Interpreting the Information Ratio

Cameron Clement, CFA
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The Information Ratio is a widely used and powerful tool for evaluating manager skill. In this paper, we attempt to foster a better understanding of the ratio, explaining its development and superiority over its antecedent, the Sharpe Ratio. We discuss how the ratio should be interpreted and outline how it pertains to Cornerstone Investment Partners and its process. Finally, some popular criticisms are challenged; and while caution in using the ratio is advised, it remains arguably the most robust tool for evaluating manager skill.

Background

The Information Ratio was established to address the shortcomings of the reward-to-variability ratio (now known as the Sharpe Ratio) first expounded by William Sharpe in 1966. The Sharpe Ratio introduced a method of assessing manager performance relative to risk taken. Risk, in this case, refers to volatility of returns as is generally accepted in Modern Portfolio Theory. It is calculated as follows:

$$Sharpe - Ratio = \frac{R_p - R_f}{stdev(R_p)}$$

Where: R_p = *return of portfolio*
R_f = *risk-free rate*

Illustration

The table below shows a simple example of the advantage of using the Sharpe Ratio over relative return analysis.

	Manager A	Manager B	Risk Free Rate
Year 1	5.0%	6.0%	5.0%
2	-2.0%	8.0%	5.0%
3	5.0%	10.0%	5.0%
4	-3.0%	8.0%	5.0%
5	25.0%	6.0%	5.0%
6	8.0%	-2.0%	5.0%
7	4.0%	-1.0%	5.0%
8	2.0%	2.0%	5.0%
9	5.0%	8.0%	5.0%
10	5.0%	8.0%	5.0%
Annualized Return	5.2%	5.2%	5.0%
Standard Deviation	7.7%	3.1%	
Sharpe Ratio	0.02	1.91	

Source: Cornerstone Investment Partners

On a relative return basis the two managers look the same. However, further analysis shows that all of Manager A's excess return came in one year, whereas the excess returns of Manager B were far more consistent. Manager A's outperformance, therefore, would seem to be more a function of luck than skill. The Sharpe Ratio picks up on this by adjusting excess returns for the volatility of returns and rightly shows Manager B more favorably.

Issues with the Sharpe Ratio

Probably the biggest issue with the Sharpe Ratio, as it relates to active management, centers on the use of a risk-free rate. This places all managers on a level playing field regardless of style. The IR, by introducing an appropriate benchmark, addresses this issue.

	Return	**Risk**
Sharpe Ratio	Relative to risk-free rate	Total
IR	Relative to appropriate benchmark	Active

The development of this modern form of the IR is widely credited to Treynor and Black (1973). It measures the manager's excess return over an appropriate benchmark relative to the standard deviation of those excess returns. By computing risk on a relative return basis, the IR effectively eliminates market risk, showing only risk taken from active management. Therefore, in one simple number, the IR shows how a manager has performed per unit of active risk taken.

$$Information - Ratio = \frac{R_p - R_B}{stdev(R_p - R_B)}$$

Where: R_p = *Return of Portfolio*
R_b = *Return of Benchmark*

An Improved Analysis

Returning to our original example, we replace the risk-free rate with an appropriate benchmark. Say Manager A is a large-cap core manager and mostly invests in stocks in the S&P 500 and Manager B is a small-cap manager investing largely from the Russell 2000. The table on the next page highlights the frailties of the Sharpe Ratio.

