

## The Perfect Stock Portfolio

The AIER-Beta Portfolio beats the market by minimizing risk and maximizing returns.

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Ask the average investor what the perfect stock portfolio would look like, and you will get an answer something like this: In bull markets, the stocks should go up faster than the market. In bear markets, they should fall less than the market, not at all, or even go up in price.

Based on AIER's study, the perfect portfolio just might be possible. The AIER-Beta Portfolio generated twice as high an annual average total return than the market, with relatively low volatility.

For more than 100 years, a stock trader's maxim has been "don't fight the market." In bull markets most stocks rise, and in bear markets they fall.

That's mostly true—but not all the time. The key to our strategy is called beta, a statistical measure of how much a stock rises or falls along with the market.

When the beta of a stock is one, for example, that means that if the market goes up by 1 percent, on average the stock goes up by 1 percent. Similarly, if the market goes down by 1 percent, then on average the stock goes down by 1 percent.

Since markets mostly rise, portfolios or stocks with higher betas will earn higher returns. They will also be more volatile, so they are impact-

ed more by market downturns. This is the basis of often-quoted notion that to get a higher return, you have to be willing to accept higher risk.

In periods dominated by market declines, studies show that portfolios or stocks with lower betas can earn higher-than-market returns by limiting downside risk.

A lot of portfolio theory is based on the notion that betas are symmetric: Stocks are equally responsive

percentage of stocks react to the market asymmetrically.

To see how these special asymmetric-beta stocks performed in comparison to the broad market, our model portfolio ranked stocks by the combination of optimal upside betas and downside betas. We wanted low downside betas to minimize losses during down markets, and high upside betas to maximize returns in up markets.

After computing the betas for each stock in each year, we ranked them by optimal performance. Then we drew from the rankings to build the portfolio for the following year.

Stocks with the top 20 ideal upside and downside beta combinations were selected for each year and equally weighted to form our model portfolio. Following each year's beta computation, we reconstructed the portfolio to reflect the optimal choice from the latest beta rankings.

There were two anomalous years. In 2002, the portfolio consisted of just one stock, since it was the only one that met this high-low beta criterion. In 2007, the portfolio included just the four stocks that met the criterion.

We randomly chose the last day of February as the end of the portfo-

**Between 2000 and 2011, the AIER-Beta had an average return 17.9 points higher than the market's total return.**

in up and down markets. But a portfolio made up of stocks with asymmetrical betas—one that limits risk and maximizes returns—could be a game-changer. That's where the AIER-Beta Portfolio comes in.

We created the portfolio by computing betas for all stocks for the years 1995-2011 in the Russell 3000, a broad-based stock market index. We also separately computed betas in rising and falling markets. Betas in rising markets are upside betas, and betas in falling markets are downside betas. The movement in most stocks is fairly symmetric. But a small

### The Model Portfolio Outperforms the Market

Year	'95	'96	'97	'98	'99	'00	'01	'02	'03	'04	'05	'06	'07	'08	'09	'10	'11
Bear/Bull	+	+	+	2	+	6	12	7	+	+	+	+	4	12	+	2	5
Beat the Market?		y				y	y	y	y	y	y	y	y	y		y	y

The year is the portfolio year; + is a bull market. A bear market occurs when the market goes down more than 10 percent. The number of months represents the months of the bear market. Y indicates that the total return of the portfolio is greater than the market.

