0.58	
25	1.55	1.98	
26	2.25	1.64	
27	2.23	2.01	
28	0.10	0.33	
29	7.42	7.05	
30	4.33	4.22	
31	2.18	1.30	

Example Data:

32	1.82	2.32
33	-7.34	-6.54
34	0.34	0.17
35	-1.59	-1.89
36	-0.73	-1.67

Note: Ensure that returns are in the same frequency i.e. monthly. If you mix different frequencies, results may be misleading.

Step 2: Compute Monthly Excess Returns

For each month, calculate the excess return by subtracting the benchmark return from the portfolio return: *Excess Return = Portfolio Return – Benchmark Return*

Month	Portfolio Return	Benchmark Return	Excess Return
Month	(%)	(%)	(%)
1	-2.34	-3.11	0.77
2	3.45	4.03	-0.58
3	-1.56	-0.81	-0.75
4	-3.19	-3.52	0.33
5	-4.37	-5.05	0.68
6	8.99	9.68	-0.69
7	3.78	4.15	-0.37
8	-2.40	-3.54	1.14
9	5.34	4.83	0.51
10	3.31	3.81	-0.50
11	-2.98	-3.44	0.46
12	-2.51	-2.63	0.12
13	-1.43	-2.05	0.62
14	-0.75	0.38	-1.13
15	3.88	4.17	-0.29
16	4.25	3.51	0.74
17	4.28	3.72	0.56
18	3.37	3.09	0.28
19	-0.55	-1.70	1.15
20	2.76	1.82	0.94
21	-1.75	-2.72	0.97
22	7.33	6.09	1.24
23	6.97	8.07	-1.10
24	0.98	0.58	0.40
25	1.55	1.98	-0.43
26	2.25	1.64	0.61
27	2.23	2.01	0.22
28	0.10	0.33	-0.23
29	7.42	7.05	0.37
30	4.33	4.22	0.11
31	2.18	1.30	0.89
32	1.82	2.32	-0.49
33	-7.34	-6.54	-0.80

34	0.34	0.17	0.16
35	-1.59	-1.89	0.30
36	-0.73	-1.67	0.94

This series of excess returns will be used in the upcoming steps.

Step 3: Calculate Cumulative Returns for the Fund & Benchmark

Cumulative return represents the total growth of the portfolio and the benchmark over the period. This calculation gives a single number representing the total return over the entire period.

<u>Formula</u>

Cumulative Return =
$$\prod_{i=1}^{n} (1 + R_i) - 1$$

= $(1 + R_1)(1 + R_2) \cdots (1 + R_n) - 1.$

Where:

 R_i = Return in each period (in this case, returns generated in each month) (in percentage)

n= *Total number of periods* (in this case, total number of months i.e. 36)

The cumulative returns over the entire period is:

Portfolio Cumulative Return: 56.55%

Benchmark Cumulative Return: 45.61%

In Excel, use Product Formula for the series of monthly returns i.e.

Cumulative Returns = (*Product*(1+'*Monthly Series Data Points*')-1)

in Note: Cumulative returns are not annualized returns. They simply show how much the portfolio and benchmark have grown over the given time frame.

Step 4: Compute Annualized returns for the Fund & Benchmark

Since we are dealing with monthly returns, we must annualize them to make them comparable to yearly performance metrics.

Formula to calculate annualized return-

Annualized returns = $((1+R/100)^{1/n-1})$

R = cumulative return (from Step 3)

n = total number of years (3 in this case)

Portfolio and Benchmark Annualized return is:

Portfolio Annualized Return: 16.11%

Benchmark Annualized Return: 13.34%

Step 5: Calculate the Standard Deviation of Excess returns

The standard deviation of excess returns measures how much the portfolio's outperformance fluctuates over time.

Formula

$$s = \sqrt{\frac{(x_i - \bar{x})^2}{n - 1}}$$

X_i = Each individual data point (in this case, excess returns generated every month)

 \overline{X} = mean (average) of the data set (in this case, average excess returns generated in 36 months)

n= number of data points (in this case, number of months i.e. 36)

The standard deviation of excess returns is:

Monthly Standard Deviation: **0.67%**. In Excel, for Monthly Standard Deviation use formula *STDEV*(*Monthly Series Data*)

Since we have monthly data, we must annualize the standard deviation by multiplying it by $\sqrt{12}$, Annualized Standard Deviation: **2.31**%.

In Excel, for Annualised Standard Deviation use formula STDEV(Monthly Series Data)*SQRT12

Step 6: Compute the Information Ratio

Finally, calculate the Information Ratio (IR) using the formula:

Information Ratio (IR) = (Portfolio Return – Benchmark Return) / Standard Deviation of Excess Return

where:

Numerator = Difference between the annualized portfolio return and the annualized benchmark return (from Step 4).

Denominator = annualized standard deviation of excess returns (from Step 5).

Calculation

Information Ratio (IR) = (16.11%-13.34%) / 2.31% = 1.20

The Information Ratio (IR) for this portfolio is 1.20.

Various Scenarios of Information Ratio and its interpretation

To better understand the Information Ratio, let's consider different scenarios.

