TRIVARIATE RESEARCH

THE HIGHER THE BETA THE LOWER THE ALPHA

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BACKGROUND AND RESEARCH SUMMARY

Background: Over the last few weeks, we have analyzed the risk of several investor portfolios and ETFs. One metric we constantly use to assess risk is beta. At Trivariate we use the median of four beta horizons as an attempt to marry near-term conditions with the longer-term market sensitivity of each stock. Nonetheless, betas can change when there is sharp price action, and hence, we analyzed the betas of the top 2000 US equities to identify anomalies and to assess how alpha potential varies by beta decile across the market.

Beta data: Among the mega-cap stocks, it appears that the median growth stock has average beta, but the betas of non-growth stocks have plummeted to lows. Essentially, among mega caps, if you are not a Mag 7 stock, your beta is low. The bottom 40% of mega cap stocks have not had betas this low since the TMT bubble in 2000.

Extreme sector betas: For many generalist portfolio managers, it has been a challenge to correctly size Semiconductor positions, as betas are both high and disperse vs. history. On the flip side, Insurance, Energy, and Utilities companies all have low beta vs. their own histories, though we suspect they will be less defensive in a downturn than current betas imply.

The higher the beta, the lower the alpha: Across the market, there is a clear inverse relationship between beta and alpha. <u>Lower beta stocks have higher alpha, and the higher beta stocks have lower alpha and higher volatility of beta</u>. The pattern perfectly rank orders across beta decile for the overall market over the last 25 years. <u>The same pattern of the higher the beta decile the lower the realized alpha held in both growth and value stocks.</u>

INVESTMENT CONCLUSIONS

Beta by substance: Among high quality companies, there is positive alpha across all beta deciles, but avoiding the highest beta decile is prudent on average. Among the lowest quality quartile, we call junk, there is no alpha across the highest 60% of beta.

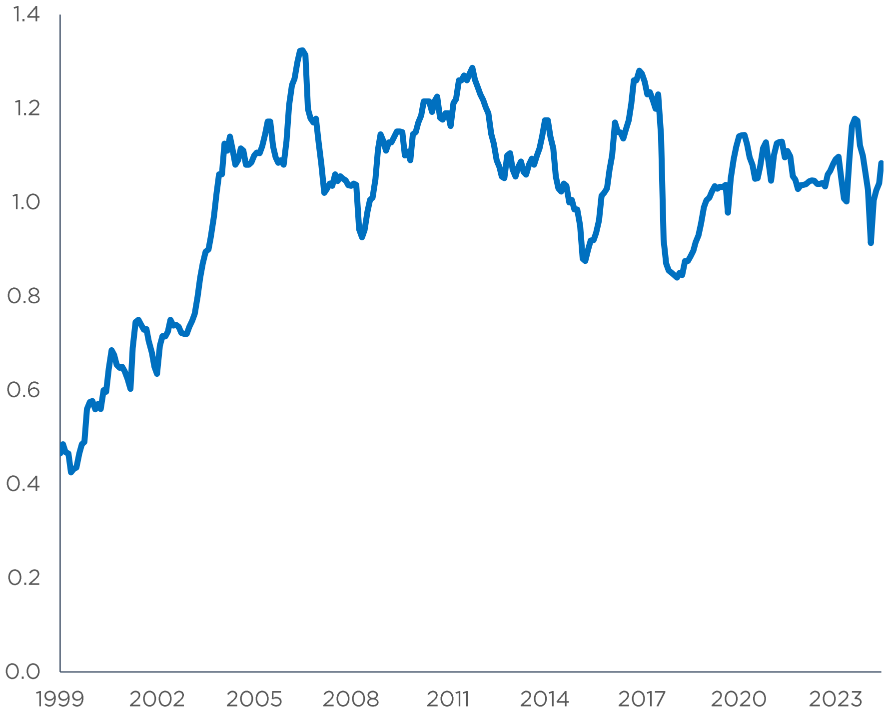
Alpha vs. beta: Five percent of stocks have beta less than 0.25, and the median stock in this low beta group had 10.9% annualized alpha. On the contrary, only 5% of stocks have a beta higher than 2.21 historically, and that cohort realizes an annual NEGATIVE alpha of 620bps. Assuming the historical betas by decile hold constant, we simulated the expected return (market assumption*beta + alpha) for various S&P500 return scenarios. **If the S&P500 is not up at least 7%, the lower the beta the better.** If the market is up between 7% and 12%, there is not a meaningful implied total performance differential by beta decile. Once the market's returns are above 12%, investors need to seek higher beta, as <u>capturing more of the market performance offsets the alpha destruction that comes from the average high beta stock.</u>

Implied return assumptions vary by cohort / sector: Among high quality stocks, the total implied return is the highest for the lowest beta decile of stocks if the S&P500 is up less than 8%. Above 8%, the bottom decile of beta has the highest implied returns. We show the return required to sell low beta stocks and move to higher beta by sector. **Only if the market returns more than 18% should investors chase beta in Communication Services and Real Estate. Higher beta stock selection makes sense when the market is up more than 4% in Utilities and 6% in Technology.** At the stock level, if the market is up around 7% next year, NVDA, PLTR, ANET, SHOP, CRWD, and APH will likely have more total return than AAPL, ROP, FTNT, CTSH, ACH, and CSCO. Under the same conditions, EQC, COLD, HR, AHR, TKO, and CABO have higher implied returns than PK, SATS, OUT, SLG, SSTK, and PEB.

BETA LEVELS ARE AVERAGE, BUT THE MEGA CAPS BETA ARE DISPERSE

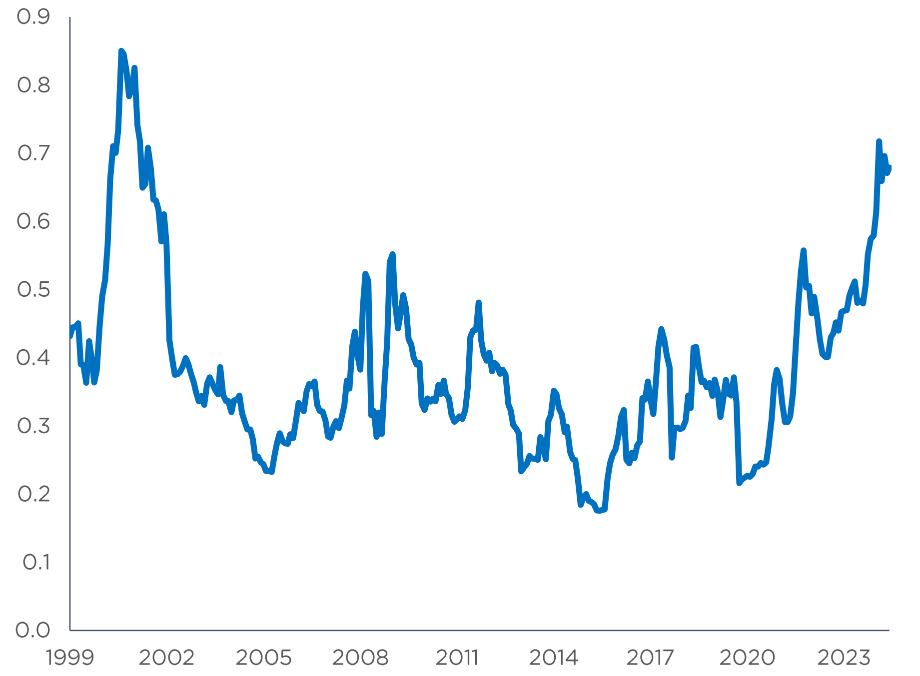
We analyzed the beta of the Top 2000 US equities to see if the recent risk-on price action had caused any material changes to beta. The beta of the median stock has oscillated between 0.85 and 1.15 for much of the last 15 years (left). Among the top 50 stocks by market capitalization, which we call Mega Cap stocks, we noticed there has been increasing dispersion in beta (right), now at the highest levels since the TMT bubble unwind.

