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TRIVARIATE RESEARCH

OUR QUANTITATIVE FRAMEWORK AND IDEAS

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TRIVARIATE'S PROPRIETARY QUANTITATIVE FRAMEWORK

We developed a database, signals, models and a risk management system to run a hedge fund in 2019 – the data integrity and system checks passed allocator diligence – and we now use these powerful tools to offer investment advice to both bottom-up stock pickers and quantitative money managers (stock ideas on page 24).

The Trivariate frameworks consists of:

1. Proprietary stock level models with custom tags, cohorts, signals
2. Ingestion of 150+ macro factors to re-sort our model outcomes and improve recommendations on grossing / sizing
3. Systematic identification of fundamental factors, such as M&A, new management teams, etc. which increase volatility without commensurate alpha

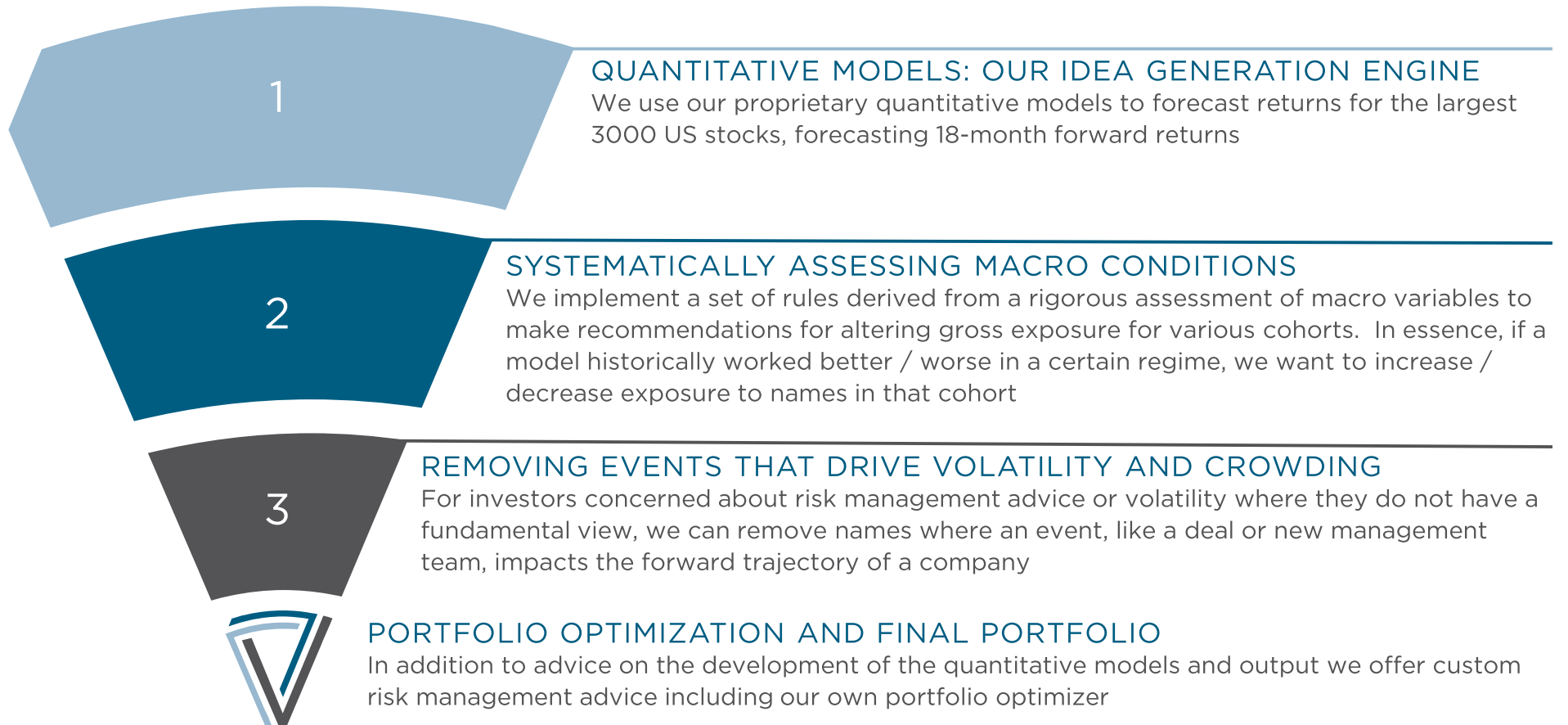
Following our idea generation, we advise on risk management in areas including:

1. Risk diagnostics
2. Portfolio optimization with customizable constraints
3. Identification of crowded ideas from proprietary 13-F “high conviction” analysis

Please reach out to us for custom risk management services and proprietary research projects.

QUANTITATIVE MODEL OVERVIEW

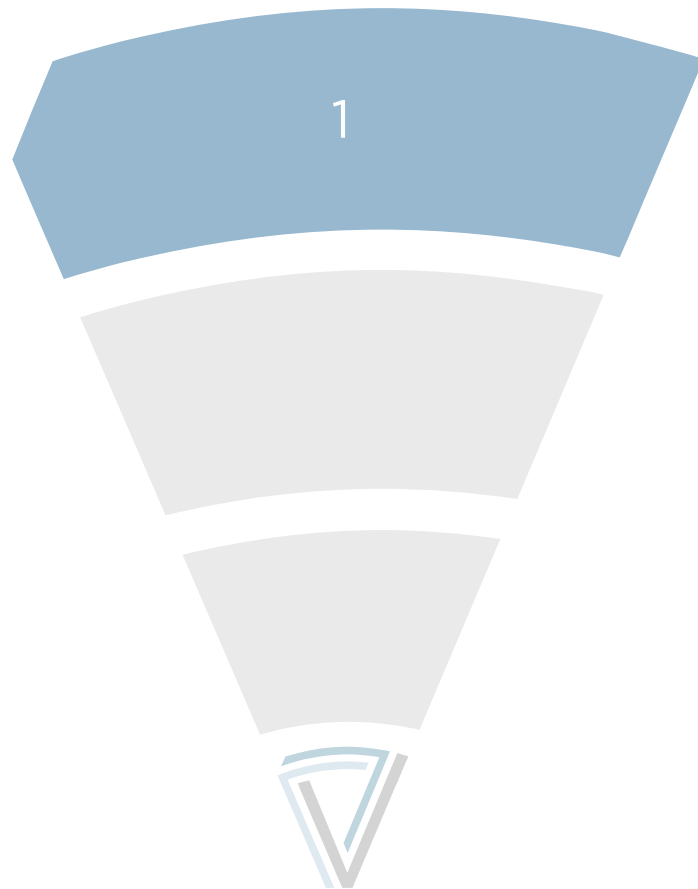
Trivariate Research's process for investment advice combines quantitative stock-level models, top-down rules designed to improve how investors make decisions about gross exposures, and a systematic identification of stocks where fundamental "events" create increased volatility. Our goals are to improve how CIOs use their judgment in forming their final portfolios, advise quantitative investors on some novel ways to add value in portfolio construction and signal formation, and importantly, to generate long / short stock ideas.





QUANTITATIVE MODELS: OUR IDEA GENERATION ENGINE

The first and, in our view, most critical step in the process is running our custom quantitative models to predict returns for the largest 3000 US stocks. The output of this quantitative process is a ranking of the stock universe by anticipated returns. When we ran our hedge fund we selected the top 20% as potential long ideas and the bottom 20% as potential short ideas. We often use quantitatively-derived stocks for idea generation to embody a theme in our research.



