



The Case for TD Low Volatility Equities

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Most investors like generating returns but dislike taking risks, which leads to a natural assumption that competition among investors would lead to a positive relationship between an asset's level of risk and its expected return. This assumption is the basis for most theories of expected returns in finance, such as the Capital Asset Pricing Model (CAPM)¹. However, while a large number of academic researchers have analyzed historical stock prices to find supporting evidence, most of their empirical findings suggest that risk has not been compensated over full market cycles².

Figure 1 illustrates the historical risk-return pattern of the constituents of the S&P 500 Index from August 1978 through December 2014. Each bar represents the annualized return on a portfolio of 100 stocks from the Index. Each portfolio has been equally weighted and constructed on the basis of trailing 36-months standard deviation. Contrary to CAPM, the data shows that the most volatile equities have delivered lower average returns over the long run.

When Is Equity Risk Rewarded?

Figure 1 summarizes returns averaged over the most recent 36 years, but averages hide significant patterns that depend on the strength and direction of markets. For example, investors who hold more volatile equities have historically been rewarded during strong market rallies. Figure 2 provides evidence of this. It shows the monthly average returns for the same five quintile portfolios as Figure 1 but only includes months in which the S&P 500 Index posted monthly returns of 4% or greater. This happened in 24% of the 436 months in our sample, and the data shows that investors were rewarded for bearing risk during strong market rallies.

Figure 1

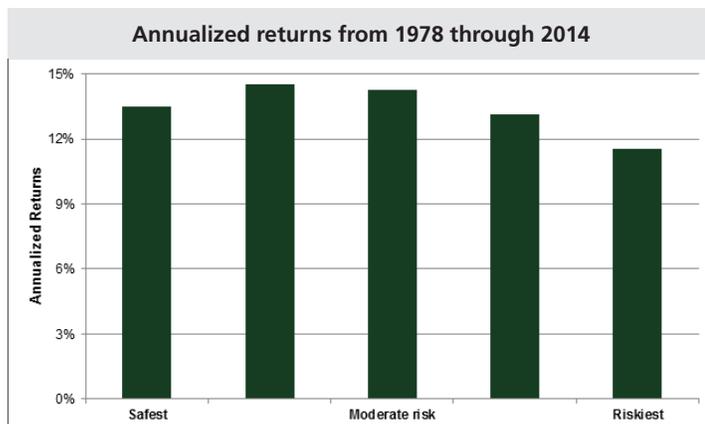


Figure 1: Annualized returns on S&P 500 constituents from August 1978 through December 2014. Quintiles represent equally-weighted portfolios of 100 stocks each, constructed monthly from equities sorted by trailing 36 months standard deviation.
Source: TD Asset Management, Standard & Poor's.

Figure 2



Figure 2: Each quintile represents an equally-weighted portfolio constructed monthly from 100 equities sorted by trailing 36 months standard deviations. Each bar represents the average monthly return on quintile portfolios shown for all months between August 1978 and December 2014 during which the S&P 500 Index rose by 4% or greater.
Source: TD Asset Management, Standard & Poor's.

¹The CAPM was introduced by Jack Treynor (1961, 1962), William Sharpe (1964), John Lintner (1965) and Jan Mossin (1966) independently, building on the earlier work of Harry Markowitz on diversification and modern portfolio theory.

²Most empirical tests of the CAPM, starting with Black, Jensen & Scholes (1972), conclude that riskier equities have not yielded statistically higher returns than less risky equities.

In Figure 3, we observe the reverse pattern during significant market downturns. More volatile equities underperformed less volatile equities during months in which the Index dropped by 4% or more, which happened in 12% of the 436 months in our sample.

The majority of the time (64% of the time during our sample period), markets are characterized by moderate market moves, and we found no economically significant difference between the average returns from the most and least volatile equities. This is illustrated in Figure 4.

