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TRIVARIATE RESEARCH

THE EIGHT BIGGEST RISKS

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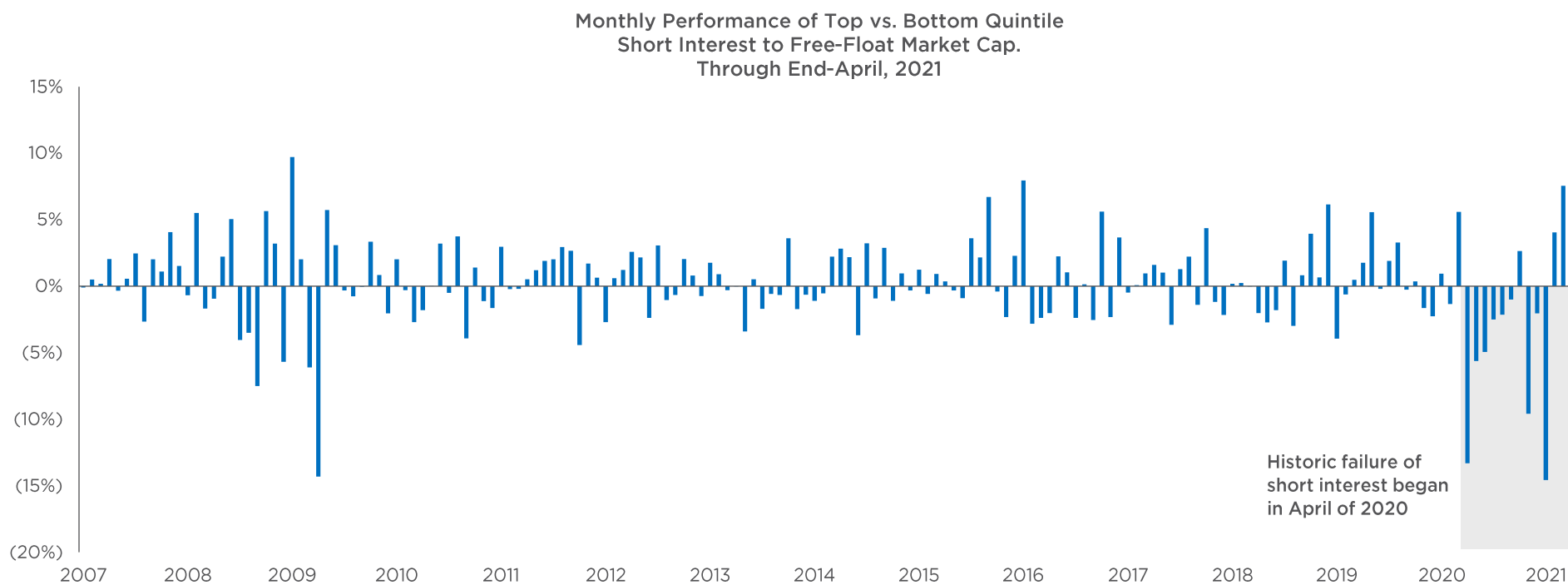
IF RISKS DID NOT CHANGE, ANYONE COULD DO RISK MANAGEMENT

- **8 key risks worth monitoring**

1. **Short interest:** Avoid shorting stocks with short interest greater than 15%
2. **Low price:** Avoid shorting the few remaining stocks that trade below \$5 a share
3. **Price momentum:** Measure price momentum over multiple horizons
4. **High signal correlation:** Variables both fundamental managers and quants use to pick winners from losers are highly correlated in both REITS and industrials
5. **COVID:** Quality “reopening” stocks have still massively underperformed “junk” “work from home” stocks – monitor exposure of “substance” and “work from home” / “reopening”
6. **Inflation:** We recommend looking at the correlation of every stock in your portfolio to an inflation basket (contact us if you want access to our inflation basket) to monitor exposure
7. **Correlations during downturns:** Many stocks become more correlated to other names during market sell-offs than during “normal” times, and an assessment of drawdowns can help locate better hedges
8. **Asymmetric betas:** Measure beta during downturns as there appears to be a consistent group of stocks that have much higher betas during market corrections than “normal” times –many of these are REITS

