



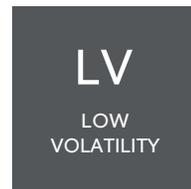
FACTOR PROFILE: LOW VOLATILITY

Low volatility strategies target securities that exhibit less price volatility than the broader equity market. Ideally these strategies fall significantly less in down markets and participate in a meaningful portion of the up-market. This risk and return pattern is referred to as an asymmetrical return pattern, which can have powerful alpha generation effects over time. The idea that return should be positively related to risk is intuitive and forms the hallmark of William Sharpe's capital asset pricing model (CAPM). Contrary to this traditional theory, research has shown that lower volatility stocks tend to outperform higher volatility stocks over time ("low volatility anomaly").

This anomaly can be explained by behavioral tendencies and structural issues, and has persisted across markets for long periods of time. For example, the "lottery preference" is a behavioral tendency of investors to overpay for small chances of earning large gains, which means they prefer high volatility stocks and cause them to be overpriced [Bali, et al. [2011]].

Further, structural limitations may also contribute to the low volatility anomaly. For example, investors may be prohibited or reluctant to employ leverage, and with leverage unavailable, high return seeking investors bid high volatility stocks up and subsequently, push expected returns on those same stocks downward.

Compared to other factors, low volatility is somewhat unique because there are two efficient ways to gain low volatility factor exposure. Our low volatility investing view includes both approaches: a portfolio variance minimization approach combined with high quality, and a security level factor perspective. The scope of this factor profile will be on the latter view in which we take a stock level rather than portfolio level view of low volatility.



INVESTOR PROFILE:

Lower risk tolerance; Defensive

FACTOR APPLICATION:

Reduce absolute risk; Seek asymmetrical returns for long-term outperformance

AVERAGE FACTOR CYCLE LENGTH:

Short¹

¹ Relative to other factors. See "Factor Investing: Not Which, But When", Northern Trust Research Paper [2015].

OUR APPROACH TO FACTOR DESIGN

Simple factor definitions have the potential to create very large sector and region biases in a portfolio. For example, a ranking of stocks by a singular measure like beta would likely show sector and regional concentrations. We believe these concentrations are uncompensated over time because they add risk to the portfolio, but not necessarily return. Furthermore, factor definitions change among regions and sectors due to differing business models and accounting customs and regulations.

For the last 25 years, Northern Trust’s approach to defining factors has incorporated three primary elements:

Multidimensionality: Factor anomalies are very complex and strictly unobservable. As such, no single metric can hope to fully describe the anomaly. Our research shows that constructing factors using multiple metrics or signals that complement each other is a more robust way capture the factor phenomenon.

Region and Sector Neutrality: To reduce biases inherent in naïve factor design, all Northern Trust factor strategies are region- and sector-neutral, with factors being ranked and scored in unique regional and sector combinations. This process limits the presence of unintended exposures that can become embedded in factor definitions that do not take this approach.

Region and Sector Specific Factor Definitions: In some instances the business models of sectors are so dissimilar they require different factor definitions. For example, one cannot use the same criteria to judge the quality of a REIT, a commercial bank, or an information technology firm. Similarly, accounting data among regions is inconsistent. For these reasons, Northern Trust’s factor definitions are customized to regional and sector needs, as appropriate.

OUR APPROACH TO LOW VOLATILITY

Our approach utilizes signals of asymmetric risk, fundamental variability, and historical volatility to define our low volatility factor, which are applied in a regional and sector neutral manner. This is particularly important for low volatility because certain sectors have systematically lower volatility, such as utilities and consumer staples. This is how low volatility strategies can become sector concentrated.

VALUE	QUALITY	MOMENTUM	LOW VOLATILITY
Current Value	Management Efficiency	Market Sentiment	Asymmetric Risk
Normalized Value	Profitability	Analyst Sentiment	Fundamental Variability
Prospective Value	Cash Flow		Historical Volatility

