Low volatility investing

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J.P.Morgan
Asset Management

Attractive equity market valuations are often coupled with periods of market uncertainty and turbulence. The perennial dilemma is how investors can efficiently tilt their portfolios to gain access to the equity market premium in a defensive fashion. In this paper, we take a look at how the equity market premium can be captured in an efficient fashion through low volatility investing.

Optimising exposure to attractive equity markets in uncertain times

Traditional financial theory in the form of the capital asset pricing model (CAPM) would argue that riskier assets deliver, on average, higher return as compensation for holding that risk. Surprisingly, however, well-constructed low-risk portfolios appear to contradict this most basic conclusion of traditional finance. Low volatility investing provides a way for the investor to naturally be more defensive on the downside while capturing most (though not all) of the upside.

In recent years, practitioners and academics have increasingly recognised that various sources of return, which in the past were considered alpha, have proven to be systematic in their nature. Low volatility investing combines lower exposure to traditional beta than the market capitalisation-weighted exposure and, at the same time, captures a systematic low volatility premium[1]. This is a particularly potent result for asset allocators wanting to tilt towards or not fully tilt away from equities in uncertain times. In this paper, we shall examine this apparent anomaly, explain why it persists, and look at how investors can use it to their advantage.

Explaining the anomaly

More generally, the outperformance of low beta/volatility stocks over high beta/volatility stocks is one of the biggest challenges to CAPM, which would argue that the opposite would hold. The anomaly was first identified as far back as 1972 when Black, Jensen and Scholes (1972)[2] reported that a portfolio constructed by being long low beta stocks and short high beta stocks generated positive returns. Fama and MacBeth (1973)[3] extended this work and showed that the relationship between risk and return is generally too flat compared to theoretical expectations.

The debate surrounding this anomaly has continued unabated, with a number of explanations proposed. Unsurprisingly, all explanations offered for one of the biggest challenges to the efficient markets hypothesis (EMH) are behavioural-based. One explanation[4,5] reflects the structure of the investors in the market. Most active managers are measured relative to a market index with limited, if any, ability to take on leverage. As a result, low beta stocks will often look risky against the manager's index as the manager would be unable to lever the investment to limit the tracking error to the benchmark on a beta-adjusted basis. The lower level of demand in these stocks will by extension depress their price, increasing the upside potential for investors.

Other explanations have also been offered as to why investors tend to favour higher volatility stocks, depressing their returns. Barberis and Huang[6] argue that investors underestimate the risk of stocks that offer the potential for a really high payout. Highly volatile stocks will therefore have their prices bid up. Related to this is the argument that stocks that are consistently in the news (typically high volatility stocks) are generally overbought and thus deliver a lower average return. The mechanism by which this anomaly operates appears to be associated with the cross-sectional dispersion of beta across cycles[7]. In bear markets, markets are more volatile and betas more disperse. As a result, investing in low beta stocks forms a buffer against falling markets. Conversely, during bull markets, beta spread is tighter and, as a result, while high beta stocks outperform, the outperformance is in aggregate limited.

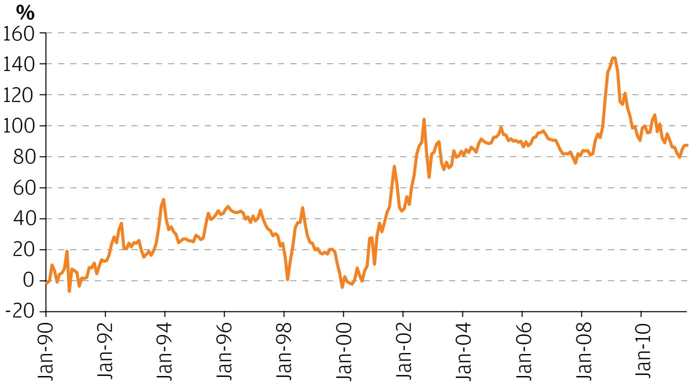
A more risk-efficient way to capture equity beta

Consistent with the research mentioned above, **Exhibit 1** shows the return of a theoretical portfolio in which we are consistently long the top decile of low-beta stocks (rebalanced monthly) and short the highest beta stocks, from 1990 until 2011. The portfolio is constructed to have zero notional exposure and will therefore be negative beta in aggregate. The performance of the portfolio highlights an interesting result from low-beta investing. Over the period, the portfolio generates an annual positive performance of 4.05%, with positive performance coming at exactly the times in which the market is experiencing stress (2000-2002, 2008), while negative performance occurs during strong bull markets (1998-2000, 2009-2010).

