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TRIVARIATE RESEARCH

HOW TO IMPROVE YOUR RISK MANAGEMENT

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RESEARCH SUMMARY

Risk management is critical for the success of any investor - especially with regards to their high conviction positions, which often carry disparate and opaque risks. Today's research shows how to best to hedge / replicate the returns of such positions with the goal of being exposed to only the company's idiosyncratic risk, thereby avoiding unwanted exposures that are not part of the high conviction thesis.

For single stock hedges, investors often use rudimentary approaches or blunt instruments, including ETFs and single-stock pairs. These approaches may increase volatility or add unwanted exposures because they were developed unintentionally with spurious correlations.

We have refined our approach to hedging after years spent both on the buyside (including running our own fund) and advising investors while on the sell-side. In today's research we offer:

- Our "how to" approach to building hedge baskets, illustrating how a combination of quantitative and fundamental knowledge are required to optimize the process
- Six case studies of high conviction names today, which pose unique challenges and have varying conclusions about the underlying risk and hedge potential
- Our "how to" approach for monitoring these existing baskets

Please reach out to us to create and trade any hedge / diversification basket for your portfolio.

HOW TO HEDGE / REPLICATE AND IMPROVE YOUR RISK MANAGEMENT

To illustrate how we would build baskets, we analyzed the high conviction holdings of a proprietary group of fundamental long / short funds we track. Our universe is a group of 60 managers who manage between $1 and $10 billion in assets and typically do deep fundamental research. We define high-conviction as 3% or more of their long assets under management in a name. Since we have written in the past about the risks and ownership of FAANGM (Facebook, Apple, Amazon, Netflix, Google, and Microsoft) we took the most frequently owned high conviction stocks outside of this group.

High conviction hedge fund holdings today, including **United Healthcare (UNH), T-Mobile (TMUS), Brunswick Corporation (BC), PG&E (PCG), Expedia (EXPE), and Palo Alto Networks (PANW).**

Each specific stock hedge requires some nuance, and this list of stocks with different underlying attributes shows why a disciplined checklist combined with judgment is the best way to implement risk management.

Long-only investors, or those who do not own these specific names can still benefit from these examples, as diversifying a large long position, or translating our approach to a different holding is not difficult once you read today's work.

TRIVARIATE'S HEDGING BASKET CHECKLIST

We assessed several variables when creating an initial list of names for a hedge basket. Considerations include:

1. **Size:** If a stock is mega or large cap (top 350) by market cap, we would only look for hedges that are mega, large or mid-cap, not small or micro. If a stock is mid-cap, we would look for anything that is not micro-cap. We consider size not just for liquidity reasons, but rather, to find candidate stocks that are more likely to trade in tandem with the high conviction position we are attempting to hedge. Our prior work has show mega / large caps trade materially differently than small / micro-cap stocks, so size matters.
2. **Liquidity:** In practice, this is an incredibly important variable. Obviously, it starts with what the manager is hoping to accomplish. If they have a large long position and are looking for diversification, the questions include: how many names would you own for risk not alpha? How big do you want the replication / diversification basket to be? How much total capital do you want to deploy in this basket? What is the maximum individual position size in the basket, etc.? For a hedge basket, being short stocks to reduce the net exposure but isolate the alpha of a large long position brings about other considerations, and poor liquidity is a risk on the short side. In constructing our baskets today, we eliminated all stocks that trade less than $100 million per day (lowering this will add potential hedge names).
3. **Style:** We have a proprietary style model that tags stocks in tertiles - 1/3 growth, 1/3 in the middle ground we call neither, and 1/3 value. For stocks that we are analyzing that are growth, we eliminate value from the candidate list, and vice-versa. For "neither" stocks, we do not eliminate any stocks based on style.

TRIVARIATE'S HEDGING BASKET CHECKLIST

4. Substance: We have a proprietary substance model that tags stocks in quartiles – ¼ high, ¼ moderate, ¼ low quality, or ¼ junk. We have consistently found that junk stocks trade differently than other stocks during risk-on or risk-off regimes and avoiding hedging junk stocks with high quality, or high quality with junk stocks is prudent.

5. Industry: It is critical to remove stocks in any industries where relationships are likely to be spurious rather than meaningful. For instance, hedging a software company with an insurance company might not pass the smell test even if two stocks happen trade in tandem recently.

6. Beta: We use the median of four different beta horizons to compute each company's beta. In practice, if a stock has a beta of 1.25, it may be prudent only include stocks with betas in a range of 1.05 to 1.45. For instance, we remove stocks with betas below 1 for stocks with betas above 1.2, and those above 1 with stocks with betas of 0.8.

7. Momentum: It is challenging to know what period to evaluate correlations between securities as shorter-term spurious relationships can mask longer-term trends. We avoid stocks that have been acting completely different recently than the longer-term correlations might otherwise indicate. Hence, we evaluate 63-day price momentum and only retain stocks where recent performance does not wildly deviate from the high conviction stocks we are hedging. For example, if a stock is down 10% in the previous quarter, we might only retain stocks that are down as stocks that are up during that same regime are behaving differently.

TRIVARIATE'S HEDGING BASKET CHECKLIST

8. Valuation: We think it is important to assess the price-to-forward earnings (and potentially other metrics like price-to-sales, price-to-tangible book for financials, etc.) as a proxy for a similar-type of business. While far from thorough, our logic is that if a stock currently trades at 14x forward earnings, it probably is not reasonable to keep potential hedge stocks that lose money, or trade above 35x earnings.

9. Profitability: Consider the profit margins of a business when creating a hedge. This may already be taken care of in the valuation screening (higher multiples are typically associated with higher margins), but if there are a lot of names to choose from, we would avoid taking higher margin names to proxy lower margin ones.

10. Short interest and low price: We generally think stocks that have very high short interest are riskier hedges, even if over the very long-term they underperform. Therefore, we remove all names with above 10% short interest from our potential basket of consideration. In risk on regimes, we also think shorting stocks that trade below $10 a share can be incrementally risky. In risk-off regimes like we have seen this year, the basket may protect less with this overlay.

11. Company-specific risk: We have a proprietary seven-factor model to see how much of any stock's returns we can explain from macro factors. While we do not think stocks with incredibly high company-specific risk (i.e. above 70% in today's environment) are good candidates for replication / hedging, we also do not like to use stocks where macro explains nearly all the returns. Hence, we typically look for stocks in the 35%-70% range as candidate hedges. Macro explaining near the average amount of a stock's returns is more reasonable than a huge deviation from average in our judgment.