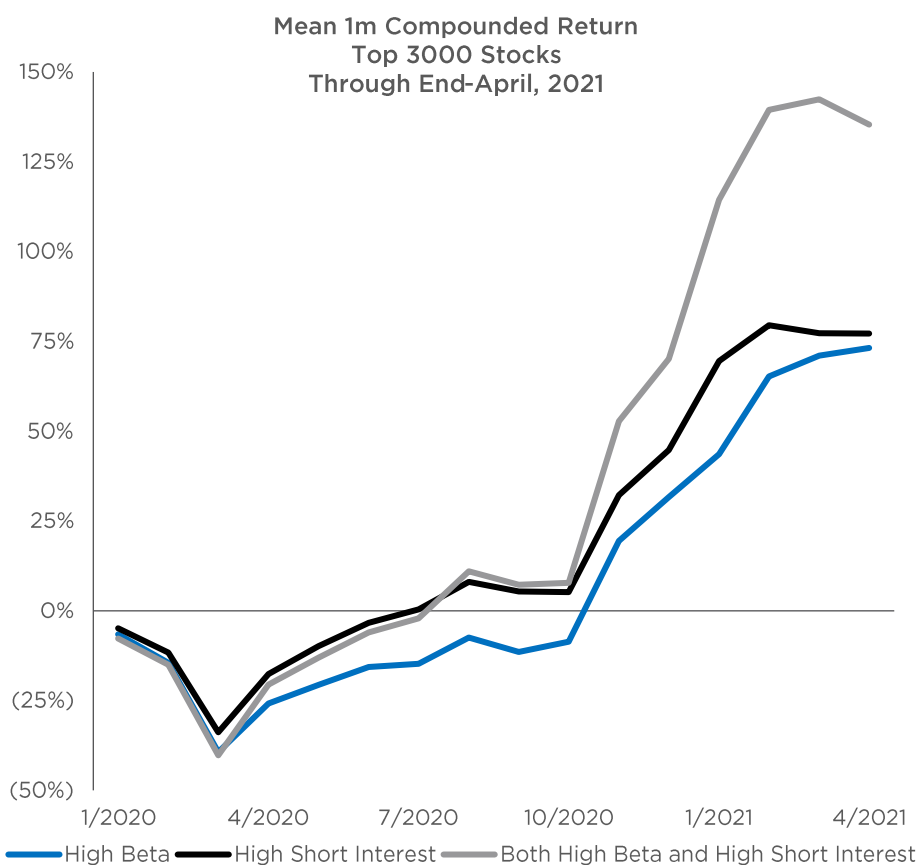
RISK ONE: HEAVILY SHORTED STOCKS

Many quantitative investors use high short interest as a signal to predict subsequent stock underperformance. Many fundamental managers share their top short ideas, fueling more short interest. As such, for long periods of time, stocks with high short interest underperformed. This materially failed beginning in 2020. At the hedge fund, Trivariate Capital, we ran last year, we wrote in our Q2 2020 letter that we did not think it was prudent to short stocks with short interest above 15% given the failures we saw immediately following the global financial crisis. We obviously did not foresee the retail armies that would form several months later, but there is no doubt that monitoring short interest and avoiding stocks with above 10% short interest remains prudent risk management into the second half of 2021, even with the recovery of the signal in recent months



HIGH BETA SHORT INTEREST IS PARTICULARLY RISKY

Both heavily shorted stocks and high beta stocks were risks in 2020, and stocks with both qualities remain a risk. That basket performed strongly as the economy recovered (left chart), and we would specifically be cautious of shorting the stocks in the top 5% on both metrics today (right chart)