While this artificially constructed long/short portfolio has no net equity exposure and in fact carries a negative beta overall, this result highlights the fact that long-only low volatility investing has in aggregate offered a more defensive way to take risk. Although it will underperform in strong equity markets, it nonetheless delivers a positive return over the long term.

References can be found in the Bibliography on page 7.

Exhibit 1: Top versus bottom decile of low beta stocks

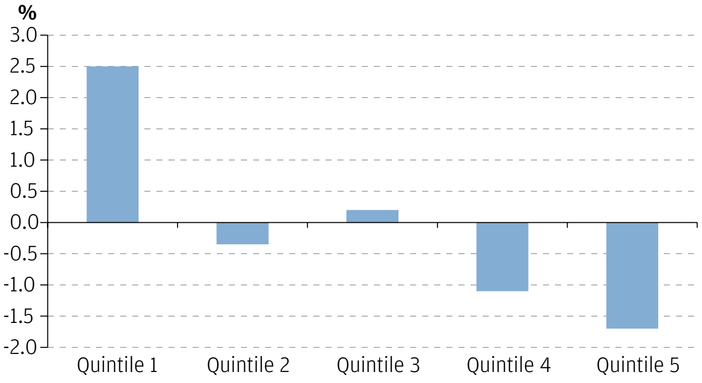


Excess return	4.05%
Volatility	22.31%
IR	0.18
Skew	-0.29
Kurtosis	2.05
% Positive months	52%
1m VaR (99.5%)	-16.59%
1 yr VaR (99.5%)	-57.48%
Exp monthly shortfall (5%)	-16.14%

Source: Thomson Reuters Datastream; J.P. Morgan Asset Management Analysis

It is important to note, however, that when we look at the quintile performance (**Exhibit 2**) it is in fact only the extremes of beta (the top and bottom quintiles) where the anomaly appears. Careful attention therefore has to be paid to the best way of capturing the anomaly.

Exhibit 2: Beta: quintile performance



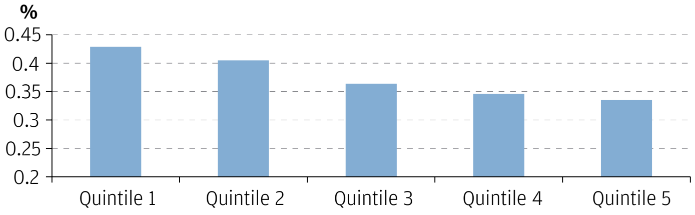
Source: Factset, J.P. Morgan. Monthly data from January 1990 to December 2011.

Low volatilty strategies are expected to produce a return which is composed of their beta exposure to the market (empirical evidence suggests 70%) plus the low volatility premium. Their risk is made up of 70% of the market volatility with a low volatility variance component negatively correlated with the market. If market returns are high, the low volatility premium will not make up for the 30% (100% minus 70%) of exposure not held. If returns are low or negative the return of a low volatility strategy will be higher. From a risk perspective low volatility strategies will be superior unless their negative correlation with the market breaks down, which though unlikely, is not impossible. A recent example is the impact of the Japanese earthquake on low volatility utility stocks.

As highlighted in the findings above, what makes the low volatility strategy particularly interesting is its relationship with the market cycle. Outperformance typically comes in periods of stress for risk assets, while any lag in performance comes when risk assets are generally performing well. As noted above, this has been linked to the beta dispersion among stocks.

Exhibit 3 shows that the higher the market volatility, the higher is the dispersion in beta among the underlying stocks. In other words, in bear markets, which tend to be highly volatile, low beta stocks, will naturally outperform their high beta peers. However, in low-volatility, positive-risk periods, low beta names will not lag as much simply because beta dispersion is generally tighter.

