

ARTICLE

The Shifting Sands of Alternative Risk Premia Strategies

August 2024

Introduction

The 2022 broad market downturn across major asset classes came as a nasty surprise to investors. Historically, such an event is very rare, and no one was expecting to see almost all asset classes down for the year. Yet, even though it might seem as if diversification was of no help in 2022, the story changes if we look beyond the major headline asset classes.

For the year, alternative risk premia strategies actually posted modest gains on average. In that respect, the 2022 experience provides a good reminder that investors should consider diversifying their portfolio of headline asset classes through alternative risk premia strategies that harvest returns orthogonal to those of traditional asset classes. At least that's how the investment landscape looks on the surface, but that appearance is deceiving.

Below the surface, hidden risks lurk unseen and ready to emerge. In fact, investors would do well to learn a lesson from the classic science fiction novel <u>Dune</u> (and its recent movie adaptations). On the desert planet of the title, nomadic inhabitants known as Fremen must live with the constant threat of being devoured by giant predatory sandworms (called <u>Shai-Hulud</u>) that tunnel through the dunes. The worms are attracted by the sound of rhythmic movements. The Fremen have survived by developing two strategies. The first is a shuffling, dance-like sand-walk that disguises their movements. (In our nonfictional world, surfers have developed an analogous wading technique called the stingray shuffle.) The second strategy is learning how to read the subtle wormsigns on the sand that provide advance warning of an approaching <u>Shai-Hulud</u>.

Like the desert-dwelling Fremen, investors who want to reap the gains of alternative risk premia strategies would do well to learn how to adapt to unseen risks—hidden exposures to headline asset class risk factors. As our analysis shows, practical techniques of portfolio construction can mitigate such risks. We must learn to shuffle through shifting sands and read the wormsigns.

"Like the desert-dwelling Fremen [from Dune], investors who want to reap the gains of alternative risk premia strategies would do well to learn how to adapt to unseen risks."



AUTHORS



Jay Jeon Senior Vice President, Multi-Asset Strategies



Jim Masturzo, CFA Partner, Chief Investment Officer, Multi-Asset Strategies

Key Points

- Alternative risk premia strategies can play an important role in an investor's portfolio, providing an additional source of diversification when traditional headline asset classes go through tumultuous periods (e.g., 2022).
- Investors should be wary of hidden exposures to headline asset class risk factors lurking under the surface and not be misled by the low correlations measured over the long term.
- A risk-neutral portfolio construction approach can significantly reduce the unintended bets taken by a dollar-neutral approach and maximize the diversification benefits of alternative risk premia strategies.



Revisiting the Role of Alternatives

As noted, 2022 was a particularly painful year. Among headline asset classes, only commodities were up for the year, reflecting high inflation. Furthermore, as of the end of June 2024, certain asset classes, such as bonds, have yet to dig out of the 2022 drawdown (indeed, Bloomberg U.S. Aggregate Bond Index is still in a drawdown of approximately 9% since the beginning of 2022). In **Exhibit 1**, if we look at the calendar returns of nine indices that represent a broad range of headline asset classes, it is unusual to see a calendar year where more than half (five) of the indices post negative returns. In fact, it has occurred only four times in the period from 1997 to 2023.



Exhibit 1. Negatively Returning Asset Classes by Year (1997-2023)

Given this context, the gains of alternative risk premia strategies provide a stark contrast. For example, the SG Multi Alternative Risk Premia Index, an index composed of alternative risk premia funds, produced a gain of approximately 5%, as displayed in **Exhibit 2**.





Exhibit 2. 2022 Calendar-Year Returns

Having written about the role of alternative risk premia strategies as part of an investor's broader portfolio (Ko, Kunz, and Shepherd 2018), we believe the recent experience of the 2022 downturn provides an instructive opportunity to revisit this topic. The key takeaway is that incorporating a meaningful allocation to alternative risk premia strategies can improve an investor's future investment outcome by increasing the likelihood of clearing return hurdles while helping to reduce portfolio volatility and other higher-order risks (e.g., skew).

However, given the various components and potential complexities of alternative risk premia strategies, we must also acknowledge that these strategies may pose risks of their own. Like the nomads of *Dune*, we must shuffle our feet through the sand to avoid the hidden risks that may be hiding under the surface of these strategies. It is important to lay out a robust framework for building an alternative risk premia strategy, starting from the universe, signal, and portfolio construction. The investment industry and academia have concentrated much attention on identifying new risk premia signals (factors), but this article focuses on an area often taken for granted: portfolio construction. For more on factor "zoo" literature, see Hsu and Kalesnik 2014 as well as Feng, Giglio, and Xiu 2020.



Constructing Risk Premia Portfolios

Across finance literature, portfolio construction of cross-sectional long-short risk premia portfolios generally follows a similar framework as summarized here:

- 1. Measure the risk premia signal of each asset within a defined universe.
- 2. Sort and rank the assets by value of the signal.
- 3. Assign top (bottom) x% of the assets to long (short) leg.
 - Within a long or short leg, assets can be weighted in various ways (e.g., equal weighted, rank weighted, etc.).
- 4. Long and short legs are sized equally so that all weights sum to zero (dollar-neutral). For example, long (short) assets sum to 100% (-100%).

For the purposes of this article, because the focus is not on identifying the best signal or assets, we use a set of well-cited risk premia signals (carry, value, and momentum) across familiar asset classes (equities, bonds, commodities, and FX), building on Brightman and Shepherd (2016). Assets include 15 equity index futures, 17 government bond futures with maturities ranging from 2 years to 10 years, 27 commodity futures, and 15 FX forwards denominated against the U.S. dollar across both developed and emerging markets. To avoid data-mining concerns, we have chosen signals based on definitions that are relatively simple and have been found to be robust.

	Signal Do	efinitions									
Asset Class	Carry	Value	Momentum								
Equity	Futures curve roll relative to spot price	B/P z score (3 years)	1-year return (ex 1 month) / volatility								
Bond	(Slope + roll down) / duration	Real yield / duration	*Minus 1 year return (ex 1 month) / volatility								
Commodity	Futures curve roll between adjacent contracts	5-year price reversal	1-year return (ex 1 month) / volatility								
FX	Interest rate differential	5-year real exchange rate reversal	1-year return (ex 1 month) / volatility								
*Based on th mor	*Based on the work of EDHEC-Risk Institute (2019), which finds that the negative momentum signal captures the mean reversion of the yield curve.										
Note: We define carry (2013). Value is base Momentum is based	/ based on Erb and Harvey (2 d on Asness, Moskowitz and on Jegadeesh and Titman (19	2006) and Koijen, Moskowitz Pedersen (2013) and Kunz a 293) and Maeso, Martellini, a	, Pedersen, and Vrugt nd Mazzoleni (2018). Ind Rebonato (2019).								

The simulation spans December 1999 through March 2024, and we construct 12 individual risk premia strategies and also create aggregate strategies, both within and across asset classes. All portfolios are rebalanced at month-end. When forming the portfolios, we use tertile sorts (i.e., top and bottom 33.3%) and equal-weight the assets within the long or short leg of the portfolio. Finally, simply



for comparability, we scale the portfolios ex post to have full-sample volatility of 10%. When building blended asset class strategies (e.g., blend of equity carry, equity value, and equity momentum) and the aggregate strategy (i.e., blend of equity blend, bond blend, commodity blend, and FX blend), we equal-weight the underlying strategies. Given that we first scale each strategy to 10% volatility, this approach can then be interpreted as a form of equal-volatility weighting of the strategies (of course, we would not know this volatility during trading: this simple approximation is made only for the purposes of this article).

Dollar-Neutral: What Can Go Wrong?

Portfolios that seek to harvest risk premia often reflect what is referred to as dollar-neutral portfolio construction. This approach, which takes an equal-sized position in both the long and short legs of the portfolio, was likely inspired by the long history of finance literature that utilizes "self-financing" (e.g., sell \$1 of asset A to buy \$1 of asset B) factor or arbitrage portfolios. Given the simplicity and economic interpretation, it is easy to see why this approach has been widely utilized by both academics and practitioners. In addition, the simplicity also improves the reproducibility of results and is likely a significant reason why so many studies in finance literature build on one another.

While simple in its implementation, dollar-neutral construction can often lead to portfolios that take on unintended (and often undesired) bets. This effect is especially likely when the underlying assets used to form the portfolio exhibit a wide range of risk characteristics. For example, consider a formation period for a commodity long-short portfolio in which the assets in the long (short) leg happen to exhibit high (low) beta to the Bloomberg Commodity Index. By construction, the portfolio would reflect a net-long directional bias to the index. Would this bias be desirable? We think not, especially because a directional commodities view can easily be achieved by overweighting the asset class through the asset allocation process. The same holds for the opposite case, a net-short view.

"While simple in its implementation, dollar-neutral construction can often lead to portfolios that take on unintended (and often undesired) bets."

For example, in **Exhibit 3** when we measure the rolling 1-year correlations of the commodity value portfolio, we observe that it can at times be highly (both positively and negatively) correlated to the headline commodity index (see **Appendix B** for an explanation of how we estimate ex-post rolling correlations). As a result, the portfolio's full-sample average correlation of -0.12 can be misleading in the sense that what the investor would experience over the simulation period likely would not reflect this single value. In fact, for extended periods, the investor might wonder, "Why is this supposedly orthogonal strategy moving in the same (or opposite) direction of the commodities market?"





Exhibit 3. Rolling 1-Year Correlations of Commodity Value Portfolio to Bloomberg Commodity Index

The Risk-Neutral Shuffle

Many researchers have written about unintended bets that can inadvertently be expressed by a portfolio and about ways to avoid such bets, exemplified by the works of Aghassi, Asness, Kurbanov, and Nielsen (2011). As shown above, simply looking at long-term averages can give a false sense of security by hiding the high-correlation periods that emerge from time to time. In the context of alternative risk premia strategies, which bets or risks should be avoided? Regional bets? Other factor bets?

There are many ways to go about dealing with this problem, but in this article, we focus on neutralizing the underlying market risk of the asset class. In this respect, reiterating the goal of alternative risk premia strategies and their roles as part of a broader portfolio helps provide strong motivation to build risk-neutral portfolios that have hedged the directional exposures to headline markets that can be easily obtained cheaply.

How do we know what is the underlying market risk for each asset class? To provide an answer, we use economic rationale as a foundation supported by statistical analysis. In **Exhibit 4**, for each of the four asset classes that represent the universe of assets, we select the headline indices as the primary risk factors. This approach has two advantages: (1) simplicity and (2) representativeness for most investors' portfolios. Principal component analysis (PCA) shows that these indices are highly correlated with the first principal components of each asset class, suggesting that our choices are robust. For more details on PCA, see **Appendix A**.



Exhibit 4. Market Risk Factors

Asset Class	Risk Factor Chosen	Correlation with First Principal Component
Equity	S&P 500	90%*
Bond	Bloomberg US Treasury 7-10Y	92%*
Commodity	Bloomberg Commodity	95%
FX	GDP-weighted FX (vs. USD)	95%*
*Sign of correlation is negative, but interpretation is e	quivalent.	ff research affiliates

Source: Research Affiliates, based on data from Barchart and Bloomberg.

The S&P 500 represents the U.S. equity market and the intuition that it drives the global equity market. The Bloomberg U.S. Treasury 7-10 Year Index represents the underlying interest rate risk of bonds, and the Bloomberg Commodity Index represents the inflation-rate risk present in commodities, a real asset. Finally, the Purchasing Power Parity (PPP) GDP-weighted FX factor represents the global risk of the U.S. dollar.

For this article, we use a relatively simple approach for constructing risk-neutral portfolios. The first three steps are the same as the framework described above for constructing dollar-neutral portfolios, but the fourth step is replaced with the following process:

- Measure the beta of each asset to the risk factor. See Appendix B for a detailed description of beta measurement. We measure betas using trailing 3-month, 6-month, and 1-year daily data and also average these betas, which we will primarily use in the rest of the article.
- Size the long and short legs so that its weighted beta = 1.

Note that the resulting portfolio is ex ante beta neutral at rebalances by construction but may exhibit some levels of correlations to the risk factors ex post as a result of measurement noise or even as an effect of the dynamic risk characteristics of the assets themselves. For bonds, an alternative and possibly more interpretable implementation would be to construct duration-neutral portfolios. We find that both approaches give similar results; sizing the long and short legs to be beta of 1 to the Bloomberg U.S. Treasury 7-10 Year Index can be thought of as sizing the long and short legs to be duration of approximately 7 (average duration of the index).

Learn to Read the Shifting Sands

Now that we have learned the sand-walk of the Fremen, we can read the <u>wormsigns</u> of risks ready to emerge from beneath the surface. Again, as an example, in **Exhibit 5**, we repeat the same exercise of calculating the 1-year rolling correlation of the commodity value portfolio but this time include the beta-neutral versions as well. As the chart shows, the beta-neutral portfolios tend to have correlations that are centered around zero for the simulation period. In addition, the volatility of the correlations themselves also appears much lower compared with that of the dollar-neutral portfolio.





Exhibit 5. Rolling 1-Year Correlation of Commodity Value Portfolio to Bloomberg Commodity Index

Boxplots of the rolling correlations in **Exhibit 6** provide an even clearer view of the distribution differences between dollar-neutral and risk-neutral approaches. The boxplots display only the rolling 3-month correlations and only the beta-neutral portfolio that uses the average betas. Full distribution summaries can be found in **Appendix C**. Correlation distributions of the beta-neutral portfolios exhibit smaller ranges and outliers while being centered closer to zero on average.

Interestingly, strategies constructed on equity index futures exhibit relatively smaller differences (still meaningfully reduced) between the dollar-neutral and risk-neutral approaches. In fact, when we look at the gross leverage of the equity blend strategies, the dollarneutral and risk-neutral portfolios have similar full-sample averages of 277% and 260%, respectively (as opposed to bond blends, which have diverging full-sample averages of 665% and 965%, respectively). This effect likely reflects the universe of equity index futures because there is not a lot of dispersion of risk among developed equity indices. Once again, the benefits of the risk-neutral approach are most evident when the assets exhibit a large range of risk characteristics.





Exhibit 6. Correlations of Portfolios to Major Risk Factors of Each Asset Class

Could there be any side effects from going risk neutral? Specifically, could we be unintentionally adding exposures (yet again) to different risks by hedging one specific risk? In **Exhibit 7**, we look closely at each of the asset class blend portfolios by measuring the correlations not only to the chosen primary risk factors of the asset class but to all four. The boxplots of the correlations show that for most of the blended strategies, no excessive bias or volatility is observed in correlations to the non-primary risk factors specific to the asset class. For the FX blend, however, something more interesting appears: the correlations to equity and bond risk factors exhibit nonzero averages. Given that the dollar-neutral portfolio also exhibits this behavior, the appearance of these non-zero averages is likely not a side effect of the risk-neutral approach. Instead, it is likely due to the nature of the assets in the FX universe. While the GDP-weighted FX risk factor is highly correlated to (and is a good proxy for) the first principal component of FX assets, it represents only



58% of the variances of the assets. In fact, the second principal component's correlations to the equity and bond first principal components are nontrivial at 48% and 44%, respectively. Constructing an FX alternative risk premia strategy that also hedges these other risk factors likely would require a more sophisticated portfolio construction methodology that is beyond the scope of this article, but we will touch on this point later. In **Appendix D**, we show that if we risk-neutralize the equity risk factor instead for all FX strategies, we can manage the equity risk better, but doing so significantly degrades our ability to manage the FX risk factor, making it an undesirable approach.



Exhibit 7. Correlations of Portfolios to Major Risk Factors

Source: Research Affiliates, based on data from Barchart and Bloomberg through March 31, 2024.

Finally, we examine the simulation performances (see **Exhibit 8**), a subject typically of high interest to investors but of less significance for this article. Ex ante, it is unclear what effects hedging the risk factors would have on the strategies. Compared with a dollar-neutral approach, could it improve risk-adjusted returns by better isolating the relative attractiveness of assets? Or would it instead degrade



returns by eliminating the market-timing component embedded in the strategy? Even in the latter case, we believe the better approach is to construct a strategy that reflects the cross-sectional bets rather than to rely on unintentional market bets, even if it provides alpha. If there are truly any market-timing capabilities within the risk premia strategy, we believe that a better approach in a portfolio context would be to isolate that portfolio view and allocate an appropriate amount of capital or risk to it.

Several observations can be drawn from the simulation results of the various alternative risk premia strategies built using the dollarneutral and beta-neutral approaches. First, the two approaches are highly correlated, with correlations exceeding 80% for most of the strategies (note that bond strategies have lower correlations between the two approaches, a pattern that likely reflects the wide range of risks represented in the universe, i.e., short versus long duration). This finding indicates that both approaches broadly capture similar trades and, correspondingly, portfolio returns.

Second, results for the individual strategies show a mixture of improvements (e.g., bond value) and degradations (e.g., bond carry) of risk-adjusted returns between the two approaches, reflecting the ex ante uncertainty discussed above. Interestingly, the magnitude of the degradations tends to be smaller than the improvements, leading to overall improvements for all blended strategies, but more on that later. Third, outside of equities, most risk characteristics (e.g., skew, drawdown) of the strategies are improved. Again, this result for equities is likely due to the underlying assets displaying very similar risk profiles, limiting any improvements in that regard.