CASE STUDIES

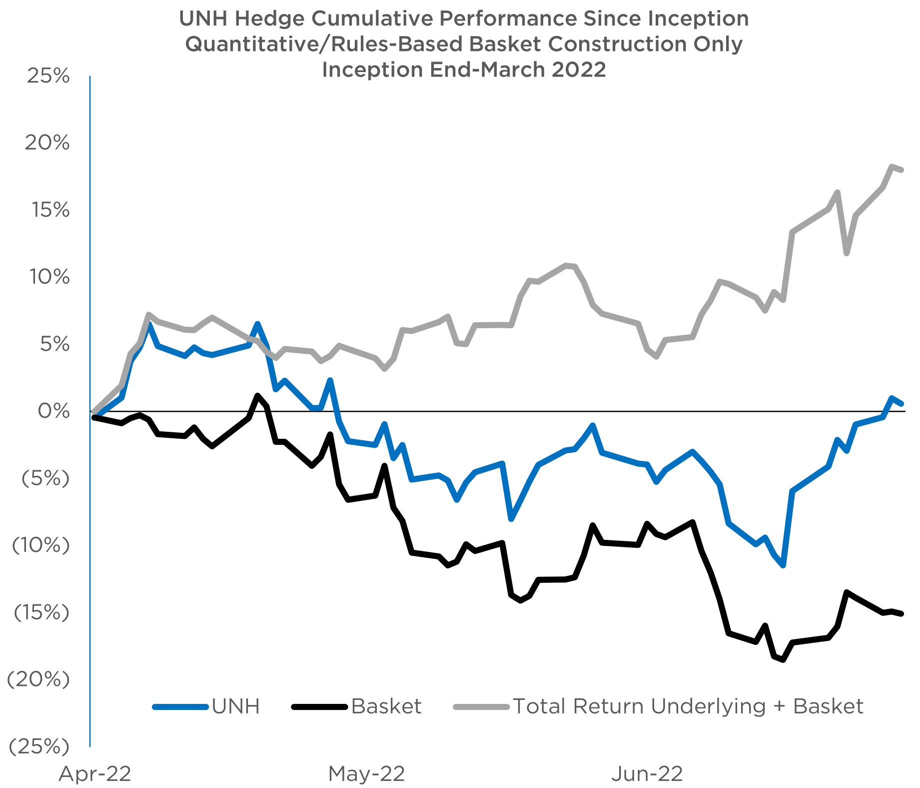
Our universe of hedge funds we follow is a group of 60 managers who manage between $1 and $10 billion in assets and typically due deep fundamental research. We define high-conviction as 3% or more of their long assets under management in a name. Since we have written in the past about the risks and ownership of FAANGM (Facebook, Apple, Amazon, Netflix, Google, and Microsoft) we took the most frequently owned high conviction stocks outside of this group.

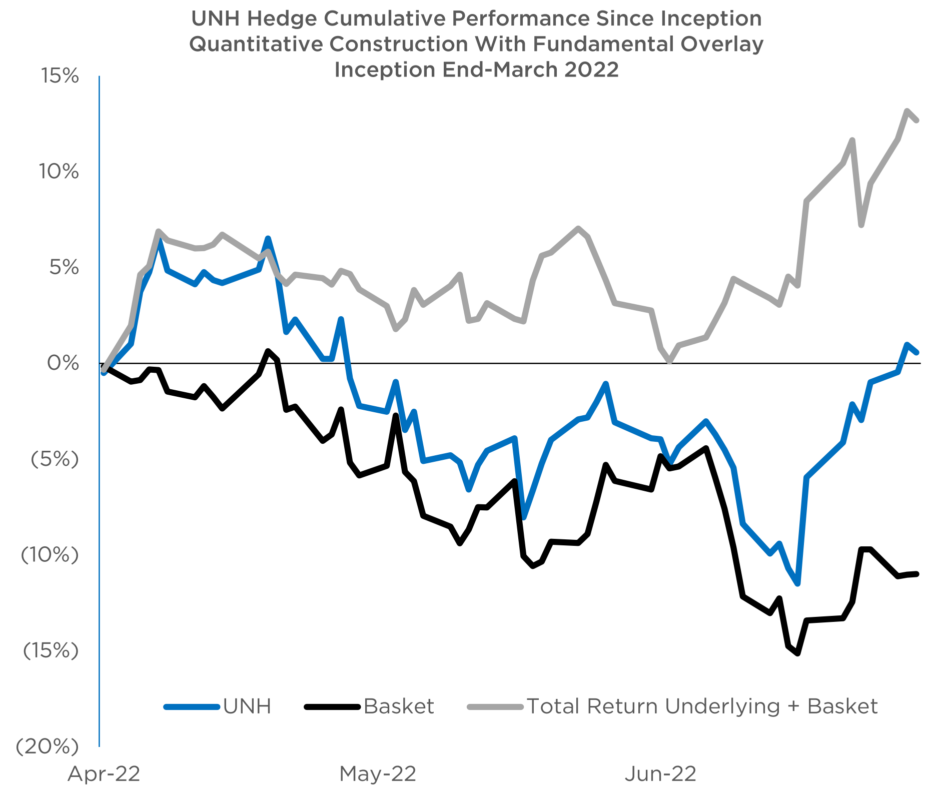
These include:

1. **United Healthcare (UNH)**
2. **T-Mobile (TMUS)**
3. **Brunswick Corporation (BC)**
4. **PG&E (PCG)**
5. **Expedia (EXPE)**
6. **Palo Alto Networks (PANW)**

UNH: HIGH QUALITY MEGA CAP BUT SOMEWHAT REPLICABLE

First, we looked a hedging the well-owned United Healthcare (UNH). We show the performance of UNH (blue) vs. a purely quantitative basket (black) with the difference being the gray line (left chart). We show the same but with a basket formed from a combination of rules and judgment, eliminating names we judge to be spuriously correlated (right). In both cases the baskets were formed at the end of March 2022 and followed through the end of June. Here the quantitative approach would have worked better in creating a long-short spread then the combined quant plus judgment during this period. It appears that the hedge basket would have been very effective during Q2.





