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Managing Portfolio Turnover

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Turnover is a much maligned requirement of investment management. Often, investors assume that high turnover is inherently bad, or that managers with very low turnover have the best stock-picking skills. High turnover managers are often seen as “traders”, whereas low turnover managers are often seen as investors. Of course, the reality is never that simple.

Turnover can be seen as a means of capturing the rapidly evolving information which is characteristic of today’s investment market. Given this reality, it’s easy to see that even the best stock picker will experience high turnover rates if he or she is responding to rapidly evolving information. Conversely, a “trader” will have very low turnover in the absence of new information.

Turnover is also a function of the return horizon of the forecasting models. Forecasts which reach their information peak one month from the prediction date will undergo significant revisions each time new information is received. Forecasts which reach their information peak six months from the forecast date will undergo smaller revisions as new information is received; the vast majority of the forecast remains valid, and a small minority should be reflective of the new information. Thus, the turnover rate for these forecasts should be approximately six times less than the forecasts with a one month information peak.

How then do we measure how current the information in our portfolios is? How can we adjust our rate of turnover to accommodate the ebb and flow of information which affects our forecasts? Clarke, de Silva, and Thorley suggest using a portfolio’s *transfer coefficient* – the relationship between predicted return and portfolio weight – to measure portfolio “freshness”¹.

Portfolio managers are tasked with maximizing active returns for a given risk profile. Active return is simply the portfolio return minus the benchmark return, and is determined by the active weight of each security times the security’s excess return. Active returns are created by taking a positive active weight in securities which outperform the benchmark, and taking negative active weights in securities which underperform the benchmark. As Clark, de Silva and Thorley describe, “performance in any given period is related to the cross-sectional correlation between the active security weights and realized residual (active) returns².”

Our ability to forecast these realized active returns is crucial to our success. The correlation between our forecasts for excess return and the actual excess return is known as the *information coefficient* (IC) of our signal. Increasing the information coefficient is the goal of our research efforts.



Our ability to incorporate our forecasts into a comprehensive portfolio is equally crucial to our success. The correlation between our forecasted returns and the active weights in our portfolio is known as the *transfer coefficient* (TC) of our portfolio. Maintaining the highest possible transfer coefficient is a primary goal of our portfolio management efforts.

The greater the amount of available information contained in the portfolio, the higher the expected return (for a given risk level). This return per risk is known as the *information ratio* (IR). Maximizing the information ratio is the primary goal of the combined investment team. In fact, the Fundamental Law of Active Management tells us that if we are able to incorporate all available information into our portfolio (i.e., transfer coefficient = 1.0), then the portfolio's expected information ratio is

$$IR = IC \sqrt{N}$$

where N is the “breadth”, or number of independent bets in the portfolio. *(The breadth is typically determined by the benchmark and risk tolerance specified by the client, and is very difficult for the manager to control.)*

Note, this is a type of ceiling on the information ratio; transfer coefficient of less than one will lower the information ratio as seen in the generalized fundamental law

$$IR = IC \sqrt{N} * (TC)$$

There are several limiting factors which prevent TC from approaching one. I'll present a few of the limiting factors to illustrate the level of transfer we can expect to see in a typical long-only portfolio. We'll review a typical Large Cap core portfolio. *(We should first note that because portfolio optimizers typically use a multifactor model to approximate the correlation matrix of security returns, the maximum transfer coefficient achieved by an optimizer will be close to - but not equal to - one³.)*

While the Fundamental Law assumes a transfer coefficient of one, limiting the portfolio's tracking error to 4% versus the S&P 500 and imposing a long-only constraint renders the assumption invalid. One cannot achieve a transfer coefficient higher than .62 even when these two seemingly minimal constraints are imposed.

To understand why this is true, consider the long-only constraint. Since benchmarks constituents are weighted by market capitalization, the long-only constraint limits the negative exposure to a stock expected to deliver negative active return. Consider two 5 stock portfolios, one with a long-only constraint:

Table 1

	Forecast	% Bmrk	%Long-Only	%Active	%L/S	%Active
Stock1	3	45%	50%	5%	50%	5%
Stock 2	1	35%	38%	3%	38%	3%
Stock 3	0	15%	11%	-4%	15%	0%
Stock 4	-1	4%	1%	-3%	1%	-3%
Stock 5	-3	1%	0%	-1%	-4%	-5%
Transfer Coefficient				0.69		1.00

In the long/short portfolio, we are able to make full use of our information by selling the stock short, and hence achieving a larger negative active underweight. However, in the long-only portfolio, we cannot take full advantage of our negative forecast for the smallest stock in the benchmark; its underweight is limited to -1%. This prevents the transfer coefficient from approaching 1.0.

Applying the style constraints necessary to deliver a true core portfolio limits the transfer coefficient even further. A portfolio might take an underweight position in a software stock with a positive forecast in order to reduce an overweight in the technology sector, for example. Table 2 captures the effect of imposing a series of sequential constraints typically used in managing a long-only core large-cap portfolio.

Table 2

Portfolio Constraint	Active Risk	TC	IR	Alpha
None	17.67%	.945	1.69	3.00
Tracking Error	3.99%	.728	1.30	2.73
Long-Only	3.99%	.619	1.11	1.66
Beta	3.99%	.619	1.11	1.66
Style	3.99%	.391	0.70	1.43
Sectors	3.99%	.391	0.70	1.43

*S&P 500 universe, IC assumed to be .08

A portfolio manager must find a way to maximize the informational content of the portfolio under the constraints imposed by the investment agreement.

