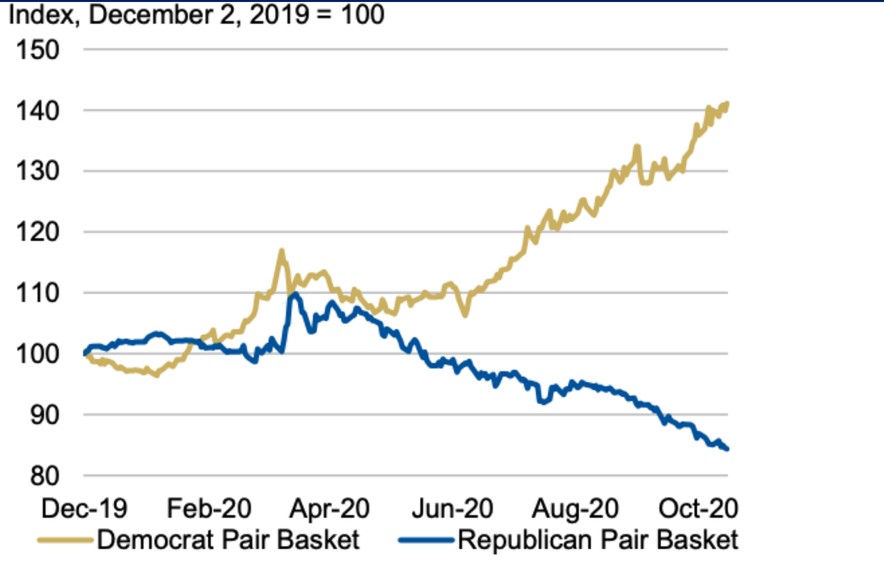
Astoria's Investment Committee Quarterly Review

The Economic and Earnings Cycles are More Important than the Presidential Cycle.

Election Commentary

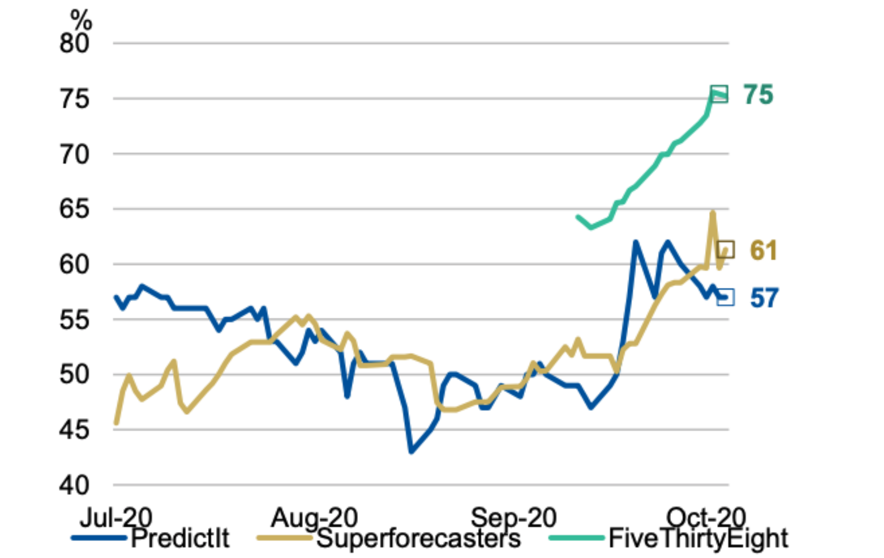
The stock market is currently pricing in a Democratic President. If Biden wins, will investors take profits before year-end out of fear of higher capital gains taxes in 2021?

Performance of the Democratic Pair Basket of Stocks vs. Republican Pair Basket of Stocks



Source: Morgan Stanley Research; Note: The Democratic Pair Basket (MSXXDEM) represents an equal notional pair trade of going long the Democratic Policy Outperformers (MSXXDEML) and short the Democratic Policy Underperformers (MSXXDEMS). The Republican Pair Basket (MSXXREP) represents an equal notional pair trade of going long the Republican Policy Outperformers (MSXXREPL) and short the Republican Policy Underperformers (MSXXREPS).

Unconditional vs. Joint Probabilities of a Blue Sweep: Market Prices vs. Superforecasters vs. FiveThirtyEight*



Source: Morgan Stanley Research, Goodjudgment.com, Bloomberg, PredictIt.org, FiveThirtyEight; *The probabilities from FiveThirtyEight are joint probabilities, whereas probabilities from the Superforecasters are unconditional probabilities.

Below are Morgan Stanley's estimates for what happens to various asset classes, post election.

