Can You Beat the Market?
Evaluating a Simple Investment Strategy
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The nineties were fantastic years for buy and hold investors. Holding a portfolio that was allocated in stocks and bonds provided tremendous returns. For example, a portfolio of 80% S&P 500 combined with 20% bonds earned a 16.3% return with only an 11.3% standard deviation, for an eye-popping Sharpe ratio of 1.00.[1] Those are Warren Buffet-like results. In these heady years one need only to rebalance yearly and go fishing. These results, however, allowed the recency bias to set in—the tendency to weigh recent years more heavily than distant years when forming expectations about future returns. In discussing the euphoria that leads to market crashes, Ken Rogoff and Carmen Reinhart referred to it as the "This Time Is Different" syndrome in their book of the same name.[2] Many people just assumed that the great returns would continue because "this time is different." Unfortunately, the tremendous gains by investors during the 1990s were balanced by the tremendous losses that came in 2000-2002 and in 2008.

Diversification works well during normal times to protect one's portfolio against typical market corrections. But diversification fails in times of crisis when the asset return correlations move toward one. This leaves investors scrambling for ways to control risk. Mebane Faber proposed a well-known and simple strategy to address the issue of risk management.[3] Faber's strategy is a form of trend following or timing. Trend following is criticized by proponents of the Efficient Market Hypothesis or EMH (we once considered trend following slightly more scientific than astrology). The EMH asserts that all information relevant to an asset price is already reflected in the price, so it can't be under-valued or over-valued. As a result, one can't consistently earn above-market profits. However, Faber's strong results (and those of others) speak for themselves.[4] The results are consistent with the presence of the momentum anomaly.

Anomalies in this context refer to outcomes that are at odds with the predictions of the EMH. The momentum anomaly occurs when the best performing stocks in one period continue to perform above the overall market in a subsequent period. The same applies to the worst performing stocks. Buying these winners and selling the losers would therefore be an effective way of earning above-market profits. Momentum has been documented in multiple studies going as far back as Victorian England.[5] Jegadeesh and Titman were the first to rigorously test the anomaly.[6] They found that stock winners or losers for the past three-to-twelve months continue to win or lose for the subsequent three-to-twelve month period. The

six-to-twelve month period delivered the best returns, and the magnitude of the effect made it twice as strong as the value anomaly, documented a year earlier by Fama and French. [7]

THE TIMING STRATEGY, DATA, AND METHODOLOGY

Given the strength of the anomaly, a natural extension is to form portfolios designed to exploit the anomaly. Several approaches have been proposed.[8] Faber used an asset class approach made up of five equally weighted assets: the S&P 500, the Morgan Stanley Capital International Europe, Australasia, and Far East Index (MSCI EAFE), 10-Year U.S Government Bonds, the Goldman Sachs Commodity Index (GSCI), and the National Association of Real Estate Investment Trusts index (NAREIT).[9] He then used an old and easily recognized trend-following strategy to decide when to buy or hold, and when to sell an asset class:

Buy Rule: Buy or hold an asset if monthly price > 10-Month Simple Moving Average

Sell Rule: Sell and move into cash if the monthly price < 10-Month Simple Moving Average[10]

In a world that is often ruled by irrational exuberance and irrational pessimism, this strategy has some advantages. It has a simple, purely mechanical logic that takes the emotion out of buying and selling decisions. The same model and parameters applies to all asset classes, and is price-based only. The mechanical details are as follows:

1. All entry and exit prices are on the day of the signal at the close. The model is updated on a monthly basis and on the last day of the month. Any other price fluctuations during the month are ignored.

2. All data series are total return series including dividends, updated monthly.

3. Cash returns are estimated using the 90-day Treasury bills price.

4. Taxes, commissions, and slippage are excluded.

Each asset class averages one round-trip move per year so turnover is small. Using data from Global Financial Data, Faber tested this method on a portfolio made up of five asset classes, equally weighted to see how they compared to the traditional "buy and hold" approach.[11] All asset classes are available inexpensively via ETFs. His findings, updated by us through 2011, are shown below.