Median Beta of Top 2000 US Equities
1999 to November 25th, 2024



Source: Trivariate Research

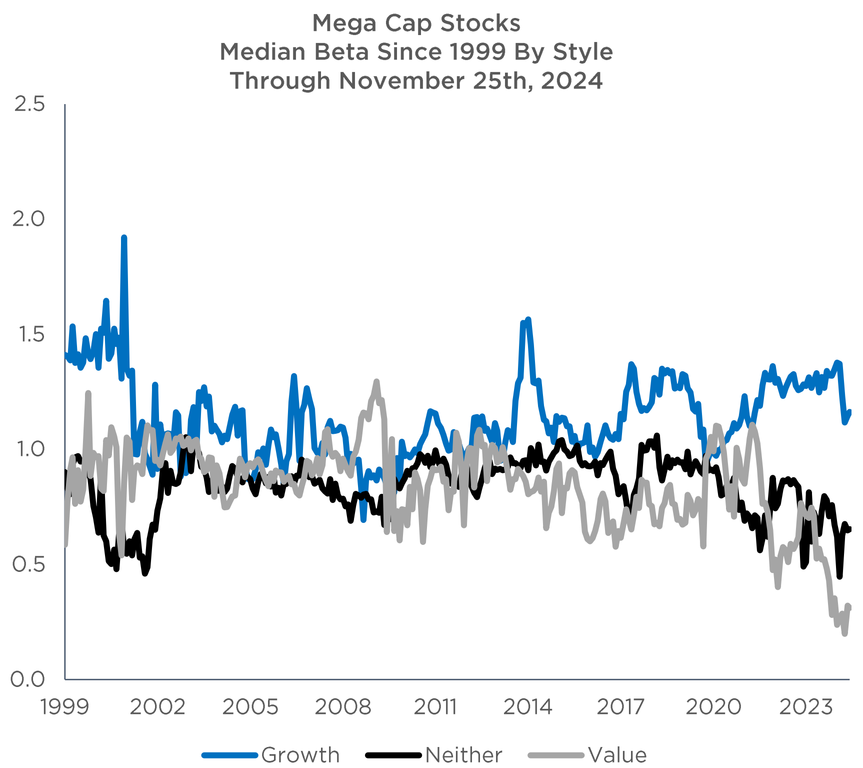
Beta Dispersion of Mega Caps.
1999 to November 25th, 2024



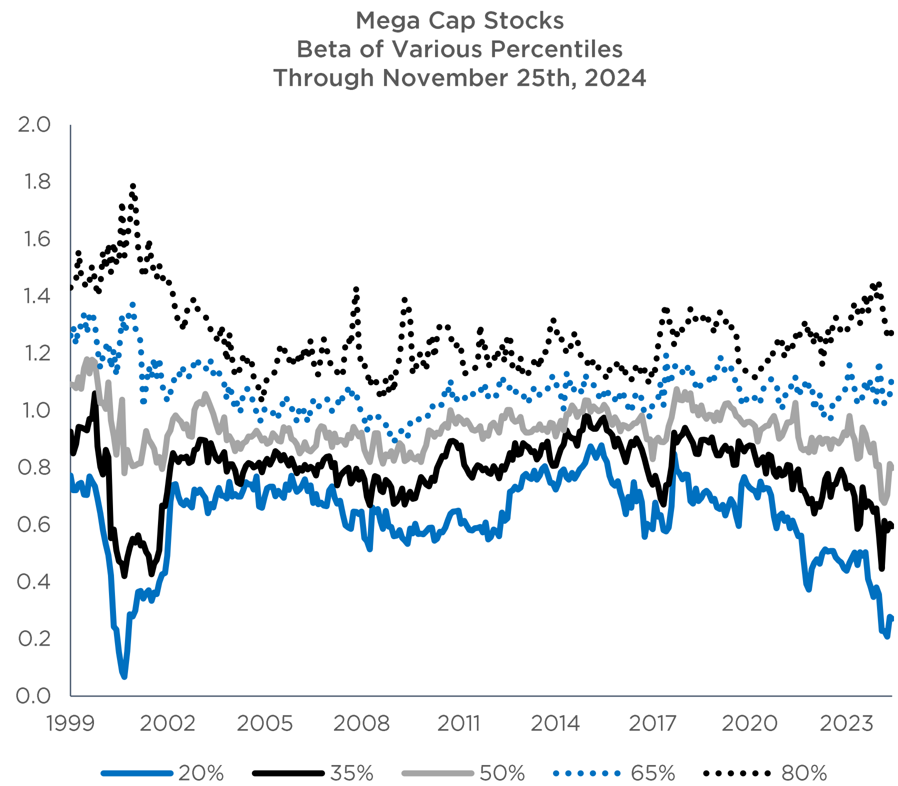
Source: Trivariate Research

THE MEGA CAP BETA DISPERSION IS DRIVEN BY VALUE / NON-MAG 7

Within the mega caps, it appears that the median growth stock has about normal beta, but the betas of the non-growth stocks have plummeted. Basically, if you aren't a Mag 7 growth stock, your beta is different (left). In particular, the bottom 40% (so the stocks 20 mega caps stocks with the lowest beta) have not had lower betas since the TMT bubble (right).



