*Excerpt of an interview with McKinley Capital Management's Director of Quantitative Research, Anureet Saxena, Ph.D., CFA*

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## 2020 – The Year of Low Volatility Strategies?

*Q. What got you interested in low volatility strategies?*

A. 2020 was a very interesting year from a market analysis perspective. We were amid a global pandemic, unemployment rates soared through the roof, thousands of people lost their livelihoods, volatilities surged across the board to levels last seen during the 2008 Great Financial Crisis, and yet, most global markets ended the year on a positive note. Given the unprecedented volatility, one would have expected low volatility (also referred to as minimum volatility) strategies to outperform. However, most products in this space failed to deliver positive risk adjusted returns. During one of our weekly calls in Q4 of 2020, McKinley CEO/CIO Rob Gillam and I discussed these developments and we both asked, "Is there a fundamental explanation for the underperformance of minimum volatility (min-vol) strategies?"

*Q. How did you go about answering that question?*

A. We scoured the literature on this topic and found that researchers have mostly explored the low volatility (LV) anomaly from a technical perspective, namely, stocks with low price volatility will likely outperform their higher volatility peers. While there have been behavioral explanations for the existence and persistence of this anomaly, we failed to find any tangible fundamental explanation for the LV phenomenon. Specifically, we wanted to understand the relationship between price volatility and uncertainty in a company's fundamentals, and this led us to the discovery of "Fundamental Complexity".

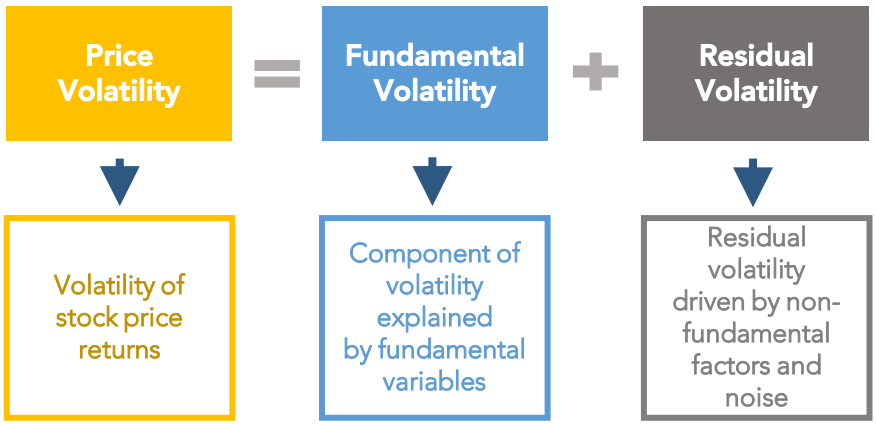
*Q. How do you explain "Fundamental Complexity" in King's English?*

A. Consider two companies (say A and B) in the industrial sector. Company A is an industrial conglomerate that is routinely involved in M&A, corporate restructuring and spin-offs while Company B is limited to manufacturing specific kinds of equipment and has done limited M&A in recent years. Given the profile of these two companies, it is reasonable to expect company A to have more volatile growth rates and margins vis-à-vis Company B. Similarly, forecasting future fundamentals of Company A is likely to be more difficult and error prone as compared Company B.

Fundamental complexity captures such inherent difficulties in analyzing the operating segments of a firm that arise by virtue of the unique ways the firm makes operating, investing, and financing decision. While the concept of fundamental complexity is intuitively appealing, quantifying fundamental complexities of firms across a wide range of industries presents some unique challenges. Using an interesting combination of fundamental insights and AI/ML based techniques, we developed a quantitative framework that can not only quantify the notion of fundamental complexity but also allow us to better understand the LV phenomena from a fundamental standpoint.

*Q. Can you explain the application of fundamental complexity in unravelling stock price volatility?*

A. Using the conceptual framework of fundamental complexity, we were able to decompose price volatility into two components, namely, a component that is driven by fundamentals (fundamental volatility) and a residual component that is driven by non-fundamental factors. otherwise known as, noise.




To the best of our knowledge, such a decomposition has never been attempted. The paper by Dutt and Humphrey-Jenner (cf. [1]) comes close to our endeavor with two key differences. First, while [1] takes only a directional view of fundamentals our approach also considers volatility of the underlying fundamental variables thereby offering a key advantage. Second, [1] has only a handful of fundamental variables while our approach utilizes dozens of variables that cover a wide spectrum of fundamentals such as growth, margin, profitability, capex, and risk.

References: Dutt, Tanuj & Humphery-Jenner, Mark, 2013. "Stock return volatility, operating performance and stock returns: International evidence on drivers of the 'low volatility' anomaly," Journal of Banking & Finance, Elsevier, vol. 37(3), pages 999-1017.

*Q. The idea of decomposing price volatility into a fundamental and residual component sounds very interesting. How does that help in our understanding of low volatility phenomenon?*

A. Based on the volatility decomposition, we constructed three different simulated variants of min-vol strategies, namely,

1. Traditional min-vol that bets on stocks with low price volatility
2. Fundamental min-vol that bets on stocks with low fundamental volatility
3. Residual min-vol that bets on stocks with low residual volatility

Among other things, we wanted to understand what fraction of the LV phenomenon is driven by the fundamental component of volatility. We ran three long-term min-vol simulated backtests for each one of the variants identified above and were quite surprised by the empirical findings. First and foremost, the data showed only 20% of price volatility is driven by fundamentals. Thus, a significant portion of the market volatility we experience on a daily, weekly or monthly basis is driven by non-fundamental factors. Second, we believe it is precisely the fundamental component of volatility that gives rises to the low volatility phenomenon. In other words, there appear to be no excess returns associated with the residual component of volatility, and we believe the LV risk premium can be entirely explained by the fundamental component of volatility. Furthermore, min-vol strategies built using fundamental component of volatility appear to outperform the traditional min-vol strategies based on total (active) return and Sharpe (information) ratio.