	S&P 500	MSCI EAFE	10-Year Bond	GSCI	NAREIT
Buy&Hold 1973-2011					
Return	9.57%	9.66%	8.26%	8.88%	9.41%
Volatility	15.80%	17.57%	8.57%	20.15%	18.20%
Sharpe (6%)	0.23	0.18	0.25	0.14	0.19
Maximum Drawdown	-50.95%	-56.40%	-15.79%	-67.64%	-67.89%
Best Year	37.58%	69.94%	39.31%	74.96%	48.97%
Worst Year	-37.00%	-43.06%	-9.50%	-46.49%	-42.23%
Timing 1973-2011					
Return	10.18%	10.49%	7.84%	11.01%	12.47%
Volatility	11.79%	12.61%	7.29%	16.74%	11.65%
Sharpe (6%)	0.35	0.36	0.29	0.31	0.56
Maximum Drawdown	-23.26%	-23.45%	-14.20%	-37.96%	-20.89%
Best Year	37.58%	69.94%	39.31%	74.96%	48.97%
Worst Year	-15.53%	-13.80%	-12.86%	-22.05%	-14.92%

With the exception of bonds, the timing method outperforms buy and hold in every aspect. To see if this method worked over a longer time-frame we went back 170 years with the S&P Index/S&P 500. One finds a similar outcome.

S&P Index/S&P 500

	B&H	Timing
1840-2011 Return	8.77%	9.33%
1840-2011 STD	16.54%	11.47%
Max Drawdown	-83.46%	-50.29%
Sharpe Ratio	0.17	0.29
Best Year	66.72%	66.72%
Worst Year	-43.47%	-26.86%

The timing strategy delivered better risk-adjusted returns in eleven out of seventeen decades and better overall returns in ten out of seventeen decades. It does not always beat "buy and hold," but it does more often than not.

Faber created two portfolios consisting of the five asset classes he researched. This "core portfolio" as we call it had equal distributions of 20%. One portfolio employed a "buy and hold" strategy, and the other the timing strategy described above. Both portfolios were rebalanced on a monthly basis. Even though the results of the "buy and hold" portfolio were respectable due to the benefits of diversification, the results of the timing strategy within an asset allocation framework were tremendous. The exhibit below illustrates his findings updated through 2011.

Faber's Portfolio, 1973-2011		
	B&H	Timing
Return	9.92%	11.12%
Volatility	10.14%	7.00%
Sharpe Ratio	0.39	0.73
Max Drawdown	-46.00%	-9.56%
Best Year	26.03%	25.60%
Worst Year	-30.01%	-0.52%

These results are consistent with those of the timing method applied to the individual indices. Absolute return, risk adjusted returns, volatility, and drawdown are significantly improved using the timing strategy. The worst year is basically flat—a remarkable feat. And there was only one down year.

BEYOND FABER'S FINDINGS

In this section we extend Faber's original findings. In the past two decades the great returns realized by emerging market investors has made exposure to this asset class a small yet growing staple within many investors' portfolios. Applying the timing strategy to an Emerging Market total return data series going back to 1973 yielded results consistent with the other asset classes tested.

Emerging Markets 1973-2011		
	B&H	Timing
Return	12.73%	14.10%
Volatility	21.98%	16.32%
Sharpe (6%)	0.31	0.50
Maximum Drawdown	-61.44%	-31.97%
Best Year	79.02%	74.84%
Worst Year	-53.18%	-23.49%

The next step was to add Emerging Markets equity to Faber's core portfolio:

1973-2011		
	Faber's Core	CorEM
Return	11.12%	11.63%
Volatility	7.00%	7.20%
Sharpe Ratio	0.74	0.78
Max Drawdown	-9.56%	-11.31%
Best Year	25.60%	25.83%
Worst Year	-0.52%	-4.58%

Return on the portfolio increased and the Sharpe ratio slightly increased. However volatility, the worst year, and maximum drawdown increased. Overall it is a mixed bag, not significantly different than what Faber found.