Exhibit 3: Betas are more disperse in bear markets

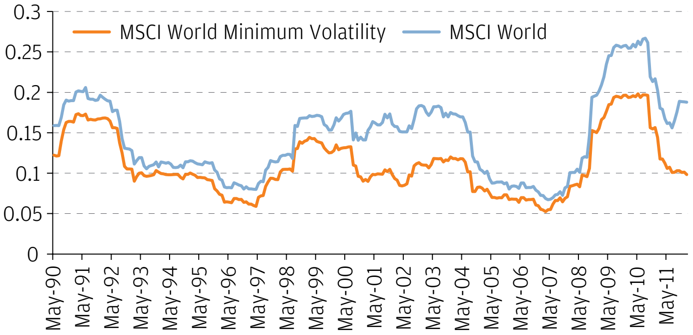


Source: Factset, FTSE, J.P. Morgan. Monthly data from October 2003 to February 2012.

From theory to practice

Moving from theory to practice, we compare the performance and risk profile of a widely known market cap weighted index, the MSCI World Index, with a low volatility index, the MSCI World Minimum Volatility Index. As highlighted previously, low volatility strategies behave as a safety mechanism, with a more significant effect when overall market volatility is high. **Exhibit 4** illustrates this by plotting the 24-month rolling realised volatility of both indices. In high-risk bear markets, the low volatility index exhibits markedly less risk, while in low-volatility markets, there is little significant difference between the two.

Exhibit 4: Realised volatility comparison



Source: MSCIBarra, J.P. Morgan. Monthly data from May 1990 to January 2012.

This reduction in volatility can be shown to have been beneficial for performance. **Exhibit 5** shows that a low volatility strategy, from May 1988 to January 2012, results in a higher information ratio, a 30% reduction in volatility and a more limited drawdown.

Exhibit 5: Performance analysis

	Return (USD, % pa)	Volatility (% ann)	Sharpe ratio	Monthly min (%)	Monthly max (%)	Ratio up/down
MSCI World Minimum Volatility[1]	6.7	11.7	0.6	-15.8	9.2	1.8
MSCI World[1]	5.9	15.7	0.4	-18.9	11.3	1.5

Source: MSCI Barra, J.P. Morgan. Monthly data from May 1988 to January 2012. Gross dividends reinvested

Low volatility strategies will tend to show more evenly distributed index weights and less of a large cap bias, thus providing a more diversified index. **Exhibit 6** shows the largest holdings and weights of both the MSCI World Minimum Volatility Index and the MSCI World Index, and these effects are clearly observed.

Exhibit 6: Index constituents

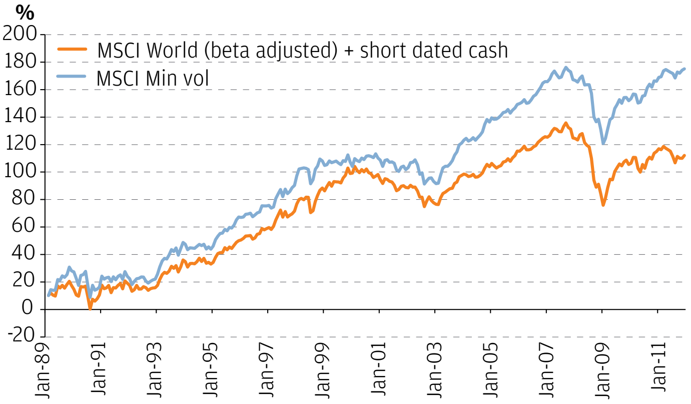
Largest constituents of Minimum Volatility Index		Largest constituents of MSCI World	
Name	Weight	Name	Weight
MCDONALDS CORP	1.54%	APPLE INC	1.79%
ENBRIDGE INC	1.54%	EXXON MOBIL CORP	1.72%
AMGEN INC	1.49%	INTERNATIONAL BUSINESS MA	0.97%
EXXON MOBIL CORP	1.47%	MICROSOFT CORP	0.94%
ABBOTT LABS	1.46%	CHEVRON CORP NEW	0.87%
NTT DOCOMO	1.45%	GENERAL ELECTRIC CO	0.84%
JOHNSON & JOHNSON	1.44%	NESTLE	0.80%
AUTOMATIC DATA PROCESSING	1.42%	JOHNSON & JOHNSON	0.76%
NESTLE	1.40%	AT&T INC	0.74%
NOVARTIS AG RS	1.33%	PROCTER & GAMBLE CO	0.73%

Source: MSCIBarra, J.P. Morgan. Data as end of January 2011.