Chart 1: The Total Returns of AIER-Beta Portfolio vs. the Market

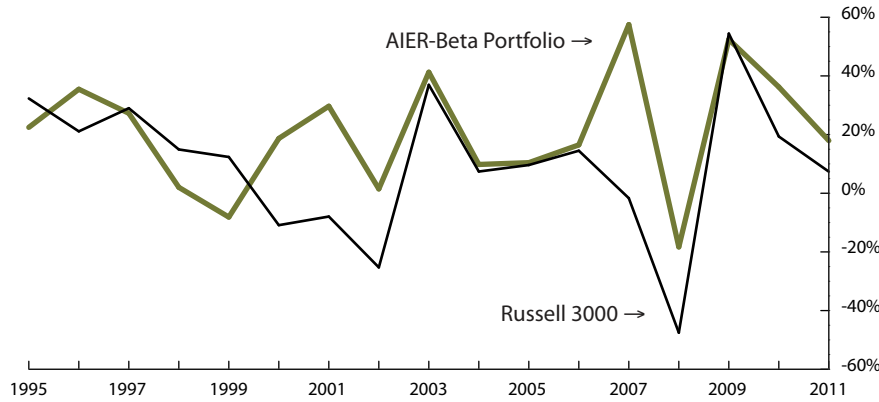


Chart 2: The Betas

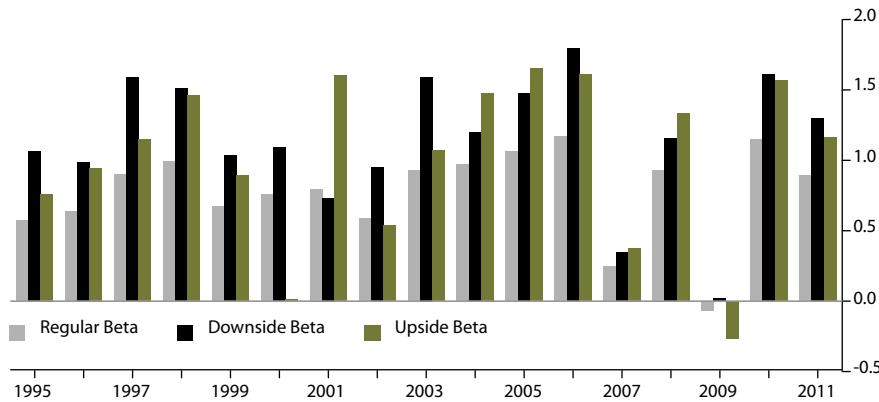
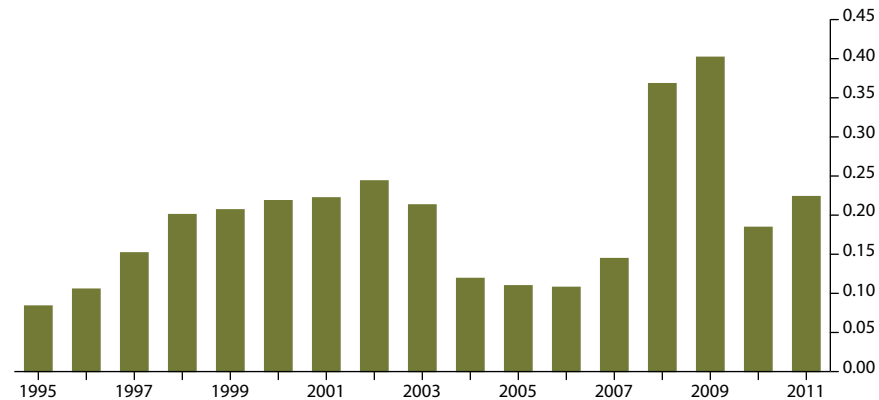


Chart 3: Market Volatility (annualized standard deviation of the daily price changes)



Source: Bloomberg, calculated by author

lio year. Accordingly, March 1 was the first day of the portfolio year.

The selection criterion captured stocks from companies of various sizes. About one third of the stocks were small caps, followed by smaller portions of mid cap, large cap, and micro cap companies. About 5 percent of the stocks were nano cap—that is, small public companies with a market capitalization below \$50 million.

In drawing from the selected stocks, we did not consider nano cap stocks because of their high risks and lack of liquidity. We also included a smaller percentage of less risky large cap stocks. The Russell 3000 index is value-weighted, so the large cap movements could be very close to the market and less likely to outperform it.

The selected stocks cover all 10 industry sectors, so no one sector is dominant. But more than a quarter of the stocks were from the financial sector. The consumer-discretionary and health care sectors were both represented by over 10 percent of the portfolio. Stocks were less likely to come from the energy and utility sectors, each of which accounts for a little over 1 percent of the portfolio. Utility stocks are usually thought of as having more limited down market risk. But their share prices generally do not rise quickly enough to exploit the profit opportunity in up markets.