UNH HEDGE BASKET

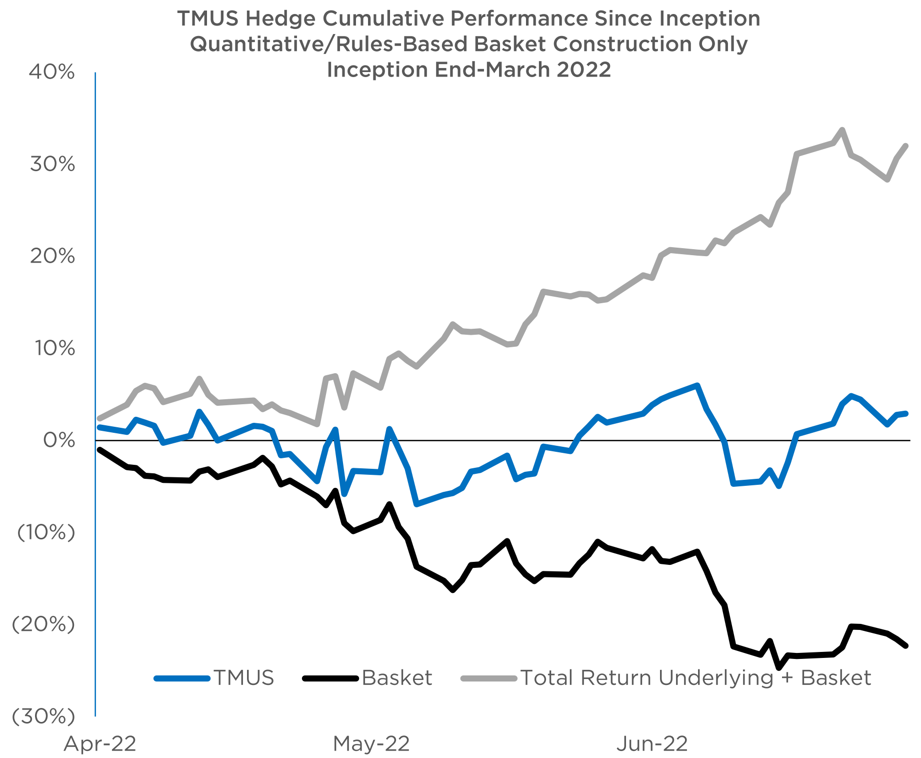
At the end of Q1 2022, UNH was a mega cap, growth stock in the highest quartile of our quality model known as “high quality”, with a beta of 0.7. By the end of Q2, it remained mega cap ($480b), and high quality, but had moved to the middle tertile “neither” on style. We try not to replicate growth stocks with value ones, but the transition from growth to neither in Q2 opens up more potential basket candidates. Following our rules and judgment, we created a hedge basket. Because of its relatively low beta, only 13 of 87 potential initial candidates are in the healthcare sector, with far more in utilities and industrials, and several REITs.

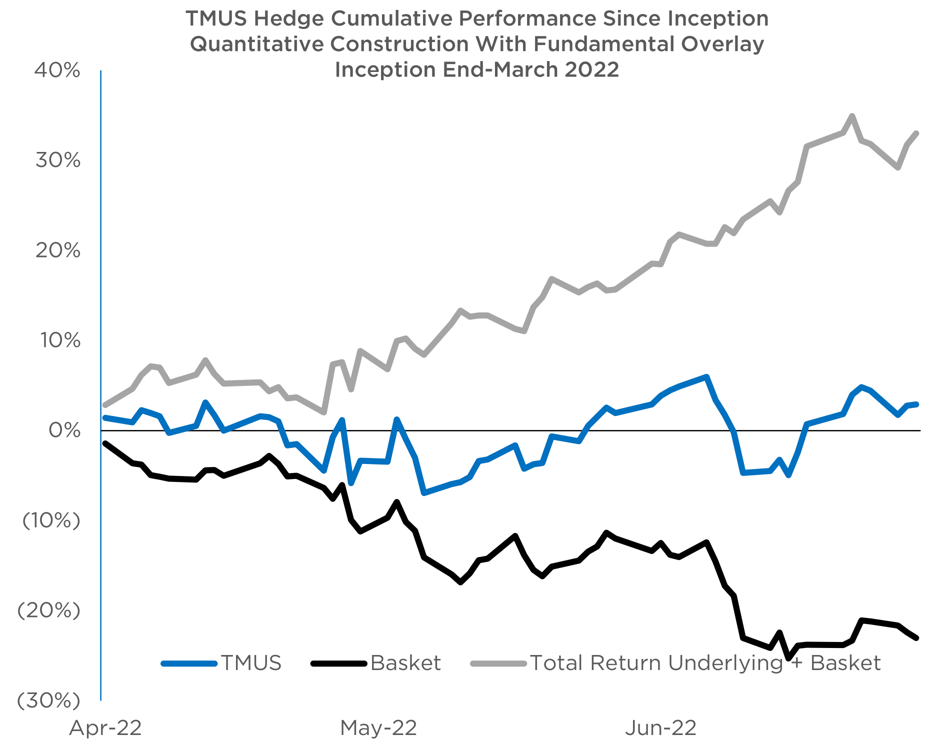
UNH Hedge Basket
Top 20 Stocks in Basket By 1y Corr. To UNH
July 12, 2022

Ticker	Company	Sector	Market Cap ($B)
KO	The Coca-Cola Company	Consumer Staples	271.68
PEP	PepsiCo, Inc.	Consumer Staples	234.16
ABT	Abbott Laboratories	Health Care	189.63
UPS	United Parcel Service, Inc.	Industrials	156.73
UNP	Union Pacific Corporation	Industrials	129.69
ELV	Elevance Health Inc.	Health Care	115.23
PLD	Prologis, Inc.	Real Estate	89.52
D	Dominion Energy, Inc.	Utilities	64.36
HUM	Humana Inc.	Health Care	61.12
PSA	Public Storage	Real Estate	53.95
NSC	Norfolk Southern Corporation	Industrials	53.00
EXC	Exelon Corporation	Utilities	43.35
O	Realty Income Corporation	Real Estate	41.73
RSG	Republic Services, Inc.	Industrials	40.56
WCN	Waste Connections, Inc.	Industrials	31.48
CHD	Church & Dwight Co., Inc.	Consumer Staples	22.99
AEE	Ameren Corporation	Utilities	22.60
EXR	Extra Space Storage Inc.	Real Estate	22.42
LSI	Life Storage, Inc.	Real Estate	9.39
CHE	Chemed Corporation	Health Care	7.50

TMUS: VERY IDIOSYNCRATIC AND EXPENSIVE FOR A MEGA CAP

T-Mobile (TMUS) turns out to be a very tough stock to hedge or replicate. It is one of the most expensive and idiosyncratic mega cap stocks. Our quantitative and judgment basket combined (right chart) did slightly better than the pure quant basket (left chart), though neither effectively replicated the performance of T-Mobile during Q2 of 2022. Given this position is tough to diversify against with other longs and tough to hedge with shorts, it is riskier. For those who have high conviction, we would argue that **the risk of this name is materially higher than its beta**, which is currently 0.84. If the stocks outperforms, **it is a source of differentiated alpha.**





TMUS IS BOTH TOP 10 EXPENSIVE AND IDIOSYNCRATIC IN $100B CLUB

TMUS is among the most expensive stocks of the 64 stocks that are currently greater than $100b market cap (left), with only AMZN, TSLA, and AMT more expensive on price-to-forward earnings (left). Furthermore, our seven-factor macro model explains less of its returns than most mega-cap stocks as well, making among the top ten most idiosyncratic stocks as well (right).