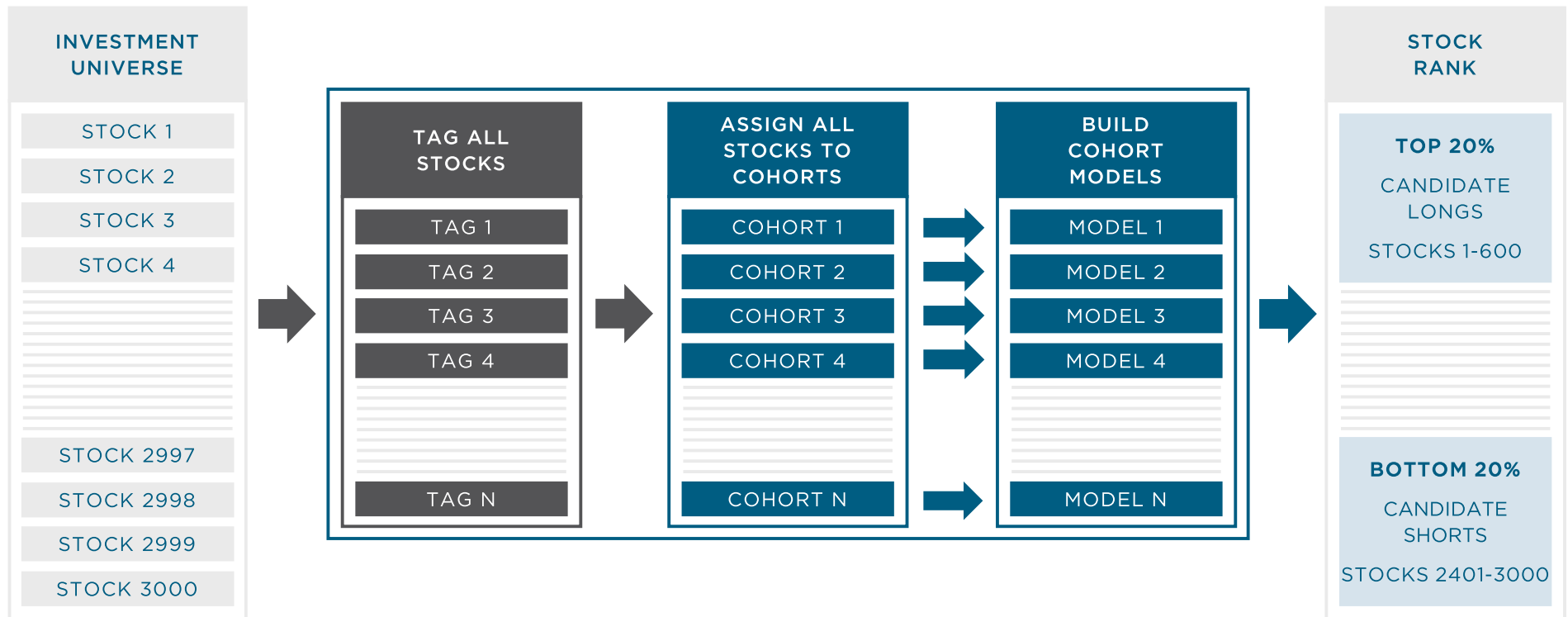
QUANTITATIVE MODELS – WHAT ARE WE DOING?

- **Breaking the market into distinct cohorts:** We parse the universe into 21 proprietary cohorts that are the result of years of research and multiple model-building iterations. Examples include: “hyper growth”, “high yield junk”, “cheap for a reason”, and other non-traditional classifications. We think there is little if any alpha left in traditional GIC-based long-dated models, and novel approaches like this are key to adding value.
- **Infusing fundamental knowledge:** A significant source of our differentiation is our experience in combining both the quantitative and fundamental disciplines. The goal in using growth, yield, and quality in forming modeling cohorts is to infuse our fundamental knowledge into the signal selection in those areas and enhance our ability to pick winners from losers.
- **Differentiating our time horizon:** We build models to predict 18-month forward returns for each US stock.
- **Limiting variable overlap:** We use variables to predict returns in our models that come from categories like balance sheet, income statement, cash flow, sentiment, valuation, and accounting, with several custom definitions and a low overlap of variables between cohorts. However, signal formation is key, and rank ordering is no longer the exclusive approach – distance from median or even perverse implementation is now prevalent. In the end, we have 90 distinct signals in our 21 cohort models, or 4.5 unique signals per model with a maximum of 4 total uses in the 21 models. We do not want to die with one signal.



OVERVIEW OF OUR QUANTITATIVE MODELS

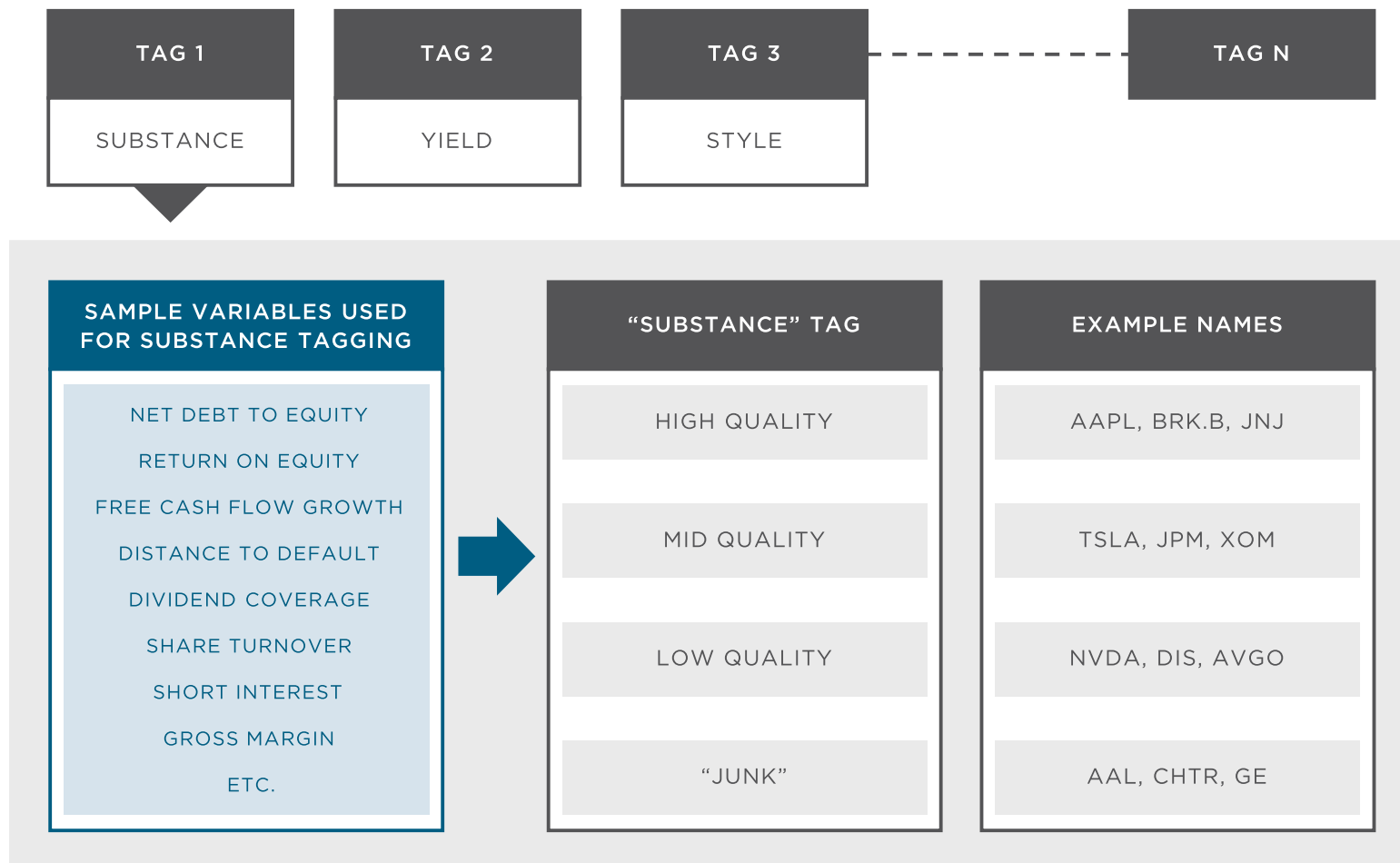
Each stock receives several tags which are systematically used to determine its cohort. These cohort groupings are critical as model development improves when stocks in a cohort share common characteristics. We then build different models in each cohort, using distinct variables to predict future stock-level returns. Finally, we rank the universe from 1 to 3000 on the forecasted return from the models, with the top 20% becoming potential long ideas and the bottom 20% potential short ideas.





SUBSTANCE TAG - WHICH STOCKS ARE “JUNK”?