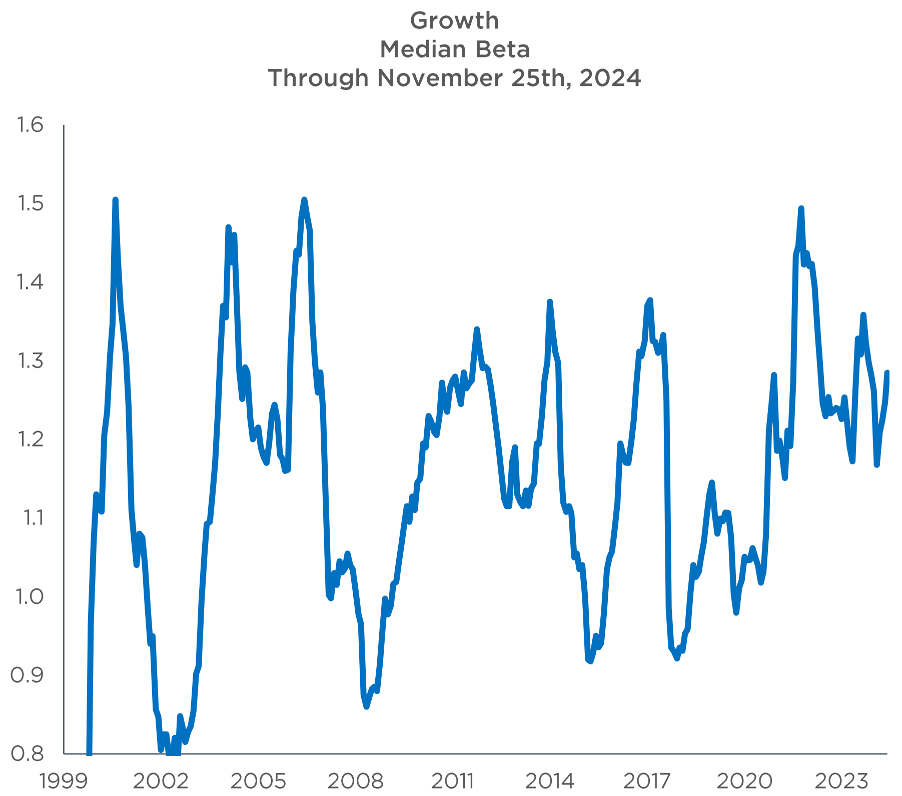
Source: Trivariate Research



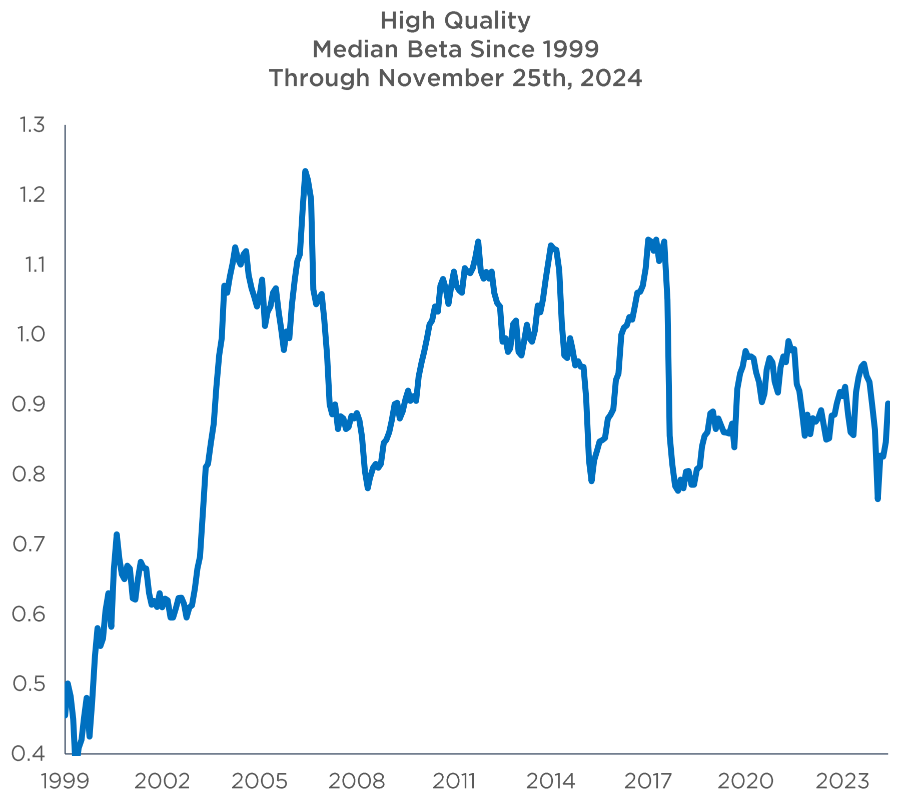
Source: Trivariate Research

BETAS OF COHORTS LIKE GROWTH AND QUALITY ARE AVERAGE

The median beta of stocks in other major cohorts doesn't particularly stand out, with the current median Growth stock beta of 1.28 (left) about in-line with longer-term averages. The median beta of the highest quality quartile of stocks (right) is 0.9, which also in-line with long-term averages.



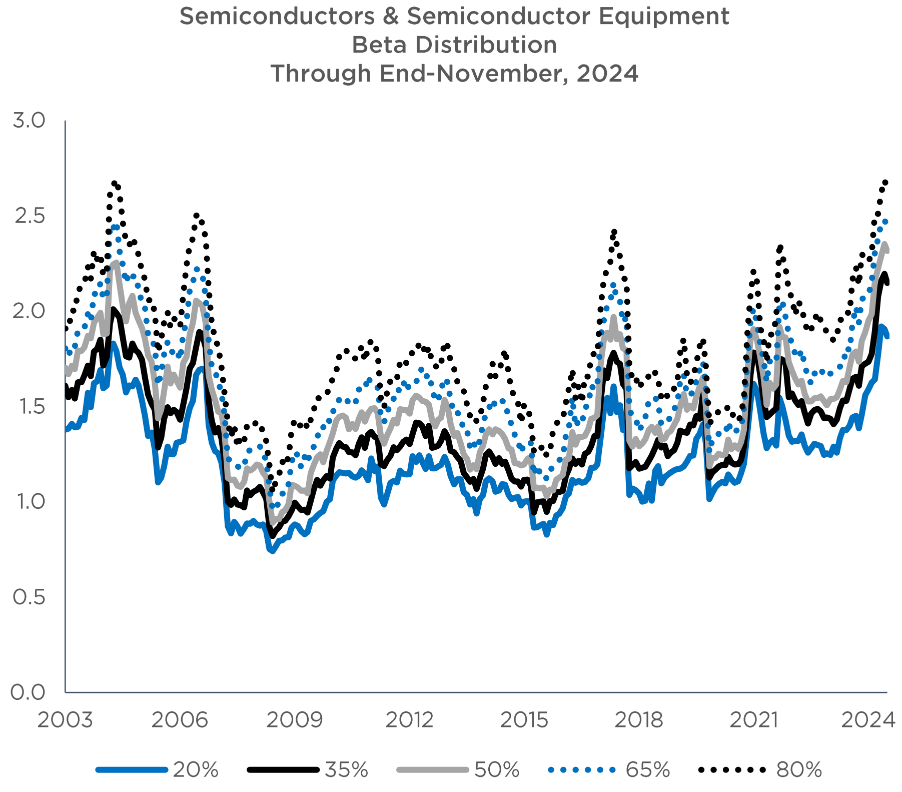
Source: Trivariate Research



Source: Trivariate Research

SEMICONDUCTOR BETAS ARE HIGH AND INSURANCE BETAS ARE LOW

For many generalist portfolio managers, it has been a challenge to correctly size their Semiconductors exposure. "Story checks out," as they say, because across the distribution the betas are as high as they have been – or higher than the TMT bubble (left). On the flip side, Insurers have particularly low betas vs. their own histories (right). Our judgment is to worry about "extreme" betas, which here means we think Semiconductors will sell-off sharply when the market-rolls over, AND, that Insurance will not be as defensive as the current betas indicate when that happens either.



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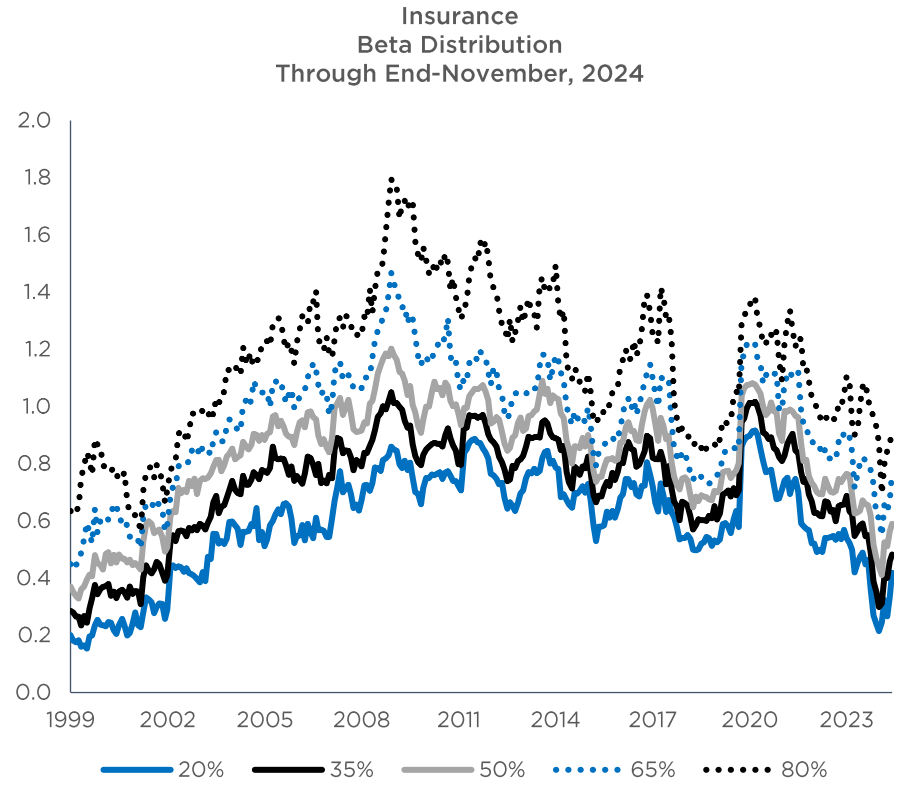
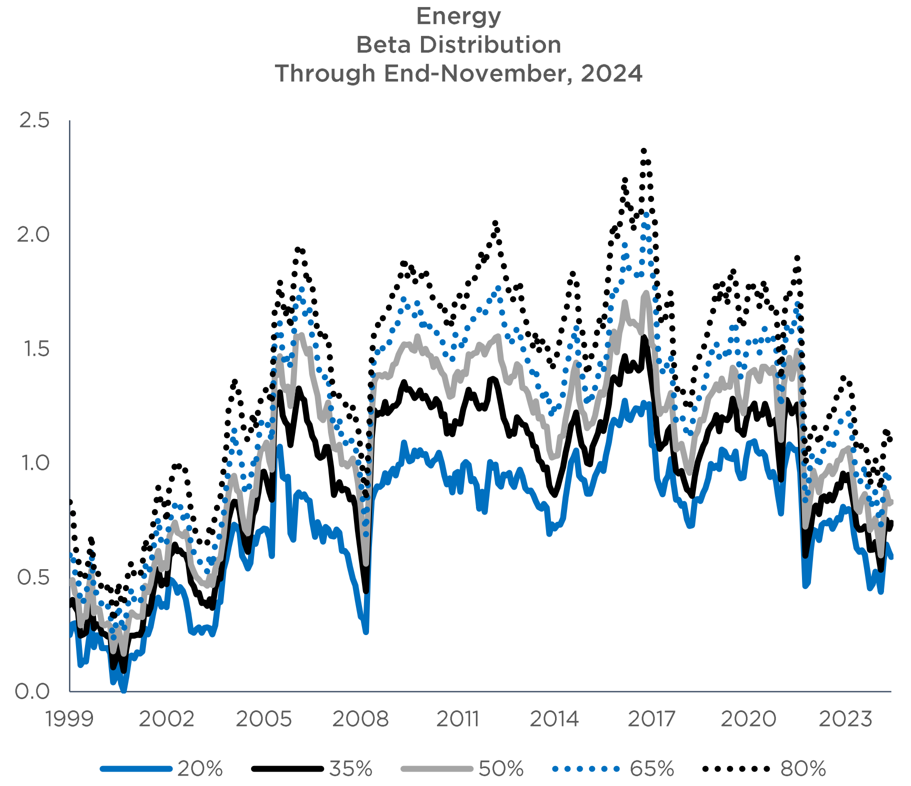


Source: Trivariate Research

THE MEDIAN ENERGY AND UTILITY STOCK ALSO HAVE LOW BETA

Energy (left) and Utilities (right) also stand out as having particularly low betas vs. history. We doubt they will be this defensive in a market sell-off.