	Manager A (large cap)			Manager B (small cap)		
Information Ratio	**0.86**			**0.44**		
Sharpe Ratio	**0.02**			**1.91**		
	Returns	S&P 500	Excess Return	Returns	Russell 2000	Excess Return
Year 1	5.0%	3.0%	2.0%	6.0%	-4.0%	10.0%
2	-2.0%	-4.0%	2.0%	8.0%	8.0%	0.0%
3	5.0%	2.0%	3.0%	10.0%	15.0%	-5.0%
4	-3.0%	-5.0%	2.0%	8.0%	7.0%	1.0%
5	25.0%	23.0%	2.0%	6.0%	5.0%	1.0%
6	8.0%	8.0%	0.0%	-2.0%	-5.0%	3.0%
7	4.0%	6.0%	-2.0%	-1.0%	-3.0%	2.0%
8	2.0%	-3.0%	5.0%	2.0%	3.0%	-1.0%
9	5.0%	3.0%	2.0%	8.0%	7.5%	0.5%
10	5.0%	5.0%	0.0%	8.0%	3.0%	5.0%
Annualized Return	5.2%	3.5%		5.2%	3.5%	
Standard Deviation of Excess Returns			1.9%			3.9%

Source: Cornerstone Investment Partners

Both managers outperformed their respective benchmarks by the same amount, but Manager A did so with less tracking error. Assuming both benchmarks are appropriate, Manager A now shows less volatility in excess returns suggesting a greater skill in stock picking reflected by a higher IR. In this way, "the IR is a powerful tool for assessing the skill of an active manager" (Goodwin, 1998) and is "one of the most important performance measures in the investment management industry" (Grinold, 1989).

Interpreting the Information Ratio

The first way we can interpret the IR stems from the concept of a "zero-sum game" as it relates to active investing. Sharpe (1991) put forward his assertion that, "before costs, the return on the average actively managed dollar will equal the return on the average passively managed dollar." For this assertion to hold, two assumptions must be made. First, each active manager is only investing from within the passive index. This assumption probably does not apply to the real world; however, to the extent that a benchmark should be appropriate it ought to be mostly true. Second, Sharpe does not include management fees. If he did, then the average actively managed dollar would actually be lower than the passively managed dollar.

Extending this assertion, we could deduce that an active manager with positive excess returns is above average (even more so if fees are included). This time, we are extending our set of assumptions to include a normal distribution around the passive investor. As this assertion relates to the IR, given that the denominator (standard deviation) cannot be negative, a positive IR implies positive excess returns, *ergo,* an above-average manager.

To extend any interpretation beyond this would involve broad generalizations spanning different market environments, investment styles, and time periods. This, though, did not stop Grinold and Kahn (1995) asserting that an IR above 0.50 is "good," above 0.75 is "very good," and above 1.0 is "exceptional". While it is not clear whether these breakpoints were determined empirically, they did also report that about 10 percent of all IRs lie above 1.0 and the table below seems to have taken hold as the industry standard.

Percentile	Information Ratio	Manager Skill
90	1.0	Exceptional
75	0.5	Good
50	0.0	Above Average
25	-0.5	
10	-1.0	

Goodwin (1998) challenged this wisdom examining the IR of managers with 10 years of unbroken returns from 1986 to 1995. Observations were split into six different styles: Core, Value, Growth, Small Cap, International and Bonds. Goodwin noted that no manager in four of the six styles had an IR greater than 1.0 and less than 3% of the managers in the other two would have been considered "exceptional." Furthermore, there were not even any "good" managers in two of the styles and less than 21% in three of the styles. Goodwin concluded that sustaining a high IR over a substantial length of time appears to be a tougher proposition than suggested by Grinold and Kahn. Not noted by Goodwin, but a further challenge to Grinold and Khan's contention, were the large differences in mean IRs across the different styles.

	Information Ratio vs. S&P 500	
	Last 3 years	Last 5 years
5th %ile	1.29	1.09
25th %ile	0.72	0.62
Median	**0.35**	**0.38**
75th %ile	0.02	0.12
95th %ile	-0.39	-0.25
# of Observations	269	247

