

Beta Analysis Report

Different Types of Beta Computations:

1. Main Beta (computed using daily data):

- **Detail-Oriented:** This method captures the most granular representation of a stock's relationship with the market, given its reliance on daily data. Such a detailed approach can be beneficial when short-term market movements are of interest.
- **Industry Recognition:** Being a commonly employed method in many financial analyses, it's widely recognized and understood within the finance industry. This broad acknowledgement implies that when presenting analyses based on daily beta values, the audience is more likely to be familiar with the methodology.

2. Monthly Beta (computed using monthly data):

- **Long-term Perspective:** By averaging returns over a month, this approach potentially filters out the noise from short-term market fluctuations. It can be particularly valuable when analyzing long-term trends or when the focus is on more macro-level insights.
- **Stability:** Monthly beta offers a degree of stability as it's less influenced by daily market disturbances or transient events. For analyses where reduced volatility and a smoother trend are desired, monthly beta can be a preferred choice.

3. Welch Beta (computed using the Welch (2021) method):

- **Robustness:** The standout feature of the Welch Beta methodology is its robustness. By considering outliers in daily stock returns and winsorizing extreme values, it seeks to offer a more accurate beta estimation.
- **Superior Predictive Capabilities:** The Welch (2021) paper claims that this "slope-winsorized" beta estimator can predict future betas more effectively than other popular methods. If true, this makes the Welch method particularly valuable for forward-looking analyses.
- **Efficiency:** Designed for practicality, the Welch Beta method is easy to implement, requiring only a single-pass formula. This efficiency can be crucial when processing large datasets or when timely analysis is required.

Historical Events and Their Impact on Beta Values:

- **2008 Financial Crisis:** The data reveals a discernible impact on beta values around this period, which can be attributed to the market turmoil triggered by the housing bubble and subprime mortgages.
- **2010 Flash Crash:** A quick disturbance in beta values around 2010 can be correlated with the rapid crash and subsequent recovery of securities prices. Such short-term but significant events can be pivotal when considering high-frequency trading strategies.
- **2020 COVID-19 Pandemic:** As expected, the pandemic introduced significant market volatility, which is evident in the sharp beta value fluctuations in 2020. This period can serve as a case study on the resilience and adaptability of different sectors during global crises.

Economic Sensitivity across Sectors:

- **General Economic Sensitivity:** Certain industries, like 'Services' and 'Retail Trade', have displayed higher sensitivity to broad economic conditions. Their beta values have shown greater fluctuations in response to major economic events, highlighting their dependency on overall economic health.
- **Stability in Sectors:** Contrarily, sectors such as 'Public Administration' have shown relative stability, with less fluctuating beta values. Such sectors might be considered safe havens during economic downturns.

Comparative Analysis of Beta Computations:

- Different beta computation methods yield varied beta profiles. While daily and monthly betas capture different facets of market volatilities, the Welch method stands out for its robustness, potentially reducing the influence of extreme market movements. The choice between these methods should hinge on the specific analysis objective and the intended audience.

Decile Analysis:

For this particular analysis, the Welch beta for 12 months (beta_welch_12M) was chosen. This decision was informed by:

- **Duration:** A 12-month period strikes a balance between capturing short-term market dynamics and offering a sufficiently long window to observe sustained patterns.

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- **Robustness of the Welch Method:** As reiterated, the Welch method introduces a degree of robustness by winsorizing extreme values, leading to a more reliable beta estimation.

Beta and Excess Return Patterns:

- Value-weighted portfolios show a tendency to have consistently lower average beta values compared to equal-weighted portfolios throughout the examined period. This observation suggests that the stocks comprising the value-weighted portfolios inherently possess lower systematic risk.
- The excess returns, which represent returns beyond what is predicted by the CAPM, demonstrate variability in both portfolio types. Some years exhibit notable positive excess returns, whereas others display negative trends. It becomes evident that beta, while influential, isn't the sole factor driving these return patterns.

Risk-Return Trade-Off:

- The Newey-West t-statistic for the value-weighted portfolio, when adjusted with 5 lags, stands at approximately 4.96. This value strongly indicates that the excess returns of the value-weighted portfolio are statistically significant and not a product of mere random fluctuations.
- For the equal-weighted portfolio, the Newey-West t-statistic isn't provided. Consequently, drawing a concrete conclusion about its average excess return's statistical significance remains challenging.
- Given the available data, the value-weighted portfolios seem to offer a more favourable risk-return proposition. They combine the benefits of lower beta values (indicative of reduced risk) with positive average excess returns. Conversely, the equal-weighted portfolios appear to adopt a riskier stance, potentially due to their inherent structure and composition.

CAPM Prediction:

- The cornerstone of the CAPM is its assertion of a positive correlation between a stock's market beta and its expected returns. From the data, this prediction seems to find resonance with the value-weighted portfolio, which, despite its lower beta, registers positive average excess returns.
- The verification of CAPM's predictions for the equal-weighted portfolio remains elusive, primarily because of the absence of key metrics like the Newey-West t-statistic. A comprehensive assessment would necessitate this and possibly other related data points.

Differences in Portfolio Structures:

- Value-weighted portfolios lean towards stocks with diminished beta values. This inclination suggests a strategic emphasis on stocks that are deemed less risky when their market capitalization is taken into account.
- In stark contrast, equal-weighted portfolios adopt an egalitarian approach, distributing weights uniformly across stocks. While this can lead to enhanced diversification, it might also usher in elevated risk levels given the indiscriminate weighting.