Most Expensive Stocks on 1y Price-to-Forward-Earnings
That Are Greater than $100 Billion Market Cap
July 12, 2022

Ticker	Company	Sector	Market Cap ($B)	1y Price-to-Forward-Earnings
AMZN	Amazon.com, Inc.	Consumer Discretionary	1111.25	120.6x
TSLA	Tesla, Inc.	Consumer Discretionary	724.65	58.4x
AMT	American Tower Corporation	Real Estate	118.94	56.8x
TMUS	T-Mobile US, Inc.	Communication Services	168.53	54.1x
LLY	Eli Lilly and Company	Health Care	291.28	38.9x
CRM	Salesforce, Inc.	Information Technology	165.50	35.0x
COST	Costco Wholesale Corporation	Consumer Staples	217.34	33.9x
MA	Mastercard Incorporated	Information Technology	314.03	30.3x
INTU	Intuit Inc.	Information Technology	108.85	28.0x
NEE	NextEra Energy, Inc.	Utilities	157.06	27.9x

Most Idiosyncratic Stocks
As Gauged by Trivariate's Proprietary Model
That Are Greater than $100 Billion Market Cap
July 12, 2022

Ticker	Company	Sector	Trivariate Proprietary Idiosyncratic Risk Score
LMT	Lockheed Martin Corporation	Industrials	82.1%
PFE	Pfizer Inc.	Health Care	81.1%
MRK	Merck & Co., Inc.	Health Care	80.7%
WMT	Walmart Inc.	Consumer Staples	77.8%
PM	Philip Morris International Inc.	Consumer Staples	76.2%
BMY	Bristol-Myers Squibb Company	Health Care	72.0%
ABBV	AbbVie Inc.	Health Care	70.5%
VZ	Verizon Communications Inc.	Communication Services	70.2%
AMGN	Amgen Inc.	Health Care	68.2%
TMUS	T-Mobile US, Inc.	Communication Services	67.2%

TMUS HEDGE BASKET

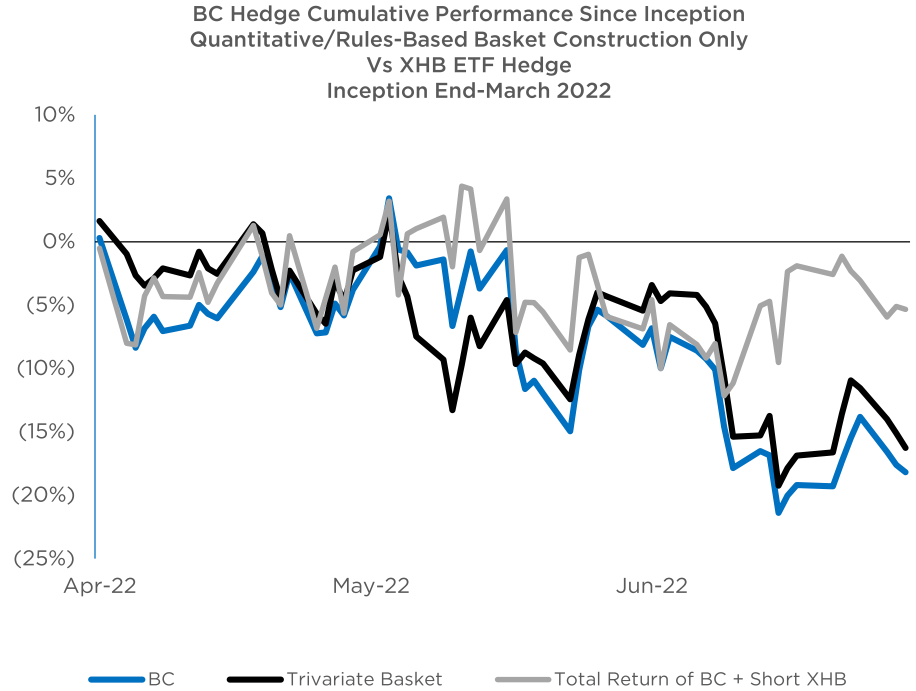
It is very difficult to find a group of stocks with a relatively high correlation to TMUS . With no dividend, high valuation, low beta, and high company-specific risk, there are only a few stocks that possess those attributes. In fact, the only names (removing the market cap. parameter) with higher than 0.5 correlation to TMUS in the last year are stocks below.

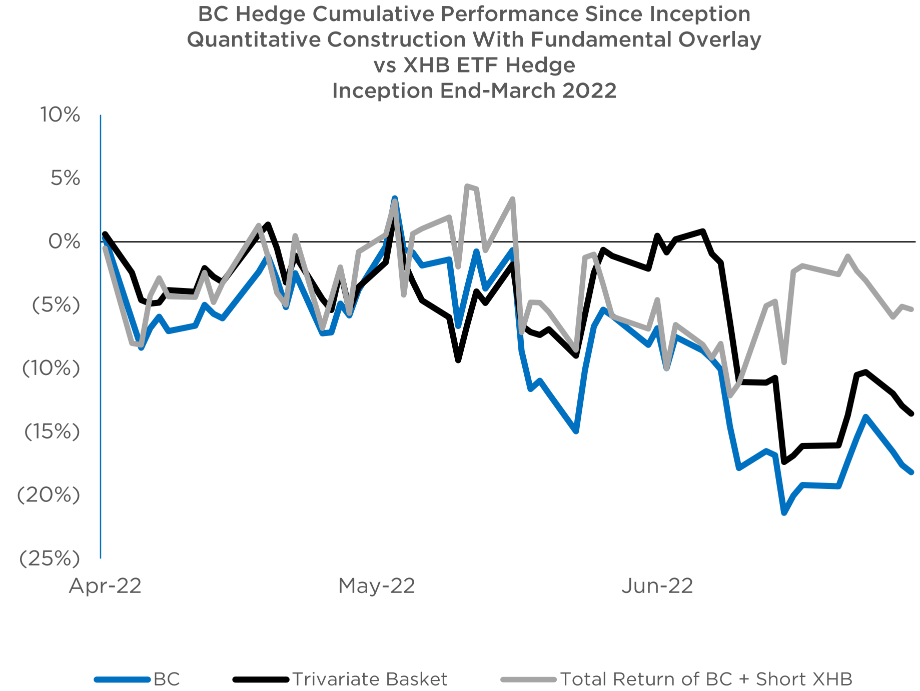
TMUS Hedge Basket
Top 20 Stocks in Basket By 1y Corr. To TMUS
July 12, 2022

Ticker	Company	Sector	Market Cap ($B)
T	AT&T Inc.	Communication Services	147.47
RTX	Raytheon Technologies Corporation	Industrials	140.15
AMGN	Amgen Inc.	Health Care	131.93
CI	Cigna Corporation	Health Care	88.63
D	Dominion Energy, Inc.	Utilities	64.36
CTVA	Corteva, Inc.	Materials	38.04
BIIB	Biogen Inc.	Health Care	31.57
DTE	DTE Energy Company	Utilities	24.26
CNP	CenterPoint Energy, Inc.	Utilities	18.53
ATO	Atmos Energy Corporation	Utilities	15.55
LNT	Alliant Energy Corporation	Utilities	14.50
GLPI	Gaming and Leisure Properties, Inc.	Real Estate	12.18
NI	NiSource Inc.	Utilities	11.64
DOX	Amdocs Limited	Information Technology	10.10
BKH	Black Hills Corporation	Utilities	4.62
HE	Hawaiian Electric Industries, Inc.	Utilities	4.40
NJR	New Jersey Resources Corporation	Utilities	4.18
PSN	Parsons Corporation	Industrials	4.18
NWE	NorthWestern Corporation	Utilities	3.11
OFC	Corporate Office Properties Trust	Real Estate	2.91