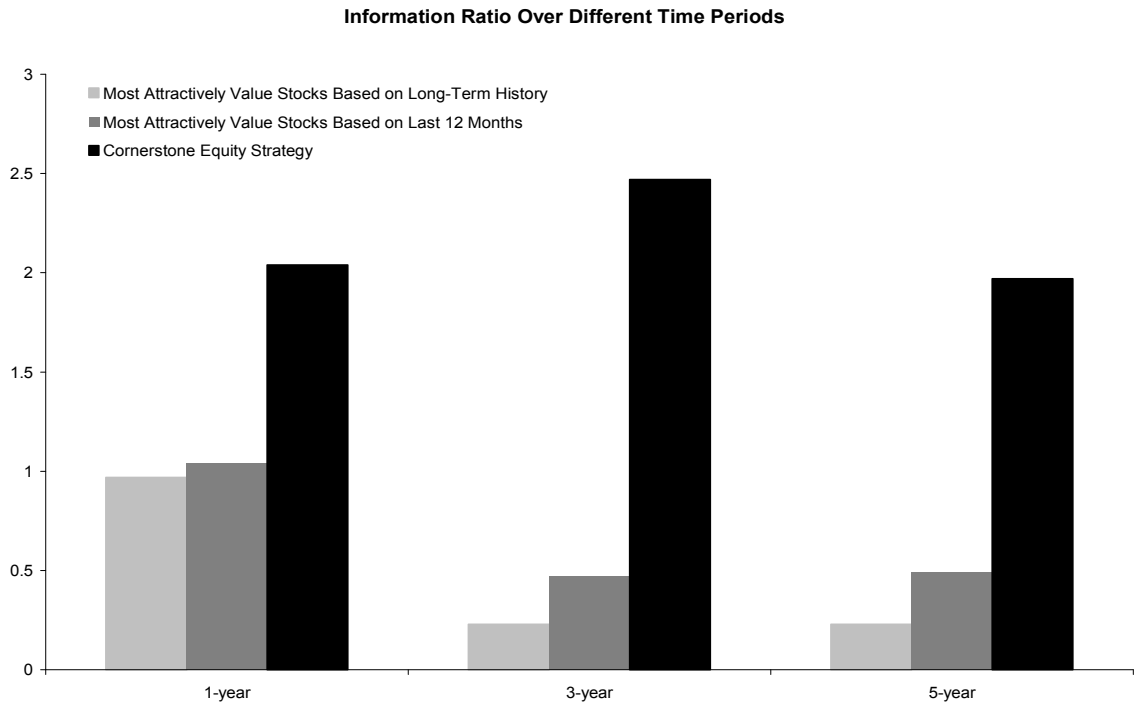
Source: eVestment Alliance, data as of 09/30/2009

The table above shows data that would seem to contradict our earlier statement that a positive IR means an above average manager - how can more than 75% of all managers be above average? Inherent in our assertion was the assumption of a normalized distribution around the passive index, which is not usually the case in an unusual and flat market. Another, and perhaps more significant, factor working against our assertion is survivorship bias. The table above would seem to indicate that a number of active managers went out of business following underperformance, a massive market sell-off, or most likely some combination of the two.

Cornerstone Investment Partners and the Information Ratio

Cornerstone's Fair Value Model™ is a powerful tool. The extent by which the most attractively valued stocks have outperformed the less attractively valued stocks over the last 22 years is a testament to that, so much so that one question often put forward is "why not just buy the most attractively ranked stocks?"

This question is valid, but the evidence shows the IR can be improved significantly through fundamental research. The chart below illustrates that the "model-only" IR would fall near the "good" category. The addition of fundamental research catapults the IR to above 2.0 for five years and 2.5 for three years.



Source: Cornerstone Investment Partners, data as of 09/30/2009

As could be expected, stocks that look the most attractive relative to their past are often at substantial risk of an earnings collapse (value trap), bankruptcy, or simply an inability to repeat their record. The chart above is proof that correct interpretation of the Fair Value Model™ combined with rigorous fundamental research has substantially eliminated these risks without giving up return.

Criticisms of the Information Ratio

The main criticisms of the IR relate to the fact that it is an *ex-post* measure of two dynamic variables (risk and return) that can differ greatly over time. Inherent in this criticism is a belief that the past is no indication of the future.