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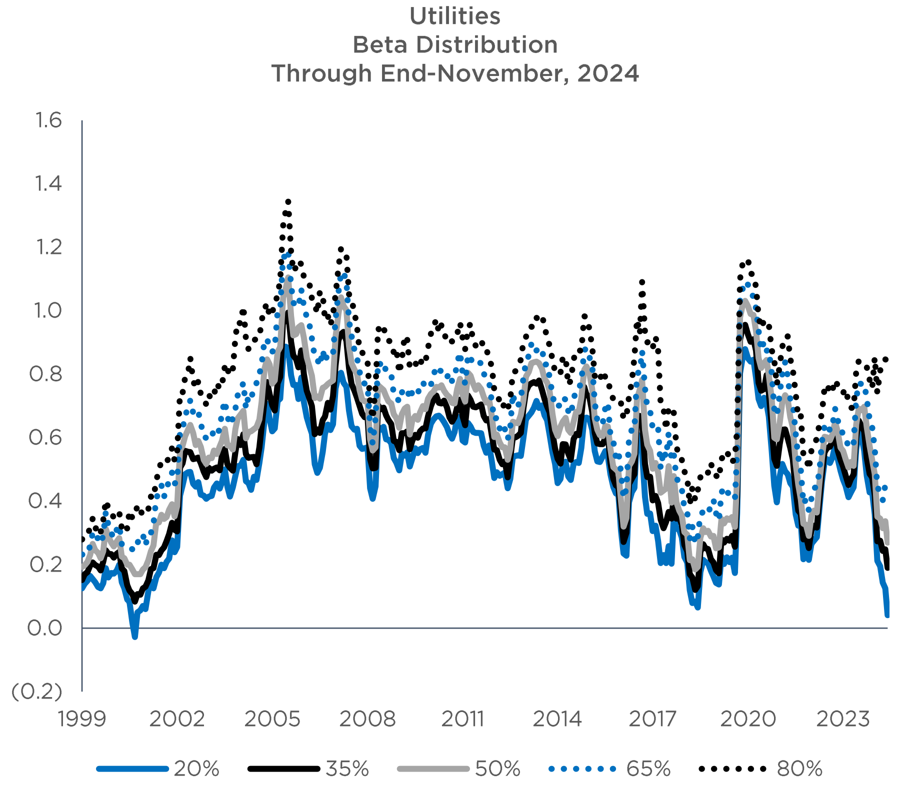
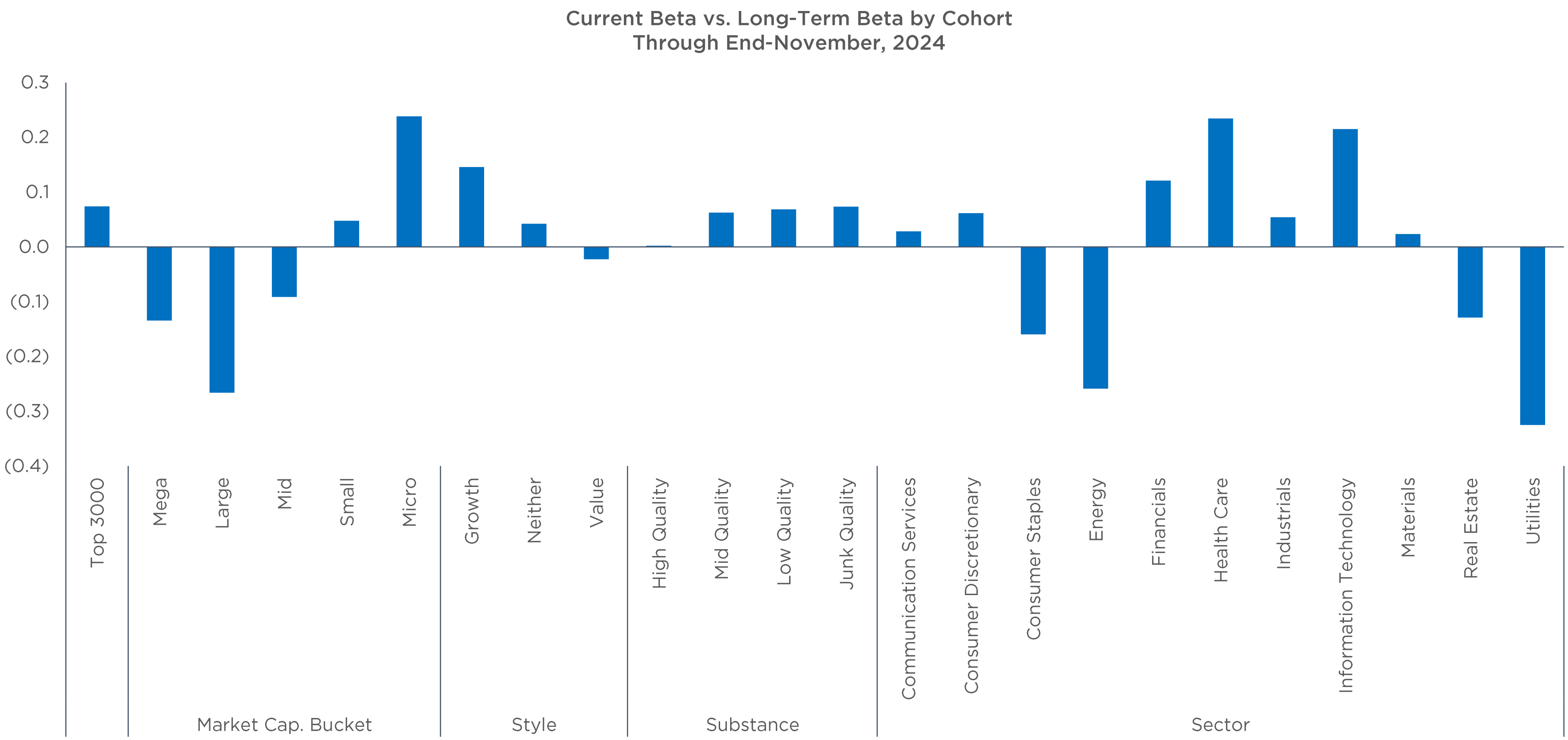


