

The Implied Advantage: Empowering Beta-Neutrality with Options-Based Metrics

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The concept of achieving beta neutrality within an investment strategy holds immense significance for portfolio managers. Beta neutral strategies are designed to create a portfolio with a beta of zero, ensuring that its performance remains relatively immune to overall market movements and effectively eliminating exposure to systematic risk. This research note explores the efficacy of beta neutral portfolios and the methods employed to estimate constituent betas. The use of forward-looking or "implied betas" derived from liquid options markets, specifically from the [OptionMetrics IvyDB Beta](#) dataset, has emerged as an alternative to traditional beta estimation based on historical daily returns. This forward-looking metric of systematic risk is particularly relevant for funds engaging in market neutral, equity long short, statistical arbitrage, and pairs trading strategies.

In this research, we present evidence showcasing the superior effectiveness of implied betas in achieving beta neutrality for leveraged long/short factor portfolios compared to historical beta estimates. We find that nearly all portfolios using implied beta for leverage calculation are more successful in approximating the target beta of zero.

As an example, we demonstrate results from our paper on ["Implied Betting Against Beta \(IBAB\)."](#) In this study, we construct both the implied BAB and traditional BAB portfolios, utilizing implied beta and historical beta, respectively, to determine the leverage of the long/short (L/S) portfolio. Constituents within the high/low beta portfolio are reverse rank weighted based on beta. The high beta portfolio is the top decile, the low beta portfolio is the bottom decile.

Performance of \$1 in Implied BAB and Traditional BAB Factor



Factors are constructed by long low beta stocks and short high beta stocks. Stocks are rank-weighted by beta in each portfolio and leveraged to beta-neutral.

Source: IvyDB Beta • Created with Datawrapper

The IBAB portfolio exhibits significantly higher annualized returns of 5.28%, while the BAB portfolio experiences a negative return of -3.04% (per Portfolio Analytics, below). A key contributing factor to the outperformance of implied BAB over traditional BAB is the closer proximity of absolute beta to zero for IBAB. Implied beta proves to be a better predictor of realized beta over the period, leading to a more accurate selection of the long/short leverage during portfolio formation. On the other hand, the traditional BAB portfolio's realized beta over the period was -0.28, resulting in a net short market exposure.

Portfolio Analytics

Monthly Performance of BAB Factors. Factor is constructed by long low beta stocks, short high beta and leveraged to be beta neutral.

Portfolio	Average Returns	Annualized Returns	Annualized Volatility	Sharpe Ratio	Beta
Traditional BAB	-0.0003	-0.0304	0.2285	-0.0717	-0.2797
Implied BAB	0.0057	0.0528	0.1835	0.3067	-0.1145

Sample covers from Jan 2007 to November 2022. SPY annualized returns over this was 6.7% with a Sharpe ratio of 0.39

Source: IvyDB Beta • Created with Datawrapper

To bolster these findings, we perform a comparable analysis using other long/short factors. It is essential to emphasize that the choice of factors is solely for illustrative purposes concerning realized beta over the period and does not endorse any particular strategy. The objective is to strengthen the evidence of implied betas' effectiveness in attaining beta neutrality for leveraged long/short factor portfolios.

In the table below, we analyze the realized beta of equal-weighted, beta-neutralized long-short factor portfolios that undergo monthly rebalancing. A realized beta closer to zero indicates the estimate of beta that provided more effective neutralization.

In all equal-weighted long-short portfolios, implied beta neutralization achieved results closer to zero compared to historical beta. The most substantial difference in ex-post betas was observed for the market capitalization and BAB factors. The market cap long-short (L/S) portfolio exhibited ex-post betas of 0.053 and 0.154 for implied and historical beta, respectively. Furthermore, the realized beta for the implied beta L/S portfolio was not statistically significant.

Regarding the BAB factors, implied BAB outperformed historical BAB significantly in terms of neutralization. The realized beta for implied BAB did not significantly differ from zero, while traditional beta had a considerable positive value of 0.238. These results differ from the

above findings due to a larger sample (including 2023) and an equal-weighting scheme instead of reverse rank weighting.

The skew L/S portfolio neutralized by implied beta also demonstrated a lower realized absolute beta. However, beta neutralization using both techniques for momentum-style portfolios did not generate a significant difference.

Equal Weighted Portfolios

Shows realized betas and corresponding T-stat of equally weighted, monthly rebalanced Long/Short Portfolios using different factors from 2007 - 2023. Market Cap LS is small minus big. Skew LS is low minus high. Momentum LS is monthly and is high minus low. Implied BAB is Implied 30 Day Beta and is low minus high. Traditional BAB is historical 1 year beta and is low minus high.

Portfolio	Realized Beta	T-stat
Market Cap LS - Implied Beta Neutralized	0.053	1.377
Market Cap LS - Historical Beta Neutralized	0.154	3.676***
Skew LS- Implied Beta Neutralized	-0.060	-1.951*
Skew LS - Historical Beta Neutralized	0.096	2.657***
Momentum LS - Implied Beta Neutralized	-0.195	-3.337***
Momentum LS - Historical Beta Neutralized	-0.209	-3.111***
Implied BAB	-0.064	-1.028
Traditional BAB	0.238	2.789***

$Skew = (OTM\ put\ vol - OTM\ call\ vol) / ATM\ vol$
 $p\text{-value} < 0.1 *$
 $p\text{-value} < 0.05 **$
 $p\text{-value} < 0.01 ***$

Source: OptionMetrics • Created with Datawrapper

Next, we assess beta neutralization for value-weighted factors. The results show no meaningful differences compared to equal-weighted portfolios, providing further evidence of the superiority of implied betas regardless of the weighting scheme.

Value Weighted Portfolios

Shows realized betas and corresponding T-stat of market cap weighted, monthly rebalanced Long/Short Portfolios using different factors from 2007 - 2023. Market Cap LS is small minus big. Skew LS is low minus high. Momentum LS is monthly and is high minus low. Implied BAB is 30 Day Implied Beta and is low minus high. Traditional BAB is historical 1 year beta and is low minus high.

Portfolio	Realized Beta	T-stat
Market Cap LS - Implied Beta Neutralized	0.040	0.952
Market Cap LS - Historical Beta Neutralized	0.140	3.122***
Skew LS - Implied Beta Neutralized	-0.071	-1.829***
Skew LS - Historical Beta Neutralized	0.065	1.524
Momentum LS - Implied Beta Neutralized	-0.142	-2.305**
Momentum LS - Historical Beta Neutralized	-0.151	-2.186**
Implied BAB	-0.013	-0.208
Traditional BAB	0.242	2.827***

Skew = (OTM put vol - OTM call vol) - ATM vol

*p-value < 0.1 **

*p-value < 0.05 ***

*p-value < 0.01 ****

Source: OptionMetrics • Created with Datawrapper

In conclusion, achieving beta neutrality is a crucial concept for portfolio managers seeking to mitigate market risk and enhance portfolio performance. Beta neutral strategies, designed to maintain a portfolio with a beta of zero, offer a shield against the impact of overall market movements.

A noteworthy advancement in this area is the utilization of implied betas. This alternative approach to traditional beta estimation holds particular relevance for funds engaging in market-neutral, equity long-short, statistical arbitrage, and pairs trading strategies.

Our findings present compelling evidence of the superiority of implied betas in achieving beta neutrality for leveraged long-short factor portfolios when compared to historical beta estimates. The majority of portfolios employing implied beta for leverage calculation exhibited results closer to the target beta of zero, underscoring the effectiveness of this approach.