Vanguard Study

A recent Vanguard paper tested this assumption. Vanguard examined 2,301 managers over a three-year period from 1997 to 1999. They found that the median IR of the top 100 managers (top 4%) for the time period was 0.63 (more ammunition against Grinold and Kahn). Studying those same managers over the subsequent three-year period yielded a median IR of -0.47. While they used this study to highlight what they believe is a major shortcoming of the IR, they conceded in their conclusion that, "these observations are not criticisms of the IR, but only of its misuse."

Even Good Managers Can Have Bad Times

While it should be noted that past results are not necessarily indicative of future results, Vanguard's study should be challenged, not least because of the short time periods employed. We used a Monte Carlo simulation of 1000 iterations randomizing returns of a so-called "good" manager (IR = 0.5) over 40 years to test this. Returns were randomized around the standard deviation of excess returns applying the Empirical Rule whereby:

- 68% of excess returns over the time period fell within the implied annual excess return plus or minus one standard deviation
- 95% within two standard deviations and
- 100% within three standard deviations (rounding up for simplicity)

Under this random scenario, we found it more likely than not that even this "good" manager would underperform *3 years in a row* at some point in the next 40 years. These results highlight the danger of working with relatively short time periods and also that it is a statistical certainty that even "good" managers will underperform for varying periods of time.

Concluding Remarks

The old adage, "past results may not be indicative of future results" has persisted because it has merit. If a number of managers set out to beat a benchmark, some will beat it due to skill and some will beat it due to luck. The challenge is to separate random luck from skill. As the skilful manager's performance is likely to persist, the lucky (or unskilled) manager is more likely to fall from the top to the bottom the longer the game is played.

While even the skilful manager may underperform for certain time periods, we believe that a superior investment process will deliver outperformance over the long-term. Cornerstone's investment process has improved an already "good" IR over time by both increasing outperformance and reducing risk. Furthermore, while historical returns are backward looking, the risk component of the IR can be estimated on an *ex-ante* basis. This *ex-ante* estimated tracking error has shown less drift than the excess return component. Predictability increases further the more faithfully the investment process is applied. In this way, the IR offers the outside observer information beyond a simple relative return analysis. While it is problematic to analyze on an absolute basis, in that there is no sound definition of what a "good" IR is, it remains a useful and widely used tool for assessing manager skill and has improved on the prior standard measure, the Sharpe Ratio.

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CAMERON CLEMENT, CFA, INVESTMENT ANALYST

Cameron is a research analyst with a range of responsibilities including stock research, model maintenance and analysis, special projects, and trading. Prior to joining Cornerstone, Cameron was a Quantitative Analyst with Invesco Global North America in the Multiple Asset Strategies team. He also served on the Investment Analytics team working on the proprietary equity investment model. Prior to this, Cameron was a member of the U.S. Large Cap Value team. Working with John Campbell, they achieved top decile results. Cameron is a graduate of the University of Strathclyde with Joint Honours in Finance and French.

Appendix 1 – Cornerstone IR Relative to Peers

The table below was put together using only data supplied by an independent outside source. It shows the percentile breakpoints for Cornerstone's relevant universe over the last 3 and 5 years. 269 products are included for the last 3 years and 247 for the last 5 years. The data at the foot of the table specifically highlight where Cornerstone ranked relative to its peers over these time periods. The extent to which Cornerstone is an outlier is evident and while we would urge caution that the past is not necessarily indicative of the future, we would also stress that our investment process has served our partners well for decades; it does not change and is strictly adhered to regardless of the market environment.

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Median	**0.35**	**0.38**
75th %ile	0.02	0.12
95th %ile	-0.39	-0.25
# of Observations	269	247
Cornerstone IR	2.47	1.97
Cornerstone Rank	1	1

Source: eVestment Alliance, data as of 09/30/2009