Source: Trivariate Research

HIGHER FOR TECH / HEALTHCARE, LOWER FOR ENERGY / DEFENSIVES

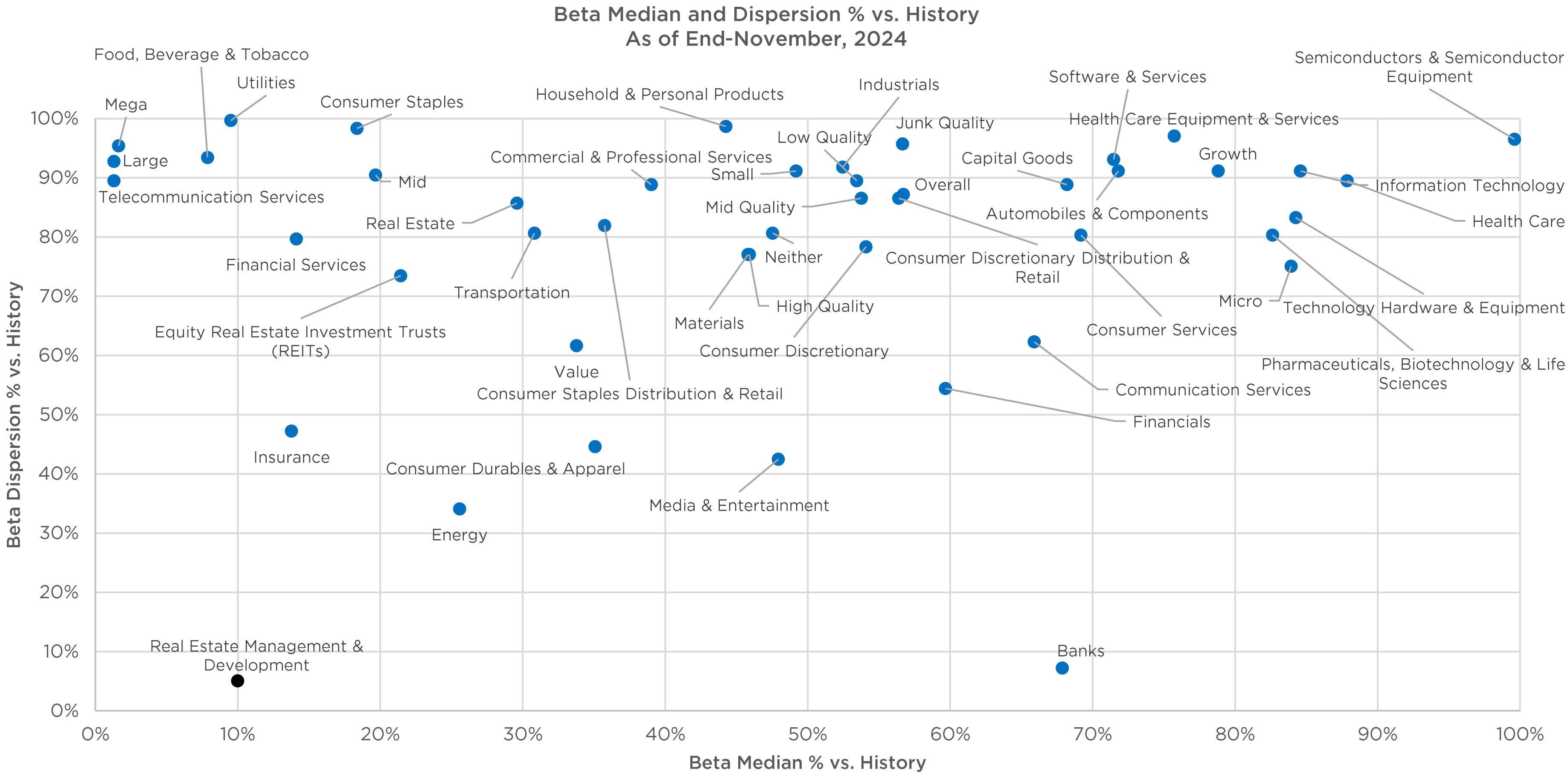
We compared the long-term average betas to the end-November betas for the market overall, and several of the major cohorts and sectors. Today, Large-cap stocks, and Consumer Staples, Energy, Real Estate and Utilities have low betas vs. their own histories. Micro-caps, growth stocks, Technology, and Healthcare have high betas vs. their long-term histories.



Source: Trivariate Research

MAPPING LEVEL AND VOLATILITY OF BETA CAN BE HELPFUL

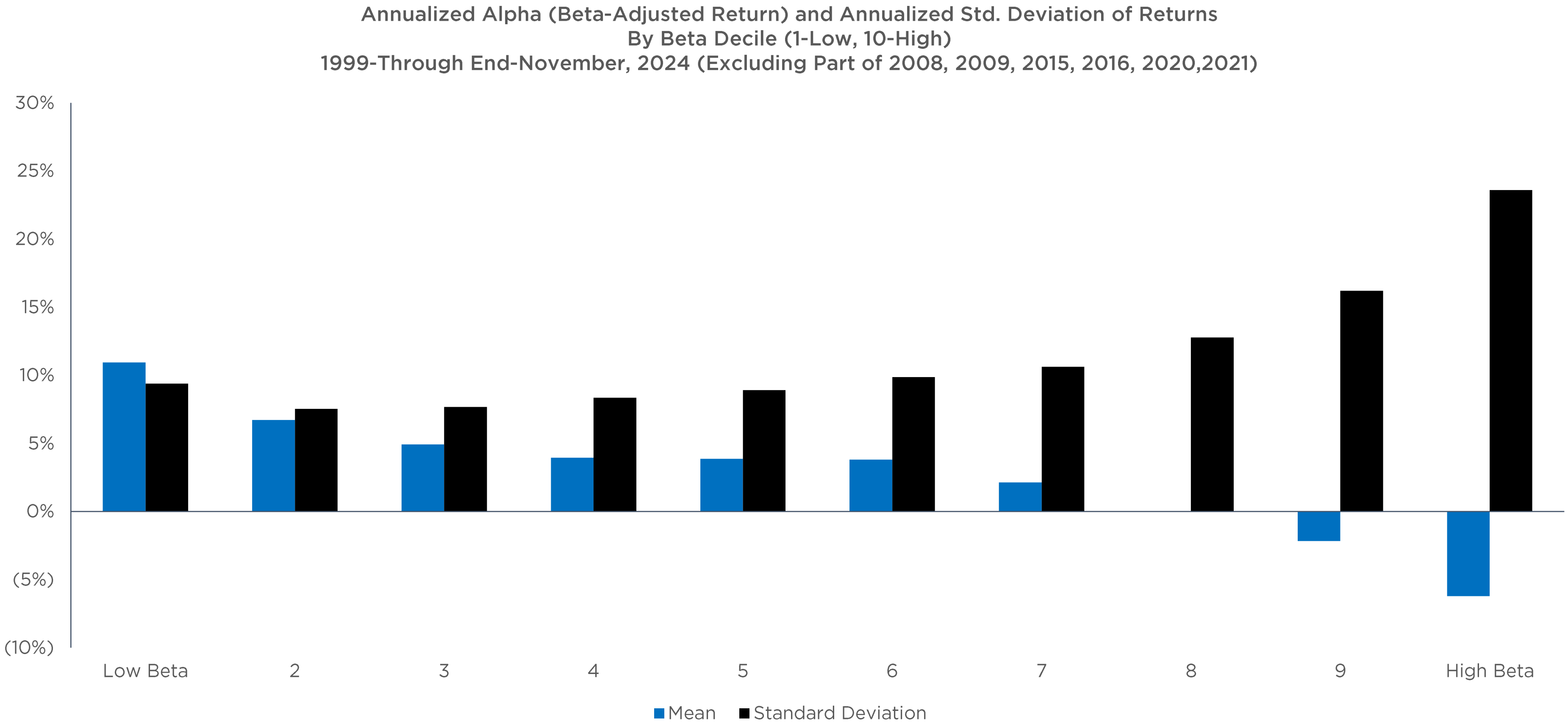
Below we show the beta dispersion percentile vs. history (y-axis) and the beta percentile vs. history (x-axis). Semiconductors have high and disperse betas. Real Estate Management Development, Energy, and Insurance are all low and have narrowly dispersed betas. Mega cap betas are low but very disperse. Bank betas are high vs. their history but narrow.



Source: Trivariate Research

THE HIGHER THE BETA, THE LOWER THE ALPHA

Across the market, there is a clear inverse relationship between beta and alpha. The lower beta stocks have higher alpha, and the higher beta stocks have lower alpha and higher volatility of alpha. The pattern is clear and perfectly rank orders across beta decile.