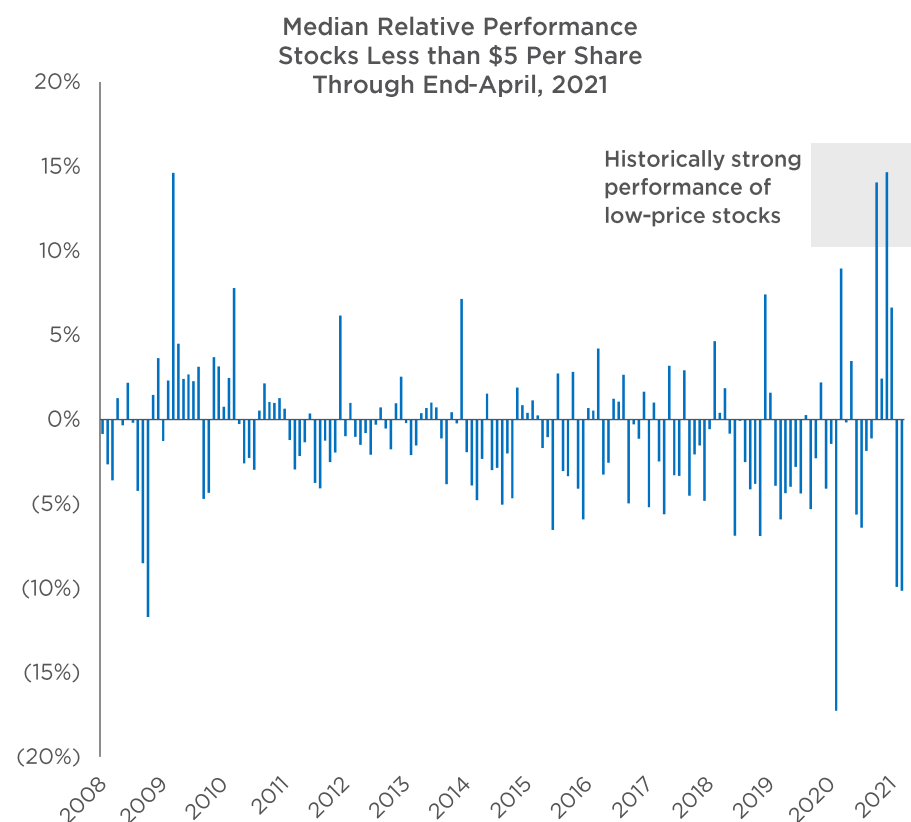


**Top 5% in Both Beta and Short Interest
May 21, 2021**

Ticker	Company	Market Cap. (US\$ Bil.)
Z	Zillow Group, Inc.	27.31
CREE	Cree, Inc.	11.12
RUN	Sunrun Inc.	9.37
CLF	Cleveland-Cliffs Inc.	9.02
LMND	Lemonade, Inc.	4.81
MSTR	MicroStrategy Incorporated	4.39
CELH	Celsius Holdings, Inc.	4.33
SABR	Sabre Corporation	4.09
SPWR	SunPower Corporation	4.06
BE	Bloom Energy Corporation	3.84
DDD	3D Systems Corporation	3.39
FCEL	FuelCell Energy, Inc.	2.87

RISK TWO: LOW PRICE STOCKS

After a long period where stocks that traded at less than \$5 per share underperformed, a huge recovery of “low price” stocks unfolded last year (left chart). When we were managing our hedge fund, we also implemented a rule not to short any stocks below \$5 a share last June and changed that to \$10 in the fall of 2020. A large low-quality recovery can make shorting low-price stocks very dangerous, another feature of the post-financial crisis recovery. While low price stocks have begun to underperform again the last two months, we continue to think it is dangerous to short stocks that trade below \$10 a share – today there are virtually no mega, large, or mid-cap stocks that are “low price” (see right chart for stocks currently below \$5 a share)



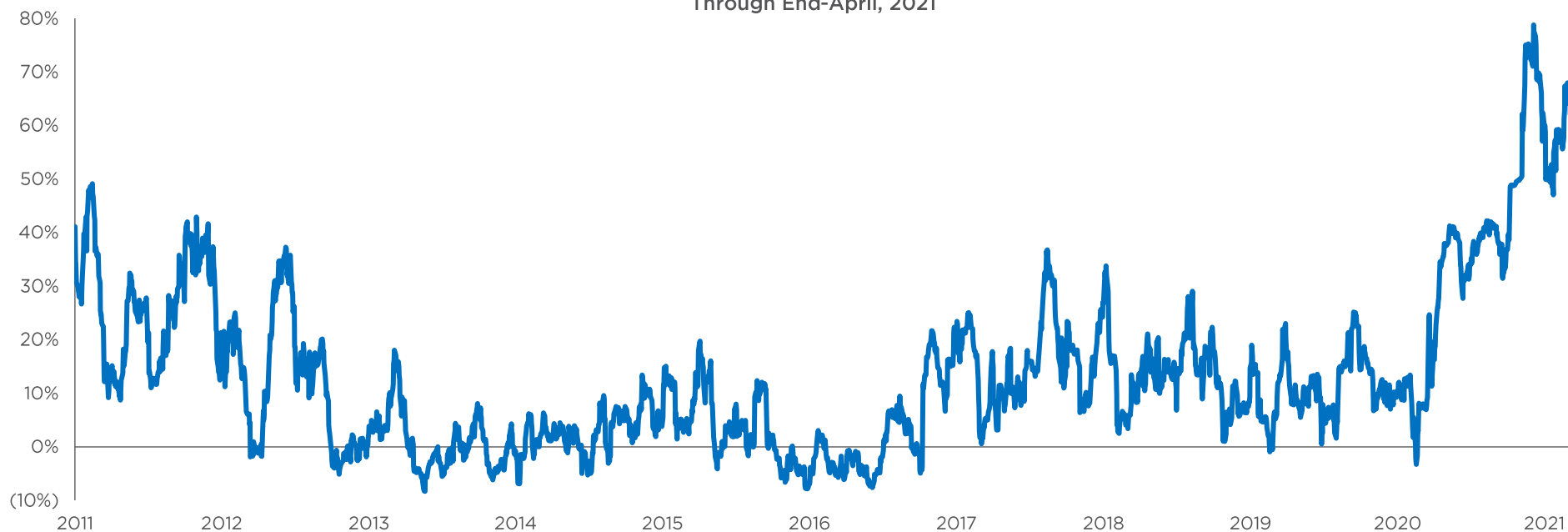
**Stocks Less than \$5 Per Share
Market Capitalization Greater than \$1 bn.
May 21, 2021**