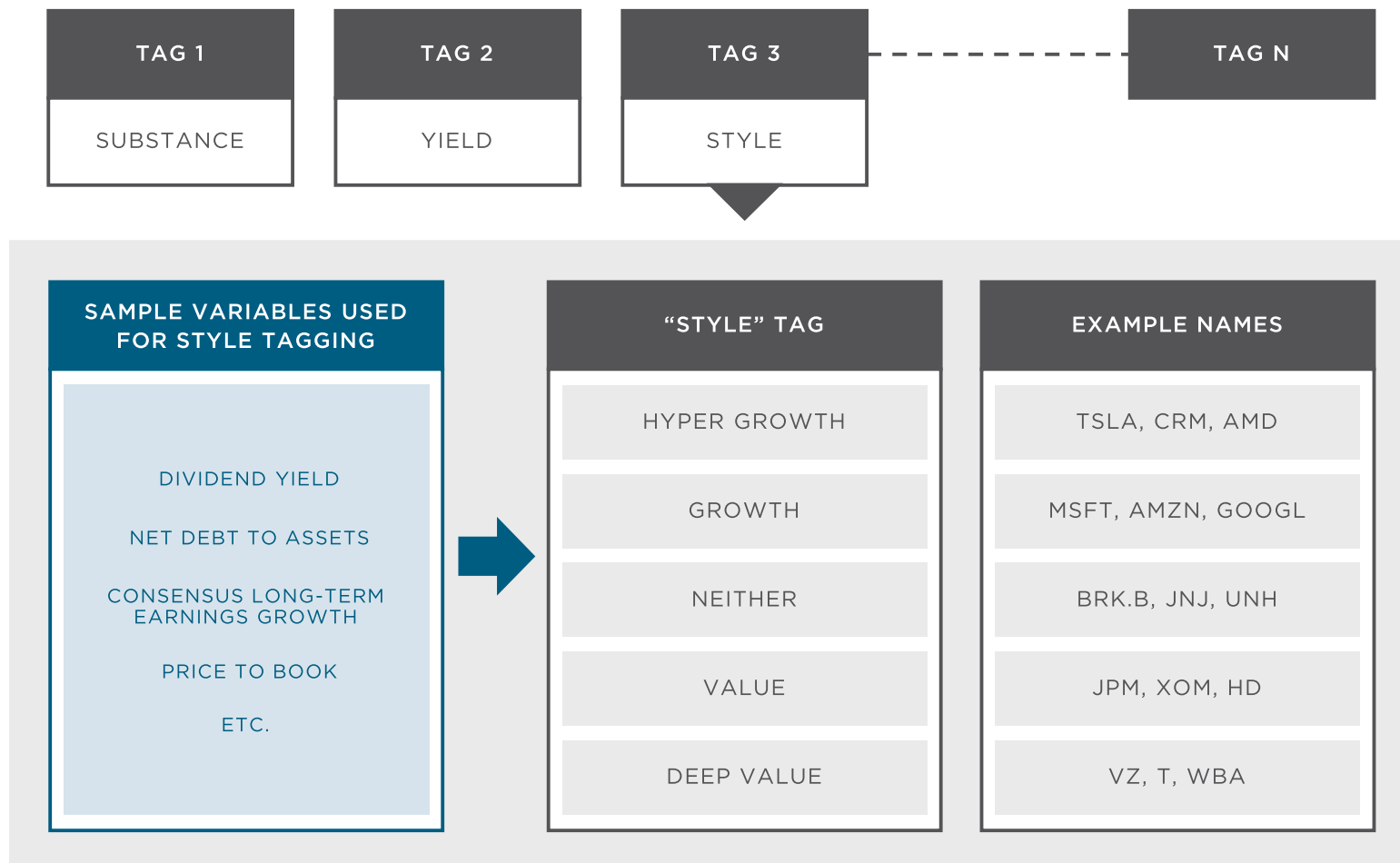
The first step in building our distinct cohorts is assigning multiple tags to each stock in the universe. Each tag is systematically generated based on a series of input variables. As an example, every stock will be labeled with a “substance” tag which has five potential categories as shown below. We care if stocks are in the bottom quartile, which we call “junk”, as our ability to pick winners from losers in this group is strong, and often models that do not exclude this group are systematically biased against these stocks.





STYLE TAG - WHICH STOCKS GROW REALLY FAST?

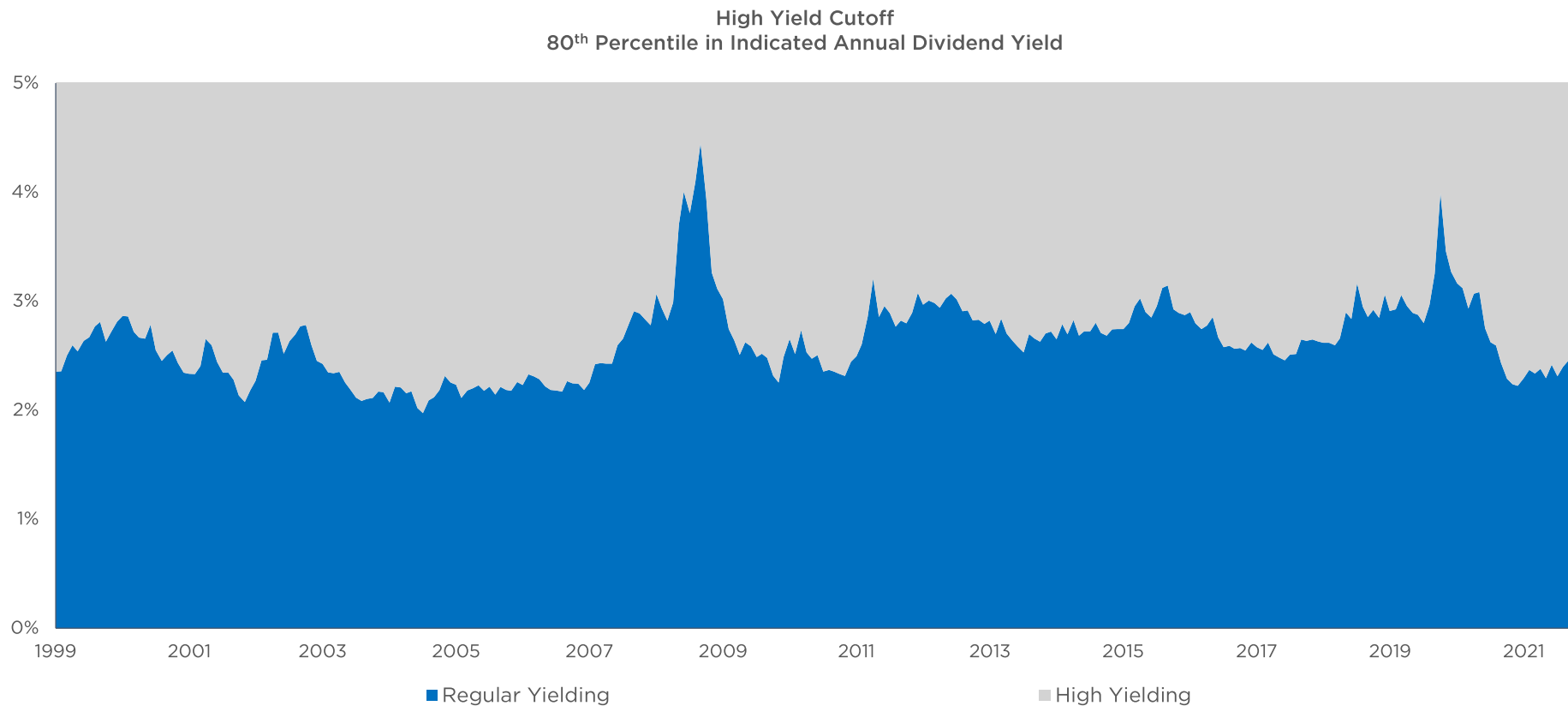
Another tag we need to create our modeling cohorts is style. Our framework systematically labels stocks as growth, “neither”, or value. The fastest growth parts of growth we call “hyper” growth, and the very cheap parts of value we use to create a “deep value” universe, that is a pre-cursor to our “cheap for a reason” cohort.





DIVIDEND YIELD TAG

One additional tag we need is “high yield” which we define as the top 20% of dividend yielding stocks. We know that there is a large class of investors who value income, and that these stocks trade around fundamental attributes related to the growth and maintenance of the dividend, more than their sector or industry constitution. Today the high yield cohort is defined by stocks with a dividend yield above 2.5%.





ASSIGNING EACH STOCK TO A COHORT

Once the tagging is complete for our stock universe, we systematically assign each stock to a cohort. We have six specialty cohorts where stocks are assigned in a hierarchy. Cheap for a reason first, then down through other junk (blue column). This process is rules-based, mutually exclusive and exhaustive. Stocks are tagged and assigned to cohorts on a monthly basis. Below is an illustration of how several large cap stocks were tagged and assigned to their Trivariate cohorts and some example stocks.