Other asset classes offered attractive risk/return and correlation characteristics using both "buy and hold" and timing strategies. Among many candidates the most promising ones included emerging market debt and Treasury Inflation-Protected Securities (TIPs).[12] TIPs are a good diversifier, having a negative or zero correlation with most of the core portfolio assets. Over this period the timing method underperformed "buy and hold." This is consistent with the earlier findings from traditional bonds. Emerging market debt generated a slightly higher timing return than "buy and hold," and it also generated a significantly lower volatility and drawdown, and a higher Sharpe ratio.

Buy and Hold		
	TIPs 1997-2011	Emerging Market Bonds 1994-2011
Return	7.40%	10.5%
Volatility	6.97%	12.1%
Sharpe (4%)	0.63	0.54
Maximum DD	-11.3%	-31.4%
Timing		
1996-2011*	TIPs 1997-2011	Emerging Market Bonds 1994-2011
Return	4.7%	10.9%
Volatility	7.0%	8.4%
Sharpe (4%)	0.25	0.82
Maximum DD	-12.9%	-14.4%

*TIPs start 7/97

After adding these assets we designed several portfolios. The following ones were the best in terms of Sharpe Ratio or overall return. The compositions for each portfolio are listed below. Since TIPs are only available starting in 1997, we went back only fifteen years and also had to change the composition of the portfolio for part of the period.

	SharpeMan*	AlphaSeeker**	CorEM	Faber's Core
S&P 500	16.67%	20.0%	16.67%	20.0%
EAFE	16.67%	20.0%	16.67%	20.0%
10 Year Bonds	16.67%		16.67%	20.0%
Commodities			16.67%	20.0%
Real Estate	16.67%	20.0%	16.67%	20.0%
Emerging Market Equity		20.0%	16.67%	
Emerging Market Bonds	16.67%			
TIPS Buy and Hold	16.67%	20.0%		

*S&P500+EAFE+Real Estate+Bonds+EMB from 7/95-6/99
**S&P500+EAFE+Real Estate+EM from 7/95-6/99

Before discussing the portfolios, a word of caution and clarification is needed. Approximately 30-35% of the time one will not be in a particular asset class but in cash. So when one sees 20% allocated to a particular asset class, that really is closer to 13-14% because that part of the portfolio will be in cash one-third of the time. That also means that nervousness about AlphaSeeker having no money in bonds is unwarranted because over time the portfolio will be 30% cash.

Back-testing some portfolios, including both assets, generated attractive risk/return characteristics relative to the previous timing portfolios. All of our modified portfolios offered better worst years and comparable or lower maximum drawdowns (the largest peak-to-trough fall). They all outperformed Faber's Core from 2005-2010, which includes the crash year. The SharpeMan portfolio had the distinction of having no losing years over the past fifteen, in addition to an outstanding Sharpe ratio. However it should also be clear that we did not significantly out-perform Faber's original portfolio, with the possible exception of SharpeMan.

15 years*	SharpeMan	AlphaSeeker	CorEM	Faber's Core
Returns	10.1%	11.2%	11.0%	11.6%
Volatility	4.2%	7.7%	6.3%	6.6%
Maximum DD	-4.8%	-11.6%	-11.0%	-6.9%
Sharpe (4%)	1.46	0.94	1.12	1.16
Best Year	18.1%	21.3%	17.8%	20.9%
Worst Year	1.0%	-2.0%	-5.4%	-6.4%

10 years*	SharpeMan	AlphaSeeker	CorEM	Faber's Core
Returns	9.0%	11.9%	10.4%	9.8%
Volatility	4.2%	8.9%	7.4%	6.7%
Sharpe (3%)	1.42	1.00	0.99	1.03

*to 6/30/11

The portfolios we develop offer a range of new options and further diversification gains. They offer good potential but generate their great attractiveness by limiting losses during bad years. The most recent five-year period is perhaps the most impressive.