BC: EASY TO REPLICATE AND HARD TO SEE THE ALPHA POTENTIAL

Brunswick Corporation (BC) is a mid-cap (5.3b), low quality, neither growth nor value, boat supplier. It has a beta of 1.26, and its company-specific risk is less than 50%, meaning it is a predominantly macro call to be such a high conviction idea from bottom-up stock pickers. It appears that investors think they will be successful with their recent acquisitions or that a deal or major change in capital use is imminent. The returns can be replicated quite easily (look how close the blue and black lines are in both baskets). **We would not own a high conviction position in this name. It is risk that is not worth taking in our view unless the business model materially changes.**





BC HEDGE BASKET

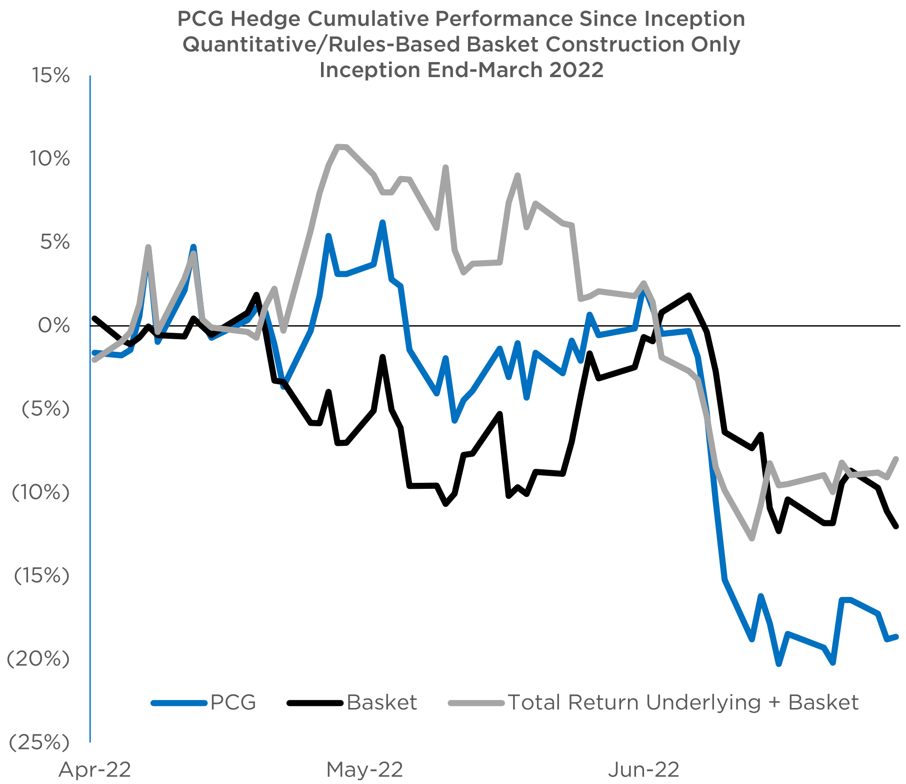
We found it relatively easy to replicate Brunswick's returns, and hence build a hedge or diversification basket. Many of the stocks in the basket were homebuilders or other discretionary items like Polaris.

BC Hedge Basket
Top 20 Stocks in Basket By 1y Corr. To BC
July 12, 2022

Ticker	Company	Sector	Market Cap ($B)
DHI	D.R. Horton, Inc.	Consumer Discretionary	26.19
LEN	Lennar Corporation	Consumer Discretionary	22.26
PHM	PulteGroup, Inc.	Consumer Discretionary	10.47
BURL	Burlington Stores, Inc.	Consumer Discretionary	9.64
JLL	Jones Lang LaSalle Incorporated	Real Estate	8.68
MHK	Mohawk Industries, Inc.	Consumer Discretionary	8.10
LAD	Lithia Motors, Inc.	Consumer Discretionary	8.04
WMS	Advanced Drainage Systems, Inc.	Industrials	7.94
MAT	Mattel, Inc.	Consumer Discretionary	7.82
PII	Polaris Inc.	Consumer Discretionary	6.54
BC	Brunswick Corporation	Consumer Discretionary	5.36
GXO	GXO Logistics, Inc.	Industrials	4.75
LPX	Louisiana-Pacific Corporation	Materials	4.71
CWK	Cushman & Wakefield plc	Real Estate	3.43
HAYW	Hayward Holdings, Inc.	Industrials	3.16
TMHC	Taylor Morrison Home Corporation	Consumer Discretionary	3.13
MTH	Meritage Homes Corporation	Consumer Discretionary	3.00
KBH	KB Home	Consumer Discretionary	2.65
MDC	M.D.C. Holdings, Inc.	Consumer Discretionary	2.52
THRM	Gentherm Incorporated	Consumer Discretionary	2.03

PCG: ILLOGICAL TO CONCLUDE THERE ARE REASONABLE HEDGES?

PG&E Corp (PCG) is highly idiosyncratic (70.7%) and cheap (9x forward earnings). But only FOUR stocks have a correlation above 0.5 to PCG out of the top 3000 by market cap in the last year (right). We created a pure quant basket of 18 names that had above 0.4 correlation, knowing it was likely largely spurious (left). The basket offered only modest protection in Q2. **Our conclusion is that this position has outsized risk to it relative to any position size because it is challenging to replicate.**