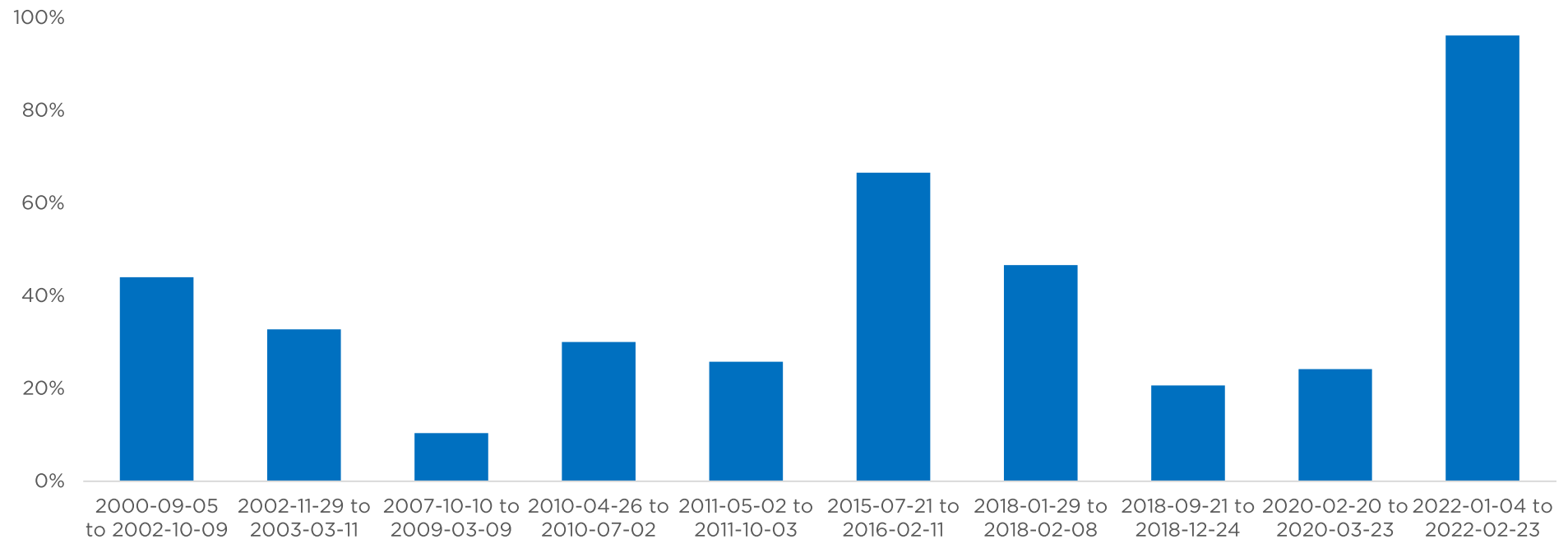
| TICKER | SUBSTANCE TAG | | DIVIDEND YIELD TAG | | STYLE TAG | | TRIVARIATE COHORT | GICS SECTOR |
|--------|---------------|---|--------------------|---|-------------|---|--------------------|------------------------|
| VZ | Mid Quality | + | High | + | Deep Value | ➔ | Cheap For A Reason | Communication Services |
| FIVE | Junk | + | Regular | + | Fast Growth | ➔ | Hyper Growth Junk | Consumer Discretionary |
| CRM | High Quality | + | Regular | + | Fast Growth | ➔ | Hyper Growth | Information Technology |
| MPC | Junk | + | High | + | Value | ➔ | High Yield Junk | Energy |
| JNJ | High Quality | + | High | + | Neither | ➔ | High Yield | Healthcare |
| GE | Junk | + | Regular | + | Neither | ➔ | Other Junk | Industrials |



CHEAP FOR A REASON – VALUATION DOESN'T OFFER PROTECTION

We call one of our specialty cohorts “cheap for a reason” or CFAR. CFAR is a subset of our deep value style stocks that also have poor recent price momentum. Previously, the conventional wisdom was that the stocks that had the most multiple expansion prior to market corrections would be the ones with the most to lose during market pullbacks. However, that is not true – it is those with the most multiple contraction prior to market corrections that still perform poorest during corrections. It seemed clear to us as the result of that work that valuation would not be effective at separating winners from losers among very cheap stocks. As such, we analyzed whether price-to-forward earnings was efficacious at picking winners from losers during the last nine SP500 corrections of ten percent or more and compared efficacy for CFAR stocks relative to the rest of the universe. Each time, price-to-forward earnings performed worse for CFAR stocks, meaning that valuation does not offer protection during downturns for very cheap stocks.

**Relative Annualized Factor Efficacy of Price-to-Forward Earnings
Overall Universe Excluding “Cheap for a Reason” vs. “Cheap for a Reason”
During SP500 Drawdowns of 10% or More Since May 2000**

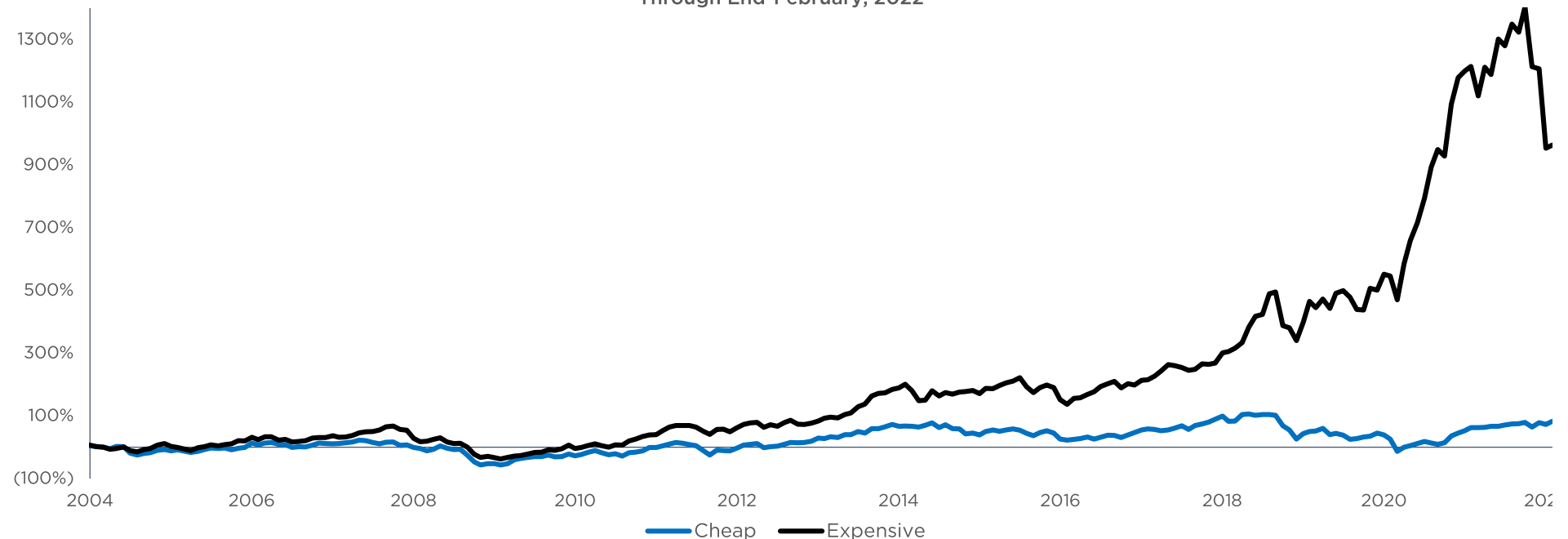




HYPER GROWTH: EXPENSIVE OUTPERFORMS CHEAP

Valuation motivated us, in part, to create a special cohort for fast-growing stocks, called Hyper Growth. We know that fast growing stocks that are cheap underperform fast growing stocks that are expensive. If a stock is fast growing and cheap, the market on average is right to be concerned, as cyclicality, or technological obsolescence, or looming competition are among the potential fundamental concerns. Below we show the performance of the cheap quintile in blue and the most expensive quintile in black on price-to-forward earnings since 2004 among the hyper growth stocks. Clearly this is not spurious – more expensive is better than cheap among fast growing stocks, although the recent harsh sell-off shows it was at least in part the function of a one-way street on interest rates.

Hyper Growth Universe
Price-to-Forward Earnings Mean Quintile Returns
Through End-February, 2022

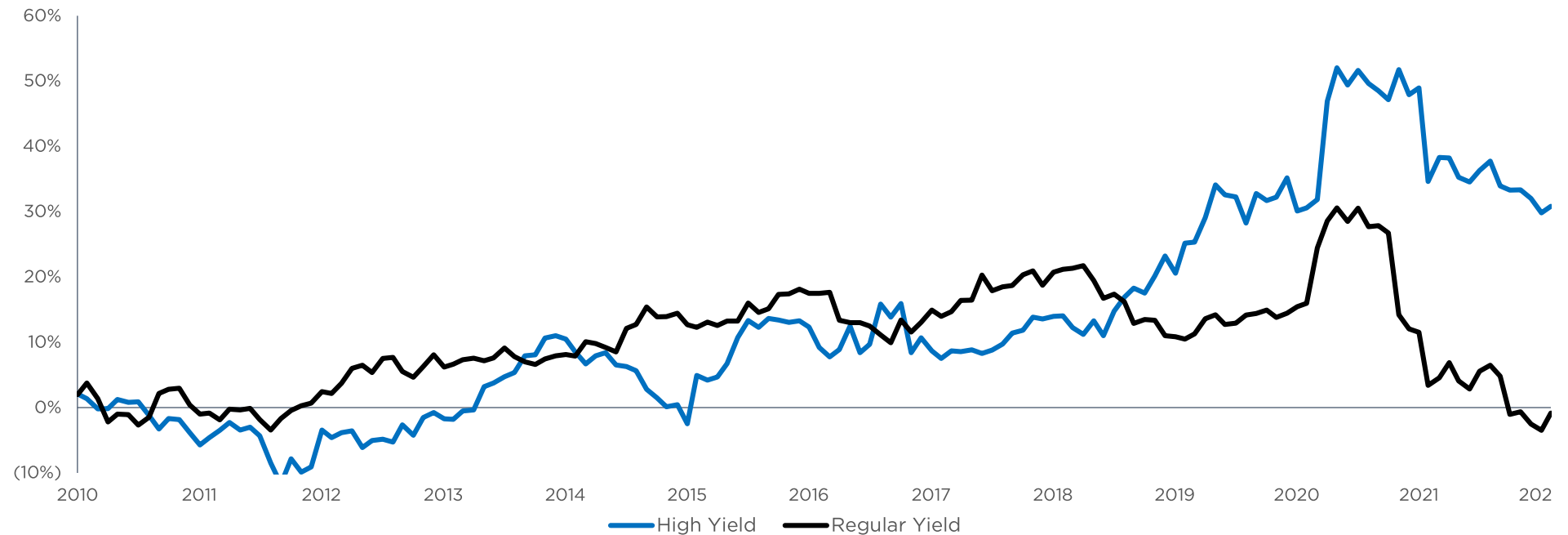




DIVIDEND GROWTH IS MORE EFFECTIVE IN HIGH YIELD

Using dividend yield to cluster stocks can also be highly effective, as yield-focused investors care about different fundamental metrics than non-yield-focused investors. For instance, a signal like high indicated dividend growth outperforms low dividend growth by ~4% per annum (blue line) whereas this metric generates negligible spread among stocks that do not have high dividend yields (black line). Hence, we have a cohort called “High Yield”.

