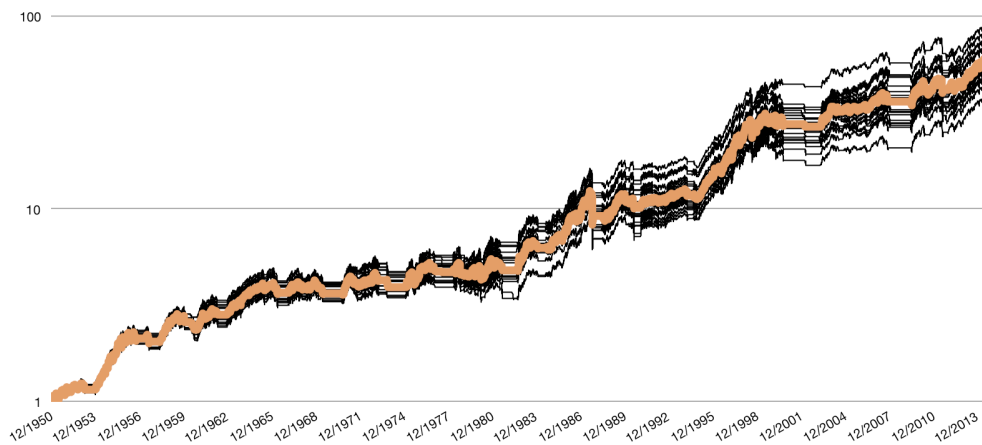


The What & Why of Portfolio Tranching



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- The *frequency* of portfolio rebalancing is often well thought out, but the exact date of rebalancing is not
- Portfolios constructed with identical methodologies but rebalanced on different days show considerably different total return profiles over time
- In our constructed example, over a 65 year period, this rebalance timing luck accounted for a potential total return difference of 5800 percentage points.
- Tranching is a technique that helps mitigate the impact of timing luck.

Introduction: What is *Timing Luck*?

Asset management due diligence places heavy emphasis on “Process and People”: the methodology behind how a portfolio is constructed and the qualifications of the people designing and executing that process. Process due diligence usually starts with high-level investment philosophy and works down to portfolio execution decisions.

“How often do you rebalance?” is a commonly asked question. The *frequency* with which a portfolio is rebalanced is often well thought out, creating a balance between the quickness that the portfolio can adapt to new market dynamics with the desired turnover and tax efficiency of the portfolio. The date upon which most portfolios rebalance often lines up with a standard calendar time window: weekly, monthly, quarterly, et cetera. Strategies then usually rebalance on the first or last days of these periods. But robustness testing around this selection is infrequent at best. The choice of rebalancing date, however, can have a massive impact – potentially hundreds of basis points a year – on the total return profile of any strategy.

The Impact of Timing Luck: An Example

To demonstrate the impact that the rebalance date can have, we will construct a simple tactical trading strategy. The strategy will compare the price of the S&P 500 Index to its trailing 200-day moving average. The portfolio will be fully invested in the index when its price is above its 200-day moving average¹, otherwise the portfolio will hold cash. The portfolio will reevaluate this rule every 21 trading days².