Asset Class: Straightaways & Detours by Scenario (President/Senate/House)

	Blue Sweep (DDD)		Blue Tide (DRD)		Thin Red Line (RRD)		Red Redux (RRR)	
Asset Class	Straightaway	Detour	Straightaway	Detour	Straightaway	Detour	Straightaway	Detour
S&P 500		↘ ↗		↗ ↘		↗ ↘	↗	
MSCI EM	↗		↘			—		—
TOPIX	↗		↘			—		—
MSCI Europe	↗			↘ ↗	↗		↗	
MSCI Russia		↘ ↗		↘ ↗	↗		↗	
UST 10yr Yield	↗			↘	↗		↗	
UST 30yr Yield	↗			↘	↗		↗	
10yr B/E	↗			↘	↗		↗	
EM Sov Credit	↗			↘ ↗		↘ ↗		↘ ↗
CDX HY	↗			↘ ↗		↘ ↗	↗	
CDX IG	↗			↘ ↗		↘ ↗	↗	
Agency MBS OAS	↗		—		—		↗	
WTI	↘							↗

Source: Morgan Stanley Research. See US Public Policy: US Election: Road Rules for Investors (9 Oct 2020) for more detail.

Morgan Stanley's Executive, Legislative, and Net Fiscal Impact Policy Outcomes (see footnotes for RRD, DRD, DDD, and RRR)

Policy Outcomes Under the Four Election Scenarios (President/Senate/House)

		Divided Government		Unified Government	
	Policy	Thin Red Line (RRD)	Blue Tide (DRD)	Blue Wave (DDD)	Red Redux (RRR)
Executive	Jobs-Related Immigration Restriction	P			P
Executive	Disengagement from Multilateral Agreements & Institutions	P			P
Executive	Re-engagement with Multilateral Agreements & Institutions		P	P	
Legislative	Tax 2.0: Extending Individual Tax Cuts, Deduct Start-Up Costs, Repeal R&D Tax Cliff				P
Legislative	SALT Cap Repeal			P	
Legislative	Energy or Oil Sector Aid: Section 232 Tariffs, Direct Aid Payments, or IEEPA				P
Legislative	Bipartisan Prescription Drug Pricing Bill	P	P		
Legislative	Healthcare Reform Short of Medicare for All			P	
Legislative	Raise Minimum Wage			P	
Legislative	Regulatory Push for Tech Regulation; Net Neutrality; Environmental Issues; Financial Regulation		P	P	
Legislative	Immigration Reform			P	
Legislative	Infrastructure Project			P	P
Net Fiscal Impact	Proactive Fiscal Expansion			P	P
Net Fiscal Impact	Reactive Fiscal Expansion	P			

Source: Morgan Stanley Research. See 2020 US Election: A Revised Guide to Economic Policy Paths & Market Impacts (8 Jun 2020) for more detail. RRD = Republican President, Republican Senate, and Democratic House. DRD: Democratic President, Republican Senate, Democratic House. DDD = Democratic President, Democratic Senate, Democratic House. RRR = Republican President, Republican Senate, Republican House.

Morgan Stanley's fiscal impact by Election Scenario (see footnotes for DDD, DRD, RRD, and RRR).

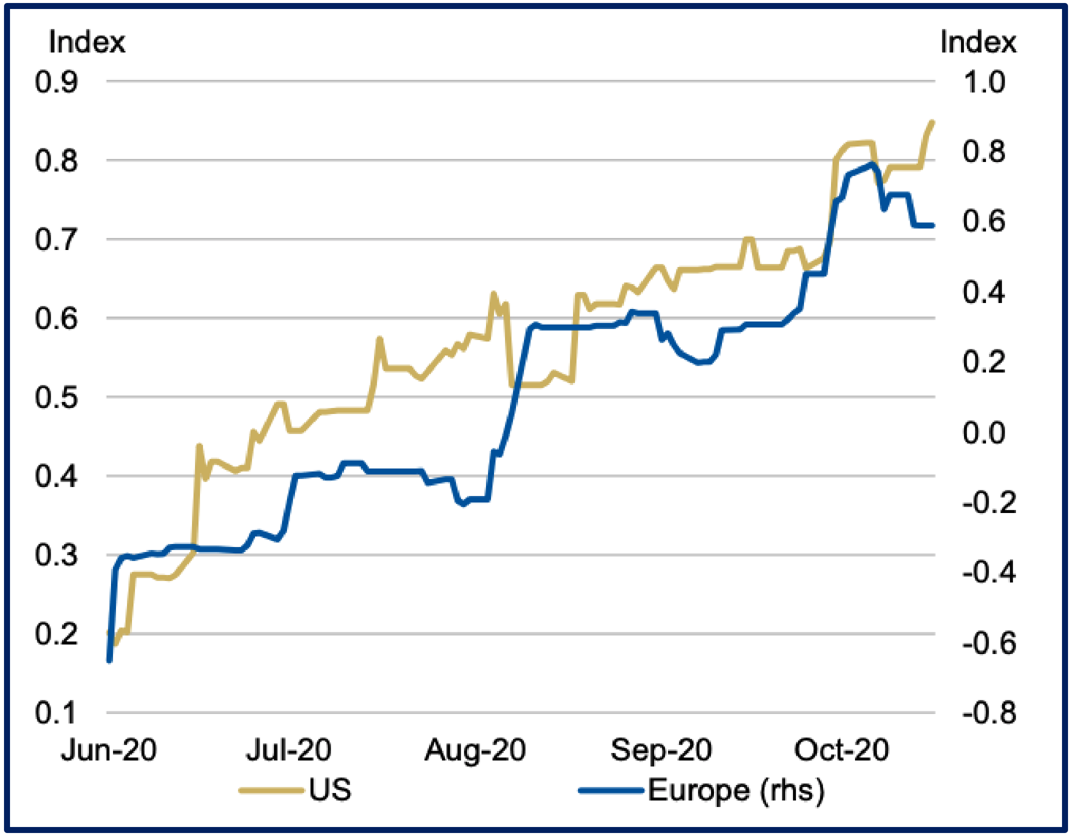
Fiscal Impact by Scenario (President/Senate/House)