Efficacy of Indicated Dividend Growth
Through End-February, 2022





SIGNAL DIVERSIFICATION IS KEY

Stocks that are not in our specialty cohorts are combined into more traditional GIC industry-like cohorts, with some exceptions. Below we show the example of signals used and tickers in 11 out of 21 of our models – we intentionally build models with a small overlap in signals, to diversify our factor exposure.

Trivariate Quantitative Models

| Select Model | Example of Signals Used | Example of Tickers |
|--------------------------|---|--------------------|
| Banks & Consumer Finance | Price-to-Tangible Book, Loan Loss Coverage Ratio, Provision for Loan Loss Ratio Growth | JPM, BAC, WFC |
| Cheap For A Reason | Revenue Growth Acceleration, Total Debt Stability, Total Revenue Stability | VZ, T, WBA |
| Discretionary | Receivables Growth, Gross Margin Growth, Sell-Side Consensus Recommendation (Opposite) | AMZN, HD, MCD |
| High Yield | SG&A Stability, Net Income Stability, Dividend Growth | JNJ, XOM, CVX |
| High Yield Junk | Forecasted Revenue Growth, Receivables Stability, Quick Ratio Growth | DOW, MPC, EXC |
| Hyper Growth | Price-to-Forward-Earnings (Opposite), Change in Trading Volume, Revenue Growth Acceleration | TSLA, CRM, AMD |
| Hyper Growth Junk | Momentum Stability, Percent Upside to Sell-Side Analyst Target (Opposite), Return on Invested Capital | MAR, SNAP, TWTR |
| Insurance | Statutory Surplus Ratio, Underwriting Leverage, Net Income Stability | CB, MMC, AON |
| Other Junk | EV-to-Gross Profit, Buyback Yield, Accruals | NFLX, CAT, GE |
| Real Estate | Distance to Default, FFO Growth, PP&E Accruals | PLD, AMT, CCI |
| TMT | Revenue Growth, R&D Stability, Sales Estimate Revisions | MSFT, GOOGL, FB |



A STOCK ILLUSTRATION OF THE POWER OF SPECIALTY COHORTS

The differentiation of the cohort definitions we use to segment the market and build our models is a key aspect of our modeling approach. On the left side we show stocks that are in our high yield cohort, which can be in nine different traditional GIC sectors. On the right we show stocks that are all in the GIC consumer discretionary sector that could be in nine different Trivariate modeling cohorts - we think combining HD with ABNB and GM into one consumer model would be highly ineffective.

| TRIVARIATE HIGH YIELD COHORT* | | GICS CONSUMER DISCRETIONARY | |
|-------------------------------|------------------------|-----------------------------|--------------------|
| TICKER | GICS SECTOR | TICKER | TRIVARIATE COHORT |
| CCOI | Communication Services | GPS | Cheap For A Reason |
| QSR | Consumer Discretionary | HD | Discretionary |
| KO | Consumer Staples | NKE | Durables |
| CVX | Energy | GPC | High Yield |
| CME | Financials | VFC | High Yield Junk |
| JNJ | Health Care | ABNB | Hyper Growth |
| UPS | Industrials | MAR | Hyper Growth Junk |
| CSCO | Information Technology | APT | Industrials |
| SCCO | Materials | GM | Other Junk |

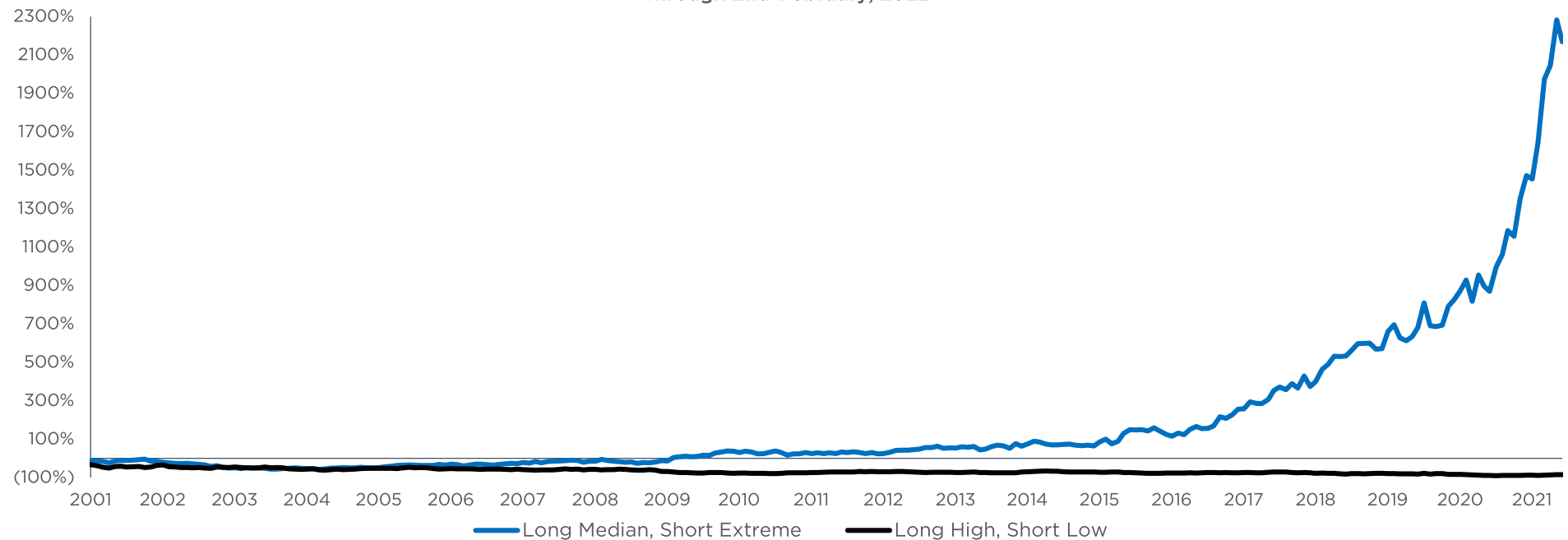
* As of March 11th, 2022



SIGNAL FORMATION REALLY MATTERS

In addition to our specialty cohorts for model development, signal formation for building intra-cohort models has progressed a lot. Solely using traditional “ranked” metrics is now becoming increasingly passe. Below we show return on invested capital (ROIC) for our pharma / biotechnology cohort (see note below). The blue line shows that the performance of stocks with median ROIC is far greater than stocks with extreme (low or high) ROIC. On the flip side, if we just bought high ROIC and shorted low ROIC stocks in this cohort (black line) the signal lost money!

Compounded Median Monthly Return of ROIC
Pharma Biotech Cohort
Through End-February, 2022



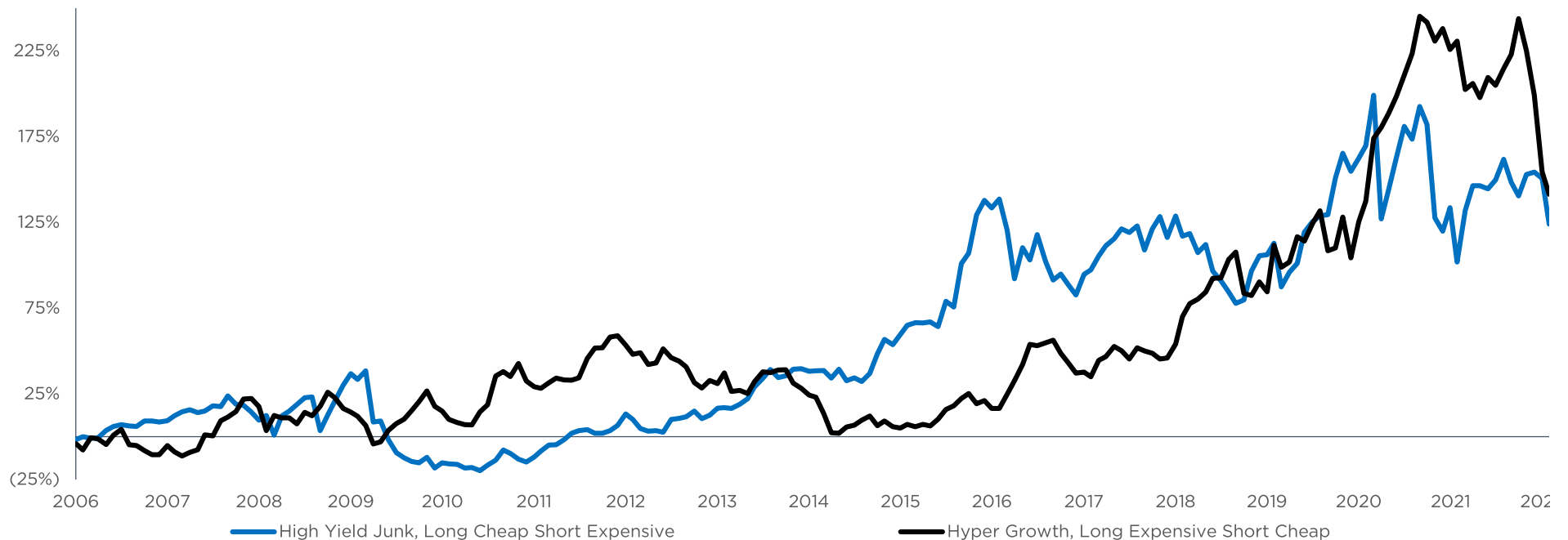
Note: Our pharma / biotechnology cohort excludes mid, small, and micro-cap biotechnology stocks, which we do not model quantitatively. Also, given our modeling cohort formation hierarchy, these stocks are all pharma / biotech that are NOT cheap for a reason, hyper growth, high yield, or junk - it is the rest of the pharma / biotech cohort that we reference here