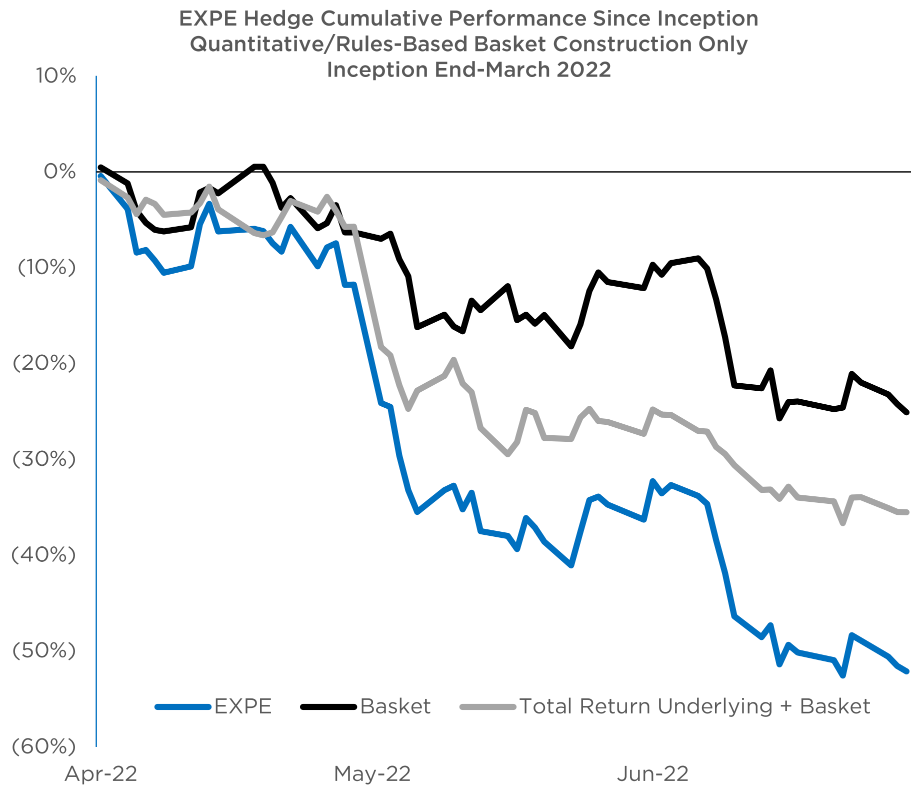


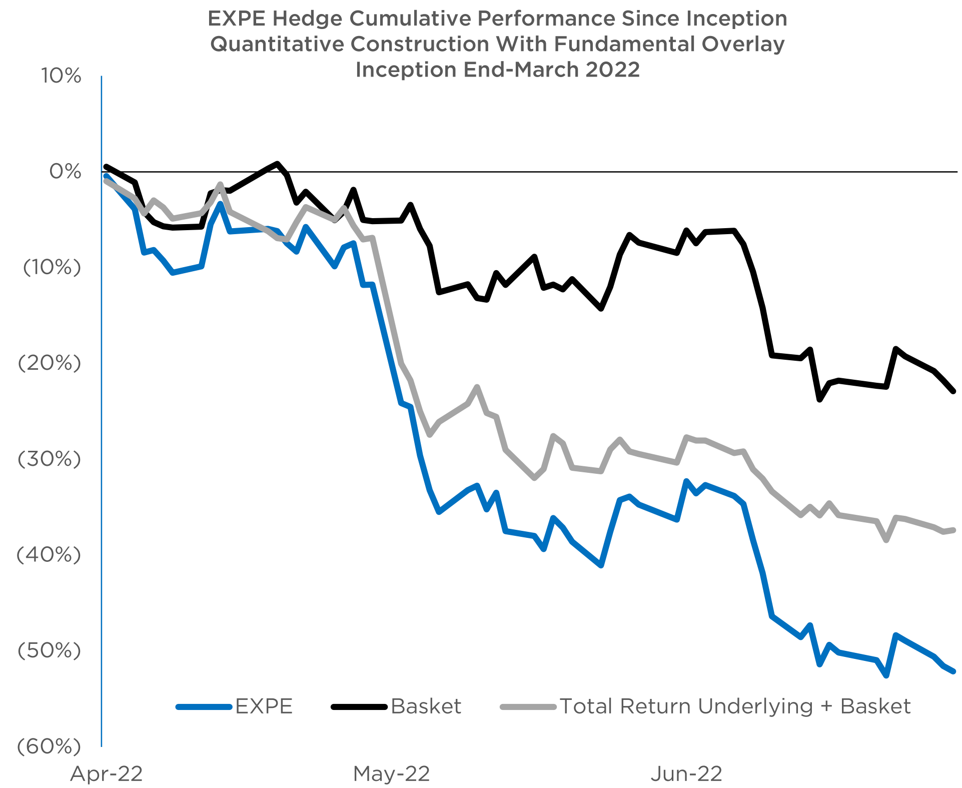
All Stocks In Universe of Top 3000 By Marketcap
Which Screened as Good Hedge on Fundamentals for PCG
And Had >50% 1y Correlation with PCG

Ticker	Company	Sector	Market Cap ($B)
PCAR	PACCAR Inc	Industrials	27.93
TSCO	Tractor Supply Company	Consumer Discretionary	21.99
WOOF	Petco Health and Wellness Company, Inc.	Consumer Discretionary	4.00
CNX	CNX Resources Corporation	Energy	3.15

EXPE: A HEDGE BASKET FOR MORE MACRO NAMES IS PRUDENT

As a high beta (1.37x), hyper growth stock levered to the travel industry, Expedia (EXPE) has performed poorly. Hence shorting nearly anything against would have worked recently. We did slightly better with our judgment plus quantitative basket (right) than the purely quantitative basket alone (left). Hedging it requires shorting other high-beta "reopening" stocks which can be volatile. **EXPE is not particularly idiosyncratic, and hence, most of its hedging candidates are not either. Our judgment is that a hedge basket against EXPE is prudent.**





EXPE HEDGE BASKET

We identified 20 stocks that meet our criteria and have the highest correlation to EXPE in the last year. EXPE underperformed all 20 of these in Q2 (see below). Hedge names largely include travel HLT, BKNG, MAR, and other reopening plays.

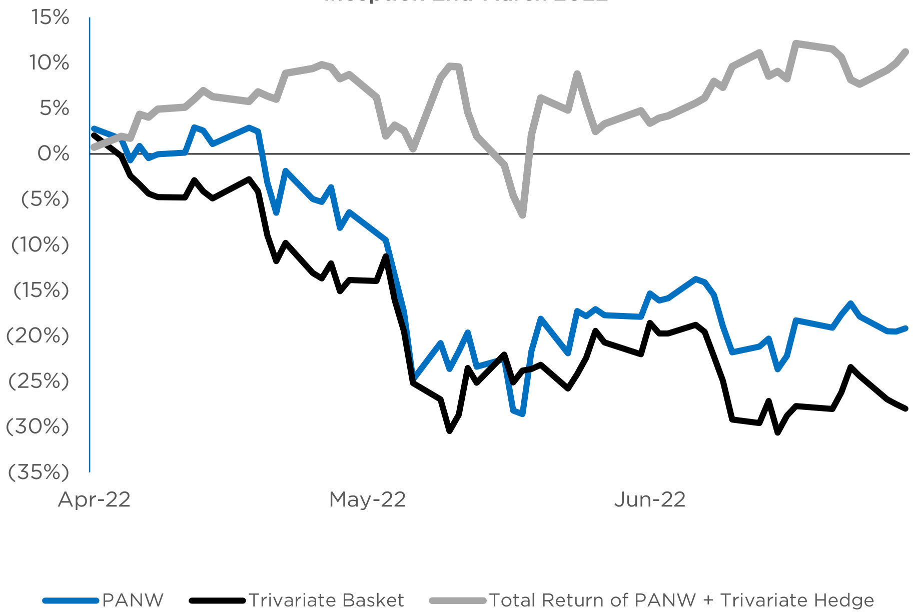
EXPE Hedge Basket
Top 20 Stocks in Basket By 1y Corr. To EXPE
With 63-Day Price Momentum
July 12, 2022