Let's say you're evaluating the performance of a mutual fund scheme that primarily invests in the equity market. The fund's benchmark is the Nifty 50, which represents the performance of the top 50 stocks on the National Stock Exchange (NSE).

Assumption

To maintain clarity and simplicity in the illustrations, the calculation details have been omitted from the scenarios below. However, the same calculation process as outlined above is applied.

a) <u>Scenario 1</u>

Portfolio Return: In the last 5 years (Form 31st Jan 2020 to 31st Jan 2025), the fund generated an annualized return of **14**%

Benchmark Return: During the same period, the Nifty 50 index delivered an annualized return of 12%

Standard Deviation of Excess Return: The annualized volatility of the fund's return relative to its benchmark is calculated to be **8%**.

Now, let's calculate the Information Ratio:

Information Ratio (IR) = (14% – 12%) / 8% = 0.25

In this example, the Information Ratio (IR) is 0.25.

In this case, the IR of 0.25 suggests that for every 1% of risk taken (measured by the standard deviation of excess return), the fund has able to generate an additional 0.25% return over the benchmark.

Interpretation

- An IR greater than 0 indicates that the portfolio has been able to outperform the benchmark on a risk-adjusted basis.
- However, it also shows that even though the fund has able to outperform the benchmark, the incremental returns generated is relatively low as compared to the amount of risk taken. (8% Standard Deviation of Excess Return)

b) <u>Scenario 2</u>

Portfolio Return: In the last 3 years (Form 31^{st} Jan 2022 to 31^{st} Jan 2025), the fund generated an annualized return of 8%

Benchmark Return: During the same period, the Nifty 50 index delivered an annualized return of 12%

Standard Deviation of Excess Return: The annualized volatility of the fund's return relative to its benchmark, is calculated to be **5%**.

Calculation of the IR of the above scenario

Information Ratio (IR) = (8% – 12%) / 5% = -0.80

In this example, the Information Ratio (IR) is -0.8.

This means that for every 1% of risk taken (Standard Deviation of Excess Return), the fund has underperformed the benchmark by 0.80%.

Interpretation

- A negative IR suggests that the fund manager has not been able to generate excess returns as compared to the benchmark despite taking on risk. (5% Standard Deviation of Excess Return)
- The underperformance also implies that the fund manager's investment choices have not been able to add significant value and thus have failed to generate excess returns.

c) <u>Scenario 3</u>

Portfolio Return: In the last 10 years (Form 31st Jan 2015 to 31st Jan 2025), the fund generated an annualized return of **15**%

Benchmark Return: During the same period, the Nifty 50 index delivered an annualized return of **12**%

Standard Deviation of Excess Return: The annualized volatility of the fund's return relative to its benchmark is calculated to be **2**%.

Calculation of the IR of the above scenario

Information Ratio (IR) = (15% – 12%) / 2% = 1.50

In this example, the Information Ratio (IR) is 1.50.

This means that for every 1% of risk taken (measured by the standard deviation of excess return), the fund has able to generate an additional 1.5% return over the benchmark.

Interpretation

- An IR or 1.50 suggests that, the fund manager is making smart and efficient active bets that are generating consistent outperformance
- The fund is not only beating the benchmark, but it's doing so in an efficient manner by taking lower risk. (2% Standard Deviation of Excess Return)

d) <u>Scenario 4</u>

Portfolio Return: In the last 5 years (Form 31st Jan 2020 to 31st Jan 2025), the fund generated an annualized return of **-12**%

Benchmark Return: During the same period, the Nifty 50 index delivered an annualized return of **-6**%

Standard Deviation of Excess Return: The annualized volatility of the fund's return relative to its benchmark is calculated to be **10%**.

Calculation of the IR of the above scenario

Information Ratio (IR) = ((-12%) - (-6%)) / 10% = -0.6

In this example, the Information Ratio (IR) is -0.6.

This means that for every 1% of risk taken (measured by the standard deviation of excess return), the fund has able to generate a negative return of -0.6% over the benchmark.

Interpretation

- The fund underperformed the benchmark despite both delivering negative returns, showing that the active bets taken by the fund manager failed to add any significant value.
- The fund took on a significant amount of risk (10% standard deviation of excess return) but failed to generate excess returns.
- An IR of -0.6 also suggests that, the underperformance was not due to random fluctuations but was fairly consistent over time.

e) <u>Scenario 5</u>

Portfolio Return: In the last 3 years (Form 31st Jan 2022 to 31st Jan 2025), the fund generated an annualized return of -5%

Benchmark Return: During the same period, the Nifty 50 index delivered an annualized return of **-7**%

Standard Deviation of Excess Return: The annualized volatility of the fund's return relative to its benchmark is calculated to be **4**%.

Calculation of the IR of the above scenario

Information Ratio (IR) = ((-5%) - (-7%)) / 4% = 0.5

In this example, the Information Ratio (IR) is 0.5.

This means that for every 1% of risk taken (measured by the standard deviation of excess return), the fund has been able to generate 0.5% of excess return over the benchmark.

Interpretation

- An IR greater than 0 indicates that the portfolio has outperformed the benchmark after adjusting for risk.
- In this case, even though the fund has generated negative returns, it performed better than the benchmark, indicating the fund manager's ability to add value by taking relatively lower risk. (4% Standard Deviation of Excess Return)