Source: Northern Trust

FACTOR PROFILE: LOW VOLATILITY

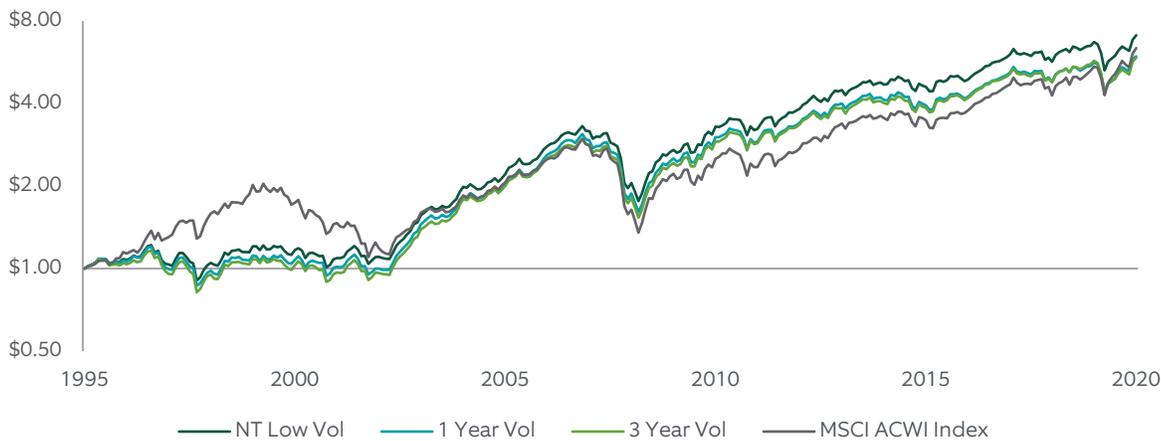
There are three sets of signals that comprise our proprietary low volatility factor:

Asymmetric risk signals look at the distribution of historic volatility. Our research shows that stocks that are more volatile on the downside relative to their volatility on the upside are undesirable in a low volatility portfolio. These stocks tend to have negative skew (more frequent extreme returns below the average) in their return patterns and simply avoiding these stocks can be a powerful way to capture favorable asymmetry in returns.

Fundamental variability signals provide a fundamental underpinning to our factor design based on data directly from company financial statements. Fundamental variability is a great way to identify low volatility stocks using signals that are not tied to valuation movements. We believe these signals add a unique perspective and tend to decrease turnover associated with simplistic strategies based only on historical price volatility. Examples of fundamental signals include variability of free cash flow and variability of sales.

Smoothed historical volatility signals are based on stock price volatility, which is a well-researched approach to exploit the low volatility anomaly. Our signals measure volatility over time and place a greater weight on recent price return observations. Examples of our historical volatility signals include a one year weekly volatility and a three year weekly volatility measure.

OUR RESEARCH AND SUPPORTING EVIDENCE:



Source: Northern Trust Quantitative Research; Cumulative performance (log scale) of the top 20% of stocks ranked by the low volatility measure. The research portfolios are equally weighted portfolios rebalanced monthly that are sector- and region-neutral. Period 12/31/1995 – 12/31/2020. Benchmark is the MSCI ACWI Total Return Index. “NT Low Vol” = Northern Trust proprietary definition, “1 Year Vol” = standard deviation of monthly returns over the last 12 months, “3 Year Vol” = standard deviation of monthly returns over the last 36 months. This graph does not show actual performance results. For illustrative purposes only. Past performance is not indicative or a guarantee of future results. Index performance returns do not reflect any management fees, transaction costs or expenses. It is not possible to invest directly in any index.

	Annualized Ret, %	Annualized Vol, %	Annualized Excess Return, %	Sharpe Ratio	Max Drawdown
NT Low Vol	8.16%	12.92%	0.47%	0.46	-46.8%
1 Year Vol	7.39%	13.33%	-0.30%	0.39	-48.1%
3 Year Vol	7.34%	13.56%	-0.35%	0.38	-48.4%
MSCI ACWI Index	7.69%	15.64%		0.35	-54.5%

REFERENCES AND RELATED READING

Hunstad, Michael and Robert Lehnerr. "Foundations in Factors." Northern Trust Research Paper (2019).
Bali, Turan G., Nusret Cakici, and Robert F. Whitelaw. "Maxing out: Stocks as lotteries and the cross-section of expected returns." *Journal of Financial Economics* 99.2 (2011): 427-446.
Daniel, Kent D. and Mota, Lira and Rottke, Simon and Santos, Tano, "The Cross-Section of Risk and Return", (2018).
Jiang, Lei and Wu, Ke and Zhou, Guofu and Zhu, Yifeng, "Stock Return Asymmetry: Beyond Skewness", (April 2018).

IMPORTANT INFORMATION. The information contained herein is intended for use with current or prospective clients of Northern Trust Asset Management. The information is not intended for distribution or use by any person in any jurisdiction where such distribution would be contrary to local law or regulation. Northern Trust and its affiliates may have positions in and may effect transactions in the markets, contracts and related investments different than described in this information. This information is obtained from sources believed to be reliable, and its accuracy and completeness are not guaranteed. Information does not constitute a recommendation of any investment strategy, is not intended as investment advice and does not take into account all the circumstances of each investor. Opinions and forecasts discussed are those of the author, do not necessarily reflect the views of Northern Trust and are subject to change without notice.