The AIER-Beta worked very well after 1999, but was less promising during the first five years. (See the table at top left.) This may be the result of distortions caused by the dot-com bubble of the 1990s, which artificially created unusually high returns from highly volatile technology stocks.

For four out of the five years between 1995 and 1999, the AIER-Beta fell more with market declines and responded less to up markets (Chart 2 at left). In these years, the portfolio’s downside beta was greater than the upside beta, and the downside beta was greater than one.

## Strategy Tames Downside Risk

Most of the stocks in our model portfolio are low volatility stocks with low downside betas and high upside betas. This follows from our notion of how a perfect portfolio should perform. Our experience with this portfolio is consistent with the 2004 study by Dr. Andrew Lo from MIT, in which he argued that in general low volatility equities have higher returns.

We also find that, for practical purposes, a portfolio that *only* limits downside risk will not consistently outperform the market. Since most stocks react symmetrically, the lowest downside beta stocks will normally have high regular betas. To test this, we looked at all the stocks with downside betas lower than one and selected the stocks with highest ratios. In years examined, the total return of the portfolio appears completely random. There appears to be no coherent relationship. For this reason, we chose stocks with low downside betas but high upside betas.

Testing on the 2011 portfolio shows that over the years, the overall volatility of each stock changes from high to low, or low to high. The responses of each stock to upside and downside markets also change. But the stock's relative risk to the market doesn't jump from one year to another. That makes it possible to use estimates of betas from the most recent years to predict a stock's next-year reaction to the market. Although it is not perfect, the performance is good.

Interestingly, our strategy doesn't work well when we use daily data to estimate betas and

select the stocks. With daily data, the model captures a totally different set of stocks. The stocks concentrate in the small, micro, and nano caps. The majority will be acquired within five years, if not the next year. Under these circumstances, the portfolio reacts in a highly volatile manner. On average, the daily portfolio did not outperform the market during the 17 experimental years. It is extremely good in some years and simply loses money in others.

This may be because in the shorter term, the market data is more dominated by noise—fluctuations in price and volume that are not in keeping with the overall direction of the market—and perhaps more dominated by market mechanics. In earlier studies on market efficiency, AIER Director of Research and Education Steven Cunningham found distinct differences in informational efficiency across time frames. Effectively, by basing our stock selection on weekly data, we filter out a lot of noise.

Our strategy identifies stocks that represent short-term profit opportunities, inefficiencies in the market that will quickly close. Since these inefficiencies are fleeting, we reconstructed the portfolio by replacing stocks frequently. In 1997, for example, using the same set of stocks from 1996, the portfolio would make more money than the reconstructed set of stocks. But in the coming two years, it would do worse than the reconstructed portfolio. This instability is evidence of the changing market environment.

As argued by Lo (2004), the risk premium—the extra return

an investor requires to take on a specific risk—is time-varying and path-dependent. If risk preferences change over time, then the equity risk premium must vary too. For this reason, in most years the portfolio required a 100 percent turnover because the beta changes over time.

Profit opportunities come and go. In the course of a year, companies are bought out, taken private, or de-listed. When a stock was lost from the portfolio, we made mid-year adjustments, replacing those lost with the next highest-ranked stocks.

Christopher J. Neely et al (2007) found evidence that the profit opportunities that existed in the 1970s and 1980s in the foreign exchange market had disappeared by the early 1990s. This is likely what happens in the stock market. Profitable opportunities change over time because the market environment changes. New profit opportunities appear, while old opportunities disappear. This is where active portfolio management comes in.

The backdrop, the broad market itself, can also change its behavior over time. In some periods it appears more efficient, in others less. Lo demonstrated this by examining the monthly returns of the S&P Composite Index using five-year rolling windows from January 1871 to April 2003. He found that the market degree of efficiency changes in cycles over time (as measured by first-order autocorrelations). For example, in 2000 the market was highly efficient, whereas a few years before and after, it was not.