	Ca	arry	Va	alue	Mom	entum	BI	end
Equity	Dollar- Neutral	Beta- Neutral (Avg)	Dollar- Neutral	Beta- Neutral (Avg)	Dollar- Neutral	Beta- Neutral (Avg)	Dollar- Neutral	Beta- Neutral (Avg)
Mean Return	6.2%	7.5%	3.3%	4.0%	0.9%	0.8%	7.3%	8.4%
Std. Deviation	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Sharpe Ratio	0.62	0.75	0.33	0.40	0.09	0.08	0.73	0.84
Skew	0.23	0.14	-0.04	1.58	0.30	0.27	0.47	1.26
Max Drawdown	-18%	-27%	-24%	-28%	-33%	-42%	-12%	-15%
Corr. with Dollar-Neutral		0.85		0.83		0.90		0.82

|--|

	Ca	nrry	Va	lue	Mom	entum	Bl	end
Bond	Dollar- Neutral	Beta- Neutral (Avg)	Dollar- Neutral	Beta- Neutral (Avg)	Dollar- Neutral	Beta- Neutral (Avg)	Dollar- Neutral	Beta- Neutral (Avg)
Mean Return	4.6%	4.1%	1.1%	2.9%	0.7%	1.6%	3.6%	4.6%
Std. Deviation	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Sharpe Ratio	0.46	0.41	0.11	0.29	0.07	0.16	0.36	0.46
Skew	-0.05	-0.72	0.10	0.43	0.21	0.56	0.30	0.70
Max Drawdown	-25%	-22%	-46%	-37%	-47%	-36%	-38%	-20%
Corr. with Dollar-Neutral		0.74		0.60		0.77		0.72

	Ca	arry	Va	alue	Mom	entum	Bl	end
Commodity	Dollar- Neutral	Beta- Neutral (Avg)	Dollar- Neutral	Beta- Neutral (Avg)	Dollar- Neutral	Beta- Neutral (Avg)	Dollar- Neutral	Beta- Neutral (Avg)
Mean Return	5.1%	4.8%	1.2%	3.4%	2.5%	3.8%	5.8%	8.3%
Std. Deviation	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Sharpe Ratio	0.51	0.48	0.12	0.34	0.25	0.38	0.58	0.83
Skew	-0.15	0.60	-0.28	-0.25	0.14	0.25	-0.68	0.11
Max Drawdown	-39%	-36%	-41%	-26%	-45%	-35%	-42%	-32%
Corr. with Dollar-Neutral		0.86		0.79		0.81		0.85

	Carry		Va	lue	Mom	entum	Blend		
FX	Dollar- Neutral	Beta- Neutral (Avg)	Dollar- Neutral	Beta- Neutral (Avg)	Dollar- Neutral	Beta- Neutral (Avg)	Dollar- Neutral	Beta- Neutral (Avg)	
Mean Return	6.5%	7.0%	3.9%	5.2%	4.1%	3.8%	8.8%	9.3%	
Std. Deviation	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	
Sharpe Ratio	0.65	0.70	0.39	0.52	0.41	0.38	0.88	0.93	
Skew	-0.49	-0.33	0.18	0.51	-0.01	0.22	0.14	0.39	
Max Drawdown	-21%	-19%	-28%	-31%	-40%	-37%	-22%	-18%	
Corr. with Dollar-Neutral		0.90		0.88		0.90		0.90	

Source: Research Affiliates, based on data from Barchart and Bloomberg through March 31, 2024. Please see disclosures for information regarding simulated performance. **m** research^{*}

The magnitude of the performance improvements tends to be larger and more frequent than the degradations, which leads to an important question: What could be driving this tendency? The time-varying risk exposures embedded in the dollar-neutral portfolios can indeed be detractive. For example, consider both the commodity value and FX value strategies, which exhibit full-period-average risk-factor correlations close to zero at -0.1 and 0.1, respectively. The time-varying market bets of these portfolios can be isolated by measuring the residual betas at each rebalance and forming beta-timing portfolios. We find that the average returns of these portfolios are negative, with those derived from commodity value and FX value losing approximately 50 basis points (bps) and 20 bps per year, respectively. Thus, removing these market bets is likely a large contributor to why we see larger performance benefits rather than detriments from the risk-neutral strategies.

Finally, putting all the strategies together in **Exhibit 9** shows a significant improvement (+0.3 Sharpe ratio) in the risk-adjusted returns and risk profile of the overall strategy. Again, these performance improvements were not the focus or the intent of the risk-neutral approach, but it is a nice benefit in addition to gaining the ability to be more intentional about the risk-factor exposures.





Exhibit 9. Performance of Blended Strategies (December 1999-March 2024)

Conclusion

Of course, our analysis does not mean that no manager is neutralizing market risks and that we have somehow stumbled upon a novel method for risk premia portfolio construction. For many investors, especially asset managers who run alternative risk premia strategies, the points and results we share in this article may be obvious. In fact, the equity market-neutral fund industry has a long history spanning decades, and we are confident that most shops would have this dynamic figured out (it would be an issue if a market-neutral fund didn't). Instead, this article can serve as a gentle reminder that when alternative risk premia strategies that span various asset classes are implemented, investors should consider the risk factors that such a strategy could *inadvertently* introduce to their portfolios and should construct portfolios with these risks in mind.

"[W]hen alternative risk premia strategies that span various asset classes are implemented, investors should consider the risk factors that such a strategy could inadvertently introduce to their portfolios and should construct portfolios with these risks in mind."

As we mentioned, the risk-neutral methodology laid out in this article is a relatively simple one. There are many extensions of the methodology that could improve managing these risk factors:

- Managing multiple risk factors: FX-based risk premia portfolios are good examples of strategies that could further benefit from managing non-primary risk factors (e.g., equity risk factor).
- Timely management of portfolio risks (e.g., betas): our method in this article is rebalanced monthly, but one could manage the risks daily and step in when either ex ante or ex post portfolio risk measures breach a threshold.
- Improving the estimation of beta or factor exposures of assets, with the caveat that one should be careful about adding too much complexity to the process.
- Alternate portfolio construction techniques and configurations: examples include optimization and sizing individual positions instead of the aggregate long or short leg, etc.



We hope to touch on these topics in future articles, but in the meanwhile, learn to shuffle through the unintended risks and—just maybe—learn to tame *Shai-Hulud*.

Appendix A

		% Variance	e Explained		
Asset Class	PC1	PC2	PC3	PC4	PC5
Equity	74%	8%	5%	3%	3%
Bond	79%	7%	5%	3%	3%
Commodity	30%	14%	11%	8%	5%
FX	58%	11%	8%	5%	4%
Source: Research Affiliates.	based on data from Barcha	rt and Bloomberg.			R research affiliates

Principal Component Analysis

Appendix B: Beta Estimation

Given the globally traded and asynchronous nature of the derivatives that represent the four asset class universes, we follow Frazzini and Pedersen (2014), using daily data as supported by Papageorgiou, Reeves, and Xie (2016):

- Use 1-day returns data to estimate volatilities of assets and risk factors. Use overlapping 3-day returns to estimate asset correlation to the risk factor (we also use 3-day returns to estimate ex post rolling correlations).
- Estimate the raw asset beta to risk factor from the volatilities and correlation.
- Estimate final asset beta as a blend: 80% raw asset beta and 20% cross-sectional average beta which are estimated as follows:
 Equities: Take cross-sectional average of all 17 raw asset betas.
 - Bonds: Group by maturity (2Y, 3Y, 5Y, 10Y) and then take the average.
 - Commodities: Group by sectors (grains, softs, energy, livestock, precious metals, industrial metals) and then take the average.
 - FX: Take average of all 15 raw asset betas.