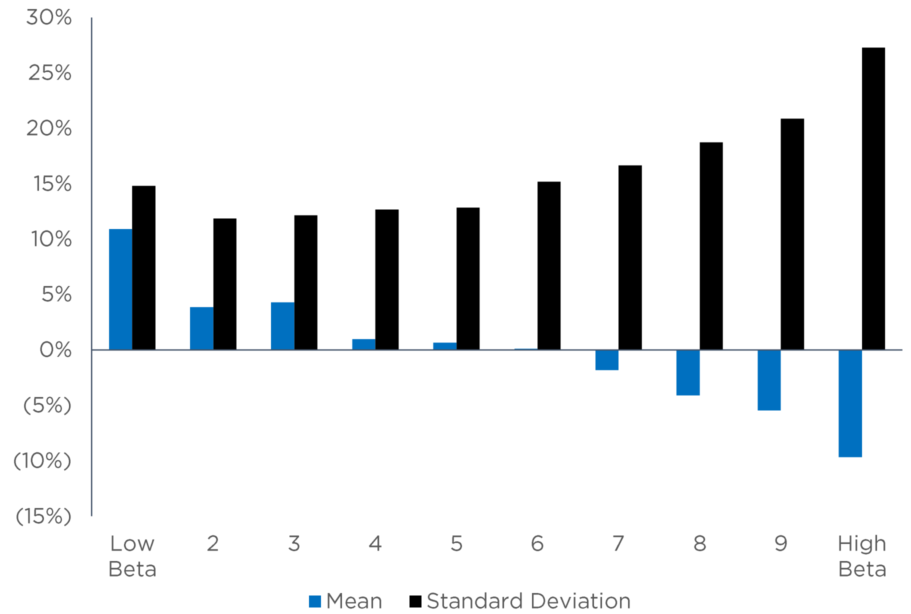


Source: Trivariate Research

IN BOTH GROWTH AND VALUE, HIGHER BETA MEANS LOWER ALPHA

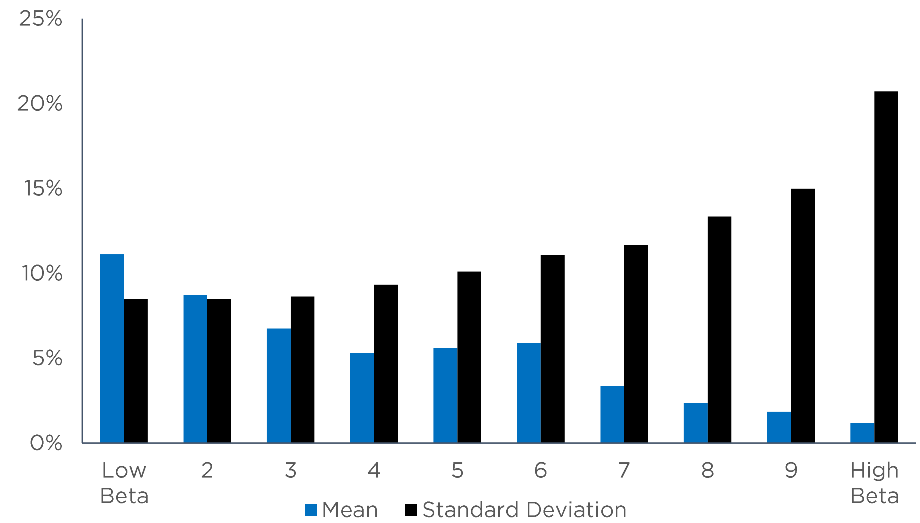
We removed the V-shape periods, i.e. the massive market declines and sharp recoveries of COVID, the Financial Crisis, and the bond scare in 2015-2016 to try to find a period of time comparable to our expectations for 2025. The same pattern of the higher the beta decile the lower the realized alpha occurred in both growth stocks (left), and values stocks (right). One difference is that among the value stocks, there historically was positive alpha across all beta deciles.

Annualized Alpha (Beta-Adjusted Return) and Annualized Std. Deviation of Returns for Growth Stocks By Beta Decile (1-Low, 10-High) 1999-Through End-November, 2024 (Excluding Part of 2008, 2009, 2015, 2016, 2020,2021)



Source: Trivariate Research

Annualized Alpha (Beta-Adjusted Return) and Annualized Std. Deviation of Returns for Value Stocks By Beta Decile (1-Low, 10-High) 1999-Through End-November, 2024 (Excluding Part of 2008, 2009, 2015, 2016, 2020,2021)

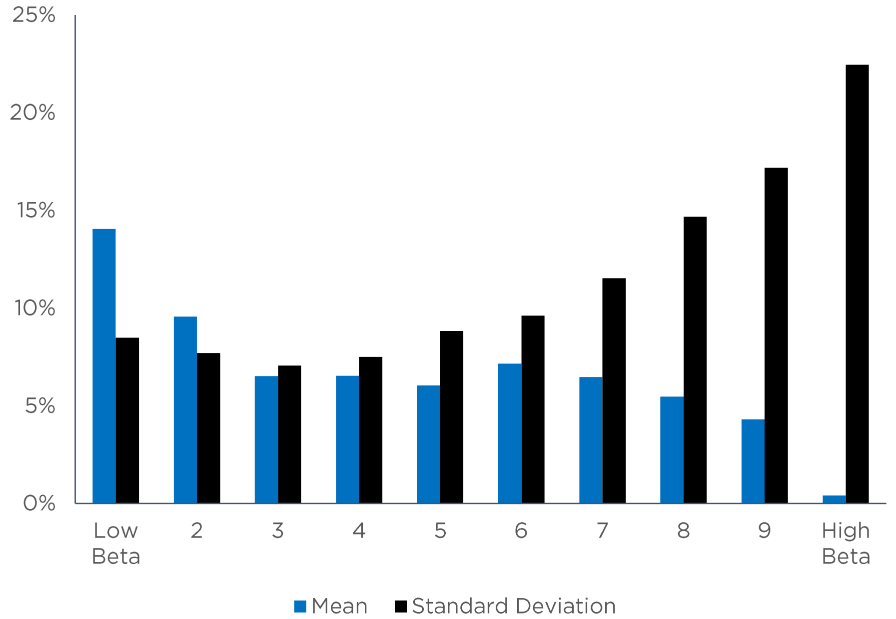


Source: Trivariate Research

WHETHER QUALITY OR JUNK, LOW BETA IS SUPERIOR TO HIGH BETA

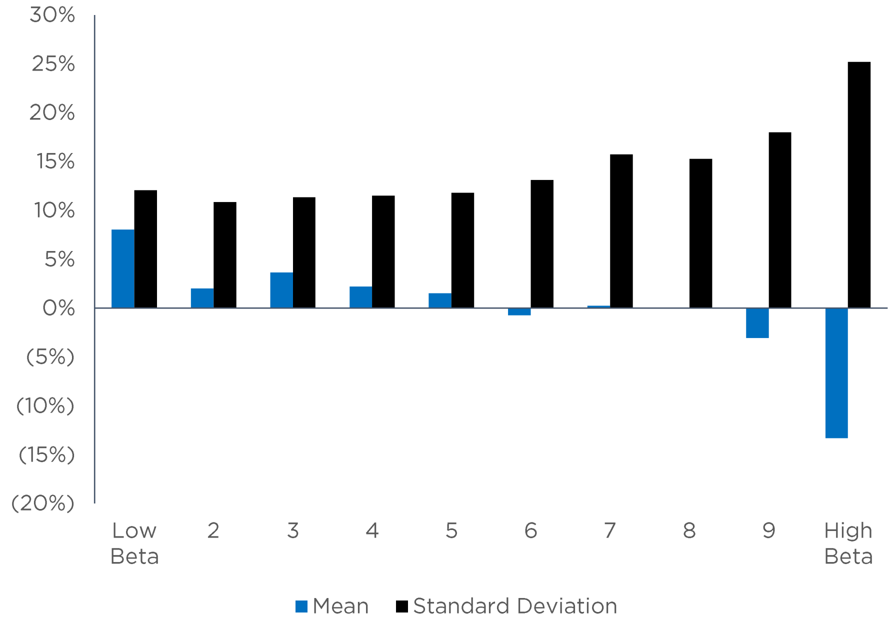
We also analyzed the relationship between beta decile and realized alpha by quality bucket Among high quality companies, there is positive alpha across all beta deciles, but clearly avoiding the highest beta decile is prudent (left). Among the lowest quality quartile, we call junk, there is no alpha across the highest 60% of beta (right).