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(In 1996, the exception, the downside risk was less than the upside trend.) Even though the model portfolio for this period averaged a 15.8 percent total return, that return was 6.1 percent less than the market's.

The market environment changed in 2000. In that year, there were about 200 fewer stocks in the Russell index compared to the highest point in 1996. And while the index updates its companies every year, in 2000 it included a disproportionately large amount of new stocks. The investors were also different. Many of those who lost a lot of money during the bubble left the market after 2000.

Starting in 2000, the strategy began paying off. Between 2000 and 2011, the total return of the model portfolio was higher than the market's total return every year except in 2009. In that year-long bull market following the economic meltdown, the market's return was 54.4 percent, while the portfolio's total return was 2 percentage points lower. But over the 11-year period, the AIER-Beta had an average return 17.9 points higher than the market total return.

The portfolio's return is designed to be more significant in bear markets, although in general it also outperformed the market during bull markets. This is because most

risk-averse investors are particularly concerned about their portfolios surviving stock market declines.

During 2001 and 2008, both year-long bear markets, the total return of the portfolio was higher than the market's returns. In 2001, as Chart 1 on page 2 shows, the portfolio's return was 37.6 percentage points more than that of the broad market. In 2008, the portfolio's return was 29 percentage points higher than the market, even though it still declined 18 percent. It went up quickly the next year. And although the total return of the AIER-Beta in 2009 was 52 percent compared to the market's 54.4 percent, the portfolio's two-year average beat that of the market considerably. It showed a net increase of 34 percent over that period, compared to the market's 6.9 percent increase.

The strategy also worked well in years with short-term bear markets. In five other years between 2000 and 2011 with two months to seven months of bear market conditions, the portfolio grew faster than the market (see the table on page 2).

The success of our portfolio is possible because markets are not always efficient: Investors can sometimes bear less risk and still receive higher returns. The AIER-Beta identifies and exploits the rolling, cyclical inefficiencies in the market.

In 2001, 2004, 2005, and 2009, for example, the upward trend was greater than the downward risk (see Chart 2). With a portfolio made up of stocks with asymmetrical betas, investors can take advantage of these inefficiencies.

Charts 2 and 3 (page 2) show how this strategy works. Most years, the upside beta caught more upside trends than the market. The downside beta contracted with market volatility in either bull or bear markets. When the market was relatively stable, a higher downside beta didn't cause much damage. When market volatility was high, a lower downside beta helped moderate losses.

Many other issues need to be resolved before this strategy is put into operation. The approach involves a high portfolio turnover rate, which likely means high transactions costs. In our preliminary analysis we chose 20 stocks in a typical year, drawing mostly from mid to low cap stocks. This may imply liquidity issues and challenges to meet cash payouts. Moreover, purchases and sales of larger portfolios may drive these stocks back to efficient behavior more quickly, closing the profit opportunity and directly influencing the prices of the stocks. We have some more homework to do—but that perfect portfolio could well be in reach.

## **AIER Summer Fellowship Program** *Walker F. Todd, Director*

In 2012, AIER will once again offer its Summer Fellowship Program. Since 1946, this program has provided training and financial support to students pursuing graduate degrees in economics.

The two-week program takes place at our beautiful campus in the Berkshires of Western Massachusetts. Students take three core seminars in property rights, sound money, and

methodology. Visiting scholars lecture on additional economic topics.

Students receive room and board plus a stipend. Those who successfully complete the program are invited to apply for the E.C. Harwood Fellowship, an award that provides financial assistance for the following academic year.

The program will be offered twice in 2012: from June 11–22 and from July 16–27.

We are accepting both general contributions and sponsorships for students, scholars, and seminars. To donate, send mail to AIER Summer Fellowship, PO Box 1000, Great Barrington, MA 01230. You can also call (888) 528-1216 or give online at [www.aier.org](http://www.aier.org). **Thank you for helping us educate the leaders of tomorrow.**

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