To summarize, fundamental complexity offers an effective toolkit to separate the fundamental component of volatility from noise, thereby allowing us to build what we believe is a more robust min-vol strategy with a strong fundamental basis.

*Q. From the point of view of portfolio construction, are there significant differences between fundamental and traditional min-vol strategies?*

A. Fundamental min-vol strategies are based on a remarkably simple concept, namely, stocks with lower fundamental complexity outperform their high fundamental complexity peers over a long period of time. Notably, this phenomenon is robust across a variety of industries, thereby. allowing us to design a stock selection model with very limited contribution from sectors or industries. As a corollary, it implies that we can manage fundamental min-vol portfolios with tight sector, industry and style (except volatility) bounds as compared to other products in this space. Specifically, we can limit the value,

growth, and quality exposure of the portfolio to avoid it from becoming a proxy bet on ancillary factors. Similarly, we can limit the active industry exposures to less than 3% to avoid any industry from becoming a significant contributor to active risk.

Brinson Attribution analysis of fundamental min-vol portfolio returns over a long period of time indicates that roughly 65-90% of the active performance is derived from stock selection. Similarly, Factor Attribution analysis shows that roughly 65% of the active returns are stock specific while the remaining factor returns are almost entirely driven by the volatility factor, as expected.

*Q. We started this conversation by talking about 2020. Can you offer some insight into how the fundamental min-vol strategy performed in 2020?*

A. The following table gives the annual returns and drawdowns for the market capitalization weighted benchmark (Russell 1000), MSCI US Min Vol Index (traditional min-vol strategy) and McKinley's simulated fundamental min-vol strategy. Returns for McKinley's simulated fundamental min-vol strategy are gross of management fees but net of estimated transaction costs. As it is evident from this table, McKinley's simulated fundamental min-vol strategy offered better drawdown protection and risk adjusted returns than the traditional variant.

| | Total Return | Jensen Alpha | Drawdown |
|---|---|---|---|
| Russell 1000 | 21.0% | - | -20.2% |
| MSCI US MinVol | 5.8% | -9.13% | -17.1% |
| Simulated Fundamental MinVol* | 17.8% | 0.01% | -16.6% |

Data Sources: FactSet, Axioma, MSCI, Russell.. The Russell 1000® Index is an unmanaged, market capitalization-weighted index that measures the performance of the 1000 companies with the largest market capitalization. The MSCI MinVol Index measures the performance of managed minimum volatility equity strategies. *Simulated Methodology: The simulated portfolio was generated using the mean-variance optimization procedure. The expected returns were derived from stock volatilities using a proprietary methodology and were used in conjunction with Axioma's fundamental worldwide medium horizon risk model (WW-MH4) and optimizer to derive optimized portfolios. The simulation was run for 2006-2020 time period with monthly rebalancing. The simulation period was determined by a variety of factors including data availability. The optimal portfolios were benchmarked to Russell 1000 index and subject to active asset, industry and sector bounds, turnover constraint, tracking error constraints, etc. The ex-post performance is reported gross of management fees but net of transaction cost of 12bps per annum.

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Anureet Saxena, Ph.D., CFA, joined McKinley Capital in 2020 as the Director of Quantitative Research. This followed Anureet's several-year-tenure on the firm's Scientific Advisory Board, and his close collaboration with Dr. John Guerard, Ph.D., McKinley Capital's former Director of Quantitative Research, on several publications including Quantitative Corporate Finance (John B. Guerard, Jr., Anureet Saxena and Mustafa Gultekin, Revised edition, New York: Springer, 2020). Anureet's academic pedigree, industry-leading research, and hands-on investment knowledge is an asset to McKinley Capital's leadership team and quantitative research department. Anureet and his team conduct thorough reviews and enhancements of the firm's investment methodology. In addition, Anureet is conducting and completing research on key business initiatives including analyst coverage and information diffusion, and managed volatility. Prior to joining McKinley Capital, Dr. Saxena was a Portfolio Manager at Lazard Asset Management, and held various positions at Allianz Global Investors, Qontigo (formerly Axioma Inc), and Assiduous Investment. Dr. Saxena has taught in the Quantitative and Computational Finance (QCF) program at Georgia Institute of Technology and Quantitative Methods program at Krannert School of Management and has published several papers in peer-reviewed journals such as Mathematical Programming, Journal of Portfolio Management, Journal of Investment Management, Journal of Investing and Journal of Risk. Dr. Saxena is the winner of 2004 Egon Balas award for best paper in Algorithms, Combinatorics and Optimization; the 2008 Gerald L. Thompson award for best dissertation in Management Science; and the 2014 excellence in Economics scholarship by Krannert School of Management. He earned his B.Tech in Computer Science and Engineering from IIT Bombay, M.S. and Ph.D. in Management Science from Tepper School of Business (Carnegie Mellon University), M.S. in Economics from Krannert School of Management (Purdue University), and a certificate in Accounting from UC Berkeley (extension program). Anureet is a CFA, CIPM and CQF charter holder.