Ticker	Company	Sector	Market Cap ($B)	63 Day Price Momentum
EXPE	Expedia Group, Inc.	Consumer Discretionary	14.46	(48.8%)
MTCH	Match Group, Inc.	Communication Services	19.76	(31.1%)
CTSH	Cognizant Tech Solutions Corp	Information Technology	33.95	(26.5%)
PDCE	PDC Energy, Inc.	Energy	5.34	(26.2%)
EEFT	Euronet Worldwide, Inc.	Information Technology	4.89	(24.1%)
HLT	Hilton Worldwide Holdings Inc.	Consumer Discretionary	31.35	(22.5%)
DAR	Darling Ingredients Inc.	Consumer Staples	9.42	(21.7%)
ALGT	Allegiant Travel Company	Industrials	2.08	(21.1%)
MTDR	Matador Resources Company	Energy	5.18	(20.9%)
JLL	Jones Lang LaSalle Incorporated	Real Estate	8.68	(20.6%)
BKNG	Booking Holdings Inc.	Consumer Discretionary	70.61	(19.8%)
ALGM	Allegro MicroSystems, Inc.	Information Technology	3.79	(19.5%)
CWK	Cushman & Wakefield plc	Real Estate	3.43	(18.8%)
GPN	Global Payments Inc.	Information Technology	31.56	(16.7%)
FLT	FLEETCOR Technologies, Inc.	Information Technology	16.35	(15.6%)
TDG	TransDigm Group Incorporated	Industrials	29.58	(15.5%)
MAR	Marriott International, Inc.	Consumer Discretionary	45.53	(14.9%)
FLEX	Flex Ltd.	Information Technology	6.63	(14.1%)
WSC	WillScot Mobile Mini Hold Corp.	Industrials	7.07	(11.7%)
USFD	US Foods Holding Corp.	Consumer Staples	7.08	(10.3%)
MA	Mastercard Incorporated	Information Technology	314.03	(8.2%)

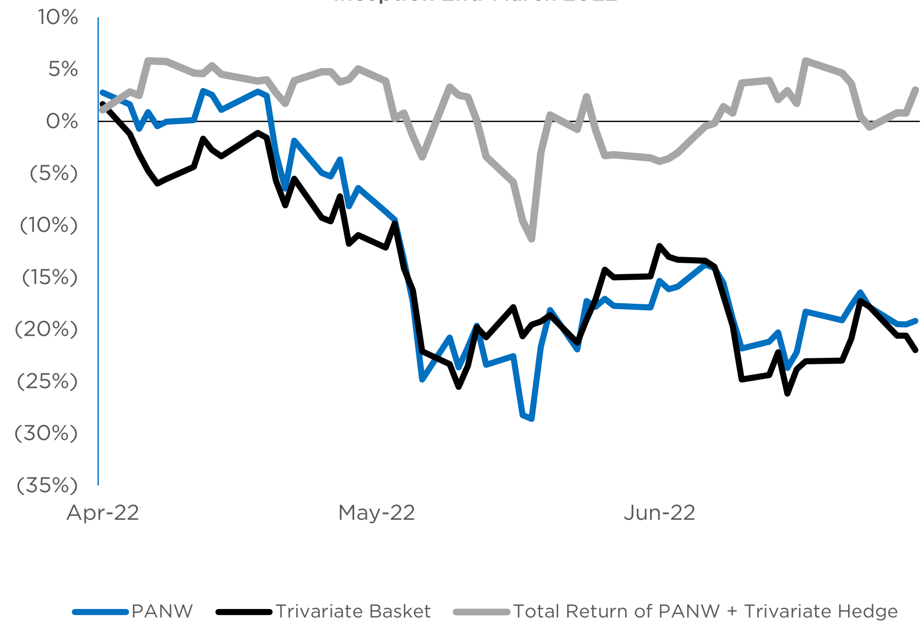
PANW: VALUATION COMPS THE KEY WHEN BETA IS HIGH

PANW is a high beta (1.28), expensive (54x price-to-forward earnings) mid-cap growth stock, with relatively high short-interest (7.8%). Many of the hedging candidates are also high beta software. This is a good example of where using comparable valuation companies is sensible, given software is now among the least idiosyncratic industries in the stock market (PANW's company-specific risk is 46%). We replicated this quantitatively (left) and unsurprisingly did not add value with the judgment relative to quant-only because the process removes risky names (right).

PANW Hedge Cumulative Performance Since Inception
Quantitative/Rules-Based Basket Construction Only
vs Hedge with XSW ETF
Inception End-March 2022



PANW Hedge Cumulative Performance Since Inception
Quantitative Construction With Fundamental Overlay
vs Hedge with XSW ETF
Inception End-March 2022



PANW HEDGE BASKET

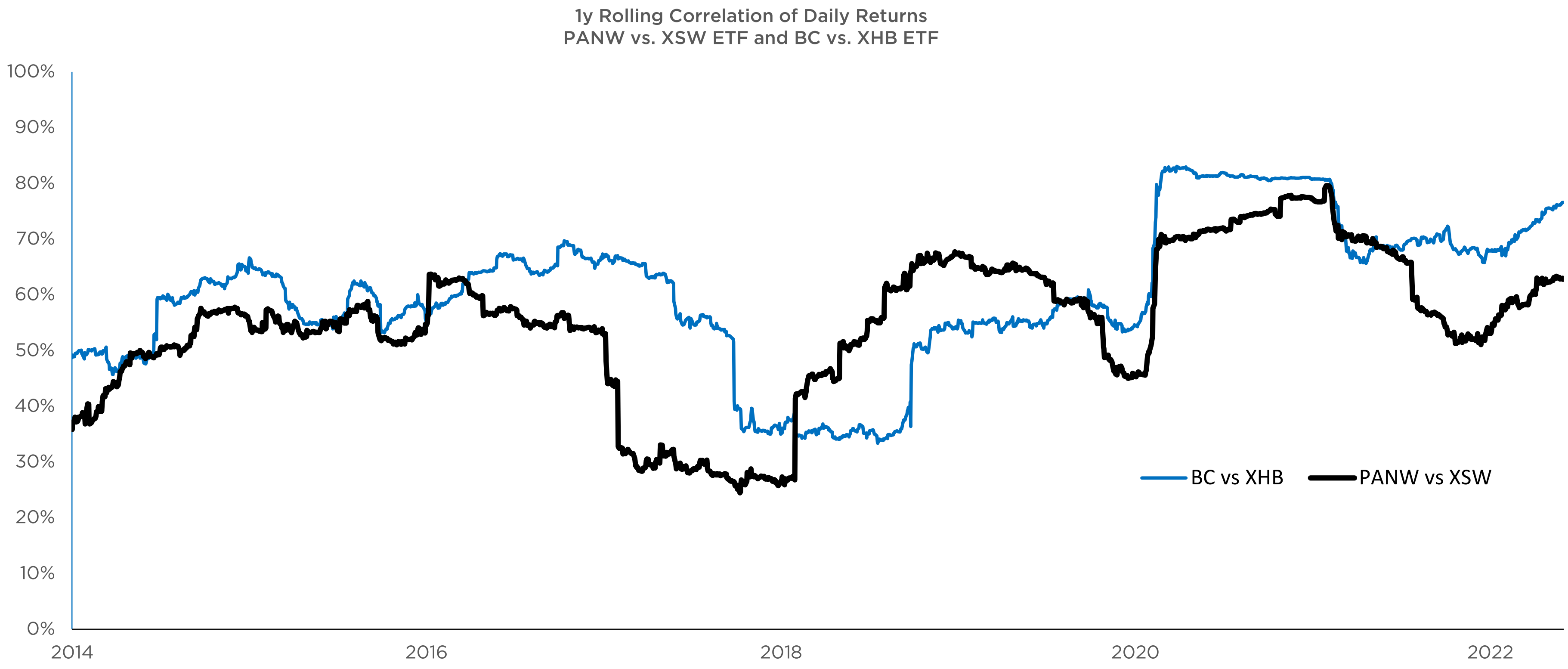
There are many high-beta software companies that have high correlation to PANW. We would recommend hedging large positions to isolate the alpha of either this stock, or this stock and its sub-industry (security) over the coming months.