EXPENSIVE CAN BE BAD OR GOOD

In addition to forming signals by using distance-from-median transforms instead of a simple ranking in some circumstances, we also used the opposite sign for the same signal in some of our models or avoided traditional metrics all together. Below we show the efficacy of price-to-forward earnings for our high yield junk model in blue and our hyper growth model in black. For high yield junk, we are buying cheap stocks and shorting expensive. For hyper growth, we are buying expensive and shorting cheap. Over time the results have been the same, and this means using valuation may not be effective to separate winners from losers.

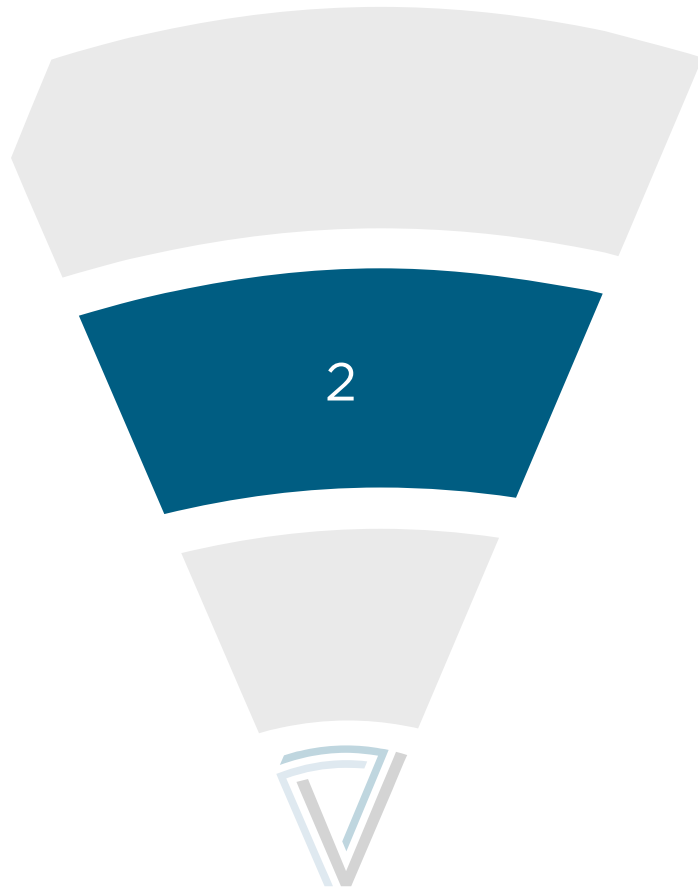
Performance of Price-to-Forward Earnings Signal
Through End-February, 2022





SYSTEMATICALLY ASSESSING MACRO CONDITIONS

The second step in the Trivariate process is a systematic assessment of top-down variables. We use this information to improve the probability of identifying and sizing portfolio candidates – this informs how we make recommendations about gross exposure.



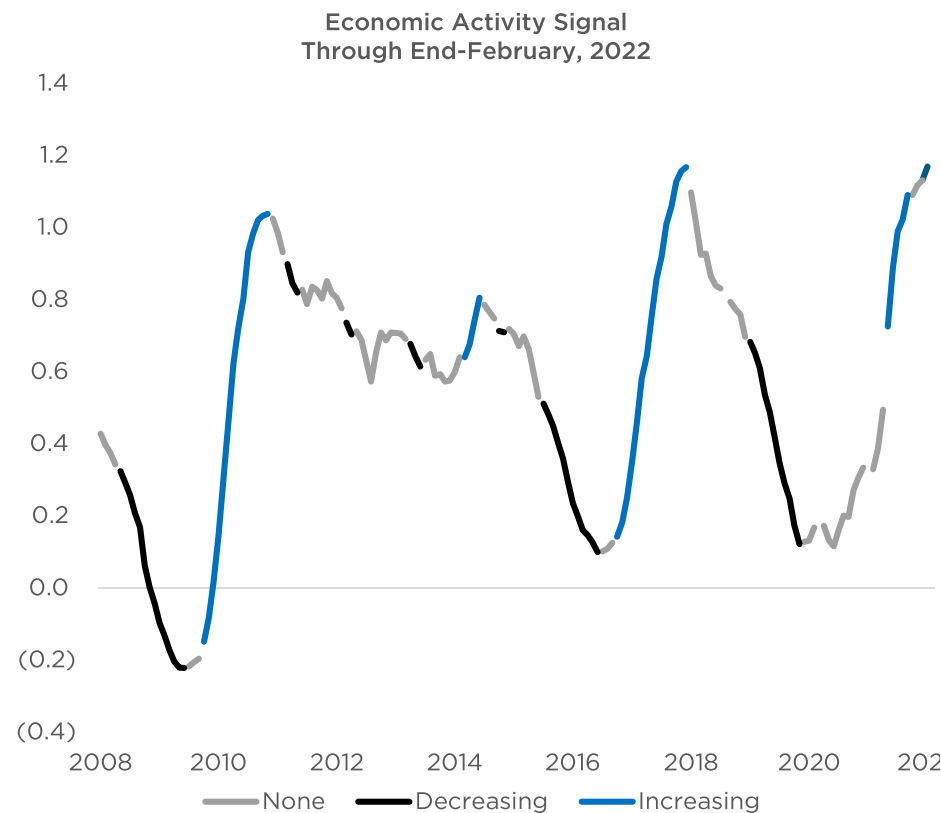
ASSESSING MACRO CONDITIONS – WHAT ARE WE DOING?

- **Analyzing macro data:** We systematically track and analyze over 100 economic and macro variables. Examples include economic activity, industrial activity, consumer activity, corporate profitability, and financial conditions
- **Assessing impact on performance:** We measure how changes in macro regimes alter the performance of our proprietary cohorts and our model efficacy
- **Creating exposure rules:** We create a set of rules that strive to increase our odds of identifying and sizing stocks correctly in the context of the relevant macro regime
- **Implementing our rules:** We execute our macro rules against the quantitative model rankings from the first phase of our investment process. This new set of model rankings, re-ordered by our macro rules, seeks to have investors gross up or down exposures in parts of the market where history dictates they would have been able to pick winners from losers BETTER than at other times
- **Avoiding macro bets:** We do not intend to make active directional macro bets as part of our quantitative process. Rather, we assume we will be late identifying a regime, and “ride it over the edge” and yet implementing a gross exposure recommendation still adds overall value



INCREASING ECONOMIC ACTIVITY MEANS GROSS UP TMT EXPOSURE

We show one of our 12 macro gauges, our economic activity signal below (left chart). We evaluate where we are in the economic activity cycle by looking at variables like Citi Economic Surprise, CEO Confidence, Philly Fed Business Outlook, Small Business Optimism, US Economic Surprise, US LEI, US 5y5y Forward Breakeven, etc. We then create this “sine wave” to assess where we are on economic activity today. We noticed (right chart) that our TMT model performs far better when economic activity is increasing than when it is not, fueling our recommendation to gross up TMT exposure today.