Annualized Alpha (Beta-Adjusted Return) and Annualized Std. Deviation of Returns for High Quality Stocks By Beta Decile (1-Low, 10-High) 1999-Through End-November, 2024 (Excluding Part of 2008, 2009, 2015, 2016, 2020,2021)



Source: Trivariate Research

Annualized Alpha (Beta-Adjusted Return) and Annualized Std. Deviation of Returns for Junk Stocks By Beta Decile (1-Low, 10-High) 1999-Through End-November, 2024 (Excluding Part of 2008, 2009, 2015, 2016, 2020,2021)



Source: Trivariate Research

MARKET HAS TO BE UP >12% FOR A LOWER BETA EXPOSURE TO HURT

The long-term betas for the mid point of each decile (meaning the 5th, 15th, 25th percentiles and so on) are shown on the left. Five percent of stocks have a beta less than 0.25, and the median stock had 10.9% of annualized alpha. On the contrary, only 5% of stocks have a beta higher than 2.21 historically, and that cohort realizes an annual NEGATIVE alpha of 620bps (left). Assuming these historical betas by decile hold constant, we simulated the expected return (market assumption*beta + alpha) for various S&P500 return scenarios (right). Clearly if the S&P500 is not up at least 7%, the lower the beta the better. If the market is up between 7% and 12%, there is not a huge total performance differential by beta decile. Once the market's returns are above 12%, the higher beta is enough to offset the alpha destruction.

Performance Statistics of Beta Deciles
1999 Through End-November, 2024

Beta Decile	Annualized Alpha	Hit Rate	Median Beta
1	10.9%	67.3%	0.25
2	6.7%	62.1%	0.55
3	4.9%	59.5%	0.73
4	4.0%	56.5%	0.88
5	3.9%	56.1%	1.02
6	3.8%	54.3%	1.14
7	2.1%	50.6%	1.26
8	(0.0%)	45.4%	1.43
9	(2.2%)	43.1%	1.68
10	(6.2%)	42.4%	2.21

Source: Trivariate Research

Implied Annual Return on Different Market Movements
As of End-November, 2024

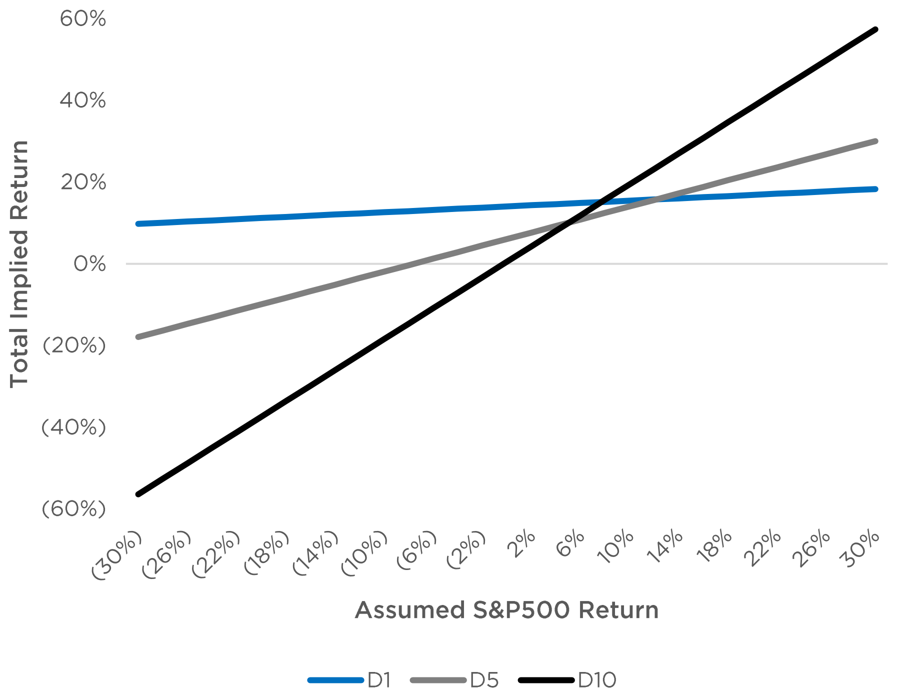
Move	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
(30%)	3.4%	(9.8%)	(17.0%)	(22.3%)	(26.6%)	(30.5%)	(35.8%)	(43.0%)	(52.5%)	(72.6%)
(25%)	4.7%	(7.1%)	(13.3%)	(17.9%)	(21.5%)	(24.8%)	(29.5%)	(35.8%)	(44.1%)	(61.5%)
(20%)	5.9%	(4.3%)	(9.7%)	(13.6%)	(16.4%)	(19.1%)	(23.2%)	(28.6%)	(35.7%)	(50.4%)
(15%)	7.2%	(1.6%)	(6.0%)	(9.2%)	(11.4%)	(13.4%)	(16.8%)	(21.5%)	(27.3%)	(39.4%)
(10%)	8.4%	1.2%	(2.4%)	(4.8%)	(6.3%)	(7.6%)	(10.5%)	(14.3%)	(19.0%)	(28.3%)
(5%)	9.7%	4.0%	1.3%	(0.4%)	(1.2%)	(1.9%)	(4.2%)	(7.2%)	(10.6%)	(17.3%)
0%	10.9%	6.7%	4.9%	4.0%	3.9%	3.8%	2.1%	(0.0%)	(2.2%)	(6.2%)
5%	12.2%	9.5%	8.6%	8.3%	8.9%	9.5%	8.5%	7.1%	6.2%	4.8%
6%	12.5%	10.0%	9.3%	9.2%	10.0%	10.7%	9.7%	8.6%	7.9%	7.1%
8%	13.0%	11.1%	10.8%	11.0%	12.0%	13.0%	12.3%	11.4%	11.3%	11.5%
10%	13.4%	12.2%	12.2%	12.7%	14.0%	15.3%	14.8%	14.3%	14.6%	15.9%
12%	14.0%	13.4%	13.7%	14.5%	16.1%	17.6%	17.3%	17.1%	18.0%	20.4%
14%	14.5%	14.5%	15.2%	16.2%	18.1%	19.9%	19.9%	20.0%	21.3%	24.8%
15%	14.7%	15.0%	15.9%	17.1%	19.1%	21.0%	21.1%	21.4%	23.0%	27.0%
20%	16.0%	17.8%	19.5%	21.5%	24.2%	26.7%	27.4%	28.6%	31.4%	38.0%
25%	17.2%	20.5%	23.2%	25.9%	29.3%	32.4%	33.7%	35.7%	39.8%	49.1%
30%	18.5%	23.3%	26.8%	30.2%	34.3%	38.2%	40.1%	42.9%	48.2%	60.1%

Source: Trivariate Research

THE CHOICE TO ADD HIGHER BETA VARIES BY SECTOR AND QUALITY

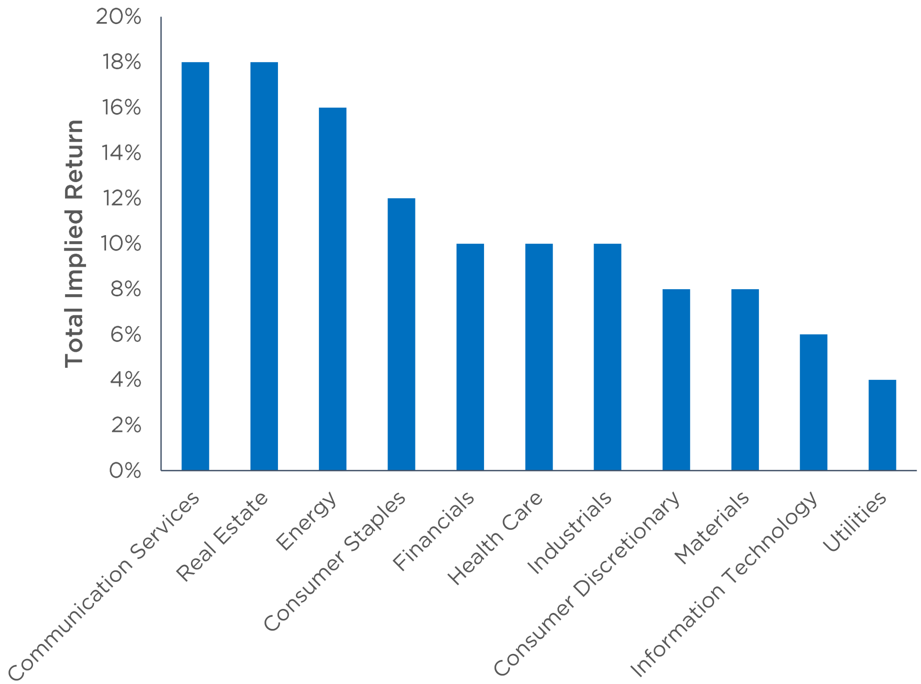
While the overall market performance needs to be above 12%, that return assumption varies by cohort and sector. For high quality stocks, the total implied return is the highest for the lowest beta decile of stocks as long as the S&P500 is up less than 8%. Above 8%, the bottom decile implied return is the highest. At no point, is the median overall beta better than both the highest and lowest decile (left). Importantly, the highest beta decile also has far higher volatility of beta, so the realized return can certainly be worse than the implied return in this simulation. On the right, we show the S&P500 return required for investors to sell low beta stocks and move to higher beta by sector. Only if the market returns more than 18% should investors chase beta in Communication Services and Real Estate. Higher beta stock selection makes sense once the market is up more than 4% in Utilities and 6% in Technology (right).