PANW Hedge Basket
Top 20 Stocks in Basket By 1y Corr. To PANW
July 12, 2022

Ticker	Company	Sector	Market Cap ($B)
WDAY	Workday, Inc.	Information Technology	35.00
PWR	Quanta Services, Inc.	Industrials	18.35
ABMD	Abiomed, Inc.	Health Care	11.69
CGNX	Cognex Corporation	Information Technology	7.56
PSTG	Pure Storage, Inc.	Information Technology	7.55
CHDN	Churchill Downs Incorporated	Consumer Discretionary	7.41
INSP	Inspire Medical Systems, Inc.	Health Care	5.33
CYBR	CyberArk Software Ltd.	Information Technology	5.25
TENB	Tenable Holdings, Inc.	Information Technology	5.17
QLYS	Qualys, Inc.	Information Technology	4.81
GXO	GXO Logistics, Inc.	Industrials	4.75
TWKS	Thoughtworks Holding, Inc.	Information Technology	4.70
AYX	Alteryx, Inc.	Information Technology	3.31
ROIV	Roivant Sciences Ltd.	Health Care	3.15
PRFT	Perficient, Inc.	Information Technology	3.12
IIPR	Innovative Industrial Properties, Inc.	Real Estate	3.10
PGNY	Progyny, Inc.	Health Care	2.73
JOE	The St. Joe Company	Real Estate	2.30
COUR	Coursera, Inc.	Consumer Discretionary	2.23
GSAT	Globalstar, Inc.	Communication Services	2.21

USING ETFS AS HEDGES CAN BE VOLATILE IN THEIR EFFICACY

We looked at the rolling correlation of PANW against the software ETF (XSW) and BC against the homebuilders ETF (XHB). Both see extreme dips in correlation during certain regimes, making them sub-optimal hedges over long-periods of time. In general we do not think ETFs are good tools to hedge large single stock positions.



HOW TO MONITOR THE HEDGE / REPLICATION BASKET

There are many considerations for making a hedge basket (shorting names against one core long position) or a diversification basket (owning a basket of names in some size instead of a large position in one name). We also didn't show in any of our examples owning a hedging long (names with a negative correlation to a long position). But with an approach that combines judgment and quantitative rules we think the above strategies are illustrative.

Size: The size of the basket may determine how many names you need in the basket (should you do 20 names with 5% positions each, or 33 names with 3% positions each, etc.). Assets under management, the size of the main position and the desired magnitude of the hedge are among the other important considerations.

Monitoring the basket: Once the basket is in place, we also look at several other variables to minimize the impact any individual name in the basket can have on the P&L.

- **Trading:** Sometimes the basket names can be volatile, and discipline around trading in and out of them can help. If you are being proactive with the hedge, ou do not need to get all the basket positions on immediately.
- **Earnings:** Even though these positions typically are not being monitored by a fundamental analyst (they can be 20bps each with 5% moves impacting the P&L by 1bp all else equal) we still advise noting when the report earnings, not trading into them the day they report if that is when you are initiating or updating the basket, and monitoring outsized positive or negative alpha post-earnings
- **Big price moves:** Stocks that now move differently than the stock they are designed to hedge might be good candidates to remove from the basket
- **Short interest / borrowing cost changes:** Big increases here can increase the volatility
- **Crowding:** We monitor 13-F filings, changes and level of volatility and liquidity to make sure the stocks are still behaving the way they did when we built the basket

This is not a comprehensive list, but among the key considerations – ultimately judgment matters.

CONCLUSIONS

A combination of quantitative rules, judgment and vigilant monitoring are required to create a good hedge baskets. The goal of a hedge is to isolate the company-specific risk with a logical subset of stocks. When there is a big risk-off trade some of the judgment might be to remove risk stocks, which would have been effective hedges in a down market but likely not optimal in more steady-state regimes. Purely rules-based approaches can work better for certain stocks during certain time frames. However, a combination of rules-based approaches and judgment works better "live" and certainly better than common ETF hedges. If you own one of these stocks in high conviction our conclusion is:

1. **United Healthcare (UNH):** We found this to be a stock worth hedging, as the high-quality, mega-cap nature of it made profitable to hedge in a down market. This happens to be one of our favorite stocks in one of our favorite industries, so we would not hedge out the entire position if we didn't have to.
2. **T-Mobile (TMUS):** A very idiosyncratic, expensive but low-beta mega-cap is hard to replicate. This position is riskier than its beta would indicate – however, if the stock outperforms it is a source of differentiated alpha.
3. **Brunswick Corporation (BC):** The returns can be replicated quite easily so owning it in high conviction does not appear to be sensible unless the business model materially changes.
4. **Pacific Gas & Electric (PCG):** Only FOUR relevant stocks have a correlation above 0.5 to PCG out of the top 3000 by market cap in the last year. Our conclusion is that this position has outsized risk to it relative to any position size because it is challenging to replicate. Moreover, it is outside the core competency of many who have amassed substantial positions.
5. **Expedia (EXPE):** As a high beta (1.37x), hyper growth stock levered to the travel industry, EXPE has performed poorly. EXPE is not particularly idiosyncratic, and hence, most of its hedging candidates are not either. Our judgment is that a hedge basket against EXPE is prudent.
6. **Palo Alto Networks (PANW):** PANW is a high beta (1.28), expensive (54x price-to-forward earnings) mid-cap growth stock, with relatively high short-interest (7.8%). Many of the hedging candidates are also high beta software. This is a good example of where using comparable valuation companies is probably sensible, given software is now among the least idiosyncratic industries in the stock market (PANW's company-specific risk is 46%).   We can hedge this name well.

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