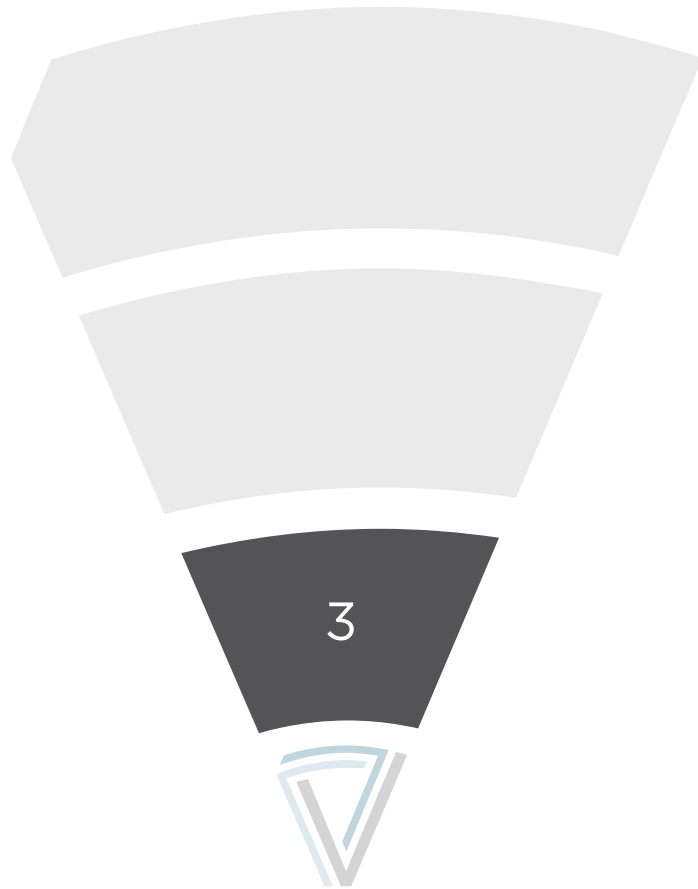
TMT Model Performance Through End-February, 2022

| Stat (Beta-Adjusted) | Economic Activity Increasing | Economic Activity Not Increasing | Difference |
|----------------------------|------------------------------|----------------------------------|------------|
| Weighted Mean | 14.7% | 7.0% | 7.8% |
| Weighted Median | 16.8% | 5.7% | 11.1% |
| Weighted Information Ratio | 1.66 | 0.74 | 0.92 |
| Hit Rate | 65.7% | 55.7% | 10.1% |



REMOVING EVENTS THAT DRIVE VOLATILITY AND CROWDING

The third step in the process is to systematically remove events such as CEO changes or M&A that may significantly affect a company's outlook. Based on our research, we have found that these "catalysts" often increase stock volatility without a commensurate increase in alpha and are often crowded by traditional fundamental investors. We can remove these stocks from our back-tests and quantitative processes where necessary to create value.



REMOVING EVENTS - WHAT ARE WE DOING?

- **Identifying material corporate events:** We systematically identify fundamental corporate activity like new CEOs, meaningful divestitures, spin-offs, mergers or acquisitions
- **Eliminating stocks for a sustained period:** We intentionally remove any stocks where these events occurred for at least one-year until their conditions normalize, for example expensive growth stocks with new CEOs, or deals that are more than 20% of the market capitalization where the initial 5-day market response is negative

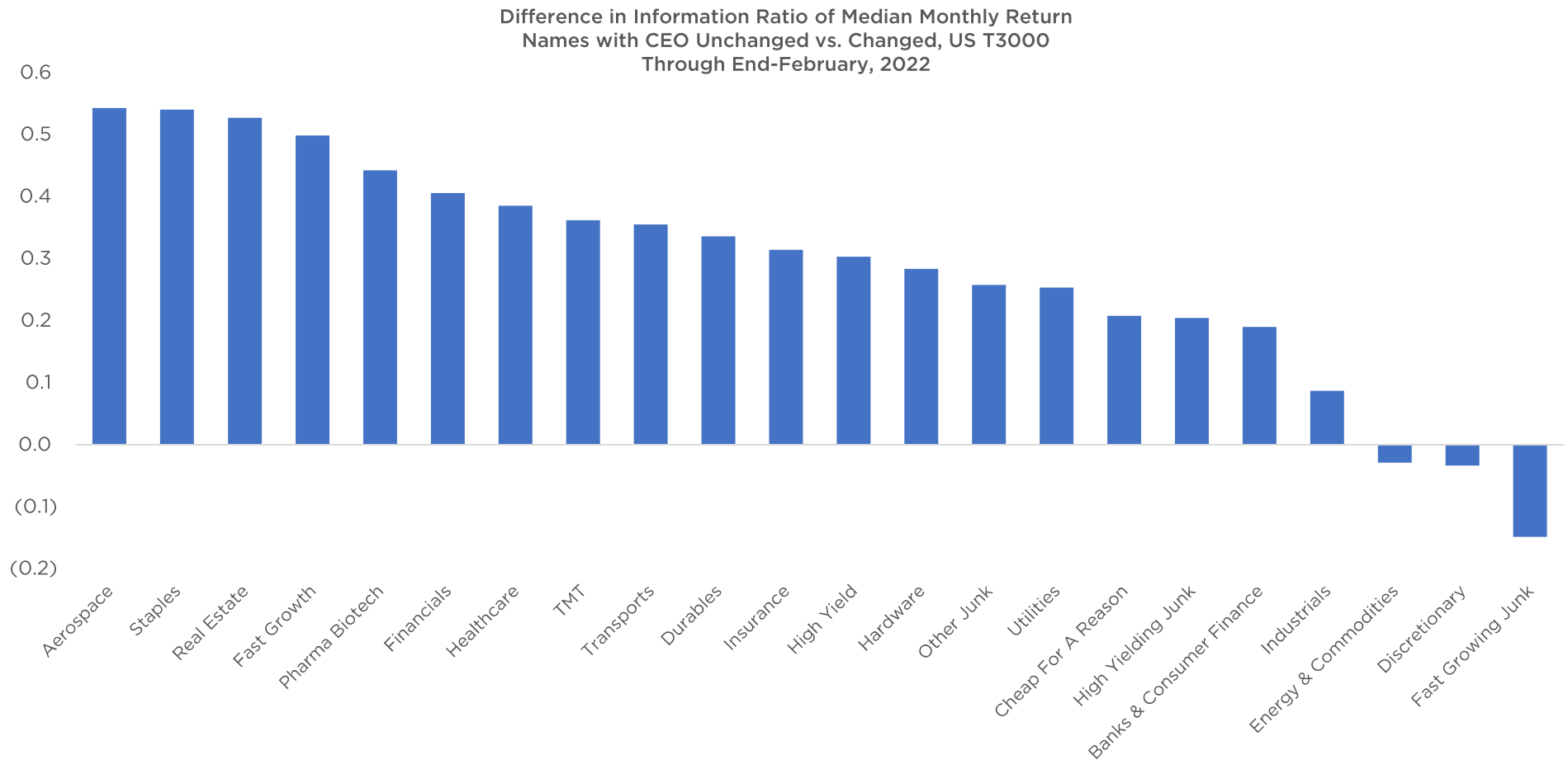
REMOVING EVENTS - WHY ARE WE DOING THIS?

- Seek to lower volatility of our model performance without losing alpha
- Seek to reduce correlation of our recommendations to other traditional L/S funds which often over-index their work to these fundamental events



CEO CHANGES RESULT IN DECREASED INFORMATION RATIOS

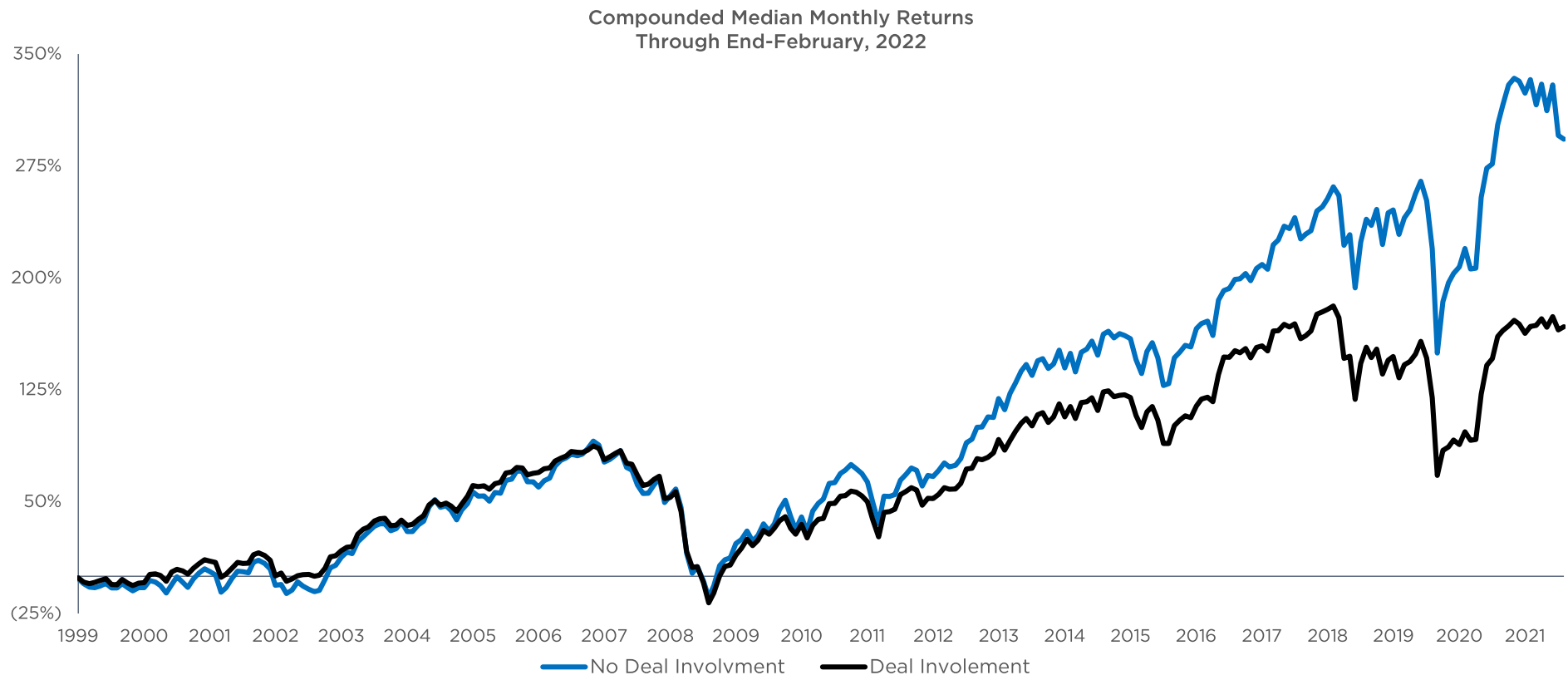
Below we show how our model performance is impacted by stocks where there are new CEOs. Often, the new CEOs inherit a situation that is difficult to improve, and sometimes their prior track-record causes investors to be anticipatory of change. Either way, the efficacy of our models is largely enhanced by removing these stocks for six months.