5 years*	SharpeMan	AlphaSeeker	CorEM	Faber's Core
Returns	7.9%	10.5%	9.0%	7.6%
Volatility	5.5%	11.1%	8.9%	8.4%
Sharpe (3%)	0.90	0.68	0.67	0.55

*to 6/30/11

TIMING AND ENDOWMENTS

Faber suggested that, given the short-term capital gains taxes that one would pay because of the frequent selling relative to "buy and hold," the timing strategy is best suited for a tax-advantaged environment.[13] The most common types of tax-advantaged accounts are retirement accounts and endowments. We consider the endowment possibility here. This strategy could prove quite valuable for colleges and universities with small endowments. There is a negative correlation between the size of an endowment and its long-term performance, as the table below shows. Small colleges lack the funds to hire dedicated staff to manage the endowment. Particularly large endowments have the ability to purchase illiquid assets such as timber or private equity and ride out the highs and lows of these asset classes—yet another luxury small colleges cannot afford.

Average Five- and 10-Year Net Returns by Endowments Size
(through June 30, 2010)

Period	Over $1 Billion	501 Million-$1 Billion	$101 Million-$500 Million	$51-$100 Million	$25-50 Million	Under $25 Million
5-year net return	4.7%	3.6%	3.0%	2.7%	2.6%	2.2%
10-year net return	5.0%	3.6%	3.3%	3.3%	2.9%	2.8%

Source: 2011 NACUBO-Commonfund Study of Endowments, p. 10[14]

We decided to see how these strategies would play out with an actual endowment—Juniata's. Juniata College, like many small colleges, experienced a roller coaster of returns over the last two decades. We acquired the data for actual endowment values and compared it to the performance had 20% of the endowment were invested in three of our timing portfolios and 80% tracked the endowment performance. Because some asset classes were unavailable cheaply, we created a portfolio called RealTime, which includes only asset classes that were easily accessible in the 1990s through mutual funds. Its composition is listed in the notes to the table. We also assumed 0.50% expenses in the 1990s and 0.25% expenses from 2000-2011. Here are the results:

(all values in millions)	1990-91	1999-00	2002-03	2008-09	2010-11
JC Endowment Actual Value	$20.1	$83.6	$50.7	$57.5	$78.2
80% Endowment/20% CorEM*	$20.1	$79.2	$53.6	$68.4	$91.9
80% Endowment /20% SharpeMan*	$20.1	$79.2	$54.3	$65.9	$87.8
80% Endowment/20% AlphaSeeker*	$20.1	$79.2	$53.7	$69.6	$95.6

*6/90-6/94: 26.67% S&P500, EAFE, REIT, 20% Bonds
 7/94-6/00: 20% each in S&P500, EAFE, REIT, Emerging Market Equity, Bonds

In all cases the addition of 20% of one of our portfolios to the endowment led to higher endowment values, in some cases considerably higher.

SUMMARY AND RECOMMENDATIONS

The evidence suggests that the strategies employed in any of our portfolios would generate strong risk-adjusted returns and significantly reduce losses during down periods. The key potential downside is a permanent loss of momentum. This is clearly possible but based on the evidence, the most likely negative

outcome would be below-market returns. According to Cornerstone Asset Management, the timing strategy is uncorrelated with the endowment, making it a good diversifier. Given the possible upside, both in terms of risk remediation and higher returns, we think this strategy is well suited for a portion of any endowment, particularly the endowment of a small college.