Appendix C

				Ex-Post (1Y)					Ex-Post (6M)					EX-Post (3M)		
Eq	uity	Dollar-Nortral	Beta-Neutral	Beta-Neutral	Beta-Neutral	Beta-Neutral	Dollar-Noutral	Beta-Neutral	Beta-Neutral	Beta-Neutral	Beta-Neutral	Dollar-Noutral	Beta-Neutral	Beta-Neutral	Beta-Neutral	Beta-Neutral
		Dollar-Iveutral	(IY)	(6M)	(3M)	(ang)	Dollar-Neutral	(IX)	(6M)	(3M)	(avg)	Dollar-reutral	(YD)	(6M)	(3M)	(avg)
	Mean	-0.181	-0.026	-0.017	-0.020	-0.023	-0.179	-0.021	-0.009	-0.011	-0.015	-0.183	-0.026	-0.013	-0.015	-0.018
Carry	MSE	0.076	0.017	0.014	0.013	0.014	0.087	0.031	0.029	0.026	0.027	0.112	0.052	0.051	0.048	0.048
	MAE	0.231	0.110	0.093	0.091	0.096	0.245	0.143	0.138	0.130	0.132	0.275	0.182	0.183	0.179	0.177
	Mana	0.012	-0.024	-0.022	-0.020	-0.022	0.017	-0.025	-0.022	0.026	-0.022	0.022	0.019	0.024	0.020	0.025
Malura	MEAN	0.012	0.024	-0.033	-0.039	0.033	0.017	-0.025	0.032	-0.030	0.032	0104	0.019	0.040	-0.030	-0.025
Value	MISE	0.065	0.024	0.015	0.014	0.016	0.079	0.036	0.027	0.024	0.027	0.104	0.055	0.049	0.045	0.047
	MAE	0.208	0.128	0.101	0.096	0.105	0.239	0.156	0.136	0.126	0.134	0.275	0.192	0.183	0.173	0.178
	Mean	-0.050	0.023	0.026	0.008	0.021	-0.050	0.026	0.026	0.007	0.022	-0.051	0.026	0.024	0.006	0.020
Momentum	MSE	0.068	0.035	0.023	0.017	0.024	0.086	0.048	0.037	0.027	0.036	0.107	0.068	0.061	0.049	0.056
	MAE	0.196	0.156	0.129	0.107	0.129	0.231	0.178	0.159	0.135	0.156	0.264	0.208	0.198	0,181	0.190
	Mean	-0.132	-0.009	-0.004	-0.021	-0.012	-0.129	-0.001	0.006	-0.016	-0.003	-0.128	0.000	0.009	-0.014	-0.001
Rigad	MSE	0.071	0.018	0.016	0.017	0.016	0.079	0.027	0.026	0.025	0.024	0104	0.047	0.046	0.046	0.044
Drand	MAC	0.211	0.010	0.105	0.017	0.107	0.077	0.027	0.020	0.023	0.024	0.265	0.190	0.170	0.177	0.174
	MAG	0211	0.114	0.103	0.111	0.107	0.224	0.134	0.132	0.131	0.120	0205	0.100	0.179	0.07	0.174
-																
				Ex-Post (1Y)					Ex-Post (6M)					Ex-Post (3M)		
B	ond	Deller Neutral	Beta-Neutral	Beta-Neutral	Beta-Neutral	Beta-Neutral	Dellas Nauturi	Beta-Neutral	Beta-Neutral	Beta-Neutral	Beta-Neutral	Dallas Mauturi	Beta-Neutral	Beta-Neutral	Beta-Neutral	Beta-Neutral
		Dollar-iveutral	(IY)	(6M)	(3M)	(avg)	Dollar-Weutral	(1Y)	(6M)	(3M)	(avg)	Donar-Neutral	(YD)	(6M)	(3M)	(avg)
	Mean	0.147	0.047	0.033	0.018	0.035	0.131	0.046	0.031	0.016	0.033	0.123	0.045	0.028	0.017	0.032
Carry	MSE	0.194	0.042	0.028	0.021	0.029	0.241	0.063	0.047	0.034	0.046	0.273	0.081	0.070	0.056	0.066
	MAE	0.294	0.171	0.1/2	0.120	0.142	0.421	0.204	0.176	0.149	0174	0.462	0.222	0.216	0.105	0.211
	Maria	0.004	0.002	0.031	0.027	0.016	0,0(0	0.200	0.070	0.030	0.014	0.003	0.232	0.035	0.020	0.211
	wean	0.085	0.002	-0.021	-0.027	-0.016	0.069	-0.001	-0.025	-0.030	-0.019	0.061	-0.003	-0.025	-0.030	-0.019
Value	MSE	0.354	0.029	0.019	0.016	0.019	0.378	0.053	0.038	0.029	0.035	0.398	0.076	0.065	0.057	0.060
	MAE	0.528	0.134	0.111	0.100	0.109	0.550	0.189	0.162	0.133	0.154	0.567	0.224	0.208	0.192	0.198
	Mean	0.000	0.002	-0.008	-0.004	-0.003	-0.005	0.007	-0.002	0.003	0.003	-0.009	0.008	-0.001	0.001	0.003
Momentum	MSE	0.123	0.023	0.020	0.017	0.019	0.179	0.041	0.040	0.032	0.037	0.213	0.065	0.066	0.056	0.061
	MAE	0.288	0.121	0.113	0.105	0.112	0.362	0.166	0.161	0.144	0.156	0,400	0.207	0.209	0.191	0.200
	Maan	0.140	0.024	0.000	-0.005	0.007	0.116	0.022	0.001	-0.004	0.008	0102	0.022	0.001	-0.007	0.007
Direct	MACE	0.307	0.023	0.000	0.019	0.007	0.241	0.011	0.000	0.022	0.000	0.222	0.070	0.062	0.067	0.060
bieliu	MIJE	0.297	0.033	0.020	0.018	0.025	0.341	0.030	0.039	0.033	0.036	0.372	0.070	0.062	0.037	0.000
	MAL	0.463	0.143	0.111	0.102	0.118	0.510	0.171	0.150	0.137	0.149	0.541	0.209	0.197	0.186	0.192
				Ex-Post (1Y)					Ex-Post (6M)					Ex-Post (3M)		
Com	nodity	Dellar Nastaal	Beta-Neutral	Ex-Post (1Y) Beta-Neutral	Beta-Neutral	Beta-Neutral	Dellas Nautaal	Beta-Neutral	Ex-Post (6M) Beta-Neutral	Beta-Neutral	Beta-Neutral	Dallar Nautari	Beta-Neutral	Ex+Post (3M) Beta-Neutral	Beta-Neutral	Beta-Neutral
Com	nodity	Dollar-Neutral	Beta-Neutral (IY)	Ex-Post (1Y) Beta-Neutral (6M)	Beta-Neutral (3M)	Beta-Neutral (avg)	Dollar-Neutral	Beta-Neutral (IY)	Ex-Post (6M) Beta-Neutral (6M)	Beta-Neutral (3M)	Beta-Neutral (avg)	Dollar-Neutral	Beta-Neutral (TY)	Ex-Post (3M) Beta-Neutral (6M)	Beta-Neutral (3M)	Beta-Neutral (avg)
Com	modity Mean	Dollar-Neutral	Beta-Neutral (IY) 0.041	Ex-Post (1Y) Beta-Neutral (6M) 0.049	Beta-Neutral (3M) 0.048	Beta-Neutral (avg) 0.048	Dollar-Neutral	Beta-Neutral (IY) 0.043	Ex-Post (6M) Beta-Neutral (6M) 0.053	Beta-Neutral (3M) 0.050	Beta-Neutral (avg) 0.050	Dollar-Neutral	Beta-Neutral (IY) 0.036	Ex-Post (3M) Beta-Neutral (6M) 0.048	Beta-Neutral (3M) 0.045	Beta-Neutral (avg) 0.045
Com	Mean MSE	Dollar-Neutral 0.070 0.107	Beta-Neutral (1Y) 0.041 0.018	Ex-Post (1Y) Beta-Neutral (6M) 0.049 0.015	Beta-Neutral (3M) 0.048 0.013	Beta-Neutral (avg) 0.048 0.014	Dollar-Neutral 0.082 0.132	Beta-Neutral (1Y) 0.043 0.037	Ex-Post (6M) Beta-Neutral (6M) 0.053 0.032	Beta-Neutral (3M) 0.050 0.027	Beta-Neutral (avg) 0.050 0.030	Dollar-Neutral 0.081 0.154	Beta-Neutral (1Y) 0.036 0.060	Ex-Post (3M) Beta-Neutral (6M) 0.048 0.060	Beta-Neutral (3M) 0.045 0.055	Beta-Neutral (avg) 0.045 0.055
Com Carry	Mean MSE MAE	Dollar-Neutral 0.070 0.107 0.272	Beta-Neutral (IY) 0.041 0.018 0.107	Ex-Post (1Y) Beta-Neutral (6M) 0.049 0.015 0.097	Beta-Neutral (3M) 0.048 0.013 0.092	Beta-Neutral (avg) 0.048 0.014 0.097	Dollar-Neutral 0.082 0.132 0.211	Beta-Neutral (IY) 0.043 0.037 0.155	Ex-Post (6M) Beta-Neutral (6M) 0.053 0.032 0.145	Beta-Neutral (3M) 0.050 0.027 0.124	Beta-Neutral (avg) 0.050 0.030 0.140	Dollar-Neutral 0.081 0.154 0.223	Beta-Neutral (IY) 0.036 0.060 0.202	Ex-Post (3M) Beta-Neutral (6M) 0.048 0.060 0.203	Beta-Neutral (3M) 0.045 0.055 0.192	Beta-Neutral (avg) 0.045 0.055 0.195
Com	Mean MSE MAE	Dollar-Neutral 0.070 0.107 0.272	Beta-Neutral (1Y) 0.041 0.018 0.107	Ex-Post (1Y) Beta-Neutral (6M) 0.049 0.015 0.097	Beta-Neutral (3M) 0.048 0.013 0.093	Beta-Neutral (avg) 0.048 0.014 0.097	Dollar-Neutral 0.082 0.132 0.311	Beta-Neutral (1Y) 0.043 0.037 0.155	Ex-Post (6M) Beta-Neutral (6M) 0.053 0.032 0.145	Beta-Neutral (3M) 0.050 0.027 0.134	Beta-Neutral (avg) 0.050 0.030 0.140	Dollar-Neutral 0.081 0.154 0.333	Beta-Neutral (IY) 0.036 0.060 0.203	Ex-Post (3M) Beta-Neutral (6M) 0.048 0.060 0.203	Beta-Neutral (3M) 0.045 0.055 0.193	Beta-Neutral (avg) 0.045 0.055 0.195
Com	Mean MSE MAE Mean	Dollar-Neutral 0.070 0.107 0.272 -0.124	Beta-Neutral (1Y) 0.041 0.018 0.107 -0.011	Ex-Post (1Y) Beta-Neutral (6M) 0.049 0.015 0.097 -0.005	Beta-Neutral (3M) 0.048 0.013 0.093 -0.003	Beta-Neutral (avg) 0.048 0.014 0.097 -0.009	Dollar-Neutral 0.082 0.132 0.311 -0.123	Beta-Neutral (1Y) 0.043 0.037 0.155 -0.014	Ex-Post (6M) Beta-Neutral (6M) 0.053 0.032 0.145 -0.008	Beta-Neutral (3M) 0.050 0.027 0.134 -0.004	Beta-Neutral (avg) 0.050 0.030 0.140 -0.011	Dollar-Neutral 0.081 0.154 0.333 -0.121	Beta-Neutral (IY) 0.036 0.060 0.203 -0.012	Ex-Post (3M) Beta-Neutral (6M) 0.048 0.060 0.203 -0.006	Beta-Neutral (3M) 0.045 0.055 0.193 -0.003	Beta-Neutral (avg) 0.045 0.055 0.195 -0.008
Come Carry Value	Mean MSE MAE Mean MSE	Dollar-Neutral 0.070 0.107 0.272 -0.124 0.241	Beta-Neutral (1Y) 0.041 0.018 0.107 -0.011 0.029	Ex-Post (1Y) Beta-Neutral (6M) 0.049 0.015 0.097 -0.005 0.019	Beta-Neutral (3M) 0.048 0.013 0.093 -0.003 0.011	Beta-Neutral (ang) 0.048 0.014 0.097 -0.009 0.018	Dollar-Neutral 0.082 0.132 0.311 -0.123 0.244	Beta-Neutral (1Y) 0.043 0.037 0.155 -0.014 0.052	Ex-Post (6M) Beta-Neutral (6M) 0.053 0.032 0.145 -0.008 0.038	Beta-Neutral (3M) 0.050 0.027 0.134 -0.004 0.023	Beta-Neutral (avg) 0.050 0.030 0.140 -0.011 0.034	Dollar-Neutral 0.081 0.154 0.333 -0.121 0.252	Beta-Neutral (1Y) 0.036 0.060 0.203 -0.012 0.080	Ex-Post (3M) Beta-Neutral (6M) 0.048 0.060 0.203 -0.006 0.069	Beta-Neutral (3M) 0.045 0.055 0.193 -0.003 0.054	Beta-Neutral (avg) 0.045 0.055 0.195 -0.008 0.062
Com Carry Value	Mean MSE MAE Mean MSE MAE	Dollar-Neutral 0.070 0.107 0.272 -0.124 0.241 0.458	Beta-Neutral (1Y) 0.041 0.018 0.107 -0.011 0.029 0.135	Ex-Post (1Y) Beta-Neutral (6M) 0.049 0.015 0.097 -0.005 0.019 0.110	Beta-Neutral (3M) 0.048 0.013 0.093 -0.003 0.011 0.083	Beta-Neutral (avg) 0.048 0.014 0.097 -0.009 0.018 0.105	Dollar-Neutral 0.082 0.132 0.311 -0.123 0.244 0.453	Beta-Neutral (1Y) 0.043 0.037 0.155 -0.014 0.052 0.186	Ex-Post (6M) Beta-Neutral (6M) 0.053 0.032 0.145 -0.008 0.038 0.158	Beta-Neutral (3M) 0.050 0.027 0.134 -0.004 0.023 0.120	Beta-Neutral (avg) 0.050 0.030 0.140 -0.011 0.034 0.149	Dollar-Neutral 0.081 0.154 0.333 -0.121 0.252 0.451	Beta-Neutral (IY) 0.036 0.060 0.203 -0.012 0.080 0.232	Ex-Post (3M) Beta-Neutral (6M) 0.048 0.060 0.203 -0.006 0.069 0.213	Beta-Neutral (3M) 0.045 0.055 0.193 -0.003 0.054 0.190	Beta-Neutral (avg) 0.045 0.055 0.195 -0.008 0.062 0.203
Com Carry Value	Mean MSE MAE Mean MSE MAE Mean	Dollar-Neutral 0.070 0.107 0.272 -0.124 0.241 0.458 0.128	Beta-Neutral (1Y) 0.041 0.018 0.107 -0.011 0.029 0.135 0.063	Ex-Post (1Y) Beta-Neutral (6M) 0.049 0.015 0.097 -0.005 0.019 0.110 0.020	Beta-Neutral (3M) 0.018 0.013 0.093 -0.003 0.011 0.083 0.003	Beta-Neutral (avg) 0.048 0.014 0.097 -0.009 0.018 0.105 0.030	Dollar-Neutral 0.082 0.132 0.311 -0.123 0.244 0.453 0.122	Beta-Neutral (1Y) 0.043 0.037 0.155 -0.014 0.052 0.186 0.065	Ex-Post (6M) Beta-Neutral (6M) 0.053 0.032 0.145 -0.008 0.038 0.158 0.025	Beta-Neutral (3M) 0.050 0.027 0.134 -0.004 0.023 0.120 0.002	Beta-Neutral (avg) 0.050 0.030 0.140 -0.011 0.034 0.149 0.032	Dollar-Neutral 0.081 0.154 0.333 -0.121 0.252 0.451 0.120	Beta-Neutral (1Y) 0.036 0.060 0.203 -0.012 0.080 0.232 0.060	Ex-Post (3M) Beta-Neutral (6M) 0.048 0.060 0.203 -0.006 0.069 0.213 0.022	Beta-Neutral (3M) 0.045 0.055 0.193 -0.003 0.054 0.190 -0.001	Beta-Neutral (avg) 0.045 0.055 0.195 -0.008 0.062 0.203 0.028
Com Carry Value Momentum	Mean MSE MAE MEan MSE MAE MEan MSE	Dollar-Neutral 0.070 0.107 0.272 -0.124 0.241 0.458 0.128 0.116	Beta-Neutral (1Y) 0.041 0.018 0.107 -0.011 0.029 0.135 0.063 0.028	Ex-Post (IY) Beta-Neutral (6M) 0.049 0.015 0.097 -0.005 0.019 0.110 0.020 0.015	Beta-Neutral (3M) 0.048 0.013 0.093 -0.003 0.011 0.083 0.003 0.001	Beta-Neutral (arg) 0.048 0.014 0.097 -0.009 0.018 0.105 0.030 0.015	Dollar-Neutral 0.082 0.132 0.311 -0.123 0.244 0.453 0.122 0.144	Beta-Neutral (1Y) 0.043 0.037 0.155 -0.014 0.052 0.186 0.065 0.049	Ex-Post (6M) Beta-Neutral (6M) 0.053 0.032 0.145 -0.008 0.038 0.158 0.025 0.037	Beta-Neutral (3M) 0.050 0.027 0.134 -0.004 0.023 0.120 0.002 0.002	Beta-Neutral (avg) 0.050 0.030 0.140 -0.011 0.034 0.149 0.032 0.032	Dollar-Neutral 0.081 0.154 0.333 -0.121 0.252 0.451 0.120 0.172	Beta-Neutral (IY) 0.036 0.060 0.203 -0.012 0.080 0.232 0.232 0.060 0.077	Ex-Post (3M) Beta-Neutral (6M) 0.048 0.060 0.203 -0.006 0.069 0.213 0.022 0.070	Beta-Neutral (3M) 0.045 0.055 0.193 -0.003 0.054 0.190 -0.001 0.058	Beta-Neutral (avg) 0.045 0.055 0.195 -0.008 0.062 0.203 0.028 0.063
Com Carry Value Momentum	Mean MSE MAE Mean MSE MAE MAE MAE MAE	Dollar-Neutral 0.070 0.107 0.272 -0.124 0.241 0.458 0.128 0.128 0.116 0.267	Beta-Neutral (1Y) 0.041 0.018 0.107 -0.011 0.029 0.135 0.063 0.028 0.132	Ex-Post (1Y) Beta-Neutral (6M) 0.049 0.015 0.097 -0.005 0.019 0.110 0.020 0.015 0.098	Beta-Neutral (3M) 0.048 0.013 0.093 -0.003 0.011 0.083 0.003 0.011 0.081	Beta-Neutral (arg) 0.048 0.014 0.097 -0.009 0.018 0.105 0.030 0.015 0.098	Dollar-Neutral 0.082 0.132 0.244 0.453 0.122 0.144 0.312	Beta-Neutral (1Y) 0.043 0.037 0.155 -0.014 0.052 0.186 0.065 0.049 0.181	Ex-Post (6M) Beta-Neutral (6M) 0.053 0.032 0.145 -0.008 0.038 0.038 0.038 0.025 0.037 0.158	Beta-Neutral (3M) 0.050 0.027 0.134 -0.004 0.023 0.120 0.002 0.025 0.126	Beta-Neutral (avg) 0.050 0.030 0.140 -0.011 0.034 0.034 0.032 0.032 0.032	Dollar-Neutral 0.081 0.154 0.333 -0.121 0.252 0.451 0.120 0.172 0.346	Beta-Neutral (TY) 0.036 0.060 0.203 -0.012 0.080 0.232 0.060 0.077 0.227	Ex-Post (3M) Beta-Neutral (6M) 0.048 0.060 0.203 -0.006 0.069 0.213 0.022 0.070 0.217	Beta-Neutral (3M) 0.045 0.055 0.193 -0.003 0.054 0.190 -0.001 0.058 0.197	Beta-Neutral (avg) 0.045 0.055 0.195 -0.008 0.062 0.203 0.028 0.063 0.205
Com Carry Value Momentum	Mean MSE MAE Maan MSE MAE Mean MSE MAE MAE	Dollar-Neutral 0.070 0.107 0.272 -0.124 0.458 0.128 0.128 0.116 0.267 0.026	Beta-Neutral (IY) 0.041 0.018 0.107 -0.011 0.029 0.135 0.063 0.028 0.132 0.065	Ex-Post (1Y) Beta-Neutral (6M) 0.049 0.015 0.097 -0.005 0.019 0.110 0.020 0.015 0.020 0.015 0.020 0.015	Beta-Neutral (3M) 0.048 0.013 0.093 -0.003 0.011 0.083 0.003 0.011 0.081	Beta-Neutral (avg) 0.048 0.014 0.097 -0.009 0.018 0.105 0.030 0.015 0.098 0.050	Dollar-Neutral 0.082 0.132 0.311 -0.123 0.244 0.453 0.122 0.144 0.312 0.038	Beta-Neutral (1Y) 0.043 0.037 0.155 -0.014 0.052 0.186 0.065 0.049 0.181 0.067	Ex-Post (6M) Beta-Neutral (6M) 0.053 0.032 0.145 -0.008 0.038 0.158 0.025 0.037 0.158	Beta-Neutral (3M) 0.050 0.027 0.134 -0.004 0.023 0.120 0.002 0.025 0.126	Beta-Neutral (avg) 0.050 0.030 0.140 -0.011 0.034 0.149 0.032 0.032 0.032 0.032	Dollar-Neutral 0.081 0.154 0.333 -0.121 0.252 0.451 0.120 0.172 0.346 0.038	Beta-Neutral (Y) 0.036 0.060 0.203 -0.012 0.080 0.232 0.060 0.077 0.227 0.059	Ex-Post (3M) Beta-Neutral (6M) 0.048 0.060 0.203 -0.006 0.203 -0.0069 0.213 0.022 0.070 0.217 0.049	Beta-Neutral (3M) 0.045 0.055 0.193 -0.003 0.054 0.190 -0.001 0.058 0.197 0.036	Beta-Neutral (avg) 0.045 0.055 0.195 -0.008 0.062 0.203 0.028 0.063 0.205 0.048
Com Carry Value Momentum	Mean MSE MAE Mean MSE MAE MAE MAE MAE MAE MAE	Dollar-Neutral 0.070 0.107 0.272 -0.124 0.241 0.458 0.128 0.116 0.267 0.026	Beta-Neutral (1Y) 0.041 0.018 0.107 -0.011 0.029 0.135 0.063 0.028 0.132 0.065 0.099	Ex-Post (1Y) Beta-Neutral (6M) 0.049 0.015 0.097 -0.005 0.019 0.110 0.020 0.015 0.098 0.048 0.048	Beta-Neutral (3M) 0.048 0.013 0.093 -0.003 0.011 0.083 0.003 0.011 0.081 0.038	Beta-Neutral (ang) 0.048 0.014 0.097 -0.009 0.018 0.105 0.030 0.015 0.098 0.050	Dollar-Neutral 0.082 0.132 0.311 -0.123 0.244 0.453 0.122 0.144 0.312 0.038 0.132	Beta-Neutral (1Y) 0.043 0.037 0.155 -0.014 0.052 0.186 0.049 0.181 0.067 0.067	Ex-Post (6M) Beta-Neutral (6M) 0.053 0.032 0.145 -0.008 0.038 0.038 0.038 0.038 0.038 0.037 0.058 0.054	Beta-Neutral (3M) 0.050 0.027 0.134 -0.004 0.023 0.120 0.002 0.025 0.126 0.042 0.042	Beta-Neutral (avg) 0.050 0.030 0.140 -0.011 0.034 0.032 0.032 0.032 0.147 0.054	Dollar-Neutral 0.081 0.154 0.333 -0.121 0.252 0.451 0.120 0.172 0.346 0.038 0.189	Beta-Neutral (1Y) 0.036 0.060 0.203 -0.012 0.080 0.232 0.060 0.077 0.227 0.059 0.054	Ex-Post (3M) Bets-Neutral (6M) 0.048 0.060 0.203 -0.006 0.069 0.213 0.022 0.070 0.217 0.029 0.049	Beta-Neutral (3M) 0.045 0.055 0.193 -0.003 0.054 0.190 -0.001 0.058 0.197 0.036 0.036	Beta-Neutral (avg) 0.045 0.055 0.195 -0.008 0.062 0.203 0.028 0.063 0.205 0.048