DEAL STOCKS IN AGGREGATE UNDERPERFORM

In addition to removing new CEOs, we also know that quantitative models are less likely to work on stocks where there are large deals - basically the pro forma financials of the new entity render parts of our modeling process useless. In addition, the basket of stocks doing deals that are more than 20% of their market capitalization underperform the companies with no deal involvement, further supporting our judgment to “not be involved”.





PORTFOLIO OPTIMIZATION AND OTHER RISK MANAGEMENT ADVICE

After our quantitative models, macro-enhancement and removal of systematic fundamental events, we can provide value to investors through customized risk management

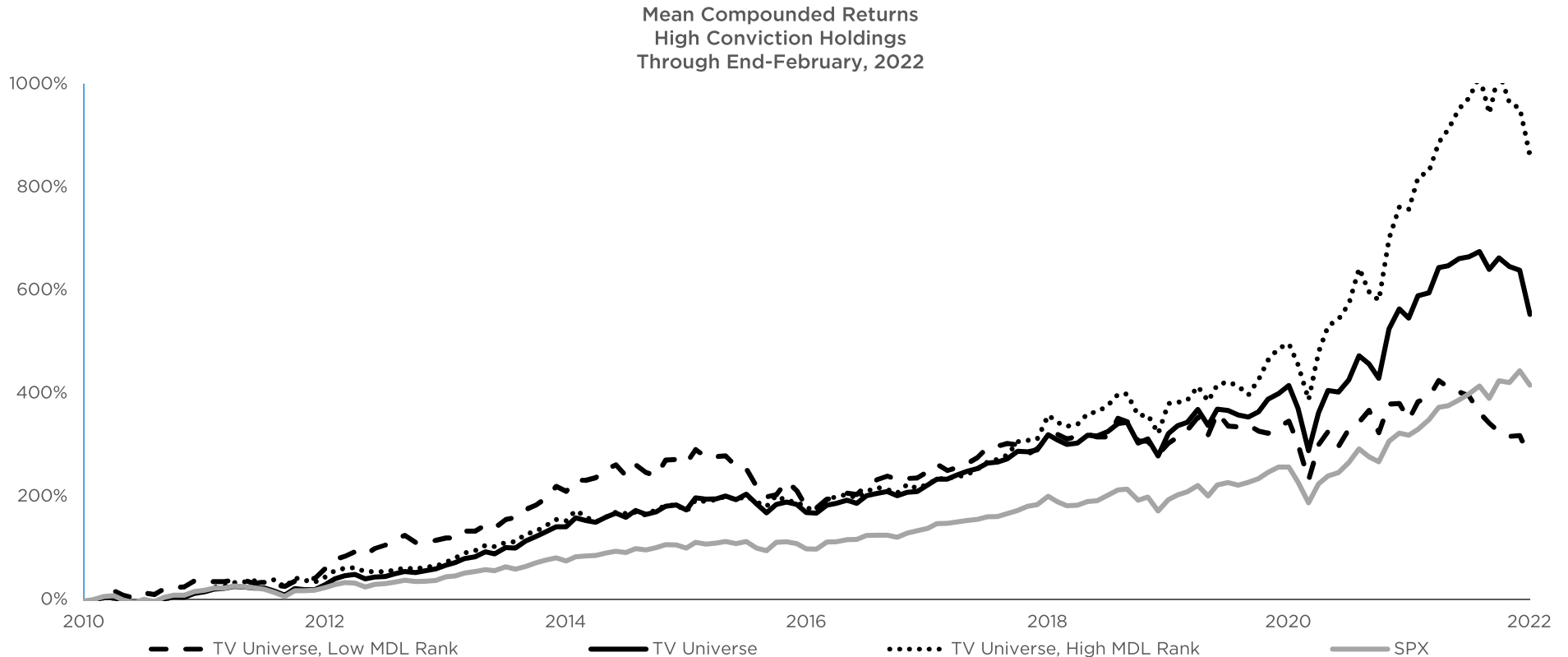


FINAL INVESTMENT ADVICE- WHAT ARE WE DOING?

- **Analyzing 13F filings for crowding:** We created a proprietary universe of hedge fund managers that we know and respect and defined a basket of their “high conviction” ideas – we think investors should avoid certain crowded names, and buy other names that are “high conviction” and out of consensus
- **Optimizing portfolios:** we can run a client’s portfolio through our proprietary optimizer to make stock and sizing recommendations
- **Differentiating risk management:** We feel that using an optimizer makes our advice analytically rigorous relative to traditional long / short funds. Relative to quantitative funds, we believe creating our own custom approach lowers the probability that our recommendations are the same as those guided or forced by funds who buy the same store-bought code
- **We offer bespoke risk management to our clients – please contact us if interested – we have signed many NDAs to engage in confidential “outsourced” risk management**

RESULTS ARE BEST WHEN OUR FUND UNIVERSE AND MODELS AGREE

We evaluated whether our models added incremental information to the fundamental high conviction ideas from our Trivariate universe of fund managers. The answer is yes. **Our models, when combined with high conviction names from 13F filings, add incremental value.** When our models disagree with our universe of managers, our models provide substantial additional information. “Good” crowding happens when the TV universe has high conviction in a stock and our quant models rank that stock in the top quintile. A good hedge is to short the names that rank poorly in the model.





SELECT QUANTITATIVELY-DERIVED LONG / SHORT IDEAS

We offer 10 long and 10 short ideas derived from our models.

Select Long and Short Ideas March 22, 2022

| Longs | | | | Shorts | | | |
|--------|----------------------------------|------------------------------------|-------------------------|--------|--|--|-------------------------|
| Ticker | Company Name | Industry Group | Market Cap (\$ US. Bil) | Ticker | Company Name | Industry Group | Market Cap (\$ US. Bil) |
| MSFT | Microsoft Corporation | Software & Services | 2099.65 | NVDA | NVIDIA Corporation | Semiconductors & Semiconductor Equipment | 552.50 |
| UNH | UnitedHealth Group Incorporated | Health Care Equipment & Services | 454.33 | BLK | BlackRock, Inc. | Diversified Financials | 104.46 |
| MS | Morgan Stanley | Diversified Financials | 151.90 | FIS | Fidelity National Information Services, Inc. | Software & Services | 54.46 |
| CI | Cigna Corporation | Health Care Equipment & Services | 72.81 | SNAP | Snap Inc. | Media & Entertainment | 48.81 |
| ICE | Intercontinental Exchange, Inc. | Diversified Financials | 71.00 | KHC | The Kraft Heinz Company | Food, Beverage & Tobacco | 45.72 |
| WM | Waste Management, Inc. | Commercial & Professional Services | 62.80 | LCID | Lucid Group, Inc. | Automobiles & Components | 37.89 |
| OXY | Occidental Petroleum Corporation | Energy | 54.13 | IFF | International Flavors & Fragrances Inc. | Materials | 30.09 |
| APD | Air Products and Chemicals, Inc. | Materials | 48.64 | FRC | First Republic Bank | Banks | 28.76 |
| OTIS | Otis Worldwide Corporation | Capital Goods | 30.77 | APTV | Aptiv PLC | Automobiles & Components | 28.72 |
| ZS | Zscaler, Inc. | Software & Services | 28.38 | CBRE | CBRE Group, Inc. | Real Estate | 28.50 |

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