This report is provided for informational purposes only and is not intended to be, and should not be construed as, an offer, solicitation or recommendation with respect to any transaction and should not be treated as legal advice, investment advice or tax advice. Recipients should not rely upon this information as a substitute for obtaining specific legal or tax advice from their own professional legal or tax advisors. References to specific securities and their issuers are for illustrative purposes only and are not intended and should not be interpreted as recommendations to purchase or sell such securities. Indices and trademarks are the property of their respective owners. Information is subject to change based on market or other conditions.

All securities investing and trading activities risk the loss of capital. Each portfolio is subject to substantial risks including market risks, strategy risks, adviser risk and risks with respect to its investment in other structures. There can be no assurance that any portfolio investment objectives will be achieved, or that any investment will achieve profits or avoid incurring substantial losses. No investment strategy or risk management technique can guarantee returns or eliminate risk in any market environment. Risk controls and models do not promise any level of performance or guarantee against loss of principal. Any discussion of risk management is intended to describe Northern Trust's efforts to monitor and manage risk but does not imply low risk.

Past performance is no guarantee of future results. Performance returns and the principal value of an investment will fluctuate. Performance returns contained herein are subject to revision by Northern Trust. Comparative indices shown are provided as an indication of the performance of a particular segment of the capital markets and/or alternative strategies in general. Index performance returns do not reflect any management fees, transaction costs or expenses. It is not possible to invest directly in any index. Net performance returns are reduced by investment management fees and other expenses relating to the management of the account. Gross performance returns contained herein include reinvestment of dividends and other earnings, transaction costs, and all fees and expenses other than investment management fees, unless indicated otherwise. For additional information on fees, please refer to Part 2a of the Form ADV or consult a Northern Trust representative.

Investing involves risk—no investment strategy or risk management technique can guarantee returns or eliminate risk in any market environment. Forward-looking statements and assumptions are Northern Trust's current estimates or expectations of future events or future results based upon proprietary research and should not be construed as an estimate or promise of results that a portfolio may achieve. Actual results could differ materially from the results indicated by this information.

If presented, hypothetical portfolio information provided does not represent results of an actual investment portfolio but reflects representative historical performance of the strategies, funds or accounts listed herein, which were selected with the benefit of hindsight. Hypothetical performance results do not reflect actual trading. No representation is being made that any portfolio will achieve a performance record similar to that shown. A hypothetical investment does not necessarily take into account the fees, risks, economic or market factors/conditions an investor might experience in actual trading. Hypothetical results may have under- or over- compensation for the impact, if any, of certain market factors such as lack of liquidity, economic or market factors/conditions. The investment returns of other clients may differ materially from the portfolio portrayed. There are numerous other factors related to the markets in general or to the implementation of any specific program that cannot be fully accounted for in the preparation of hypothetical performance results. The information is confidential and may not be duplicated in any form or disseminated without the prior consent of Northern Trust.

This information is intended for purposes of Northern Trust marketing of itself as a provider of the products and services described herein and not to provide any fiduciary investment advice within the meaning of Section 3(21) of the Employee Retirement Income Security Act of 1974, as amended ("ERISA"). Northern Trust is not undertaking to provide impartial investment advice or give advice in a fiduciary capacity to the recipient of these materials, which are for marketing purposes and are not intended to serve as a primary basis for investment decisions. Northern Trust and its affiliates receive fees and other compensation in connection with the products and services described herein as well as for custody, fund administration, transfer agent, investment operations outsourcing and other services rendered to various proprietary and third party investment products and firms that may be the subject of or become associated with the services described herein.

The Northern Trust Company of Hong Kong Limited (TNTCHK) is regulated by the Hong Kong Securities and Futures Commission. In Singapore, TNTCHK, Northern Trust Global Investments Limited (NTGIL), and Northern Trust Investments, Inc. are exempt from the requirement to hold a Financial Adviser's Licence under the Financial Advisers Act and a Capital Markets Services Licence under the Securities and Futures Act with respect to the provision of certain financial advisory services and fund management activities. In Australia, TNTCHK is exempt from the requirement to hold an Australian Financial Services Licence under the Corporations Act. TNTCHK is authorized and regulated by the SFC under Hong Kong laws, which differ from Australian laws.

Northern Trust Asset Management is composed of Northern Trust Investments, Inc. Northern Trust Global Investments Limited, Northern Trust Fund Managers (Ireland) Limited, Northern Trust Global Investments Japan, K.K, NT Global Advisors Inc., 50 South Capital Advisors, LLC, Belvedere Advisors LLC and investment personnel of The Northern Trust Company of Hong Kong Limited and The Northern Trust Company.

© 2021 Northern Trust Corporation. Head Office: 50 South La Salle Street, Chicago, Illinois 60603 U.S.A.