Ticker	Company	Market Cap. (US\$ Bil.)
GSAT	Globalstar, Inc.	2.65
ENLC	EnLink Midstream, LLC	2.45
OPK	OPKO Health, Inc.	2.45
RIG	Transocean Ltd.	2.36
GNW	Genworth Financial, Inc.	2.12
MFA	MFA Financial, Inc.	1.95
NYMT	New York Mortgage Trust, Inc.	1.71
CDEV	Centennial Resource Development, Inc.	1.31
KOS	Kosmos Energy Ltd.	1.24
IDEX	Ideanomics, Inc.	1.17
MNMD	MindMed Inc.	1.17
CCO	Clear Channel Outdoor Holdings, Inc.	1.10
TELL	Tellurian Inc.	1.07
MNKD	MannKind Corporation	1.06

RISK FOUR: HIGHLY CORRELATED SIGNALS

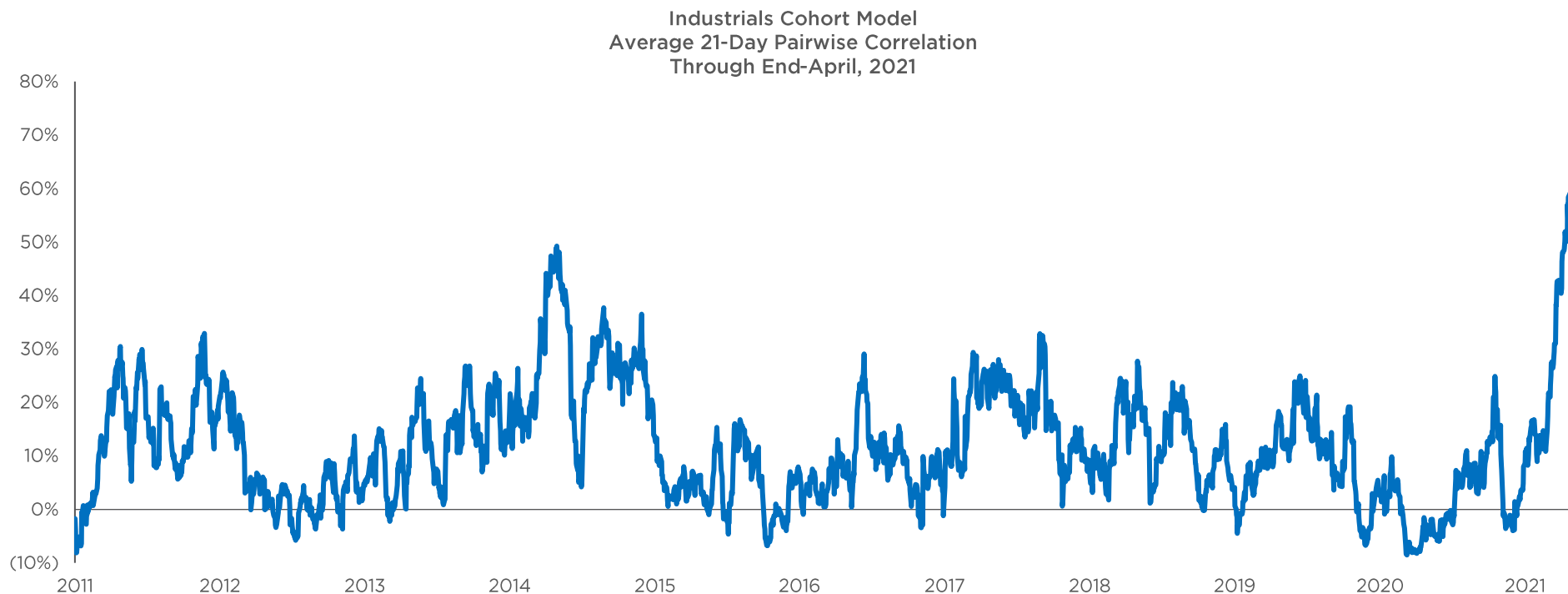
We analyzed all 21 of our quantitative models to see if signals have become increasingly correlated recently. The two biggest risks we see are the increased correlation in REITS and industrials. For REITs, we have a model comprised of eight signals to predict subsequent 18-month returns for stocks in that industry. There were sustained periods during our model development (2012-2017) where the average pairwise correlation of these signals was near zero (even briefly negative). However, right after the Pfizer vaccine announcement on November 9th of 2020, the average pairwise correlation of our REITs-model signals jumped to near 80% as REITs names rose indiscriminately. Fundamental managers who need to measure risks in the aggregate, even if they love each of their individual positions, should be mindful of signals where correlations have increased