Com Carry Value Momentum Blend	Mean MSE MAE Maan MSE MAE MAE MAE MAE MSE MAE	Dollar-Neutral 0.070 0.107 0.272 -0.124 0.241 0.241 0.458 0.128 0.116 0.267 0.026 0.094	Beta-Neutral (IY) 0.041 0.018 0.107 -0.011 0.029 0.135 0.063 0.028 0.132 0.065 0.019 0.029	Ex-Post (1Y) Beta-Neutral (6M) 0.049 0.015 0.097 -0.005 0.019 0.110 0.020 0.015 0.098 0.048 0.048	Beta-Neutral (3M) 0.048 0.013 0.093 -0.003 0.011 0.083 0.003 0.011 0.081 0.038 0.008	Beta-Neutral (avg) 0.048 0.014 0.097 -0.009 0.018 0.105 0.030 0.015 0.098 0.050 0.011 0.051	Dollar-Neutral 0.082 0.132 0.311 -0.123 0.244 0.453 0.122 0.144 0.312 0.038 0.023 0.023	Beta-Neutral (IY) 0.043 0.037 0.155 -0.014 0.052 0.186 0.065 0.049 0.181 0.067 0.032 0.032	Ex-Post (6M) Beta-Neutral (6M) 0.053 0.032 0.145 -0.008 0.038 0.025 0.025 0.037 0.158 0.025 0.037	Beta-Neutral (3M) 0.050 0.027 0.134 -0.004 0.023 0.120 0.002 0.025 0.126 0.042 0.021 0.042	Beta-Neutral (avg) 0.050 0.030 0.140 -0.011 0.034 0.032 0.032 0.147 0.054 0.023	Dollar-Neutral 0.081 0.154 0.333 -0.121 0.252 0.451 0.120 0.172 0.346 0.038 0.148	Beta-Neutral (IY) 0.036 0.060 0.203 -0.012 0.080 0.232 0.060 0.077 0.227 0.059 0.054 0.054	Ex-Post (3M) Beta-Neutral (6M) 0.048 0.060 0.203 -0.006 0.213 0.022 0.070 0.217 0.049 0.052 0.052	Beta-Neutral (3M) 0.045 0.055 0.193 -0.003 0.054 0.190 -0.001 -0.001 0.058 0.197 0.036 0.049	Beta-Neutral (avg) 0.045 0.055 0.195 -0.008 0.062 0.203 0.028 0.063 0.205 0.048 0.047 0.947
Com Carry Value Momentum Blend	Mean MSE MAE MAE MAE MAE MAE MAE MAE MAE MAE	Dollar-Neutral 0.070 0.307 0.272 -0.124 0.241 0.458 0.128 0.116 0.267 0.026 0.094 0.264	Beta-Neutral (1Y) 0.041 0.018 0.107 -0.011 0.029 0.135 0.063 0.028 0.132 0.065 0.019 0.109	Ex-Post (1Y) Beta-Neutral (6M) 0.049 0.015 0.097 -0.005 0.019 0.110 0.020 0.015 0.098 0.048 0.012 0.089	Beta-Neutral (3M) 0.048 0.013 0.093 -0.003 0.011 0.083 0.003 0.011 0.081 0.038 0.008 0.038 0.008	Beta-Neutral (ang) 0.048 0.014 0.097 -0.009 0.018 0.030 0.015 0.030 0.015 0.098 0.050 0.050 0.011 0.084	Dollar-Neutral 0.082 0.132 0.311 -0.123 0.244 0.453 0.124 0.144 0.312 0.144 0.312 0.038 0.123 0.304	Beta-Neutral (1Y) 0.043 0.037 0.155 -0.014 0.052 0.186 0.065 0.049 0.181 0.067 0.032 0.142	Ex-Post (6M) Beta-Neutral (6M) 0.053 0.032 0.145 -0.008 0.038 0.038 0.038 0.025 0.037 0.158 0.025 0.037 0.158 0.054 0.054	Beta-Neutral (3M) 0.050 0.027 0.134 -0.004 0.023 0.120 0.002 0.025 0.126 0.042 0.042 0.021 0.118	Beta-Neutral (avg) 0.050 0.030 0.140 -0.011 0.034 0.032 0.032 0.032 0.032 0.032 0.032 0.054 0.054 0.023 0.125	Dollar-Neutral 0.081 0.154 0.333 -0.121 0.252 0.451 0.120 0.172 0.346 0.038 0.148 0.334	Beta-Neutral (YY) 0.036 0.060 0.203 -0.012 0.080 0.232 0.060 0.077 0.227 0.059 0.054 0.190	Ex-Post (3M) Beta-Neutral (6M) 0.048 0.060 0.203 -0.006 0.069 0.213 0.022 0.070 0.217 0.049 0.052 0.189	Beta-Neutral (3M) 0.045 0.055 0.193 -0.003 0.054 0.190 -0.001 0.058 0.197 0.036 0.049 0.181	Beta-Neutral (avg) 0.045 0.055 0.195 -0.008 0.062 0.203 0.063 0.205 0.048 0.048 0.047 0.178
Com Carry Value Momentum Blend	modity Mean MSE MAE MAE MAE MAE MAE MAE MAE	Dollar-Neutral 0.070 0.107 0.272 -0.124 0.458 0.128 0.116 0.267 0.026 0.094 0.094	Beta-Neutral (1Y) 0.041 0.018 0.107 -0.011 0.029 0.135 0.063 0.028 0.132 0.065 0.019 0.109	Ex-Post (1Y) Beta-Neutral (6M) 0.049 0.015 0.097 -0.005 0.019 0.110 0.020 0.015 0.098 0.048 0.012 0.089	Beta-Neutral (3M) 0.048 0.013 0.093 -0.003 0.011 0.083 0.003 0.011 0.081 0.038 0.008 0.008	Beta-Neutral (avg) 0.048 0.014 0.097 -0.009 0.018 0.009 0.015 0.098 0.050 0.050 0.011 0.084	Dollar-Neutral 0.082 0.132 0.311 -0.123 0.244 0.453 0.122 0.144 0.453 0.122 0.144 0.312 0.038 0.123 0.304	Beta-Neutral (۱Y) 0.043 0.037 0.155 -0.014 0.052 0.186 0.065 0.049 0.181 0.067 0.032 0.142	Ex-Post (6M) Beta-Neutral (6M) 0.053 0.032 0.145 -0.008 0.038 0.025 0.025 0.025 0.037 0.158 0.054 0.026 0.134	Beta-Neutral (3M) 0.050 0.027 0.134 -0.004 0.023 0.120 0.002 0.025 0.126 0.042 0.021 0.042 0.021	Beta-Neutral (avg) 0.050 0.030 0.140 -0.011 0.034 0.032 0.032 0.032 0.147 0.054 0.023 0.125	Dollar-Neutral 0.081 0.154 0.333 -0.121 0.252 0.451 0.120 0.172 0.346 0.038 0.148 0.334	Beta-Neutral (1Y) 0.036 0.060 0.203 -0.012 0.080 0.232 0.060 0.077 0.227 0.059 0.059 0.054 0.190	Ex-Post (3M) Beta-Neutral (6M) 0.048 0.060 0.203 -0.006 0.213 0.022 0.070 0.217 0.049 0.052 0.189	Beta-Neutral (3M) 0.045 0.055 0.193 -0.003 0.054 0.190 -0.001 0.058 0.197 0.036 0.049 0.181	Beta-Neutral (avg) 0.045 0.055 0.195 -0.008 0.062 0.203 0.028 0.063 0.205 0.048 0.047 0.178
Com Carry Value Momentum Blend	modity Mean MSE MAE Mean MSE MAE Mean MSE MAE MAE MAE	Dollar-Neutral 0.070 0.007 0.272 -0.124 0.241 0.458 0.128 0.116 0.267 0.026 0.094 0.264	Beta-Neutral (1Y) 0.041 0.018 0.107 -0.011 0.029 0.135 0.063 0.028 0.132 0.065 0.019 0.109	Ex-Post (1Y) Beta-Neutral (6M) 0.049 0.015 0.097 -0.005 0.019 0.110 0.020 0.015 0.098 0.048 0.012 0.089 Ex-Post (1Y)	Beta-Neutral (3M) 0.048 0.013 0.093 -0.003 0.011 0.083 0.003 0.011 0.081 0.008 0.008 0.008	Beta-Neutral (ang) 0.048 0.014 0.097 -0.009 0.018 0.030 0.0105 0.030 0.015 0.098 0.0550 0.011 0.084	Dollar-Neutral 0.082 0.132 0.244 0.453 0.122 0.144 0.312 0.038 0.123 0.304	Beta-Neutral (1Y) 0.043 0.037 0.155 -0.014 0.052 0.186 0.065 0.049 0.181 0.067 0.032 0.142	Ex-Post (6M) Beta-Neutral (6M) 0.053 0.032 0.145 -0.008 0.038 0.158 0.025 0.037 0.158 0.025 0.037 0.158 0.054 0.026 0.134 Ex-Post (6M)	Beta-Neutral (3M) 0.050 0.027 0.134 -0.004 0.023 0.120 0.002 0.025 0.126 0.042 0.021 0.021 0.118	Beta-Neutral (avg) 0.050 0.030 0.140 -0.011 0.034 0.032 0.032 0.032 0.032 0.147 0.054 0.023 0.125	Dollar-Neutral 0.081 0.154 0.333 -0.121 0.252 0.451 0.120 0.172 0.346 0.038 0.148 0.334	Beta-Neutral (YY) 0.036 0.060 0.203 -0.012 0.080 0.232 0.060 0.077 0.227 0.059 0.054 0.190	Ex-Post (3M) Bets-Neutral (6M) 0.048 0.060 0.203 -0.006 0.069 0.213 0.022 0.070 0.217 0.070 0.217 0.070 0.052 0.189 Ex-Post (3M)	Beta-Neutral (3M) 0.045 0.055 0.193 -0.003 0.054 0.090 -0.001 0.058 0.197 0.036 0.049 0.181	Beta-Neutral (avg) 0.045 0.055 0.195 -0.008 0.062 0.203 0.028 0.063 0.205 0.048 0.047 0.178
Com Carry Value Momentum Blend	Mean Mean MAE MAE MAE MAE MAE MAE MAE MAE MAE	Dollar-Neutral 0.070 0.307 0.272 -0.124 0.241 0.458 0.128 0.116 0.267 0.026 0.094 0.264	Beta-Neutral (1Y) 0.041 0.018 0.107 -0.011 0.029 0.135 0.063 0.028 0.132 0.065 0.019 0.309 Beta-Neutral	Ex-Post (1Y) Beta-Neutral (6M) 0.049 0.015 0.097 -0.005 0.019 0.110 0.020 0.015 0.098 0.048 0.012 0.089 Ex-Post (1Y) Beta-Neutral	Beta-Neutral (3M) 0.048 0.013 0.093 -0.003 0.011 0.083 0.008 0.038 0.008 0.075	Beta-Neutral (org) 0.048 0.014 0.097 -0.009 0.018 0.005 0.030 0.015 0.098 0.050 0.050 0.050 0.050 0.050 0.050 0.054	Dollar-Neutral 0.082 0.132 0.311 -0.123 0.244 0.453 0.122 0.144 0.312 0.038 0.123 0.038 0.123 0.304	Beta-Neutral (1Y) 0.043 0.037 0.155 -0.014 0.052 0.065 0.049 0.081 0.067 0.032 0.032 0.042 Beta-Neutral	Ex-Post (6M) Beta-Neutral (6M) 0.053 0.032 0.145 -0.008 0.038 0.038 0.037 0.058 0.025 0.037 0.158 0.054 0.054 0.026 0.134 Ex-Post (6M)	Beta-Neutral (3M) 0.050 0.027 0.134 -0.004 0.023 0.120 0.002 0.025 0.126 0.042 0.042 0.021 0.021 0.118	Beta-Neutral (avg) 0.050 0.030 0.140 -0.011 0.034 0.032 0.032 0.032 0.047 0.054 0.023 0.023 0.125	Dollar-Neutral 0.081 0.154 0.333 -0.121 0.252 0.451 0.120 0.172 0.346 0.038 0.148 0.334	Beta-Neutral (YY) 0.036 0.060 0.203 -0.012 0.080 0.232 0.060 0.077 0.227 0.059 0.054 0.190 Beta-Neutral	Ex-Post (3M) Beta-Neutral (6M) 0.048 0.060 0.203 -0.006 0.069 0.213 0.022 0.070 0.217 0.049 0.052 0.189 Ex-Post (3M) Beta-Neutral	Beta-Neutral (3M) 0.045 0.055 0.193 -0.003 0.054 0.190 -0.001 -0.001 0.058 0.197 0.036 0.049 0.181 Beta-Neutral	Beta-Neutral (avg) 0.045 0.055 0.055 0.008 0.008 0.023 0.023 0.048 0.047 0.047 0.378 Beta-Neutral
Com Carry Value Momentum Blend	Mean MSE MAE MAE MAE MAE MAE MAE MAE MAE MAE	Dollar-Neutral 0.070 0.307 0.272 -0.124 0.241 0.458 0.128 0.128 0.128 0.128 0.116 0.267 0.026 0.094 0.264	Beta-Neutral (1Y) 0.041 0.018 0.307 -0.011 0.029 0.135 0.029 0.135 0.028 0.132 0.065 0.019 0.309 Beta-Neutral (1Y)	Ex-Post (1Y) Beta-Neutral (6M) 0.049 0.015 0.015 0.019 0.110 0.020 0.015 0.019 0.015 0.019 0.015 0.020 0.015 0.020 0.015 0.020 0.015 0.020 0.015 0.020 0.015 0.019 0.015 0.019 0.015 0.019 0.019 0.015 0.019 0.019 0.019 0.015 0.019 0.020 0.019 0.020 0.019 0.020 0.019 0.020 0.019 0.020 0.019 0.020 0.019 0.0200000000	Beta-Neutral (3M) 0.048 0.013 0.093 -0.003 0.011 0.083 0.011 0.081 0.038 0.008 0.075 Beta-Neutral (3M)	Beta-Neutral (arg) 0.048 0.048 0.009 0.014 0.009 0.018 0.009 0.015 0.030 0.015 0.098 0.050 0.011 0.084 Beta-Neutral (arg)	Dollar-Neutral 0.082 0.132 0.211 0.0123 0.244 0.453 0.122 0.144 0.312 0.312 0.312 0.312 0.323 0.304	Beta-Neutral (Y) 0.043 0.037 0.155 -0.014 0.052 0.186 0.065 0.049 0.181 0.067 0.032 0.142 Beta-Neutral (Y)	Ex-Post (6M) Beta-Neutral (6M) 0.053 0.032 0.145 -0.008 0.038 0.025 0.037 0.158 0.025 0.037 0.158 0.025 0.037 0.158 0.054 0.026 0.134 Ex-Post (6M) Beta-Neutral (6M)	Beta-Neutral (3M) 0.050 0.027 0.134 -0.004 0.023 0.120 0.025 0.126 0.025 0.126 0.042 0.021 0.021 0.118 Beta-Neutral (3M)	Beta-Neutral (avg) 0.050 0.030 0.140 -0.011 0.034 0.032 0.032 0.147 0.054 0.023 0.125 Beta-Neutral (avg)	Dollar-Neutral 0.081 0.154 0.333 -0.121 0.252 0.451 0.120 0.172 0.346 0.038 0.148 0.334 Dollar-Neutral	Beta-Neutral (YY) 0.036 0.060 0.203 -0.012 0.080 0.232 0.060 0.077 0.227 0.059 0.054 0.190 Beta-Neutral (YY)	ExcPost (3M) Beta-Neutral (6M) 0.048 0.060 0.203 -0.006 0.069 0.213 0.022 0.070 0.217 0.049 0.052 0.189 ExcPost (3M) Beta-Neutral (6M)	Beta-Neutral (3M) 0.045 0.055 0.193 -0.003 -0.003 -0.001 0.058 0.197 0.036 0.049 0.381 Beta-Neutral (3M)	Beta-Neutral (avg) 0.045 0.045 0.055 0.195 0.062 0.203 0.203 0.205 0.048 0.048 0.047 0.178 Beta-Neutral (avg)
Com Carry Value Momentum Blend	Mean MSE MAE MAE MAE MAE MAE MAE MAE MAE MAE MA	Dollar-Neutral 0.070 0.307 0.272 -0124 0.241 0.458 0.116 0.267 0.026 0.094 0.0264 Dollar-Neutral	Beta-Neutral (YY) 0.0.44 0.107 0.007 0.001 0.028 0.063 0.028 0.028 0.028 0.028 0.029 0.109 Beta-Neutral (YY) 0.042	Ex-Post (1Y) Beta-Neutral (6M) 0.049 0.015 0.097 -0.005 0.019 0.010 0.020 0.015 0.019 0.020 0.018 0.048 0.012 0.098 Ex-Post (1Y) Beta-Neutral (6M) 0.046	Beta-Neutral (3M) 0.048 0.013 0.093 0.013 0.003 0.011 0.083 0.008 0.008 0.008 0.008 0.008 0.008 0.008 0.008 0.0075 0.075	Beta-Neutral (arg) 0.048 0.014 0.097 -0.009 0.018 0.030 0.015 0.030 0.015 0.030 0.055 0.050 0.011 0.084 Beta-Neutral (arg) 0.043	Dollar-Neutral 0.082 0.132 0.2311 -0.123 0.244 0.453 0.122 0.144 0.312 0.038 0.123 0.304 Dollar-Neutral	Beta-Neutral (YY) 0.043 0.055 -0.014 0.055 0.046 0.066 0.066 0.032 0.032 0.042 Beta-Neutral (YY) 0.030	Ex-Post (6M) Beta-Neutral (6M) 0.053 0.032 0.145 0.038 0.038 0.038 0.025 0.037 0.158 0.025 0.037 0.158 0.054 0.026 0.134 Ex-Post (6M) Beta-Neutral (6M) 0.031	Beta-Neutral (3M) 0.050 0.027 0.134 -0.004 0.023 0.120 0.002 0.025 0.126 0.042 0.021 0.042 0.021 0.042 0.021 0.118 Beta-Neutral (3M)	Beta-Neutral (avg) 0.0550 0.030 0.140 -0.011 0.034 0.032 0.032 0.032 0.032 0.032 0.147 0.0554 0.023 0.125	Dollar-Neutral 0.081 0.154 0.333 -0.121 0.252 0.451 0.120 0.172 0.346 0.038 0.334 Dollar-Neutral	Beta-Neutral (YY) 0.036 0.060 0.203 0.080 0.232 0.060 0.232 0.060 0.277 0.059 0.059 0.059 0.059 0.059 0.059 0.059 0.190	Ex-Post (3M) Beta-Neutral (6M) 0.048 0.060 0.203 -0.006 0.203 -0.006 0.213 0.022 0.070 0.217 0.049 0.052 0.055 0.0	Beta-Neutral (3M) 0.045 0.055 0.055 0.054 0.054 0.058 0.058 0.077 0.036 0.049 0.038 0.049 0.038 0.049 0.038 0.049 0.038	Beta-Neutral (avg) 0.045 0.055 0.195 -0.008 0.062 0.203 0.063 0.205 0.048 0.047 0.047 0.047 0.178 Beta-Neutral (avg) 0.016
Com Carry Value Momentum Blend	modity Mean MSE MAE Mean MSE MAE Mean MSE MAE MAE MAE	Dollar-Neutral 0.070 0.107 0.272 -0.124 0.241 0.458 0.128 0.116 0.267 0.026 0.094 0.264 Dollar-Neutral Dollar-Neutral 0.066 0.117	Beta-Neutral (IY) 0.041 0.0307 -0.011 0.029 0.135 0.063 0.028 0.132 0.019 0.109 Beta-Neutral (TY) 0.042	Ex-Post (1Y) Bet - Neutral (6M) 0.049 0.049 0.015 0.097 -0.005 0.019 0.110 0.020 0.015 0.098 0.048 0.012 0.069 Ex-Post (1Y) Bet - Neutral (6M) 0.046 0.026	Beta-Neutral (3M) 0.048 0.013 0.093 0.093 0.093 0.003 0.001 0.088 0.003 0.001 0.088 0.008 0.075 Beta-Neutral (3M) 0.053 0.013	Beta-Neutral (arg) 0.048 0.014 0.097 -0.009 0.018 0.005 0.015 0.098 0.055 0.055 0.050 0.011 0.084 Beta-Neutral (arg) 0.043 0.043	Dollar-Neutral 0.082 0.132 0.311 -0.124 0.453 0.124 0.453 0.124 0.144 0.312 0.030 0.123 0.304 Dollar-Neutral 0.049 0.128 0.129 0.138	Beta-Neutral (YY) 0.043 0.037 0.155 0.052 0.186 0.065 0.049 0.181 0.066 0.049 0.181 0.067 0.032 0.142	Ex-Post (GM2) Betz-Post (GM2) (6M3) 0.053 0.032 0.145 -0.008 0.038 0.038 0.038 0.038 0.038 0.037 0.158 0.031 0.056 0.134 Ex-Post (GM2) Betz-Post (GM2) Betz-Post (GM2) 0.031 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.005 0.005 0.005 0.005 0.008 0.008 0.008 0.008 0.008 0.008 0.008 0.008 0.038 0.038 0.038 0.038 0.038 0.038 0.038 0.034 0.056 0.034 0.056 0.034 0.056 0.056 0.034 0.056 0.056 0.034 0.056 0.056 0.034 0.056 0.056 0.056 0.034 0.056 0.056 0.034 0.056 0.056 0.034 0.056 0.05	Beta-Neutral (3M) 0.050 0.027 0.134 -0.004 0.023 0.120 0.025 0.126 0.041 0.021 0.021 0.021 0.041 0.021 0.018	Beta-Neutral (avg) 0.050 0.030 0.040 0.032 0.032 0.032 0.032 0.032 0.054 0.032 0.023 0.125 Beta-Neutral (avg) 0.031 0.031	Dollar-Neutral 0.081 0.154 0.333 -0.121 0.252 0.451 0.120 0.172 0.346 0.038 0.148 0.334 Dollar-Neutral 0.032 0.15 0.152 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15	Beta-Neutral (YY) 0.036 0.060 0.203 -0.012 0.080 0.232 0.060 0.077 0.227 0.057 0.054 0.054 0.054 0.054 0.054 0.054 0.190	Excloret (3M) Beta-Neutral (6M) 0.048 0.060 0.203 -0.006 0.213 0.022 0.070 0.217 0.022 0.070 0.070 0.052 0.189 Excloret (3M) Beta-Neutral (6M) 0.015 0.075	Beta-Neutral (3M) 0.045 0.055 0.193 -0.003 0.054 0.054 0.058 0.190 -0.001 0.058 0.197 0.036 0.049 0.049 0.049 0.049 0.049 0.049 0.049 0.049 0.049 0.024 0.062	Beta-Neutral (avg) 0.045 0.055 0.195 0.062 0.203 0.028 0.063 0.205 0.047 0.047 0.047 0.047 0.047 0.047 0.047 0.047 0.047 0.047 0.047