Figure 3

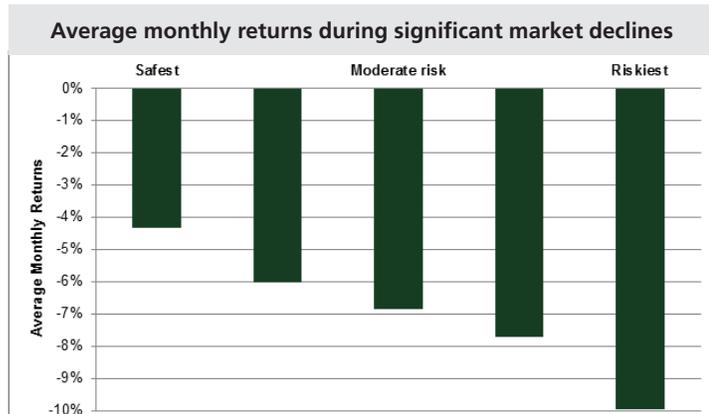


Figure 3: Each quintile represents an equally-weighted portfolio constructed monthly from 100 equities sorted by trailing 36 months standard deviations. Each bar represents the average monthly return on quintile portfolios shown for all months between August 1978 and December 2014 during which the S&P 500 Index fell by 4% or more. Source: TD Asset Management, Standard & Poor's.

Figure 4

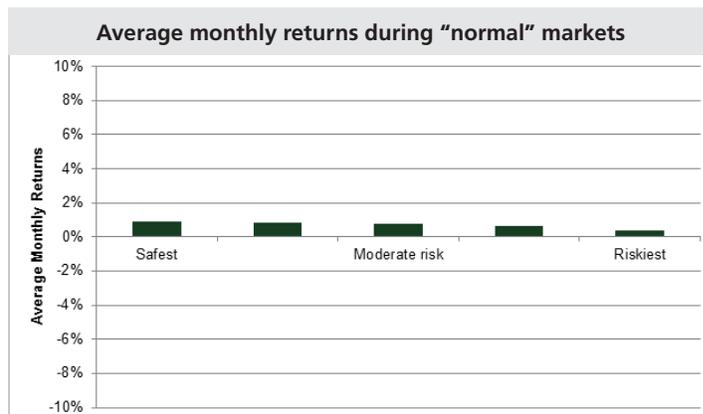


Figure 4: Each quintile represents an equally-weighted portfolio constructed monthly from 100 equities sorted by trailing 36 months standard deviations. Each bar represents the average monthly return on quintile portfolios shown for all months between August 1978 and December 2014 during which the S&P 500 Index return was greater than -4% and smaller than 4%. Source: TD Asset Management, Standard & Poor's.

Although they run counter to the common assumption that underlies CAPM, the stylized facts shown in Figures 1 through 4 are consistent with evidence published in academic and professional literature, namely that:

- Higher volatility equities have not generated higher returns than less volatile equities over the long run.
- Higher volatility equities have only generated higher returns during strong market rallies (24% of the time). During "normal" market conditions, they generated similar returns to lower volatility equities, and during bear markets, they generated more negative returns than lower volatility equities.

This begs the question — why would investors take on additional risk if it is seldom rewarded? Most explanations originate from behavioural finance. One hypothesis is that investors have been willing to "overpay" for volatile equities because they overextrapolate the future growth of popular equities. Another explanation is that many investors are drawn to the lottery aspects of volatile stocks with positively skewed returns. A third explanation is that many investors are overconfident about future prospects. Overconfidence is more important for highly uncertain volatile stocks than for more established defensive equities. Even cool-headed fund managers can be drawn to volatile stocks if they believe they can pick winning stocks that will give them an edge versus their cap-weighted benchmark indices.

However, the evidence shows that it would be more efficient to build a portfolio that minimizes expected return volatility by maximizing the Sharpe ratio (the measure of return per unit of risk), and it is this logic that led to the development of low volatility equity portfolios.

TD Low Volatility Equity Portfolios: Construction

A Canadian pioneer in the low volatility landscape, TD Asset Management (TDAM) launched the TD *Emerald* Low Volatility Canadian Equity Pooled Fund Trust on September 11, 2009. Five and a half years after its launch, the strategy has garnered substantial attention and delivered strong risk-adjusted returns in line with the expectations set from our original historical simulations. Its success spurred the subsequent launch of four other low volatility equity funds for institutional investors.

Our portfolios begin with a particular universe of stocks, such as the constituents of the S&P/TSX Composite Index or the MSCI World ex-Canada Index. These indices are the benchmarks against which we can compare performance. Our low volatility funds use risk as the primary measure to determine the inclusion, exclusion and optimal weighting of the stocks in the portfolio — a marked contrast to the benchmark indices, which use market capitalization as their criterion. Many studies have concluded that it is materially easier to forecast return volatility than to forecast future stock returns³, which is a key reason that we focus on a model that predicts risk not returns. To ensure that the portfolio is well diversified, we also apply common sense constraints such as maximum country, sector and individual stock weights.