REITS Cohort Model
Average 21-Day Pairwise Correlation
Through End-April, 2021



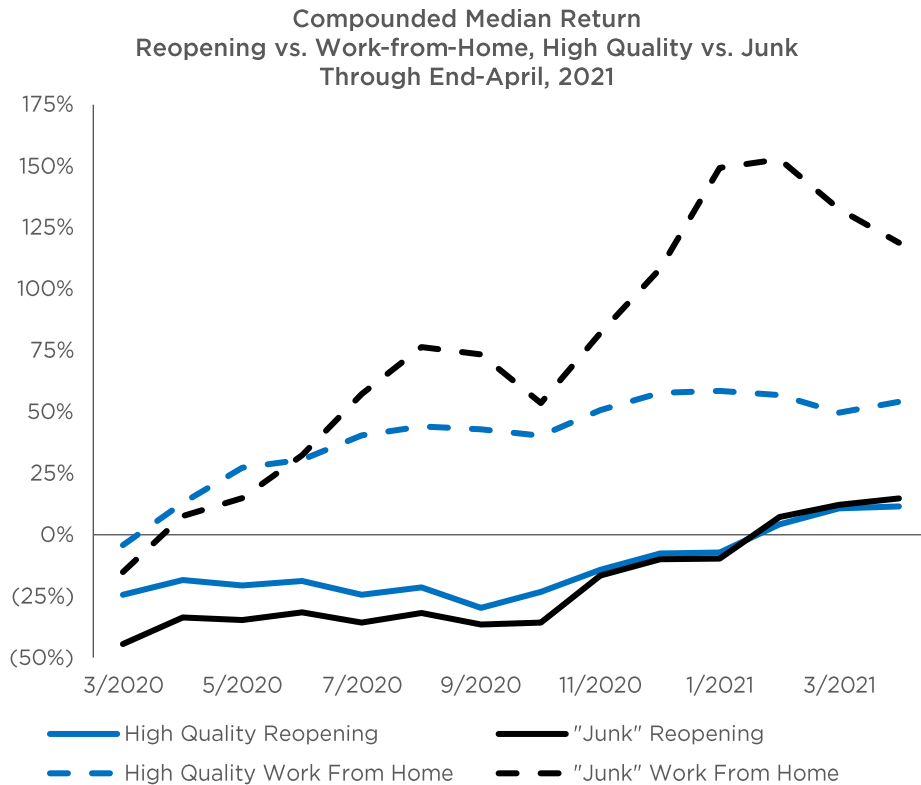
INDUSTRIALS ALSO HAVE UNPRECEDENTED SIGNAL CORRELATION

In our industrials model, we use eight signals to predict return, with valuation, balance sheet, growth and profitability, accounting, and sentiment signals all present in our final model. Recently, these signals have all become highly correlated, indicating that no signals are really a “hedge”, but rather signals that were historically uncorrelated are now highly correlated



RISK FIVE: WORK FROM HOME VS. REOPENING

We created “work from home” and “reopening” baskets and looked at the correlation of every stock in our universe to both baskets – clearly this was a major new risk to monitor that formed last year. Given the simultaneous move in “junk” and “reopening”, we looked at performance of work from home quality and junk and reopening quality and junk since March of 2020 (left exhibit). In our minds, high quality reopening names seem poised for incremental catch up, and junk “work from home” ideas could continue to lag (right exhibit for ideas)