<u>Data Appendix</u>

Using Global Financial Data's Global Asset Allocation Database we were able to acquire the total return series for many of the asset classes used in our studies including:

- The S&P 500 – from 1840-2010
- USA 10-year Government Bond Total Return Index – from 1973-2010
- Morgan Stanley Capital International EAFE Index (Europe, Australasia, Far East Asia) – from 1973-2010
- GFD Emerging Market Equity Total Return Index – from 1973-2010
- J.P. Morgan Emerging Market Bonds Total Return Index – from 1994-2010
- US 90-day Treasury Bill Rate – from 1840-2010

Goldman Sachs Commodities Index (GSCI) - We obtained the total returns series from Standard and Poor's for 1972-2011

National Association of Real Estate Investment Trusts Index (NAREIT) – We obtained the total return series from their website, http://www.reit.com/ for 1973-2011.

Treasury Inflation-Protected Securities Index – We obtained the total return series from Barclay's Bank for 1997-2011.

The Juniata endowment values were graciously provided by the Juniata College's Vice President of Finance, Rob Yelnosky.

NOTES

1. A Sharpe ratio is a measure of return per unit of risk taken. A ratio of 1.00 is outstanding and historically never lasts more than a decade (See Mebane Faber, "Where have all the Sharpe Ratios over 1 Gone?", http://www.mebanefaber.com/2009/12/03/where-have-all-the-sharpe-ratios-over-1-gone/>), accessed 6/19/2012.
2. Carmen M. Reinhart and Kenneth Rogoff, *This Time is Different: Eight Centuries of Financial Folly* (Princeton: Princeton University Press, 2009).
3. Mebane Faber, "A Quantitative Approach to Tactical Asset Allocation," *Journal of Wealth Management,* 9 (2007): 69-79; Mebane Faber, "A Quantitative Approach to Tactical Asset Allocation" (unpublished manuscript, 2009).
4. In addition to Faber's two essays, see Peng Wang and Larry Kochard, "Using a Z-score Approach to Combine Value and Momentum in Tactical Asset Allocation" (January 29, 2011). Available at SSRN: http://ssrn.com/abstract=1726443; Mebane T. Faber, "Relative Strength Strategies for

Investing", (April 1, 2010). Available at SSRN: http://ssrn.com/abstract=158551; Gary Antonacci, "Optimal Momentum: A Global Cross Asset Approach," (unpublished manuscript, 2011).

5. Benjamin Remy Chabot, Eric Ghysels, and Ravi Jagannathan, "Price Momentum in Stocks: Insights from Victorian Age Data" (November 2008). NBER Working Paper No. w14500. Available at SSRN: http://ssrn.com/abstract=1305510; Antonacci, "Optimal Momentum."

6. Narasimhan Jegadeesh and Sheridan Titman, "Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency," *Journal of Finance*, 48 (1993): 65-91.

7. Eugene Fama and Kenneth French, "The Cross-Section of Expected Stock Returns," *Journal of Finance,* 47 (1992):427–465.

8. See Louis K C Chan, Narasimhan Jegadeesh, and Josef Lakonishok, "The Profitability of Momentum Strategies," *Financial Analysts Journal*, 55 (1999): 80-90; Andrew Clare, Svetlana Sapuric, and Natasa Todorovic, "Quantitative or Momentum Based Multi-Rotation? The UK Experience," *Journal of Asset Management*, 10 (2010): 370-381.

9. Faber, 2009, pp. 23-26.

10. Faber, 2009, p. 9

11. Faber, 2009, pp. 7-10.

12. TIPs are like traditional bonds with the exception that their coupon payment rises when inflation goes up and falls when inflation goes down. As a result the holder is protected against inflation. Emerging market bonds are just like US government bonds but they are issued by developing countries like Brazil, India, and China. Because of the higher risk of default they pay higher interest rates.

13. Faber, 2009, p. 30.

14. National Association of College and University Business Officers, "2011 NACUBO-Commonfund Study of Endowments," NC4063, available at http://www.nacubo.org/Products/Online_Research_Products/2011_NACUBO_Commonfund_Study_of_Endowments.html