Com Carry Value Momentum Blend	modity Mean MSE MAE MAE MAE MAE MAE MAE MAE MAE	Dollar-Neutral 0.070 0.107 0.272 0.214 0.458 0.128 0.160 0.267 0.026 0.094 0.264	Beta-Neutral (YY) 0.041 0.018 0.007 -0.017 0.029 0.028 0.028 0.028 0.032 0.065 0.019 0.032 0.065 0.019 0.039 Beta-Neutral (YY) 0.045 0.033 0.045	Ex-Post (1Y) Beta-Neutral (6M) 0.049 0.015 0.097 -0.005 0.019 0.100 0.020 0.015 0.098 Ex-Post (1Y) Beta-Neutral (6M) 0.048 0.012 0.098 Ex-Post (1Y) Beta-Neutral 0.048 0.012 0.028 0.048 0.012 0.028 0.023 0.049 0.023 0.049 0.049 0.025 0.097 0.025 0.026 0.025 0.025 0.026 0.0	Beta-Neutral (3M) 0.048 0.013 0.093 0.001 0.083 0.011 0.083 0.001 0.083 0.001 0.038 0.005 0.038 0.0050	Beta-Neutral (arg) 0.048 0.014 0.097 -0.009 0.018 0.030 0.030 0.030 0.030 0.030 0.030 0.050 0.050 0.050 0.071 0.050 0.071 0.073 0.073 0.023 0.023 0.023	Dollar-Neutral 0.082 0.132 0.244 0.453 0.224 0.444 0.453 0.122 0.038 0.123 0.038 0.123 0.0304 Dollar-Neutral Dollar-Neutral	Beta-Neutral (1Y) 0.043 0.037 0.155 -0.014 0.052 0.066 0.049 0.181 0.067 0.032 0.142 Beta-Neutral (Y) 0.030 0.057 0.037	Ex-Past (6M) Beta-Neutral (6M) 0.053 0.032 0.145 -0.008 0.038 0.158 0.025 0.037 0.158 0.025 0.037 0.158 0.026 0.134 0.054 0.026 0.134 0.034 0.034 0.034 0.034 0.034 0.034 0.033	Beta-Neutral (3M) 0.050 0.027 0.134 -0.004 0.023 0.120 0.002 0.025 0.126 0.042 0.021 0.042 0.021 0.042 0.021 0.042 0.021 0.042 0.021 0.032	Beta-Neutral (avg) 0.050 0.030 0.040 0.034 0.034 0.032 0.032 0.032 0.054 0.023 0.054 0.023 0.023 0.023 0.023 0.023 0.023 0.023 0.023 0.023 0.023	Dollar-Neutral 0.081 0.154 0.333 -0.121 0.252 0.451 0.172 0.172 0.172 0.138 0.148 0.334 Dollar-Neutral 0.032 0.158 0.32 0.158 0.332 0.338 0.348 0.348 0.334 0.34 0.	Beta-Neutral (YY) 0.036 0.060 0.003 -0.012 0.080 0.232 0.060 0.059 0.054 0.054 0.054 0.010 0.054 0.010 0.054 0.014 0.054 0.014	ExcPote (SM) Beta-Neutral (6M) 0.048 0.060 0.060 0.006 0.006 0.002 0.0070 0.022 0.070 0.049 0.048 0.050 0.052 0.050 0.052 0.050 0.052 0.052 0.050 0.052 0.050 0.052 0.050 0.052 0.052 0.050 0.0520000000000	Beta-Neutral (3M) 0.045 0.055 0.193 -0.003 0.054 0.054 0.058 0.197 0.036 0.036 0.036 0.037 0.038 0.038 0.049 0.381 Beta-Neutral (3M) 0.024	Beta-Neutral (avg) 0.045 0.055 0.195 0.062 0.062 0.063 0.028 0.063 0.048 0.048 0.047 0.048 0.047 0.048 Beta-Neutral (avg) 0.064 0.066
Com Carry Value Momentum Blend Carry	modity Mean MSE MAE MAE MAE MAE MAE MAE	Dollar-Neutral 0.070 0.107 0.272 0.241 0.241 0.428 0.16 0.267 0.026 0.026 0.026 0.026 0.026 0.016 0.066 0.117 0.282	Beta-Neutral (YY) 0.041 0.078 0.070 0.029 0.135 0.063 0.028 0.135 0.065 0.079 0.309 Beta-Neutral (YY) 0.042 0.033 0.144	Ex-Post (1Y) Beta-Neutral (6M) 0.049 0.019 0.019 0.019 0.019 0.010 0.020 0.019 0.020 0.019 0.020 0.015 0.020 0.015 0.020 0.015 0.020 0.015 0.020 0.015 0.020 0.020 0.020 0.020 0.020 0.020 0.020 0.020 0.020 0.020 0.020 0.020 0.020 0.020 0.015 0.020 0.015 0.020 0.015 0.020 0.015 0.020 0.015 0.020 0.015 0.020 0.015 0.020 0.015 0.0200000000	Beta-Neutral (3M) 0.048 0.013 0.093 0.011 0.003 0.011 0.088 0.003 0.011 0.088 0.003 0.011 0.088 0.003 0.011 0.088 0.025 0.008 Beta-Neutral (3M) 0.053 0.075 0.019 0.116	Bets-Neutral (arg) 0.048 0.014 0.097 0.008 0.018 0.019 0.030 0.015 0.050 0.050 0.051 0.084 Bets-Neutral (arg) 0.043 0.023 0.023 0.125	Dollar-Neutral 0.082 0.132 0.312 0.244 0.432 0.122 0.122 0.134 0.038 0.122 0.304 Dollar-Neutral Dollar-Neutral 0.049 0.138 0.306	Bets-Neutral (YY) 0.043 0.037 0.155 0.186 0.052 0.186 0.066 0.049 0.181 0.067 0.032 0.142 0.032 0.142 0.030 0.037 0.037 0.037 0.057	Ex-Pact (6M) Bet=Nextral (6M) 0.053 0.032 0.145 0.038 0.038 0.038 0.025 0.037 0.158 0.025 0.037 0.158 0.025 0.037 0.154 0.026 0.034 0.026 0.034 0.026 0.034 0.026 0.033 0.026 0.033 0.026 0.033 0.026 0.033 0.026 0.033 0.026 0.033 0.026 0.033 0.025 0.037 0.037 0.037 0.037 0.038 0.037 0.038 0.037 0.038 0.039 0.038 0.039 0.038 0.026 0.039 0.038 0.039 0.038 0.039 0.038 0.0390000000000	Beta-Neutral (3M) 0.050 0.027 0.134 0.023 0.120 0.025 0.126 0.025 0.126 0.021 0.021 0.021 0.021 0.021 0.021 0.021 0.021 0.021 0.021 0.021 0.021 0.022 0.021 0.021 0.021 0.021 0.022 0.022 0.021 0.021 0.025 0.027 0.025 0.027 0.025 0.0270000000000	Beta-Neutral (avg) 0.050 0.030 0.140 0.034 0.034 0.032 0.032 0.032 0.032 0.025 0.125 Beta-Neutral (avg) 0.031 0.031 0.031 0.041	Dollar-Neutral 0.081 0.154 0.333 0.154 0.333 0.452 0.451 0.120 0.372 0.372 0.334 Dollar-Neutral 0.032 0.358 0.333	Beta-Neutral (YY) 0.036 0.060 0.203 -0.012 0.080 0.232 0.054 0.059 0.059 0.059 0.059 0.059 0.059 0.059 0.059 0.054 0.004 0.092 0.014 0.023	ExcPort (GM) Beta-Neutral (6M) 0.048 0.0660 0.203 0.0060 0.022 0.070 0.022 0.070 0.022 0.070 0.022 0.070 0.022 0.070 0.018 0.052 0.089 ExcPort (GM) Beta-Neutral (6M) 0.015 0.070 0.0214	Beta-Neutral (3M) 0.045 0.055 0.193 0.054 0.003 0.054 0.054 0.054 0.054 0.054 0.054 0.054 0.054 0.058 0.049 0.036 0.049 0.181 Beta-Neutral (3M) 0.024 0.062 0.062	Beta-Neutral (avg) 0.045 0.055 0.055 0.052 0.062 0.028 0.063 0.205 0.048 0.048 0.048 0.048 0.048 0.048 0.048 0.048 0.048 0.048 0.048 0.048 0.048 0.048 0.016 0.055
Com Carry Value Momentum Blend	modity Mean MSE MAE MAA MAE MAE MAE MAE MAE	Dollar-Neutral 0.070 0.107 0.212 0.214 0.458 0.128 0.16 0.267 0.026 Dollar-Neutral Dollar-Neutral Dollar-Neutral 0.117 0.234	Beta-Neutral (YY) 0.041 0.018 0.007 -0.017 0.029 0.028 0.028 0.028 0.032 0.065 0.019 0.032 0.065 0.019 0.019 0.045 0.019 0.045 0.045 0.019 0.033 0.044	Ex-Past (1Y) Beta-Neutra (6M) 0.049 0.019 0.019 0.005 0.019 0.005 0.019 0.020 0.020 0.008 0.048 0.048 0.048 0.008 0.058 0.098 Ex-Past (1Y) Beta-Neutral (6M) 0.048 0.023 0.023 0.021 0.010	Beta-Neutral (3M) 0.048 0.013 0.03 0.013 0.093 0.003 0.011 0.083 0.003 0.011 0.081 0.084 0.008 0.075 Perta-Neutral (3M) 0.053 0.019 0.016 0.016	Bets-Neutral (wg) 0.048 0.014 0.097 -0.009 0.018 0.015 0.030 0.015 0.098 0.050 0.010 0.011 0.050 0.011 0.044 0.029 0.030 0.044 0.050 0.011 0.044 0.023 0.023 0.022	Dollar-Neutral 0.082 0.132 0.311 0.321 0.311 0.453 0.122 0.122 0.122 0.122 0.122 0.123 0.123 0.124 0.138 0.123 0.143 0.143	Beta-Neutral (1Y) 0.043 0.037 0.155 -0.014 0.052 0.066 0.049 0.181 0.067 0.032 0.142 Beta-Neutral (Y) 0.030 0.057 0.057 0.033	Ex-Past (6M) Beta-Neutre (6M) 0.053 0.032 0.145 0.032 0.038 0.038 0.038 0.038 0.035 0.037 0.058 0.037 0.054 0.025 0.034 0.026 0.334 Ex-Past (6M) 0.034 0.043 0.044	Bets-Neutral (3M) 0.050 0.027 0.134 -0.004 0.023 0.126 0.026 0.126 0.021 0.126 0.021 0.126 0.021 0.126 0.021 0.138	Beta-Neutral (wg) 0.050 0.030 0.140 0.031 0.130 0.140 0.032 0.032 0.032 0.032 0.147 0.054 0.025 Beta-Neutral (wg) 0.041 0.160	Dollar-Neutral 0.081 0.154 0.333 0.154 0.333 0.120 0.451 0.120 0.451 0.172 0.346 0.148 0.334 Dollar-Neutral 0.032 0.158 0.333 0.151	Beta-Neutral (YY) 0.036 0.060 0.203 -0.012 0.080 0.232 0.060 0.059 0.054 0.059 0.054 0.054 0.014	Ex-Dett 6(M) Bet-Neutral 0.048 0.048 0.060 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.000000	Beta-Neutral (3M) 0.045 0.055 0.193 -0.003 0.054 0.054 0.058 0.197 0.036 0.036 0.036 0.049 0.381 Beta-Neutral (3M) 0.024 0.022	Bets-Neutral (wg) 0.455 0.055 0.195 0.005 0.005 0.005 0.0062 0.005 0.062 0.063 0.005 0.064 0.048 0.047 0.048 0.047 0.047 0.048 0.047 0.047 0.047 0.048 0.049 0.049 0.047 0.047
Corry Value Momentum Blend Carry Value	modity Mean MSE MAE MAE MAE MAE MAE MAE MAE MAE MAE MA	Dollar-Neutral 0.070 0.377 0.327 0.327 0.328 0.128 0.128 0.128 0.128 0.128 0.128 0.128 0.128 0.128 0.128 0.129 0.131 0.161	Beta-Neutral (YY) 0.041 0.078 0.070 0.029 0.135 0.063 0.028 0.135 0.065 0.079 0.309 Beta-Neutral (YY) 0.042 0.033 0.144 0.022 0.027	Ex-Post (1Y) Beta-Neutral (6M) 0.049 0.015 0.009 0.009 0.009 0.009 0.010 0.020 0.015 0.020 0.015 0.020 0.015 0.020 0.015 0.020 0.015 0.020 0.025 0.023 0.023 0.023 0.024 0.024	Beta-Neutral (3M) O.048 0.013 0.093 0.003 0.001 0.003 0.001 0.083 0.003 0.011 0.083 0.003 0.001 0.038 0.008 0.075 0.003 0.015 0.003 0.003 0.016 0.016 0.013	Bets-Neutral (arg) 0.048 0.014 0.097 0.008 0.018 0.019 0.030 0.015 0.050 0.050 0.051 0.084 Bets-Neutral (arg) 0.043 0.023 0.122 0.015 0.024	Dollar-Neutral 0.082 0.132 0.313 0.244 0.453 0.122 0.144 0.132 0.038 0.122 0.304 Dollar-Neutral 0.049 0.138 0.306 0.43 0.306 0.471	Bets-Neutral (YY) 0.043 0.037 0.155 0.186 0.065 0.049 0.186 0.067 0.032 0.142 0.032 0.142 0.033 0.057 0.192 0.033 0.041	Ex-Post (6M) Bets-Neutral (6M) 0.053 0.032 0.145 0.038 0.038 0.025 0.037 0.158 0.025 0.037 0.158 0.025 0.037 0.154 0.026 0.134 Ex-Post (6M) 0.033 0.043 0.043 0.044 0.044	Bet=Neutral (3M) 0.050 0.027 0.134 0.023 0.120 0.025 0.126 0.025 0.126 0.021 0.021 0.021 0.021 0.021 0.021 0.021 0.021 0.032 0.034	Beta-Neutral (avg) 0.050 0.030 0.140 0.034 0.032 0.032 0.032 0.032 0.025 0.125 Beta-Neutral (avg) 0.031 0.031 0.031 0.040 0.040 0.040 0.040 0.040 0.040 0.040 0.040 0.040 0.040 0.040 0.040 0.040 0.040 0.032 0.032 0.042 0.042 0.042 0.042 0.042 0.040 0.040 0.040 0.034 0.032 0.032 0.032 0.032 0.032 0.032 0.032 0.034 0.032 0.034 0.032 0.034 0.032 0.034 0.034 0.032 0.034 0.034 0.032 0.034 0.034 0.032 0.034 0.032 0.025 0.025 0.025 0.025 0.025 0.025 0.025 0.025 0.025 0.025 0.047 0.031 0.025 0.047 0.049 0.046 0.046 0.046 0.046 0.046 0.046 0.046 0.046 0.046 0.046 0.0470000000000	Dollar-Neutral 0.081 0.154 0.333 0.154 0.333 0.455 0.451 0.120 0.372 0.372 0.334 0.334 0.334 0.334	Beta-Neutral (YY) 0.036 0.060 0.030 -0.012 0.080 0.233 0.054 0.059 0.059 0.054 0.059 0.059 0.054 0.054 0.054 0.054 0.064 0.082 0.233 0.041 0.064	ExcPort (GM) Beta-Neutral (6M) 0.048 0.0660 0.203 0.0060 0.002 0.002 0.070 0.213 0.022 0.070 0.213 0.049 0.052 0.189 ExcPort (GM) Beta-Neutral (6M) 0.015 0.070 0.214 0.031 0.068	Beta-Neutral (3M) 0.045 0.055 0.193 0.054 0.003 0.054 0.097 0.036 0.049 0.049 0.049 0.049 0.049 0.049 0.049 0.049 0.049 0.049 0.049 0.049 0.049 0.024 0.062 0.062 0.0032 0.0032	Beta-Neutral (avg) 0.045 0.055 0.195 -0.008 0.062 0.203 0.028 0.048 0.205 0.048 0.205 0.048 0.048 0.048 0.048 0.048 0.078 0.016 0.076 0.016 0.208 0.208 0.028
Comm Carry Value Momentum Blend	modity Mean MSE MAE MAA MAE MAE MAE MAE MAE MAE	Dollar-Neutral 0.070 0.307 0.272 -0.124 0.241 0.248 0.126 0.266 0.094 0.264 Dollar-Neutral 0.066 0.117 0.282 0.131 0.151 0.230 0.330	Bets-Neutral (1Y) 0.018 0.019 0.010 0.107 -0.011 0.029 0.135 0.063 0.122 0.028 0.132 0.065 0.079 0.099 0.093 0.033 0.144 0.027 0.136	Ex-Past (1Y) Beta-Neutra (6M) 0.049 0.019 0.019 0.009 0.010 0.020 0.019 0.008 0.048 0.048 0.048 0.048 0.059 Ex-Past (1Y) Beta-Neutral (6M) 0.059 Ex-Past (1Y) 0.023 0.023 0.021 0.021 0.021 0.021 0.021 0.021 0.023 0.021 0.021 0.023 0.021 0.021 0.021 0.023 0.021 0.021 0.023 0.023 0.021 0.021 0.023 0.023 0.021 0.023 0.023 0.021 0.023 0.023 0.021 0.023 0.025	Beta-Neutral (3M) 0.048 0.013 0.03 0.013 0.093 0.011 0.083 0.003 0.011 0.083 0.003 0.011 0.081 0.088 0.075 0.016 0.053 0.016 0.016 0.073	Bets-Neutral (wg) 0.048 0.014 0.097 -0.009 0.018 0.015 0.030 0.016 0.050 0.030 0.050 0.010 Bets-Neutral (wg) 0.023 0.023 0.012 0.012 0.015	Dollar-Neutral 0.082 0.132 0.311 0.311 0.321 0.311 0.453 0.122 0.324 0.32 0.304 Dollar-Neutral 0.049 0.328 0.306 0.143 0.0143 0.0143 0.0143 0.354	Bets-Neutral (1Y) 0.03 0.037 0.055 0.0154 0.055 0.188 0.0649 0.181 0.0632 0.142 Bets-Neutral (1Y) 0.057 0.057 0.0333 0.041 0.041	Ex-Past (6M) Beta-Neutre (6M) 0.053 0.032 0.145 0.032 0.038 0.038 0.038 0.037 0.058 0.037 0.034 0.025 0.037 0.034 0.025 0.034 0.026 0.334 Ex-Past (6M) 0.034 0.043 0.043 0.043 0.043 0.023	Bets-Neutral (3M) 0.050 0.027 0.134 -0.004 0.023 0.126 0.026 0.027 0.126 0.027 0.126 0.021 0.126 0.021 0.126 0.021 0.126 0.021 0.126 0.021 0.132 0.032 0.032 0.032 0.032 0.032 0.032 0.034 0.145	Beta-Neutral (wg) 0.050 0.030 0.140 0.034 0.034 0.032 0.032 0.032 0.032 0.032 0.147 0.054 0.023 0.125 Beta-Neutral (wg) 0.031 0.041 0.041 0.041 0.041	Dollar-Neutral 0.081 0.154 0.333 0.154 0.333 0.120 0.463 0.468 0.334 Dollar-Neutral 0.032 0.158 0.333 0.33 0.333 0.333 0.333 0.333 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.3	Beta-Neutral (YY) 0.036 0.060 0.080 0.080 0.080 0.223 0.060 0.054 0.059 0.054 0.059 0.054 0.059 0.054 0.059 0.054 0.062 0.062 0.064 0.064 0.065	Ex-Dett 6(M) Bet-Neutral 0.048 0.048 0.060 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.000000	Beta-Neutral (3M) 0.045 0.055 0.193 -0.003 0.055 0.193 -0.003 0.055 0.199 -0.003 0.055 0.190 -0.003 0.058 0.197 0.036 0.049 0.181 (3M) 0.024 0.023 0.062 0.032 0.062 0.032 0.0666 0.210	Bets-Neutral (wg) O 0.045 0.045 0.055 0.195 0.062 0.203 0.028 0.062 0.063 0.205 0.048 0.044 0.047 0.178 0.046 0.066 0.066 0.066 0.066 0.065 0.0666 0.208 0.0666