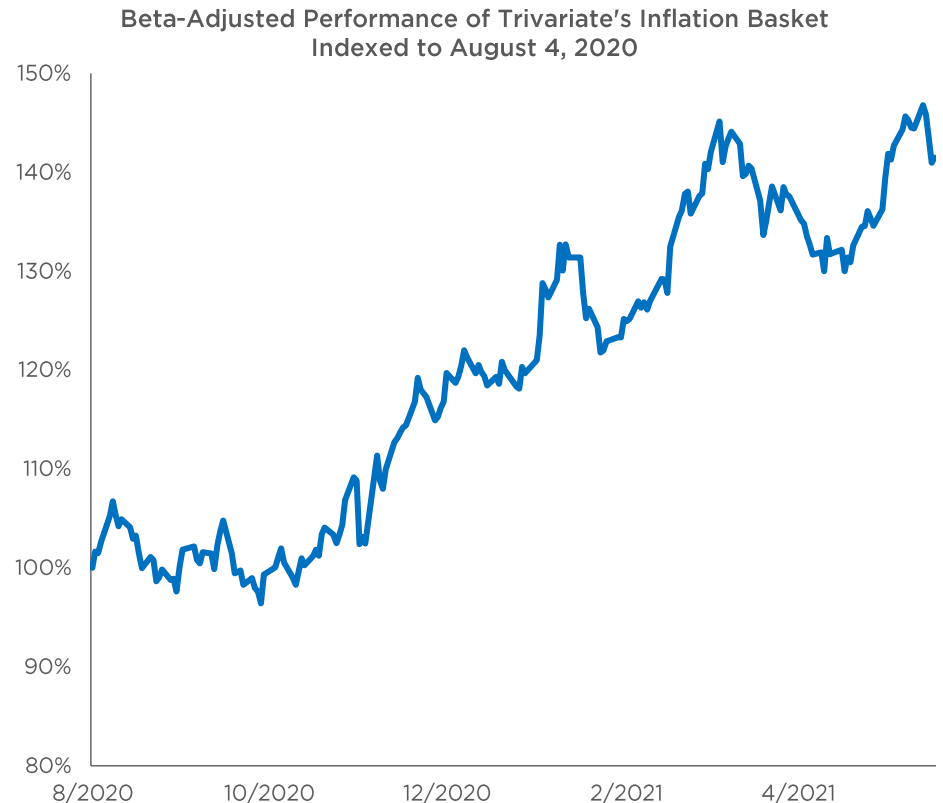
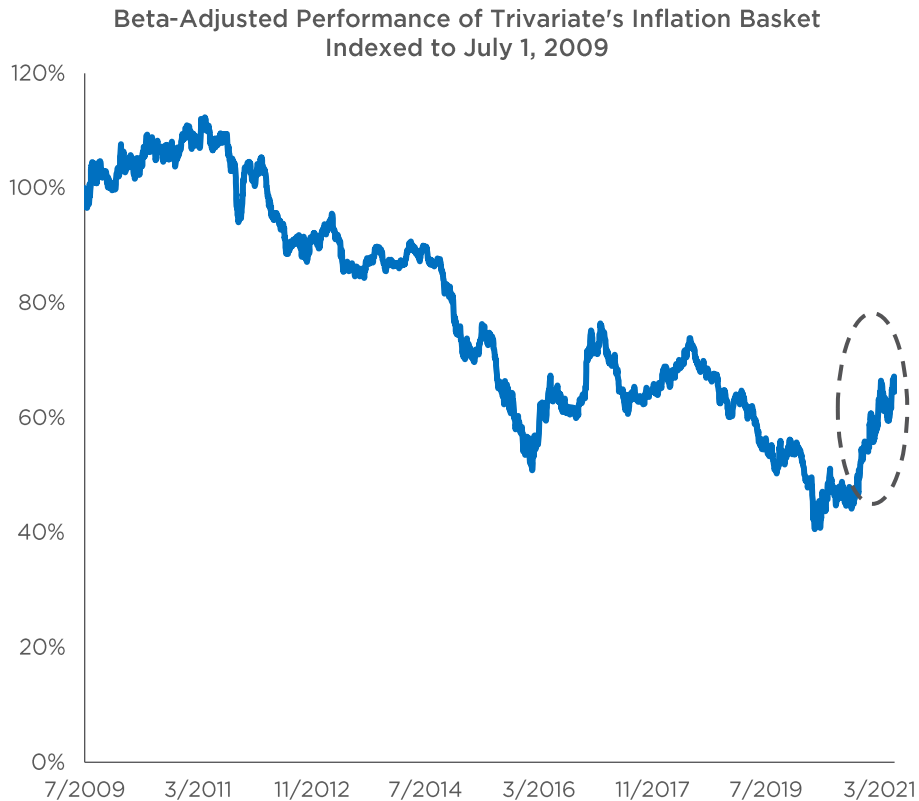


**Buy High Quality Reopening, Sell “Junk” Work-from-Home
Names in Top/Bottom Model Quartile with Market Cap. of at least \$1 Bil.
May 21, 2021**

Long			
Ticker	Company Name	Industry Group	Market Cap (\$ US. Bil)
PB	Prosperity Bancshares, Inc.	Banks	7.06
THC	Tenet Healthcare Corporation	Health Care Providers & Services	6.75
AX	Axos Financial, Inc.	Thriffs & Mortgage Finance	2.71
OLL	Oceaneering International, Inc.	Energy Equipment & Services	1.41
HNGR	Hanger, Inc.	Health Care Providers & Services	1.00
Short			
Ticker	Company Name	Industry Group	Market Cap (\$ US. Bil)
CHWY	Chewy, Inc.	Internet & Direct Marketing Retail	28.14
VRM	Vroom, Inc.	Specialty Retail	6.02
FOUR	Shift4 Payments, Inc.	IT Services	4.61
GRWG	GrowGeneration Corp.	Specialty Retail	2.20
VLDR	Velodyne Lidar, Inc.	Electronic Equipment, Instruments & Components	1.94