Using standard deviation and correlation analysis, we assess the risk that each security contributes to the portfolio. Firms with very short return histories and firms that recently underwent significant events such as spin-offs, mergers or takeovers are excluded from this analysis (and from our portfolios). We use state-of-the-art factor-based risk models to estimate the various correlations among the large numbers of equities involved. We assume that return correlations originate from sensitivities to common risk factors. For example, decreases in oil prices will systematically and negatively impact oil producing firms while the same fall in oil prices will positively impact energy users such as transportation and chemical firms.

TD Low Volatility Equity Portfolios: Characteristics

Because we focus on risk as opposed to capitalization in our construction process, our portfolios tend to look very different from their benchmark indices. Stocks with lower return volatilities and lower correlations with other stocks will tend to have larger weights, and not all benchmark securities will be included because stocks with higher return volatilities or with higher correlations will have either zero or smaller weights.

Our low volatility funds are dynamic and sector weights vary with changes in predicted risk, but broadly speaking stocks from the Utilities or Consumer Staples sectors tend to be well represented in our portfolios as these stocks are typically issued by firms with relatively stable technologies and markets. (See Figure 5 for the sector weights of the TD *Emerald* Low Volatility Global Equity Pooled Fund Trust as of December 31, 2014.) The stocks of fast growing firms are less well represented as their stock prices tend to be heavily influenced by fast changing expectations of future cash flows. Similarly, the stocks of firms with low degrees of accounting or economic leverage have higher weights than the stocks of firms that are heavily indebted or have fixed costs that cannot easily be altered according to fluctuations in demand.

Figure 5

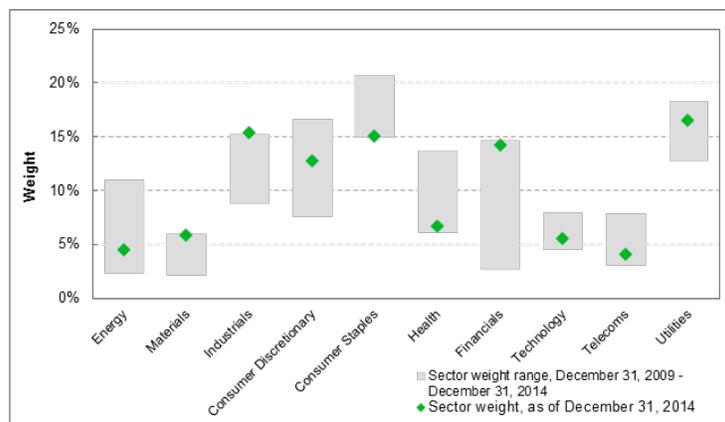


Figure 5: Sector weights of TD *Emerald* Low Volatility Global Equity Pooled Fund Trust. Each bar represent the range for each sector weight within the Fund since inception on December 22, 2009, and each diamond represents the sector weight as of December 31, 2014.

Source: TD Asset Management, MSCI Inc.

The TD low volatility portfolios have fewer mega cap stocks than their capitalization-weighted index benchmarks and more companies with mid and small market capitalization. Although small caps are, on average, more volatile than larger caps, this is not true for every stock. There are some very large-cap companies that can be more volatile than some smaller caps from the Consumers or Utilities sectors, which is why assessing each individual stock's risk level is a key part of our process.

³Chopra and Ziemba (1993) find that errors in estimating expected returns are over ten times larger than when estimating variances, and over twenty times larger than errors in estimating covariances.

TD Low Volatility Equity Portfolios: Returns

A large body of professional and academic research suggests that investors can expect higher risk-adjusted returns from low volatility equities over the long run. However, lower volatility equities do not outperform higher volatility equities under all scenarios. As demonstrated earlier in Figure 2, less volatile equities tend to underperform more volatile equities during strong bull markets. Similarly, TD low volatility equity portfolios will likely underperform their capitalization-weighted index benchmarks in strong bull markets. In such markets, characterized by general optimism and falling risk aversion, the stocks of faster growing and more volatile equities tend to rise faster than the stocks of more stable firms. The opposite will tend to be observed in falling markets, with low volatility equity portfolios losing considerably less than capitalization-weighted equity indices.