Corry Value Momentum Blend Carry Value	modity Mean MAE MAA MAAN MAE MAA MAE MAE MAAN MAAN	Dollar-Neutral 0.070 0.272 -0.124 0.241 0.241 0.241 0.243 0.128 0.128 0.026 0.094 0.267 0.094 0.026 0.017 0.282 0.034 0.034 0.13 0.13 0.13 0.13 0.13 0.13 0.13 0.13	Beta-Neutral (YY) 0.041 0.038 0.041 0.018 0.029 0.029 0.028 0.028 0.029 0.035 0.063 0.028 0.019 0.044 0.042 0.033 0.144 0.022 0.027 0.136	Ex-Post (1Y) Beta-Neutre (6M) 0.049 0.05 0.015 0.015 0.015 0.015 0.015 0.015 0.019 0.010 0.015 0.019 0.010 0.019 0.010 0.019 0.010 0.019 Ex-Post (1Y) Beta Neutral (6M) 0.023 0.025 0.023 0.025 0.023 0.025 0.023 0.025 0.023 0.025	Beta-Neutral (3M) 0.048 0.073 0.073 0.073 0.073 0.073 0.073 0.081 0.081 0.038 0.008 0.075 0.038 0.075 0.079 0.053 0.079 0.016 0.073 0.073 0.073 0.073	Bets-Neutral (wg) 0.048 0.049 0.049 0.030 0.030 0.033 0.015 0.009 0.018 0.019 0.010 0.018 0.019 0.019 0.010 0.011 0.023 0.012 0.012 0.015 0.024 0.130	Dollar-Neutral 0.082 0.32 0.31 -0.123 0.453 0.453 0.122 0.144 0.312 0.038 0.122 0.038 0.123 0.030 0.13 0.030 0.13 0.049 0.138 0.306 0.143 0.306 0.143 0.141 0.049 0.138 0.306 0.143 0.043 0.043 0.04 0.04	Beta-Neutral (Y) 0.043 0.037 0.155 0.155 0.055 0.066 0.066 0.069 0.032 0.032 0.032 0.032 0.032 0.032 0.033 0.057 0.033 0.057 0.033 0.057	Ex-Post (6M) Bets-Neutre (6M) 0.053 0.053 0.165 0.032 0.165 0.038 0.038 0.038 0.038 0.038 0.038 0.038 0.037 0.054 0.039 0.054 0.038 0.026 0.038 0.026 0.038 0.026 0.034 0.043 0.043 0.043 0.061 0.043 0.061 0.031 0.063 0.063 0.064 0.031 0.063 0.063 0.063 0.063 0.063 0.063 0.063 0.063 0.0550 0.0550 0.0550 0.0550000	Beta-Neutral (3M) 0.050 0.057 0.057 0.124 0.023 0.126 0.021 0.022 0.126 0.042 0.021 0.022 0.126 0.041 0.032 0.043 0.034 0.032 0.034 0.034 0.147	Beta-Neutral (wg) 0.050 0.140 0.140 0.030 0.140 0.034 0.032 0.032 0.032 0.032 0.032 0.023 0.023 0.023 0.023 0.023 0.023 0.023 0.023 0.031 0.023 0.031 0.031 0.031 0.031 0.035 0.035 0.035 0.035 0.035 0.035 0.035 0.035 0.035 0.035 0.035 0.035 0.032 0.032 0.032 0.032 0.032 0.032 0.032 0.034 0.032 0.033 0.032 0.033 0.032 0.033 0.035	Dollar-Neutral 0.081 0.154 0.252 0.120 0.121 0.121 0.121 0.121 0.120 0.120 0.121 0.120 0.121 0.1200 0.1200 0.1200 0.120000000000	Beta-Neutral (Y) (V) 0.036 0.060 0.203 -0.012 0.080 0.232 0.060 0.077 0.227 0.055 0.055 0.055 0.055 0.054 0.059 0.054 0.0190 0.019 0.019 0.021 0.061 0.021 0.054 0.019 0.021 0.041 0.082 0.064 0.066 0.212 0.066 0.212 0.066 0.212 0.066 0.212 0.066 0.212 0.066 0.212 0.066 0.212 0.066 0.212 0.066 0.212 0.066 0.212 0.066 0.212 0.066 0.212 0.066 0.212 0.066 0.212 0.065 0.055 0.055 0.055 0.055 0.055 0.055 0.055 0.055 0.055 0.055 0.05 0	Ex-Dart GMU Bet-Neutral 0.448 0.448 0.448 0.460 0.460 0.460 0.460 0.460 0.4213 0.022 0.070 0.213 0.070 0.217 0.049 0.052 0.070 0.049 0.052 0.070 0.052	Beta-Neutral (3M) (3M) 0.045 (0.045 0.055 0.035 0.053 0.055 0.030 0.058 0.197 0.005 0.036 0.038 0.049 0.049 0.024 0.024 0.062 0.022 0.032 0.032 0.0662 0.0662 0.203 0.052 0.0662 0.210 0.0622	Beta-Neutral (swg) 0.645 0.645 0.655 0.955 0.008 0.662 0.203 0.062 0.064 0.063 0.047 0.047 0.047 0.048 0.047 0.048 0.047 0.047 0.046 0.046 0.208 0.0566 0.208 0.0566 0.208
Corry Value Momentum Blend Carry Value Momentum Blend	modity Mean MAE MAAE MAAE MAAE MAE MAE MAE MAE MAE	Dollar-Neutral 0.070 0.307 0.272 -0.124 0.241 0.24 0.16 0.16 0.026 0.094 0.094 0.016 0.17 0.282 0.113 0.330 0.034 0.315 0.330 0.094 0.081	Bets-Neutral (1Y) 0.018 0.019 0.019 0.010 0.029 0.135 0.063 0.029 0.132 0.063 0.028 0.132 0.065 0.079 0.069 0.033 0.044 0.0227 0.133 -0.062 0.062	Ex-Past (1Y) Bet-Neutre (6M) 0.049 0.015 0.097 -0.005 0.010 0.012 0.012 0.023 0.0046 0.023 0.0045 0.0	Beta-Neutral (3M) 0.048 0.073 0.093 0.003 0.003 0.001 0.083 0.001 0.088 0.008 0.075 0.038 0.008 0.075 0.053 0.075 0.053 0.079 0.116 0.073 0.073 0.073 0.073	Bets-Neutral (srg) 0.048 0.014 0.074 0.097 0.009 0.015 0.030 0.050 0.015 0.050 0.016 0.050 0.017 0.081 0.082 0.013 0.043 0.022 0.023 0.024 0.030 0.047	Dollar-Neutral 0.082 0.132 0.311 -0123 0.244 0.453 0.124 0.453 0.124 0.138 0.123 0.123 0.038 0.123 0.049 0.138 0.306 0.143 0.316 0.143 0.717 0.354 -0.092 0.112 0.01 0.01	Bets-Neutral (1Y) 0.03 0.037 0.055 0.015 0.016 0.066 0.064 0.037 0.181 0.063 0.064 0.052 0.181 0.063 0.032 0.142 0.142 0.057 0.057 0.033 0.041 0.057 0.057 0.057 0.057 0.057	Ex-Post (6M) Bets-Neutre (6M) 0.053 0.032 0.165 -0008 0.058 0.037 0.037 0.037 0.037 0.037 0.037 0.037 0.037 0.037 0.037 0.037 0.037 0.037 0.037 0.034 0.034 0.034 0.034 0.034 0.034 0.033 0.044 0.026 0.033 0.044 0.020 0.033 0.044 0.020 0.033 0.044 0.020 0.033 0.044 0.026 0.033 0.044 0.026 0.033 0.044 0.054 0.055	Bets-Neutral (3M) 0.050 0.027 0.030 0.027 0.134 -0.004 0.025 0.026 0.026 0.027 0.126 0.044 0.021 0.021 0.024 0.021 0.023 0.044 0.032 0.045 0.022 0.334 0.145 0.038 0.038	Beta-Neutral (swg) 0.050 0.030 0.040 0.030 0.040 0.032 0.032 0.032 0.032 0.023 0.023 0.023 0.023 0.023 0.023 0.023 0.033 0.033 0.031 0.033 0.031 0.033 0.040 0.033 0.040 0.033 0.040 0.035 0.036 0.036 0.036 0.040 0.025 0.036 0.036 0.036 0.037 0.037 0.032 0.033 0.032 0.033 0.034 0.033 0.034 0.033 0.034 0.033 0.034 0.033 0.034 0.033 0.046 0.033 0.047 0.033 0.047 0.033 0.040 0.033 0.040 0.033 0.040 0.033 0.040 0.033 0.040 0.033 0.040 0.040 0.033 0.040 0.040 0.033 0.0400000000	Dollar-Neutral 0.08 0154 0.333 0.0121 0.252 0.451 0.172 0.348 0.148 0.038 0.148 0.032 0.168 0.038 0.151 0.032 0.158 0.353 0.351 0.955 0.337 0.037 0.037 0.037 0.042 0.037 0.042 0.037 0.042 0.037 0.042 0.037 0.042 0.042 0.044 0.032 0.044 0.04	Beta-Neutral (YY) 0.036 0.060 0.203 0.060 0.223 0.060 0.232 0.060 0.232 0.060 0.057 0.054 0.055 0.0	Ex-Post (3M) Beta-Neutral (6M) 0.048 0.060 0.048 0.060 0.020 0.021 0.006 0.020 0.022 0.022 0.022 0.022 0.027 0.027 0.021 0.049 0.052 0.049 0.055 0.070 0.015 0.075 0.0	Beta-Neutral (3M) 0.045 0.055 0.193 -0.003 0.054 0.190 -0.003 0.054 0.190 -0.003 0.054 0.190 0.058 0.036 0.049 0.181 (3M) 0.024 0.042 0.032 0.0666 0.210 0.064	Beta-Neutral (swg) O 0.045 0.045 0.055 0.955 0.062 0.038 0.062 0.033 0.063 0.064 0.045 0.047 0.047 0.178 Beta-Neutral (swg) 0.066 0.208 0.0666 0.208 0.0666 0.208 0.059 0.059 0.059
Corry Value Momentum Blend Carry Value Momentum	modity Mean MAE MAAN MAE MAAN Mean MSE MAE Mean MSE MAE MAE MAE MAE MAE	Dollar-Neutral 0.070 0.307 0.272 -0.124 0.458 0.16 0.267 0.026 0.094 0.264 0.17 0.264 0.17 0.28 0.131 0.313 0.131 0.314 0.315 0.315 0.326 0.326 0.326 0.326 0.326 0.326 0.326 0.32 0.33 0.33 0.33 0.33 0.33 0.33 0.33	Beta-Neutral (YY) 0.041 0.038 0.307 -0.011 0.029 0.038 0.028 0.032 0.033 0.043 0.043 0.043 0.042 0.033 0.044 0.042 0.033 0.134 0.022 0.027 0.136 0.0043	Ex-Post (1Y) Beta-Neutre (6M) 0.049 0.015 0.005 0.019 0.010 0.020 0.019 0.010 0.020 0.019 0.010 0.020 0.019 0.010 0.020 0.019 Ex-Post (1Y) Beta-Neutrel (6M) 0.022 0.023 0.025	Beta-Neutral (3M) 0.0.48 0.0.73 0.073 0.073 0.073 0.073 0.073 0.073 0.073 0.073 0.073 0.071 0.081 0.073 0.075 0.075 0.075 0.073 0.073 0.073 0.072 0.022 0.023	Beta-Neutral (arg) 0.048 0.014 0.097 -0.009 0.015 0.030 0.015 0.030 0.015 0.030 0.015 0.098 0.030 0.031 0.084 0.023 0.015 0.023 0.023 0.023 0.023 0.023 0.023 0.025 0.024 0.023 0.025	Dollar-Neutral 0.082 0.32 0.31 -0.123 0.32 0.31 0.424 0.453 0.122 0.38 0.122 0.38 0.122 0.30 0 0.144 0.312 0.012 0.013 0.023 0.013 0.023 0.013 0.023 0.01 0.01	Bets-Neutral (1Y) 0.043 0.037 0.053 0.052 0.066 0.065 0.065 0.065 0.032 0.042 Bets-Neutral (1Y) 0.057 0.057 0.057 0.057 0.057 0.057 0.033 0.057 0.057 0.064 0.033 0.044 0.057 0.057 0.064 0.033 0.044 0.057 0.057 0.065 0.033 0.044 0.057 0.065 0.033 0.044 0.057 0.065 0.045 0.033 0.045 0.033 0.044 0.057 0.065 0.045 0.045 0.045 0.057 0.065 0.045 0.057 0.065 0.045 0.057 0.065 0.045 0.057 0.045 0.057 0.057 0.057 0.057 0.057 0.057 0.057 0.045 0.045 0.057 0.045 0.057 0.045 0.045 0.057 0.057 0.057 0.045 0.04	Ex-Post (6M) Bets-Neutre (6M) 0.053 0.032 0.105 0.032 0.038 0.038 0.038 0.038 0.038 0.038 0.038 0.037 0.158 0.037 0.054 0.037 0.054 0.038 0.026 0.038 0.026 0.038 0.026 0.038 0.026 0.038 0.026 0.038 0.026 0.038 0.026 0.038 0.026 0.038 0.026 0.038 0.026 0.038 0.026 0.038 0.048 0.038 0.048 0.038 0.049 0.049	Bets-Nextral (3M) 0.050 0.057 0.037 0.134 -0.004 0.023 0.126 0.042 0.021 0.126 0.042 0.021 0.022 0.044 0.031 0.043 0.044 0.032 0.147 -0.038 0.041 0.041	Bets-Neutral (wg) 0.050 0.030 0.140 0.030 0.030 0.030 0.034 0.032 0.032 0.032 0.032 0.032 0.032 0.023 0.023 0.023 0.023 0.023 0.023 0.031 0.031 0.031 0.031 0.031 0.033 0.033 0.033 0.035 0.035 0.035 0.035 0.035 0.035 0.035 0.035 0.035 0.035 0.035 0.035 0.035 0.035 0.032 0.033 0.032 0.032 0.032 0.032 0.033 0.032 0.033 0.032 0.033 0.032 0.033 0.034 0.032 0.034 0.032 0.033 0.034 0.033 0.034 0.034 0.033 0.0340	Dollar-Neutral 0.089 0.154 0.333 -0.121 0.252 0.451 0.122 0.324 0.038 0.148 0.334 Dollar-Neutral 0.032 0.158 0.333 0.151 0.151 0.155 0.373 0.151 0.165 0.373 0.151 0.165 0.373 0.151 0.165 0.373 0.151 0.165 0.373 0.151 0.165 0.373 0.151 0.165 0.373 0.151 0.165 0.373 0.151 0.165 0.373 0.151 0.165 0.373 0.151 0.165 0.373 0.151 0.165 0.37 0.151 0.165 0.37 0.151 0.165 0.37 0.151 0.165 0.37 0.151 0.16 0.16 0.16 0.16 0.16 0.16 0.16 0.1	Beta-Neutral (Y) 0.036 0.036 0.023 -0.012 0.060 0.023 0.060 0.027 0.227 0.060 0.077 0.227 0.054 0.054 0.054 0.054 0.054 0.054 0.012 0.054 0.012 0.054 0.012 0.054 0.012 0.054 0.012 0.054 0.012 0.054 0.012 0.054 0.015 0.054 0.015 0.015 0.054 0.015 0.015 0.054 0.015 0.015 0.015 0.054 0.015 0.015 0.015 0.054 0.015 0.015 0.054 0.015 0.015 0.054 0.015 0.015 0.015 0.054 0.015 0.015 0.015 0.054 0.015 0.015 0.015 0.054 0.015 0.015 0.015 0.054 0.015 0.015 0.015 0.054 0.015 0.015 0.015 0.054 0.015 0.015 0.015 0.054 0.015 0.015 0.015 0.054 0.015 0.015 0.015 0.054 0.015 0.015 0.015 0.054 0.015 0.015 0.015 0.015 0.054 0.017 0.015 0.055 0.015 0.055 0.0	Ex-Dext G(M) Bet-Neutral G(M) 0.468 0.660 0.200 0.200 0.200 0.213 0.022 0.070 0.217 0.022 0.070 0.217 0.049 0.052 0.070 0.049 0.0520	Beta-Neutral (3M) 0.045 0.055 0.055 0.053 0.054 0.058 0.058 0.058 0.058 0.058 0.049 0.049 0.049 0.049 0.049 0.024 0.062 0.024 0.062 0.022 0.032 0.052 0.062 0.052 0.062 0.062 0.062 0.062 0.062 0.062 0.062 0.062 0.062 0.062 0.065 0.062 0.065 0.065 0.062 0.065 0.065 0.065 0.065 0.025 0.025 0.025 0.055 0.037 0.058 0.0	Beta-Neutral (swg) 0.645 0.645 0.655 0.955 0.008 0.662 0.203 0.064 0.064 0.063 0.205 0.044 0.047 0.048 0.047 0.048 0.047 0.047 0.046 0.046 0.056 0.208 0.0566 0.208 0.0566 0.208 0.0566 0.208 0.0566 0.208 0.0566 0.208 0.0566 0.208
Corry Value Momentum Blend Carry Value Momentum	modity Mean MAE MAAE MAAE MAE MAE MAE MAE MAE MAE M	Dollar-Neutral 0.070 0.272 0.224 0.224 0.124 0.226 0.128 0.16 0.226 0.026 0.026 0.026 0.026 0.026 0.026 0.017 0.264 0.117 0.264 0.117 0.266 0.117 0.282 0.154 0.154 0.154 0.154 0.154 0.154 0.154 0.154 0.154 0.154 0.154 0.154 0.154 0.154 0.154 0.154 0.226 0.154 0.226 0.156 0.226 0.156 0.226 0.156 0.226 0.156 0.226 0.128 0.266 0.128 0.128 0.128 0.128 0.128 0.128 0.128 0.128 0.128 0.128 0.026 0.027 0.026 0.026 0.027 0.027 0.027 0.027 0.026 0.027 0.026 0.026 0.027 0.026 0.026 0.026 0.026 0.026 0.0270000000000000000000000000000000000	Beta-Neutral (IV) 0.0.44 0.038 0.007 0.042 0.029 0.135 0.068 0.019 0.068 0.019 0.019 0.019 0.019 0.019 0.019 0.027 0.029 0.	Ex-Past (1Y) Beta-Neutre (6M) 0.049 0.049 0.015 0.097 -0.005 0.019 0.010 0.020 0.010 0.010 0.020 0.010 0.012 0.098 Ex-Past (1Y) Beta-Neutral (6M) 0.046 0.023 0.025 0.020 0.025 0.025 0.025 0.025 0.046 0.022 0.023 0.025 0.024 0.022 0.025 0.004 0.022 0.025 0.004 0.025 0.004 0.025 0.004 0.025 0.004 0.025 0.004 0.025 0.004 0.025 0.0045 0.	Beta-Neutral (3M) 0.048 0.073 0.093 0.093 0.003 0.003 0.003 0.003 0.008 0.008 0.008 0.008 0.008 0.005 0.005 0.005 0.005 0.003 0.003 0.003 0.003 0.005 0.003	Beta-Neutral (wg) 0.048 0.074 0.097 -0.009 0.015 0.015 0.015 0.015 0.015 0.015 0.015 0.015 0.015 0.015 0.015 0.015 0.015 0.015 0.015 0.015 0.015 0.015 0.024 0.023 0.022 0.025 0.024 0.024 0.024 0.024 0.024 0.024 0.024 0.024 0.024 0.024 0.024 0.024 0.024 0.024 0.025 0.025 0.025 0.025 0.025 0.025 0.025 0.018 0.055 0.018 0.055 0.018 0.055 0.018 0.055 0.010	Dollar-Neutral 0.082 0.32 0.31 -0123 0.244 0.453 0.124 0.453 0.124 0.138 0.123 0.038 0.123 0.038 0.123 0.049 0.138 0.143 0.143 0.143 0.143 0.143 0.143 0.143 0.143 0.143 0.143 0.143 0.143 0.143 0.143 0.143 0.143 0.143 0.143 0.144	Bets-Neutral (Y) 0.043 0.037 0.155 -0.014 0.056 0.186 0.066 0.032 0.135 Bets-Neutral (Y) 0.033 0.057 0.192 0.033 0.041 0.164 -0.057 0.057 0.057 0.057 0.057 0.057 0.057 0.057 0.057 0.057 0.057 0.057 0.057 0.057 0.057	Ex-Post (6M) Bets-Neutre (6M) 0.053 0.032 0.165 -0008 0.0158 0.0158 0.037 0.054 0.037 0.054 0.037 0.054 0.026 0.034 0.054 0.026 0.034 0.049 0.04400000000	Bets-Neutral (3M) 0.050 0.027 0.030 0.027 0.124 0.002 0.120 0.120 0.120 0.021 0.026 0.041 0.021 0.021 0.021 0.021 0.021 0.023 0.044 0.032 0.032 0.032 0.034 0.147 -0.038 0.142	Beta-Neutral (swg) 0.050 0.030 0.040 0.030 0.040 0.032 0.032 0.032 0.054 0.023 0.054 0.023 0.054 0.023 0.054 0.023 0.031 0.023 0.031 0.031 0.031 0.031 0.031 0.033 0.041 0.033 0.041 0.035 0.036 0.036 0.049 0.033 0.047 0.033 0.047 0.033 0.047 0.033 0.047 0.033 0.047 0.055 0.036 0.055 0.036 0.055 0.032 0.055 0.032 0.055 0.032 0.055 0.032 0.055 0.032 0.055 0.032 0.055 0.032 0.055 0.032 0.055 0.032 0.055 0.032 0.055 0.032 0.055 0.055 0.032 0.055 0.055 0.032 0.055 0.055 0.055 0.032 0.0550 0.0550 0.0550 0.0550 0.05500	Dollar-Neutral 0.081 0.133 0.233 0.233 0.212 0.252 0.451 0.172 0.346 0.0334 0.148 0.0334 0.148 0.032 0.158 0.353 0.151 0.95 0.337 0.95 0.377 0.092 0.377 0.092 0.32 0.32 0.32 0.32 0.32 0.32 0.32 0.3	Beta-Neutral (Y) 0.036 0.060 0.203 0.060 0.203 0.060 0.227 0.060 0.027 0.057 0.054 0.190 0.054 0.190 0.054 0.014 0.069 0.233 0.064 0.066 0.233 0.064 0.065 0.233 0.064 0.065 0.233 0.065 0.233 0.257 0.055 0.252 0.252 0.252 0.255 0.252 0.25 0.25	Ex-Port (5M) Het-Neutral (6M) 0.048 0.060 0.060 0.023 -0.006 0.023 0.022 0.072 0.072 0.074 0.052 0.052 0.052 0.052 0.052 0.052 0.052 0.052 0.052 0.052 0.052 0.052 0.052 0.052 0.055 0.075 0.055 0.077 0.075 0.077 0.075 0.077 0.075 0.075 0.075 0.075 0.075 0.075 0.075 0.075 0.0	Beta-Neutral (3M) (3M) 0.045 0.055 0.055 0.093 0.093 0.054 0.055 0.055 0.190 0.054 0.056 0.190 0.056 0.094 0.036 0.036 0.049 0.049 0.049 0.064 0.062 0.023 0.0666 0.203 0.0666 0.204 0.0649 0.0649 0.664	Beta-Neutral (swg) O 0.045 0.045 0.055 0.965 0.995 0.062 0.062 0.063 0.062 0.064 0.045 0.064 0.062 0.064 0.064 0.047 0.047 0.016 0.066 0.208 0.0666 0.208 0.073 0.053 0.065 0.208