RISK SIX: INFLATION EXPOSURE MATTERS

Following the quantitative easing phase in 2010-2012, there were fleeting fears of inflation that never materialized (left exhibit below). But since the 10-year yield bottom last August, our inflation basket has beaten the market by over 30% on a beta-adjusted basis (right exhibit below). Nearly every investor we talk to thinks interest rates will rise, but commodity / oil inflation is transitory. That probably summarizes the risk – if the 10-year does not rise, but oil / commodities continue to rise, some investors may be offside. We think investors should be long inflation in their portfolios, but prefer healthcare services, energy and materials based on valuation and relative estimate achievability to utilities and banks (see our 2-part series on inflation published earlier this month)



RISK SIX: MONITOR YOUR INFLATION EXPOSURE

We think monitoring inflation exposure will be key for the rest of 2021 – we compute the correlation between every US stock and our inflation basket in order to monitor inflation exposure. See below for the most and least correlated stocks

Most and Least Correlated to Trivariate Inflation Basket, May 21, 2021

Correlated				Anticorrelated			
Ticker	Company Name	Industry Group	Market Cap (\$ US. Bil)	Ticker	Company Name	Industry Group	Market Cap (\$ US. Bil)
BAC	Bank of America Corporation	Banks	363.34	AAPL	Apple Inc.	Technology Hardware, Storage & Peripherals	2093.13
XOM	Exxon Mobil Corporation	Oil, Gas & Consumable Fuels	249.44	MSFT	Microsoft Corporation	Software	1846.52
C	Citigroup Inc.	Banks	160.51	AMZN	Amazon.com, Inc.	Internet & Direct Marketing Retail	1615.39
CAT	Caterpillar Inc.	Machinery	129.96	FB	Facebook, Inc.	Interactive Media & Services	896.66
USB	U.S. Bancorp	Banks	89.93	NVDA	NVIDIA Corporation	Semiconductors & Semiconductor Equipment	373.22
PNC	The PNC Financial Services Group, Inc.	Banks	82.20	PYPL	PayPal Holdings, Inc.	IT Services	294.49
TFC	Truist Financial Corporation	Banks	81.87	ADBE	Adobe Inc.	Software	233.94
MET	MetLife, Inc.	Insurance	56.65	NFLX	Netflix, Inc.	Entertainment	220.77
BK	The Bank of New York Mellon Corporation	Capital Markets	45.14	TMO	Thermo Fisher Scientific Inc.	Life Sciences Tools & Services	181.71
SLB	Schlumberger Limited	Energy Equipment & Services	44.68	COST	Costco Wholesale Corporation	Food & Staples Retailing	168.48
PRU	Prudential Financial, Inc.	Insurance	42.12	NOW	ServiceNow, Inc.	Software	92.70
LYB	LyondellBasell Industries N.V.	Chemicals	36.95	CCI	Crown Castle International Corp.	REITs	80.19
VLO	Valero Energy Corporation	Oil, Gas & Consumable Fuels	31.56	ATVI	Activision Blizzard, Inc.	Entertainment	74.10
NUE	Nucor Corporation	Metals & Mining	30.56	EQIX	Equinix, Inc.	REITs	64.97
FITB	Fifth Third Bancorp	Banks	29.51	IDXX	IDEXX Laboratories, Inc.	Health Care Equipment & Supplies	46.00
HES	Hess Corporation	Oil, Gas & Consumable Fuels	25.11	DLR	Digital Realty Trust, Inc.	REITs	42.49
KEY	KeyCorp	Banks	22.44	EA	Electronic Arts Inc.	Entertainment	40.32
RF	Regions Financial Corporation	Banks	21.88	VEEV	Veeva Systems Inc.	Health Care Technology	39.78
CFG	Citizens Financial Group, Inc.	Banks	21.04	MSCI	MSCI Inc.	Capital Markets	37.66
MTB	M&T Bank Corporation	Banks	20.90	CMG	Chipotle Mexican Grill, Inc.	Hotels, Restaurants & Leisure	37.44

RISK SEVEN: BEAR CASE CORRELATIONS THAT RISE

We analyzed stock performance during market drawdowns of 10% or more and noticed that some stocks become increasingly correlated during market pullbacks. We like to monitor “bear case” correlations so we are not misled about the portfolio being hedged or defensive when there is a measurable phenomena during downturns

Names with Higher 126d Correlations to Peers During SPX Drawdowns of at Least 10%, End-April, 2021