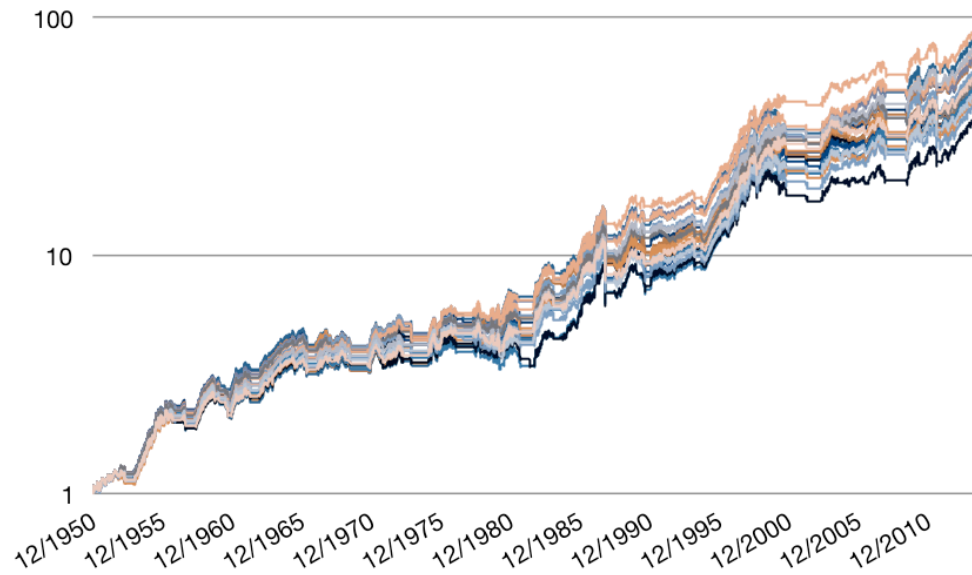
With a 21-day rebalance frequency, 21 separate strategy equity curves can be calculated (portfolio 1 rebalances on the 1st trading day of each month, portfolio 2 rebalances on 2nd trading day, et cetera)³. We will call this set of possible portfolios the *offset portfolios*. The variance in total return results among the offset portfolios is demonstrated in the equity curves below:

“OFFSET PORTFOLIOS”
The set of portfolios that can be constructed using an identical construction methodology and rebalance frequency, but are rebalanced on unique days.

¹ A total return index is utilized in these calculations

² For the convenience of calculations, instead of adhering to a strict calendar cycle, each portfolio is rebalanced on a 21 trading-day cycle.

200-DMA Tactical Strategy Offset Portfolio Equity Curves



5800 PERCENTAGE POINTS

The total return difference between the best performing and the worst performing offset portfolios over the 65-year back-test period

The variance in total returns above is dependent entirely on *when* certain market events occurred within a given 21-day period. For example, consider the scenario where the market sharply sells off at the end of the month, causing the S&P 500 Index to plunge below its 200-day moving average, only to recover shortly thereafter at the beginning of the next month. In this scenario, only those strategies rebalancing near the end of the month would be affected by the whipsaw – the remainder would passively ride out the turbulence. How particular market events fall around a portfolio’s rebalance frequency can have a significant impact on the total return profile: an effect we call *timing luck*.

The spread between the offset portfolios highlights the tremendous impact of timing luck. Over the 65-year back-test of our example strategy, the difference in total return of the best performing equity curve and the worst exceeds 5800 percentage points. Yet the strategies are identical: this difference is accounted for *only* by *when* each portfolio was selected to rebalance.

Rebalance Day	Annualized Return	Annualized Volatility	Annualized Return to Volatility
1st	6.95%	10.83%	0.64
2nd	7.24%	10.84%	0.67
3rd	6.96%	10.60%	0.66
4th	7.07%	10.79%	0.66

5th	6.73%	11.19%	0.60
6th	6.58%	11.09%	0.59
7th	7.24%	10.70%	0.68
8th	6.96%	10.58%	0.66
9th	6.20%	11.44%	0.54
10th	6.49%	11.31%	0.57
11th	6.79%	10.89%	0.62
12th	6.40%	11.03%	0.58
13th	6.49%	11.16%	0.58
14th	6.47%	11.35%	0.57
15th	6.44%	11.52%	0.56
16th	6.31%	11.52%	0.55
17th	6.63%	11.01%	0.60
18th	6.46%	10.96%	0.59
19th	5.95%	10.93%	0.54
20th	6.31%	10.88%	0.58
21 st	6.18%	11.00%	0.56

Guarding Against Timing Luck with Portfolio Tranching

Now that we have demonstrated the significant impact that the date of rebalancing can have upon both a portfolio's construction and its total return profile, the question is, "what can we do about it?" Mathematically, we want to find a method through which we can construct a portfolio that minimizes the volatility due to timing luck.

We propose that one such solution is *portfolio tranching*, whereby a strategy invests equally across all of its offset portfolios.