Corry Value Momentum Blend Carry Value Momentum	modity Mean MAE MAAE MAA MAE MAE MAE MAE MAE MAE MA	Dollar-Neutral 0.070 0.307 0.272 -0.224 0.241 0.458 0.126 0.266 0.026 0.026 0.094 0.264 Dollar-Neutral 0.064 0.017 0.282 0.33 0.330 0.333 0.333 0.333 0.333 0.333 0.334 0.35 0.35 0 0.35 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Beta-Neutral (YY) 0.0.41 0.0.81 0.0.71 0.0.71 0.0.71 0.0.72 0.023 0.132 0.065 0.132 0.065 0.139 0.139 0.139 0.139 0.139 0.139 0.139 0.139 0.139 0.139 0.132 0.132 0.132 0.132 0.132 0.132 0.132 0.132 0.132 0.134 0.132 0.136 0.032 0.136 0.043	Ex-Post (NY) Beta-Neutre Beta-Neutre 0.049 0.015 0.097 0.0005 0.019 0.010 0.010 0.010 0.010 0.010 0.010 0.010 0.020 0.015 0.0989 0.048 0.010 0.012 0.023 0.121 0.010 0.122 0.012 0.013 0.014	Bets-Neutral (3M) 0.0.48 0.013 0.093 0.003 0.003 0.001 0.088 0.003 0.011 0.038 0.003 0.001 0.038 0.003 0.001 0.088 0.003 0.001 0.038 0.005 0.008 0.0075 0.009 0.016 0.013 0.013 0.013 0.013 0.013 0.013 0.013 0.126 -0.023 0.126	Bets-Neutral (arg) 0.048 0.014 0.097 0.009 0.030 0.015 0.030 0.050 0.050 0.097 0.084 0.015 0.098 0.050 0.011 0.084 0.022 0.122 0.122 0.123 0.024 0.025 0.025 0.026 0.127 0.128 0.129 0.129 0.120 0.121 0.025 0.025 0.025 0.025 0.025 0.025 0.025 0.025 0.025 0.026 0.027 0.0310	Dollar-Neutral 0.082 0.332 0.31 -0.123 0.244 0.453 0.122 0.138 0.122 0.038 0.122 0.038 0.123 0.304 0.049 0.128 0.128 0.128 0.128 0.128 0.122 0.112 0.128 0.129 0.1	Bets-Neutral (Y) (Y) 0.043 0.037 0.055 0.016 0.057 0.052 0.86 0.064 0.055 0.86 0.066 0.067 0.032 0.142 0.032 0.142 0.057 0.057 0.057 0.057 0.057 0.053 0.031 0.164 -0.057 0.164 -0.057 0.062 0.064	Ex-Past (6M) Beta-Neutre (6M) 0.053 0.032 0.145 0.033 0.158 0.025 0.037 0.037 0.037 0.037 0.037 0.037 0.037 0.037 0.037 0.037 0.037 0.037 0.037 0.037 0.037 0.037 0.025 0.026 0.025 0.026 0.025 0.026 0.026 0.025 0.026 0.025 0.026 0.025 0.026 0.026 0.026 0.026 0.026 0.026 0.027 0.026 0.026 0.026 0.027 0.026 0.027 0.026 0.02	Bets-Neutral (3M) 0.050 0.027 0.032 0.120 0.025 0.120 0.025 0.120 0.025 0.126 0.025 0.126 0.021 0.120 0.025 0.126 0.021 0.138 Betz-Neutral 0.021 0.022 0.022 0.147 -0.032 0.147 -0.044 0.041	Beta-Neutral (swg) 0.050 0.030 0.040 0.040 0.030 0.40 0.032 0.032 0.140 0.032 0.147 0.054 0.023 0.125 0.041 0.041 0.055 0.035 0.035 0.035 0.035 0.048 0.049 0.049	Dollar-Neutral 0.081 0.154 0.333 -0.121 0.252 0.451 0.120 0.326 0.138 0.334 0.038 0.334 0.038 0.334 0.038 0.333 0.351 0.151 0.155 0.155 0.357 0.351 0.351	Beta-Neutral (YY) 0.036 0.036 0.036 0.036 0.0203 0.012 0.0050 0.032 0.060 0.203 0.060 0.273 0.059 0.059 0.054 0.059 0.054 0.059 0.054 0.054 0.052 0.054 0.052 0.223 0.054 0.059 0.054 0.059 0.054 0.059 0.054 0.052 0.233 0.041 0.042 0.042	Ex-Dext (EM) Het-Neutral Het-Neutral Het-Neutral 0.048 0.060 0.203 -0.006 0.203 0.069 0.213 0.069 0.223 0.070 0.022 0.070 0.217 0.049 0.052 0.189 Beta-Neutral (EM) 0.057 0.077 0.074 0.074 0.007 0.0	Beta-Neutral (3M) 0.045 0.055 0.932 -0.003 0.055 0.993 -0.003 0.055 0.990 0.054 0.990 0.054 0.091 0.058 0.997 0.036 0.049 0.036 0.049 0.049 0.024 0.022 0.032 0.032 0.032 0.049 0.049 0.049 0.049 0.049	Beta-Neutral (avg) Output 0.042 0.045 0.055 0.195 0.062 0.063 0.062 0.063 0.063 0.205 0.064 0.0048 0.064 0.0048 0.048 0.047 0.178 0.066 0.205 0.066 0.208 0.066 0.208 0.066 0.208 0.073 0.073 0.073 0.179 0.179
Corry Value Momentum Blend Carry Value Momentum Blend	nodity Mean MAE MAA MAA MAA MAE MAA MAE MAA MAE MAA MAE MAA MAE MAA MAE MAA MAE MAA MAE MAA MAE MAA MAE	Dollar-Neutral 0.070 0.107 0.272 -0.224 0.458 0.128 0.16 0.267 0.026 0.094 0.264 Dollar-Neutral 0.066 0.117 0.282 0.134 0.131 0.304 0.051 0.237 0.061 0.237 0.061 0.237 0.067 0.072 0.07 0.07	Beta-Neutral (YY) 0.0.41 0.038 0.001 0.0107 0.011 0.029 0.135 0.029 0.135 0.029 0.135 0.029 0.135 0.028 0.029 0.132 0.066 0.079 0.079 0.033 0.144 0.0227 0.027 0.136 -0.062 0.042 0.042 0.024	Ex-Pact (NY) Beta-Neutre (eM) 0.049 0.015 0.097 -0.005 0.019 0.010 0.010 0.015 0.019 0.010 0.020 0.015 0.020 0.015 0.020 0.015 0.020 0.015 0.021 0.022 0.023 0.121 0.025 0.122 0.023 0.121 0.025 0.122 0.023 0.121 0.025 0.122 0.025 0.121 0.025 0.121 0.025 0.121 0.025 0.121	Bets-Neutral (3M) 0.0.48 0.0.73 0.0.93 0.003 0.033 0.001 0.083 0.003 0.001 0.083 0.003 0.001 0.083 0.003 0.004 0.005 0.005 0.003 0.003 0.003 0.003 0.003 0.003 0.023 0.023 0.023 0.020	Bets-Neutral (arg) 0.0.48 0.014 0.097 0.009 0.013 0.015 0.030 0.055 0.075 0.050 0.011 0.084 0.023 0.015 0.023 0.015 0.024 0.015 0.023 0.024 0.122 0.015 0.024 0.122 0.015 0.024 0.122 0.015 0.024 0.120 0.015 0.024 0.120 0.031 0.42 0.007 0.016	Dollar-Neutral 0.082 0.331 0.224 0.42 0.423 0.224 0.423 0.3300 0.3300 0.3300 0.3300000000	Bets-Neutral (Y) (Y) 0.043 0.037 0.055 0.052 0.86 0.052 0.86 0.064 0.065 0.066 0.067 0.032 0.132 0.142 0.132 0.132 0.142 0.033 0.057 0.164 -0.057 0.064 0.004 0.004	Ex-Pact (6M) Beta-Neutre (6M) 0.053 0.132 0.145 0.033 0.158 0.025 0.037 0.158 0.025 0.134 0.025 0.134 0.025 0.134 0.024 0.134 0.024 0.021 0.031 0.043 0.160 0.031 0.049 0.075 0.037 0.037 0.037 0.037 0.031 0.031 0.054 0.024 0.024 0.024 0.031 0.043 0.060 0.043 0.060 0.054 0.031 0.054 0.024 0.025 0.035 0.0	Bets-Neutral (3M) 0.050 0.027 0.134 -0.004 0.025 0.120 0.025 0.120 0.025 0.126 0.042 0.021 0.18 Bets-Neutral (3M) 0.044 0.031 0.044 0.031 0.044 0.032 0.405 0.044 0.434 0.447 0.436 0.041 0.462 0.041 0.462	Bets-Neutral (swg) Operation 0.050 0.300 0.160 0.301 0.140 0.032 0.32 0.32 0.125 0.125 Bets-Neutral (swg) 0.031 0.054 0.025 0.031 0.031 0.032 0.125 Bets-Neutral (swg) 0.031 0.031 0.036 0.033 0.135 0.036 0.153 0.049 0.177 0.005 0.035	Dollar-Neutral 0.081 0.154 0.334 0.334 0.252 0.451 0.121 0.252 0.451 0.122 0.334 0.148 0.334 0.334 0.334 0.334 0.333 0.151 0.335 0.353 0.355 0.3	Beta-Neutral (YY) 0.036 0.036 0.036 0.036 0.037 0.012 0.080 0.332 0.056 0.057 0.059 0.054 0.059 0.054 0.054 0.054 0.054 0.054 0.014 0.069 0.12 0.069 0.130 0.014 0.069 0.157 0.057 0.057 0.057 0.052 0.057 0.052 0.052 0.052	Ex-Post (2M) Heta-Nestral Heta-Nestral 0.048 0.060 0.203 -0.006 0.223 0.069 0.223 0.069 0.223 0.062 0.070 0.2217 0.049 0.052 0.054 0.055	Beta-Neutral (3M) (0.045 0.045 0.055 0.193 -0.003 0.054 0.055 0.058 0.197 0.036 0.058 0.197 0.036 0.049 0.049 0.049 0.049 0.049 0.049 0.049 0.049 0.049 0.054 0.021 0.022 0.022 0.052 0.052 0.052 0.052 0.052 0.052 0.052 0.052 0.052 0.052 0.052 0.055 0.054 0.055 0.054 0.054 0.052 0.052 0.052 0.052 0.054 0.052 0.052 0.052 0.052 0.052 0.054 0.052 0.055 0.05	Beta-Neutral (avg) 0.042 0.055 0.195 0.062 0.062 0.063 0.063 0.064 0.063 0.064 0.063 0.048 0.048 0.047 0.178 Beta-Neutral (avg) 0.066 0.208 0.066 0.208 0.066 0.208 0.066 0.208 0.062 0.208 0.209 0.0719 0.2019
Com Carry Value Momentum Blend Carry Value Momentum Blend	modity Mean MAE MAAE MAA MAA MAE MAA MAA MAA MAA MA	Dollar-Neutral 0.070 0.070 0.107 0.272 0.124 0.458 0.124 0.458 0.126 0.264 0.026 0.026 0.026 0.026 0.017 0.264 0.066 0.177 0.282 0.018 0.066 0.171 0.282 0.018 0.237 0.094 0.081 0.237 0.094 0.081 0.237 0.094 0.081 0.237 0.094 0.081 0.237 0.094 0.081 0.237 0.094 0.081 0.237 0.094 0.081 0.237 0.094 0.081 0.237 0.094 0.081 0.237 0.094 0.081 0.237 0.094 0.081 0.237 0.094 0.081 0.237 0.094 0.081 0.237 0.094 0.081 0.237 0.094 0.081 0.0	Beta-Neutral (YY) 0.0.41 0.0.81 0.0.01 0.0.01 0.010 0.029 0.135 0.065 0.132 0.065 0.132 0.065 0.132 0.065 0.132 0.065 0.132 0.065 0.132 0.065 0.132 0.042 0.123 0.142 0.027 0.132 0.043 0.071 0.0642 0.072 0.0642 0.072 0.024 0.024	Ex-Post (NY) Beta-Neutre Beta-Neutre 0.049 0.015 0.029 0.010 0.010 0.010 0.010 0.0110 0.0120 0.015 0.010 0.010 0.015 0.010 0.015 0.010 0.015 0.010 0.015 0.010 0.026 0.026 0.026 0.027 0.121 0.0045 0.0225 0.122 0.023 0.121 0.0045 0.0045 0.0045 0.0077 0.121	Bets-Neutral (3M) 0.0.48 0.0.73 0.0.93 0.003 0.013 0.013 0.013 0.013 0.013 0.013 0.013 0.011 0.081 0.081 0.081 0.093 0.016 0.073 0.023 0.023 0.125 0.022 0.125 0.020 0.021 0.022 0.125 0.020 0.021	Beta-Neutral (wmg) 0.0.48 0.0.14 0.0.97 0.009 0.009 0.010 0.010 0.010 0.010 0.010 0.010 0.010 0.010 0.010 0.010 0.010 0.010 0.010 0.010 0.011 0.023 0.122 0.024 0.031 0.031 0.031 0.031 0.031 0.031 0.031 0.031 0.047 0.057 0.056	Dollar-Neutral 0.082 0.332 0.323 0.244 0.453 0.123 0.342 0.324 0.324 0.324 0.330 0.330 0.330 0.330 0.330 0.330 0.330 0.342 0.330 0.342 0.330 0.342 0.3200 0.3200 0.320000000000	Bets-Neutral (YY) 0.043 0.037 0.043 0.355 -0.014 0.052 0.86 0.049 0.049 0.049 0.181 0.067 0.032 0.142 0.033 0.042 0.142 0.033 0.041 0.067 0.062 0.033 0.041 0.062 0.077 0.0044 0.0046	Ex-Post (6M) Heta-Neutrie (6M) 0.053 0.032 0.163 0.038 0.158 0.025 0.037 0.158 0.025 0.037 0.158 0.025 0.037 0.164 0.021 0.021 0.038 0.025 0.038 0.025 0.038 0.025 0.038 0.025 0.038 0.025 0.038 0.025 0.038 0.025 0.038 0.025 0.038 0.025 0.037 0.038 0.046 0.021 0.038 0.025 0.038 0.025 0.037 0.038 0.046 0.021 0.038 0.025 0.038 0.025 0.037 0.038 0.046 0.021 0.046 0.021 0.046 0.025 0.038 0.025 0.025 0.038 0.025 0.038 0.025 0.038 0.025 0.025 0.038 0.025 0.037 0.035 0.037 0.035 0.037 0.035 0.037 0.035 0.037 0.035 0.037 0.035 0.037 0.035 0.037 0.035 0.037 0.035 0.035 0.037 0.055 0.037 0.055 0.037 0.055 0.0	Bets-Neutral (3M) 0.050 0.027 0.134 -0.004 0.025 0.120 0.025 0.025 0.025 0.026 0.120 0.025 0.120 0.025 0.126 0.027 0.18 Beta-Neutral (3M) 0.024 0.032 0.132 0.145 0.034 0.147 -0.038 0.024 0.024 0.024 0.024 0.034 0.041 0.024 0.024 0.024	Bets-Neutral (swg) O.050 0.050 0.030 0.050 0.030 0.140 0.034 0.032 0.032 0.034 0.032 0.032 0.147 0.054 0.024 0.021 0.021 0.021 0.021 0.040 0.160 0.036 0.153 -0.048 0.049 0.075 0.036 0.075 0.034	Dollar-Neutral 0.081 0.154 0.333 -0.121 0.252 0.420 0.124 0.334 0.334 0.334 0.032 0.334 0.032 0.334 0.032 0.333 0.351 0.353 0.351 0.357 0.377 -0.092 0.147 0.0251 0.377	Beta-Neutral (YY) 0.036 0.060 0.203 0.060 0.203 0.080 0.080 0.077 0.059 0.059 0.059 0.059 0.059 0.059 0.059 0.059 0.059 0.059 0.059 0.059 0.059 0.059 0.059 0.059 0.059 0.044 0.042 0.044 0.069 0.044 0.069 0.212 0.055 0.233 0.044 0.055 0.233 0.044 0.055 0.044 0.055 0.044 0.055 0.044 0.055 0.044 0.055 0.044 0.054 0.054 0.054 0.055 0.059 0.054 0.059 0.054 0.054 0.054 0.054 0.054 0.054 0.054 0.054 0.054 0.054 0.054 0.054 0.054 0.054 0.054 0.054 0.054 0.054 0.054 0.057 0.054 0.054 0.054 0.054 0.057 0.054 0.054 0.057 0.057 0.054 0.054 0.054 0.057 0.057 0.054 0.054 0.057 0.057 0.054 0.0570000000000	Ex-Part (M) Parts-Neutral (6M) 0.048 0.060 0.203 -0.006 0.203 0.069 0.133 0.062 0.132 0.070 0.442 0.052 0.150 0.052 0.150 0.052 0.150 0.051 0.052 0.150 0.052 0.052 0.150 0.052 0.	Beta-Neutral (3M) 0.045 0.055 0.939 -0.003 0.055 0.993 -0.003 0.054 0.990 0.054 0.990 0.054 0.091 0.058 0.977 0.036 0.049 0.049 0.041 0.042 0.052 0.052 0.052 0.052 0.052 0.052 0.052 0.052 0.052 0.052 0.066 0.210 0.069 0.17 0.059 0.201	Beta-Neutral (wg) (wg) 0.045 0.045 0.055 0.062 0.062 0.062 0.062 0.062 0.063 0.028 0.028 0.049 0.024 0.049 0.049 0.049 0.066 0.066 0.208 0.050 0.066 0.020 0.073 0.050 0.073 0.070 0.066 0.070 0.071 0.070 0.063
Corry Value Momentum Blend Carry Value Momentum Blend	nodity Mean MAE MAA MAA MAA MAE MAA MAA MAA MAA MAA	Dollar Neutral 0.070 0.307 0.277 0.214 0.278 0.324 0.458 0.458 0.458 0.478 0.026 0.094 0.267 0.094 0.017 0.228 0.016 0.013 0.323 0.067 0.021 0.2	Beta-Neutral (YY) 0.0.41 0.101 0.0.01 0.0.01 0.029 0.335 0.066 0.028 0.335 0.065 0.079 0.339 0.065 0.079 0.333 0.142 0.043 0.175	Ex-Pact (NY) Beta-Neutre (eM) 0.049 0.015 0.097 -0.005 0.019 0.010 0.010 0.0110 0.020 0.015 0.020 0.015 0.020 0.015 0.020 0.015 0.020 0.012 0.023 0.023 0.023 0.023 0.023 0.023 0.023 0.023 0.024	Bets-Neutral (3M) 0.0.48 0.0.73 0.0.93 0.003 0.003 0.001 0.083 0.003 0.011 0.083 0.003 0.011 0.083 0.003 0.011 0.083 0.003 0.016 0.038 0.0175 0.013 0.013 0.023 0.122 0.023 0.122 0.020 0.021	Bets-Neutral (arg) 0.0.48 0.014 0.097 0.009 0.013 0.015 0.030 0.055 0.075 0.0684 0.050 0.015 0.064 0.023 0.015 0.024 0.015 0.023 0.024 0.130 0.024 0.031 0.404 0.007 0.0162	Dollar-Neutral 0.082 0.332 0.312 0.224 0.453 0.122 0.123 0.224 0.453 0.122 0.326 0.326 0.326 0.326 0.336 0.336 0.336 0.336 0.336 0.336 0.338 0.336 0.338 0.336 0.338 0.339 0.339 0.338 0.338 0.338 0.339 0.338 0.339 0.3380 0.3380 0.3380 0.3380000000000	Bets-Neutral (Y) (N) 0.043 0.037 0.055 0.052 0.055 0.052 0.064 0.055 0.065 0.066 0.067 0.032 0.135 0.032 0.132 0.132 0.133 0.057 0.064 -0.057 0.062 0.207 0.0046 0.072	Ex-Past (6M) Beta-Neutre (6M) 0.053 0.132 0.145 0.032 0.138 0.158 0.025 0.037 0.158 0.025 0.037 0.158 0.025 0.037 0.158 0.025 0.134 0.026 0.134 0.021 0.031 0.043 0.160 0.031 0.043 0.160 0.031 0.043 0.160	Bets-Neutral (3M) 0.050 0.027 0.134 -0.004 0.025 0.120 0.025 0.120 0.025 0.120 0.025 0.126 0.042 0.021 0.18 Bets-Neutral (3M) 0.044 0.034 0.044 0.034 0.447 0.034 0.447 0.034 0.464 0.034 0.147 0.034 0.462 0.034 0.477	Bets-Neutral (swg) Openation 0.050 0.330 0.140 0.051 0.330 0.340 0.332 0.332 0.140 0.054 0.054 0.023 0.125 0.332 0.41 0.034 0.025 0.031 0.031 0.036 0.035 0.036 0.036 0.153 0.049 0.177 0.005 0.034 0.149 0.149	Dollar-Neutral 0.081 0.154 0.333 -0.121 0.252 0.451 0.120 0.172 0.334 0.148 0.334 0.148 0.334 0.151 0.333 0.151 0.353 0.155 0.355 0.447 0.351 0.447 0.351 0.451 0.455 0.457 0.	Beta-Neutral (YY) 0.036 0.036 0.036 0.036 0.037 0.012 0.030 0.030 0.203 0.050 0.322 0.050 0.050 0.057 0.059 0.054 0.054 0.054 0.054 0.054 0.060 0.190 0.054 0.069 0.12 0.069 0.12 0.054 0.069 0.121 0.052 0.052 0.239 0.052 0.052 0.052 0.239 0.052 0.239 0.052 0.239	Ex-Port (M) Het-Neutral (6M) 0.048 0.060 0.203 -0.006 0.223 0.069 0.223 0.069 0.223 0.062 0.070 0.227 0.049 0.052 0.052 0.052 0.052 0.055 0.057 0.052 0.052 0.057 0.052 0.052 0.057 0.052 0.057 0.052 0.057 0.071 0.071 0.071 0.057 0.071 0.072 0.057 0.072 0.057 0.075 0.071 0.057 0.071 0.057 0.057 0.057 0.057 0.071 0.057 0.05	Beta-Neutral (3M) (0.045 0.045 0.055 0.193 0.054 0.055 0.054 0.054 0.058 0.197 0.036 0.058 0.197 0.036 0.049 0.381 0.049 0.049 0.049 0.038 0.049 0.038 0.020 0.055 0.020 0.055 0.020 0.055 0.020 0.055 0.020 0.055 0.020 0.055 0.020 0.055 0.020 0.055 0.020 0.055 0.020 0.055 0.020 0.055 0.020 0.055 0.020 0.055 0.025 0.055 0.025 0.055 0.025 0.055 0.025 0.055 0.025 0.055 0.025 0.055 0.025 0.055 0.025 0.055 0.025 0.052 0.050	Beta-Neutral (swg) O.045 0.045 0.055 0.195 0.062 0.062 0.063 0.028 0.063 0.048 0.047 0.047 0.178 Beta-Neutral (swg) 0.066 0.208 0.0666 0.208 0.0666 0.208 0.0666 0.208 0.0666 0.208 0.0666 0.208 0.0666 0.0066 0.073 0.0663 0.0663 0.0793 0.208 0.0603 0.208 0.0603 0.204