Asset allocation: benchmarking a low-volatility equity solution against a cash/equity combination

One question investors often ask is how a low volatility equity solution compares to a cash/equity combination, where the two portfolios are beta matched. In other words, is this equivalent to merely running a lower level of beta in a traditional equity portfolio. In **Exhibit 7**, the MSCI Minimum Volatility Index is compared with a beta-adjusted holding in the MSCI World. This beta adjustment is achieved by combining a partial holding in the MSCI World, representing the same level of beta as in MSCI Minimum Volatility, with cash invested in short-dated government securities. What is clear is that there is more to low volatility investing than just running traditional equities at a lower target beta.

Exhibit 7: Low-volatility equity versus a combination of cash and traditional equities



Source: MSCIBarra, J.P. Morgan. Monthly data from May 1988 to January 2012.

To index or not to index

In the above discussion, we have highlighted how taking equity risk through a tilt towards low volatility stocks can be an efficient risk-adjusted solution. However, it is important to understand that there are multiple approaches to low volatility investing.

A low volatility strategy can be obtained with passive exposure to an index constructed by a conventional index provider, such as the MSCI Minimum Volatility Index. However, there are certain inefficiencies in the construction of the index and indeed in the indexation process that can be alleviated in a number of ways[10,11]. Where the transparency of the index is paramount, the index can be kept as the benchmark for an Enhanced Index Strategy. An alternative approach can be to capture the low volatility strategy through the creation of an unconstrained 'benchmark unaware' solution. A simple consideration is that while the MSCI Minimum Volatility is built using the large and mid cap universe only, the unconstrained solution has a broader investable universe, which can embed a small cap bias and increase diversification into the strategy.

Exhibit 8 demonstrates the risk and return profile for a market cap weighted investment and the low volatility strategies described above, passive MSCI Minimum Volatility, JPM Global Research Enhanced Index (REI) Minimum Volatility and an unconstrained 'benchmark unaware' low volatility index.

Exhibit 8: Risk and return analysis

	Return	Volatility	Beta	IR
Traditional market cap weighted	5.9	15.7	1.0	0.38
MSCI Minimum Volatility	6.6	11.7	0.7	0.56
JPM Global REI Minimum Volatility	7.5	11.7	0.7	0.64
Unconstrained low volatility	8.1	10.0	0.5	0.81

Source: MSCIBarra, J.P. Morgan. Monthly data from January 1990 to August 2011.

The main advantage of using an index rather than being index unaware is transparency. Relaxing the index constraints can be a benefit, but at the same time increases the challenge of finding a mutually agreeable measure of success between client and fund manager. Comparing the realised volatility of benchmark unaware strategies against a specialist low volatility index may be reasonable, while returns can be substantially different due to large sector, country and style deviations.

Conclusion

While the low volatility anomaly was first identified back in 1972, interest in capturing the phenomenon has been more recent. Low volatility strategies are here to stay and are another step in the progression of the industry towards identifying and isolating different types of beta.

Low volatility represents a strong alternative for asset allocators wanting to tilt towards equities in uncertain times. Low volatility strategies allow the construction of low-risk portfolios what provides more protection on the downside, while capturing most (though not all) of the upside. Low volatility allows the construction of defensive portfolios with expected returns composed of, roughly, 70% of the market returns plus the low volatility premium. In bull markets the low volatility premium will not make up for the exposure not held while if market returns are low or negative the return of low volatility will be higher.

Depending on their specific requirements, investors might look to capture the low volatility premium using index-referenced approaches or benchmark unaware solutions. The main advantage of using an index rather than being index unaware is transparency. The main challenge for the benchmark unaware approach is to define a mutually agreeable measure of success between client and fund manager. Different investment objectives will determine different solutions.

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