Ronald Kahn (then of Barra) notes that an information ratio of 0.5 or higher is indicative of very successful (top quartile) manager⁴. Referring to Table 2, we see that this is achievable even given the typical constraints. Using the generalized fundamental law, we can solve for the minimum transfer coefficient required to maintain the top quartile ranking:

$$IR = IC \sqrt{N} * (TC)$$

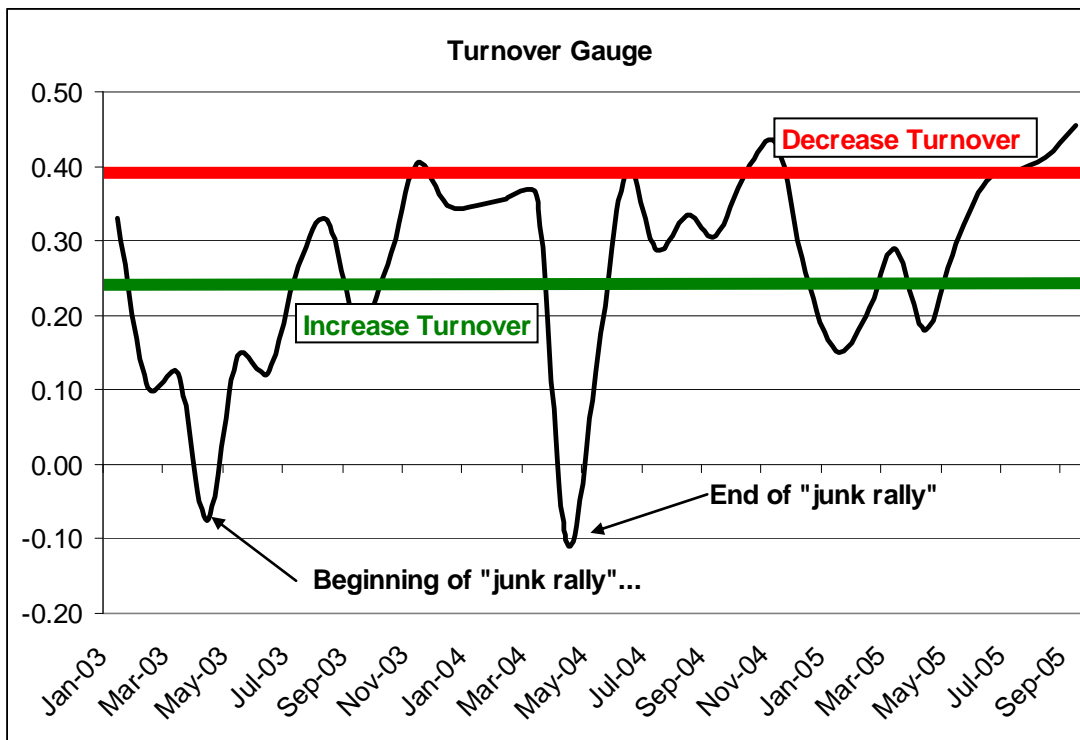
$$.5 = .08 \sqrt{500} * (TC) \text{ therefore}$$

$$\text{minimum TC} = .28$$

Using this as the floor, and the approximate ceiling of .39 derived in Table 2, we arrive at the optimal range for the portfolio's transfer coefficient.

As we discussed earlier, maintaining the optimal transfer coefficient level in the face of rapidly evolving information (and hence changing forecasts) can be challenging. The proper level of turnover is that which allows us to maximize the informational content of the portfolio net of the transaction costs required to maintain that level of information. Knowing that *on average* our forecasts' peak information coefficient is reached with a holding period of between 9 and 12 months, we can assume an *average* turnover range of 100% - 133% per annum should allow optimal performance.

Below, we show an example of how transfer coefficient can be used to determine the appropriate level of turnover. When the transfer coefficient is within the acceptable range of .28 and .39, turnover remains in the average range. When forecasts are slowly changing and the portfolio continues to hold a high level of information (i.e., TC > .39), we can slow portfolio turnover to less than 100%. However, when information flow picks up dramatically and transfer coefficient drops below the .28 floor (as was the case during the "junk" rally of 2003), turnover should be increased in order to increase the information contained within the portfolio.





Conclusion

The occurrence of new information about a stock does not hold in a steady state; information flow varies widely over time. Being able to turn a portfolio over more rapidly when new information is occurring rapidly and “saving our gunpowder” when there is a dearth of information is critical to providing optimal risk-adjusted performance. Using the transfer coefficient to determine when to increase or decrease portfolio turnover is an excellent means of ensuring portfolios reflect current information as efficiently as possible.

¹ Clarke, Roger, Harindra de Silva, and Steven Thorley. 2002. “Portfolio Constraints and the Fundamental Law of Active Management.” *Financial Analysts Journal*, vol. 58, no. 5 (September/October):48–66.

² Ibid

³ Ibid

⁴ Kahn, Ronald. 1999. *Seven Quantitative Insights into Active Management*, pg. 10.

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