Source: Research Affiliates, based on data from Barchart and Bloomberg through March 31, 2024.





Appendix D



Building FX Strategies Equity Beta-Neutral

References

Aghassi, Michele, Cliff Asness, Oktay Kurbanov, Lars N. Nielsen. 2011. "<u>Avoiding Unintended Country Bets in Global Equity</u> <u>Portfolios.</u>" Equity Valuation and Portfolio Management, edited by Frank J. Fabozzi and Harry M. Markowitz. Wiley.

Asness, Clifford S., Tobias J. Moskowitz, and Lasse Jeje Pedersen. 2013. "Value and Momentum Everywhere." The Journal of Finance 68 (3): 929-985.

Brightman, Chris. A, and Shane Shepherd. 2016. "Systematic Global Macro." Research Affiliates.

Erb, C. B., and C.R. Harvey. 2006. "The Strategic and Tactical Value of Commodity Futures." Financial Analysts Journal 62 (2): 69-97.

Feng, Guanghao, Stefano Giglio, and Cacheng Xiu. 2020. "<u>Taming the Factor Zoo. A Test of New Factors.</u>" *The Journal of Finance* 75 (3): 1327-1370.

Frazzini, Pedersen. 2014. "Betting against beta." Journal of Financial Economics 111 (1): 1-25.

Hsu, Jason, and Vitali Kalesnik. 2014. "Finding Smart Beta in the Factor Zoo." Research Affiliates.

Jegadeesh, Narasimhan, and Sheridan Titman. 1993. "<u>Returns to Buying Winners and Selling Losers: Implications for Stock Market</u> <u>Efficiency.</u>" The Journal of Finance 48 (1): 65–91.



Ko, Amie, Brandon Kunz, and Shane Shepherd. 2018. "Alternative Risk Premia: Valuable Benefits for Traditional Portfolios." Research Affiliates.

Koijen, Ralph S.J., Tobias J. Moskowitz, Lasse Heje Pedersen, Evert B. Vrugt. 2018. "Carry." Journal of Financial Economics 127 (2): 197-225.

Kroencke, Tim A., Felix Schindler, Andreas Schrimpf. 2014. "International Diversification Benefits with Foreign Exchange Investment Styles." Review of Finance 18 (5): 1847–1883.

Kunz, Brandon, and Michele Mazzoleni. 2018. "When Value Goes Global." Research Affiliates.

Maeso, Jean-Michel, Lionel Martellini, Riccardo Rebonato. 2019. "Factor Investing in Fixed-Income - Cross-Sectional and Time-Series Momentum in Sovereign Bond Markets." EDHEC-RISK Climate Impact Institute.

Papageorgiou, Nicolas, and Xuan Xie. 2016. "Betas and the Myth of Market Neutrality." International Journal of Forecasting 32 (2): 548-558.



The material contained in this document is for informational purposes only. It is not intended as an offer or a solicitation for the purchase and/or sale of any security, derivative, commodity, or financial instrument, nor is it advice or a recommendation to enter into any transaction. Research results relate only to a hypothetical model of past performance (i.e., a simulation) and not to actual results or historical data of any asset management product. Hypothetical investor accounts depicted are not representative of actual client accounts. No allowance has been made for trading costs or management fees, which would reduce investment performance. Actual investment results will differ. Simulated data may have under- or over- compensated for the impact, if any, of certain market factors. Simulated returns may not reflect the impact that material economic and market factors might have had on the advisor's decision-making if the advisor were actually managing clients' money. Simulated data is subject to the fact that it is designed with the benefit of hindsight. Simulated returns carry the risk that actual performance is not as depicted due to inaccurate predictive modeling. Simulated returns cannot predict how an investment. Index returns represent back tested performance based on rules used in the creation of the index, are not a guarantee of future performance, and are not indicative of any specific investment. Index seare not managed investment products and cannot be invested in directly. This material is based on information that is considered to be reliable, but Research Affiliates, LLC ("RA") and its related entities (collectively "Research Affiliates") make this information available on an "as is" basis without a duty to update, make warranties, express or implied, regarding the accuracy of the information contained herein. Research Affiliates is not responsible for any errors or omissions or for results obtained from the use of this information.

Nothing contained in this material is intended to constitute legal, tax, securities, financial or investment advice, nor an opinion regarding the appropriateness of any investment. The information contained in this material should not be acted upon without obtaining advice from a registered professional. RA is an investment adviser registered under the Investment Advisers Act of 1940 with the U.S. Securities and Exchange Commission (SEC). Our registration as an investment adviser does not imply a certain level of skill or training. RA is not a broker-dealer and does not effect transactions in securities.

Investors should be aware of the risks associated with data sources and quantitative processes used to create the content contained herein or the investment management process. Errors may exist in data acquired from third party vendors, the construction or coding of indices or model portfolios, and the construction of the spreadsheets, results or information provided. Research Affiliates takes reasonable steps to eliminate or mitigate errors and to identify data and process errors, so as to minimize the potential impact of such errors; however, Research Affiliates cannot guarantee that such errors will not occur. Use of this material is conditioned upon, and evidence of, the user's full release of Research Affiliates from any liability or responsibility for any damages that may result from any errors herein.

The trademarks Fundamental Index[™], RAFI[™], Research Affiliates Equity[™], RAE[™], and the Research Affiliates[™] trademark and corporate name and all related logos are the exclusive intellectual property of RA and in some cases are registered trademarks in the U.S. and other countries. Various features of the Fundamental Index methodology, including an accounting data-based non-capitalization data processing system and method for creating and weighting an index of securities, are protected by various patents of RA. (See applicable US Patents, Patent Publications and protected trademarks located at https://www.researchaffiliates.com/legal/disclosures#patent-trademarks-and-copyrights, which are fully incorporated herein.) Any use of these trademarks, logos, or patented methodologies without the prior written permission of RA is expressly prohibited. RA reserves the right to take any and all necessary action to preserve all of its rights, title, and interest in and to these marks and patents.

The views and opinions expressed are those of the author and not necessarily those of RA. The opinions are subject to change without notice.

©2024 Research Affiliates, LLC. All rights reserved. Duplication or dissemination prohibited without prior written permission.

AMERICAS

Research Affilates, LLC 660 Newport Center Drive, Suite 300 Newport Beach, California 92660 USA

+1.949.325.8700 info@researchaffiliates.com

EUROPE

Research Affiliates Global Advisors (Europe) Ltd 78-79 Pall Mall London SW1Y 5ES United Kingdom

+44 (0) 20 3929 9882 uk@researchaffiliates.com

18 of 18