Implied Annual Return For High Quality Stocks On 2025 Market Movements By Beta Decile As of End-November, 2024



Source: Trivariate Research

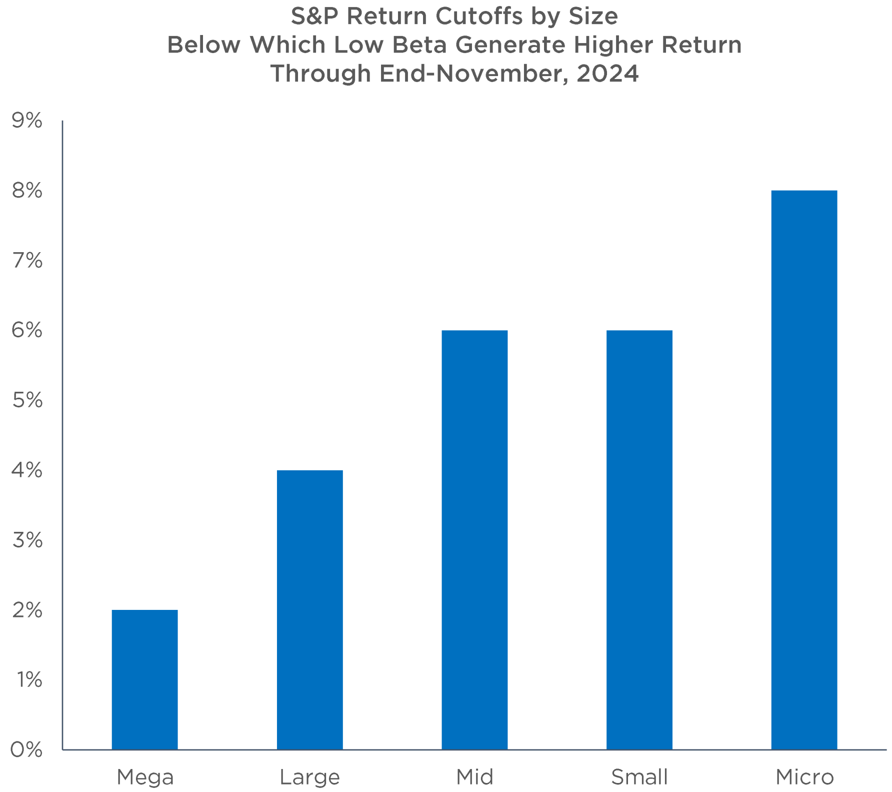
S&P Return Cutoffs by Sector Below Which Low Beta Generate Higher Return Through End-November, 2024



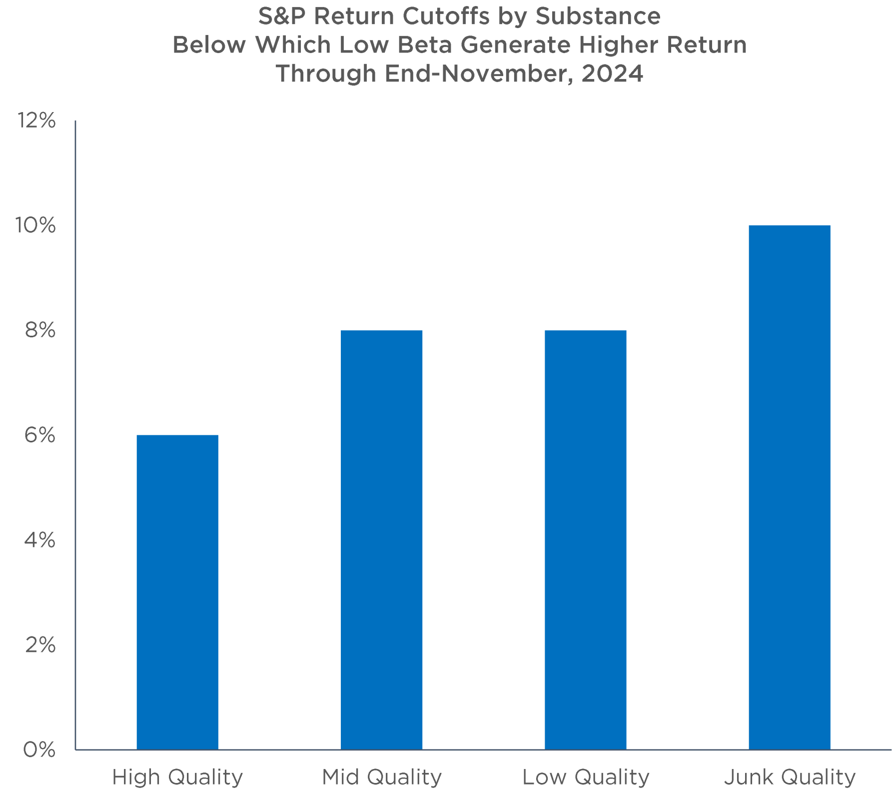
Source: Trivariate Research

BY SIZE AND SUBSTANCE, THE CASE FOR CHASING BETA VARIES

The alpha destruction among high-beta mega caps is lower than for other size buckets. Hence, chasing higher beta mega caps makes sense when one the S&P500 return is 2% or higher. However, the threshold for chasing higher beta among mid-,small-, and micro-cap stocks is far higher (left). Among quality quartiles, the market return assumptions need to be increasingly higher as quality degrades to justify chasing higher beta stocks. Said another way, owning low beta junk stocks is less risky than owning high beta junk stocks unless the market is up more than 10% (right).



Source: Trivariate Research



Source: Trivariate Research

LONG / SHORT IDEAS BASED ON BETA

If the market is up around 7% next year, NVDA, PLTR, ANET, SHOP, CRWD, and APH will likely have more total return than AAPL, ROP, FTNT, CTSH, ACH, and CSCO (left). Under the same conditions, EQC, COLD, HR, AHR, TKO, and CABO have higher implied returns than PK, SATS, OUT, SLG, SSTK, and PEB (right).

Own High Beta and Avoid Low Beta Stocks
Mega/Large Cap. High Quality Stocks In Tech & Utilities
As of End-November, 2024

Ticker	Company	Market Cap ($B)	Beta
NVDA	NVIDIA Corporation	3488.36	2.64
PLTR	Palantir Technologies Inc.	173.90	2.29
ANET	Arista Networks Inc	136.37	2.11
SHOP	Shopify Inc.	152.95	1.85
CRWD	CrowdStrike Holdings, Inc.	90.06	1.77
APH	Amphenol Corporation	89.47	1.49
AAPL	Apple Inc.	3670.73	0.98
ROP	Roper Technologies, Inc.	59.10	0.92
FTNT	Fortinet, Inc.	76.04	0.79
CTSH	Cognizant Technology Solutions Corporation	40.23	0.77
ACN	Accenture plc	226.64	0.74
CSCO	Cisco Systems, Inc.	238.53	0.72

Source: Trivariate Research

Own Low Beta and Avoid High Stocks
Smid Cap. Junk Quality Stocks In Comm, Real Estate & Energy
As of End-November, 2024

Ticker	Company	Market Cap ($B)	Beta
EQC	Equity Commonwealth	2.19	0.25
COLD	Americold Realty Trust	6.57	0.34
HR	Healthcare Realty Trust	6.38	0.45
AHR	American Healthcare REIT, Inc.	4.37	0.45
TKO	TKO Group Holdings, Inc.	11.69	0.47
CABO	Cable One, Inc.	2.37	0.58
PK	Park Hotels & Resorts Inc.	3.23	1.23
SATS	EchoStar Corporation	6.87	1.23
OUT	OUTFRONT Media Inc.	3.15	1.26
SLG	SL Green Realty Corp.	5.31	1.30
SSTK	Shutterstock, Inc.	1.13	1.43
PEB	Pebblebrook Hotel Trust	1.75	1.47

Source: Trivariate Research

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