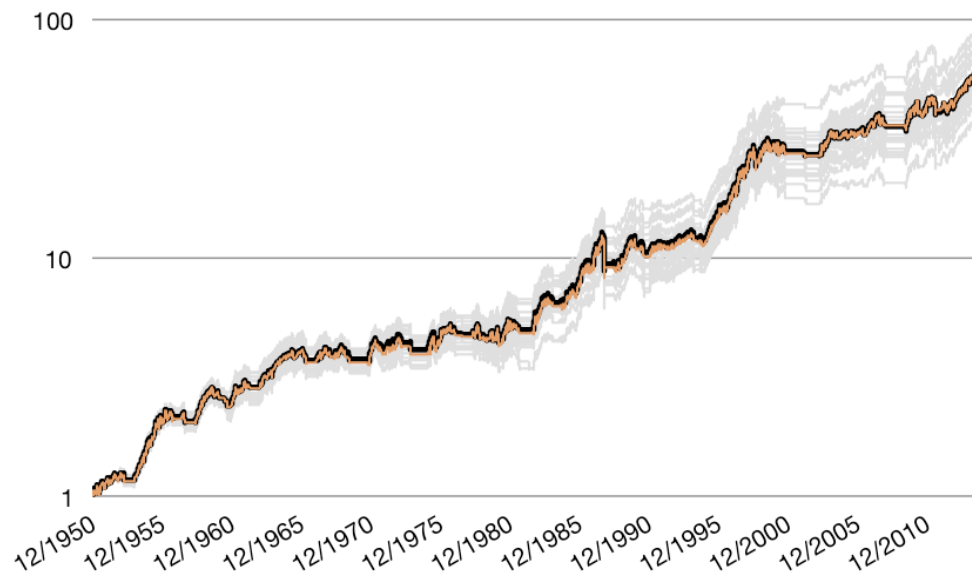
Using our prior 200 day moving average tactical timing model example, we can test the impact that tranching has on strategy results. In a purely theoretical model, we would use all 21 offset portfolios and rebalance back to equal-weight daily. Unfortunately, in the real world, this is not a pragmatic solution. Therefore, we will use four equally spaced offset portfolios (e.g. offset portfolios #1, #6, #11 and #16) and rebalance back to equal weight on a weekly basis.

Below we plot the individual offset portfolios (light gray), the average offset portfolio (black), and the portfolio constructed using the tranching methodology (orange) described above. We can see that even using just four of the offset portfolios by and large eliminates any significant deviation from the set average.

A PORTFOLIO-OF-PORTFOLIOS

Tranching utilizes a portfolio-of-portfolios approach to effectively average out the impact of timing luck, balancing the good luck with bad luck to seek the true, long-term strategy expected return.

Equity Curves of Tactical Offset Portfolios, Their Average, and a Tranching Portfolio



Most convenient about this methodology is that operationally we need not actually treat construction like a portfolio-of-portfolios. Rather, we can estimate an equal-weight exposure to each offset portfolio by constructing a single portfolio on a weekly basis that is merely the *average* of the underlying weights of portfolios generated over the current and prior three weeks. In practice, this is how Newfound Research implements tranching within its own portfolios.

IN PRACTICE

In practice, average weights across offset portfolios can be estimated and only a single portfolio held that will still closely track the long-term expected average.

Conclusion

While the frequency of rebalancing is a common topic for due diligence of an investment strategy, the date of rebalancing often goes ignored.

In this paper, we introduce the concept of *offset portfolios*: portfolios generated by an identical strategy with identical rebalancing frequency, but whose date of rebalance is offset by a consistent period of time. For example, a set of portfolios rebalanced monthly, but with one rebalanced on the 1st of the month, another on the 2nd, another on the 3rd, et cetera. In the context of tactical, factor, and strategic portfolios, we utilize these offset portfolios to demonstrate the massive impact that rebalance timing luck can have on total return performance.

We then introduce the concept of portfolio tranching: a simple methodology based on constructing an equal-weight portfolio-of-portfolios of the individual offset portfolios. Finally, we demonstrate the impact that tranching has on reducing timing luck in the construction of tactical portfolios.

Timing luck has massive implications for performance evaluation. Ultimately, unless accounted for, results demonstrated on both a back-tested as well as a live basis may be massively skewed by this factor. The effects are so powerful that two managers, following identical strategies, may have markedly different performance results over time. One may be bestowed with praise for their alpha-generating abilities and the other may be fired for perceived underperformance, based solely on when they each chose to rebalance their portfolios.

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