Ticker	Company	Industry Group	Market Cap. (US\$ Bil.)
WMT	Walmart Inc.	Food & Staples Retailing	398.81
VZ	Verizon Communications Inc.	Diversified Telecommunications Services	235.61
ORCL	Oracle Corporation	Software	227.89
PFE	Pfizer Inc.	Pharmaceuticals	223.63
MCD	McDonald's Corporation	Hotels, Restaurants & Leisure	172.55
COST	Costco Wholesale Corporation	Food & Staples Retailing	168.48
TGT	Target Corporation	Multiline Retail	111.67
EW	Edwards Lifesciences Corporation	Health Care Equipment & Supplies	58.56
PSA	Public Storage	REITs	48.42
DLR	Digital Realty Trust, Inc.	REITs	42.49
ORLY	O'Reilly Automotive, Inc.	Specialty Retail	37.96
CTSH	Cognizant Technology Solutions Corporation	IT Services	37.57
AZO	AutoZone, Inc.	Specialty Retail	32.18
EQR	Equity Residential	REITs	28.05
AVB	AvalonBay Communities, Inc.	REITs	27.93
K	Kellogg Company	Food Products	22.64
CLX	The Clorox Company	Household Products	22.18
PCG	PG&E Corporation	Electric Utilities	20.41
EVRG	Evergy, Inc.	Electric Utilities	14.34
UDR	UDR, Inc.	REITs	13.76

RISK EIGHT: NEGATIVE ASYMMETRIC BETA

We analyzed the beta of stocks during periods where the market is down 10% or more. 22 of the 25 stocks with the highest negative asymmetric betas are REITs (left side) where reopening exposure is also high. Non-REITs are shown on the right. This list represents names where we expect high underperformance in a market drawdown.

Names with Higher 252d Betas During SPX Drawdowns of at Least 10%, End-April 2021

REITs				Non-REITs			
Ticker	Company Name	Industry Group	Market Cap (\$ US. Bil)	Ticker	Company Name	Industry Group	Market Cap (\$ US. Bil)
PLD	Prologis, Inc.	REITs	86.95	SQ	Square, Inc.	IT Services	91.08
PSA	Public Storage	REITs	48.42	ICE	Intercontinental Exchange, Inc.	Capital Markets	63.68
SPG	Simon Property Group, Inc.	REITs	40.21	EXC	Exelon Corporation	Electric Utilities	44.79
SBAC	SBA Communications Corporation	REITs	31.81	TROW	T. Rowe Price Group, Inc.	Capital Markets	43.59
EQR	Equity Residential	REITs	28.05	ORLY	O'Reilly Automotive, Inc.	Specialty Retail	37.96
AVB	AvalonBay Communities, inc.	REITs	27.93	LEN	Lennar Corporation	Household Durables	28.93
ARE	Alexandria Real Estate Equities, Inc.	REITs	25.75	NDAQ	Nasdaq, Inc.	Capital Markets	26.98
O	Realty Income Corporation	REITs	24.87	PPL	PPL Corporation	Electric Utilities	22.70
VTR	Ventas, Inc.	REITs	20.31	TDOC	Teladoc Health, Inc.	Health Care Technology	21.71
EXR	Extra Space Storage Inc.	REITs	19.50	LYV	Live Nation Entertainment, Inc.	Entertainment	19.52
ESS	Essex Property Trust, Inc.	REITs	18.73	DECK	Deckers Outdoor Corporation	Textiles, Apparel & Luxury Goods	9.46
MAA	Mid-American Apartment Communities, Inc.	REITs	17.98	GPK	Graphic Packaging Holding Company	Containers & Packaging	5.10
PEAK	Healthpeak Properties, Inc.	REITs	17.75	TIGO	Millicom International Cellular S.A.	Wireless Telecommunication Services	4.55
BXP	Boston Properties, Inc.	REITs	17.49	GRA	W. R. Grace & Co.	Chemicals	4.53
UDR	UDR, Inc.	REITs	13.76	RDN	Radian Group Inc.	Thriffs & Mortgage Finance	4.40
ELS	Equity LifeStyle Properties, Inc.	REITs	12.84	UMPQ	Umpqua Holdings Corporation	Banks	4.16
CPT	Camden Property Trust	REITs	12.01	MTH	Meritage Homes Corporation	Household Durables	4.00
REG	Regency Centers Corporation	REITs	10.73	CCOI	Cogent Communications Holdings, Inc.	Diversified Telecommunication Services	3.41
KIM	Kimco Realty Corporation	REITs	8.83	EXLS	ExlService Holdings, Inc.	IT Services	3.34
VNO	Vornado Realty Trust	REITs	8.78	AUB	Atlantic Union Bankshares Corporation	Banks	3.32

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