Table 1 summarizes the pattern of monthly returns during the first full 60 months following the launch of the TD *Emerald* Low Volatility Global Equity Pooled Fund. The first row summarizes what happened in the eight months during which the MSCI World ex-Canada Index fell by 2% or more. The Fund outperformed its benchmark index in all eight months and posted an average return of -0.62%, significantly better than the -3.44% average return observed for the capitalization-weighted index. The third row shows what happened during the 23 strong up-market months, defined as months during which the MSCI World ex-Canada Index rose by 2% or more. The Fund returned 2.37% on average during these strong market months, significantly less than the 3.50% posted by the benchmark index, and the Fund outperformed its benchmark index in only 13% of the strong up market months. In more common market conditions, defined as months during which the benchmark index posted absolute returns of less than 2%, the Fund outperformed in 76% of the months by an average magnitude of 0.55% per month (shown in row 2 of the table). This pattern of returns should appeal to investors who are particularly sensitive to capital preservation and are willing to accept some underperformance during particularly good times in exchange for the peace of mind that accompanies a lower volatility portfolio.

Table 1: Monthly returns from December 31, 2009 through December 31, 2014

Market Strength & Direction ¹	No. of Months	Average	Average	Average	Hit Rate ⁴
		Fund ² Return	Index ³ Return	Excess Return	
Market < -2%	8	-0.62%	-3.44%	2.82%	100%
Market within ± 2%	29	0.87%	0.32%	0.55%	76%
Market > 2%	23	2.37%	3.50%	-1.13%	13%

¹Market measured as the monthly return on the MSCI World ex-Canada Index

²TD *Emerald* Low Volatility Global Equity Pooled Fund Trust

³MSCI World ex-Canada Index

⁴Percentage of positive excess returns

Source: TD Asset Management

Table 2 shows the annualized returns of the TD *Emerald* Low Volatility Global Equity Pooled Fund as of December 31, 2014. The Fund's annualized return since inception is 15.57%, almost 3% higher than the return of the MSCI World ex-Canada Index over the same period, and its annualized return volatility is 6.15%, 30% less than the 8.82% volatility of the benchmark index. With a higher return and lower volatility, the Fund boasts a high risk-adjusted return (measured using the Sharpe ratio) of 2.42. TD *Emerald* Low Volatility Global Equity PFT is just five years old, but its performance is consistent with the 36 years of evidence on the constituents of the S&P 500 Index we presented earlier.

Table 2: TD *Emerald* Low Volatility Global Equity Pooled Fund Trust

As of December 31, 2014	3 Months	1 Year	2 Years	3 Years	5 Years	Since Inception ¹	Volatility ²	Sharpe Ratio ³
TD <i>Emerald</i> Low Volatility Global Equity PFT ³	7.45%	20.25%	26.67%	20.31%	15.78%	15.57%	6.15%	2.42
MSCI World ex-Canada Index (C\$)	4.95%	14.56%	24.97%	21.07%	12.73%	12.58%	8.82%	1.34
Difference	2.50%	5.69%	1.70%	-0.76%	3.05%	2.99%	-2.68%	1.08

¹Inception date: December 22, 2009

²Volatility is the annualized standard deviation of all monthly returns since inception

³The Sharpe ratio is computed using all monthly returns since inception

Note: Returns for periods greater than one year are annualized; numbers may not add due to rounding

Source: TD Asset Management, MSCI Inc.

TD Low Volatility Equity Portfolios: The future

Our track record demonstrates historical outperformance, but what about future performance? We do not expect future returns to be identical to past returns, in part because we expect returns from both high and low volatility equities will be more modest going forward. However, we do expect low volatility equities to continue to provide attractive risk-adjusted returns. In fact, we believe that volatility, which has been notably low over recent years, will increase to more normal levels. In an environment of increasing volatility, we expect that investors will find low volatility returns, and the smoother return profile they offer, even more attractive going forward.

It's true that, theoretically, the low volatility advantage could fall victim to its own success. If investors dislike volatility, they should prefer assets with less volatile returns. This process should bid up their prices, thus lowering their expected returns until, in equilibrium, investors are indifferent between assets with various risk levels. However, several decades after the theory was published in academic journals and became a core component of most finance textbooks, the empirical evidence suggests that this still has not yet happened.

As awareness of risk grows, investor behaviours could change, and the low volatility effect may eventually disappear when enough capital is benchmarked using the Sharpe ratio and when enough investors are willing to deviate significantly from the traditional cap-weighted benchmarks. However, until that paradigm shift occurs, we believe that there is a window of opportunity for low volatility investors, and the rewards for early investors may be significant. ■

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