Scenario	Market Perception	Plausible Policy Path
Blue Sweep (DDD)	Risk that growth is curbed by rising corporate and personal tax rates; Risk of selling into YE due to concerns re: increase in capital gains rates	**Fiscal Expansion:** -Most potential for transformative legislative change -$1-2T net deficit expansion drive by healthcare and/or infrastructure -Policies will skew moderate to pass a D senate, limiting tax increases -Voter indifference toward deficits is backed by our AlphaWise poll, and supports the notion that Democrats may not be incentivized to fully pay for their plans
Blue Tide (DRD)	Gridlock	**Gridlock only broken upon weaker markets or economy:** -Unlikely to deliver meaningful legislative change -Do not expect further fiscal stimulus unless prodded by a substantial downturn in economic activity -Deficit-wary Senate Republicans could have less incentives to support stimulus with Democrats in the White House
Thin Red Line (RRD)	Gridlock	**Gridlock, but low threshold for reaactive fiscal stimulus:** -Expect reactive fiscal stimulus if economy requires further aid -Republicans, as party in power, will have a political incentive to deliver aid -It is core to Democrats' policy brand to deliver government assistance in times of need -Outside of reactive fiscal stimulus, do not see scope for significant policy and consequential fiscal impact
Red Redux (RRR)	Tax-driven stimulus	**Tax-driven stimulus:** -Expect early extension of 2017 TCJA, unmet by sufficient spending cuts -Extending four key corporate provisions will cost $800bn over 10-year budget window

Source: Morgan Stanley Research. Note: Morgan Stanley's AlphaWise provides proprietary evidence-based investment research. See US Public Policy: US Election: Road Rules for Investors (9 Oct 2020) for more detail. DDD = Democratic President, Democratic Senate, Democratic House. DRD: Democratic President, Republican Senate, Democratic House. RRD = Republican President, Republican Senate, and Democratic House. RRR = Republican President, Republican Senate, Republican House.

Astoria believes that despite the election noise that comes in the following weeks, stocks can do well. Why? Macro-economic data and earnings are improving.

Bloomberg US and Europe Economic Surprise Indices



Source: Bloomberg, Morgan Stanley Research

Reviewing APA's Portfolio Tilts

Astoria's Dynamic Portfolio Construction process is centered around 3 Cohorts

I. Macro-Economic Policy
LEI, Conference Board, etc.

II. Valuations + Earnings
Equity Risk Premiums, Case Shiller, etc.

III. Academic
Factors tested as persistent, pervasive, robust, having empirical evidence, etc.

- **All 3** signals need to work for Astoria to rotate our dynamic portfolios.
- In 2017, Astoria was early to include **high Quality** stocks, notice the slowing business cycle, and understand empirical evidence indicating the resilience of high Quality stocks during the later stage of economic cycle.
- Astoria focuses on strategic long-term investments. We typically experience 30% turnover per year assuming normal market conditions.
- Astoria believes that **tilting** our portfolios towards factors paired with the inclusion of **alternatives** can help deliver attractive risk-adjusted returns compared to the benchmark over time.

Source: Astoria Portfolio Advisors.

Astoria's Dynamic Portfolio Construction process is centered around 3 Cohorts (Continued)

I. Macro-Economic Policy
LEI, Conference Board, etc.

II. Valuations + Earnings
Equity Risk Premiums, Case Shiller, etc.

III. Academic
Factors tested as persistent, pervasive, robust, having empirical evidence, etc.

- Using these cohorts, most of Astoria's dynamic ETF managed portfolios have **outperformed their benchmarks for 3 years straight**. Refer to our appendix for the historical performance of Astoria's dynamic ETF portfolios. Past performance is not indicative of future results.
- Other examples of outperformance using these cohorts:
  - Astoria was early to be **OW China** in its portfolios.
  - Astoria **avoided illiquid** fixed income / high yield credit during the Spring 2020 COVID period in the market.
  - Astoria has been **long gold** for 3 years.
  - Astoria began allocating to **Small/Mid-cap** stocks and cyclicals in early Q2.

Source: Astoria Portfolio Advisors.

Astoria's (APA) Current Model Holdings

ETF Ticker	Model: Dynamic Aggressive	Dynamic Growth	Multi-Asset Risk Strategy	Dynamic Growth & Income	Dynamic Conservative	Risk Managed Dynamic Income
DGRW	17.00%	15%	15%	12%	7.5%	8.0%
GDX	2.50%	3%	3%	3%	2.5%	1.0%
USMF	10.00%	8%	–	7%	4.0%	–
MNA	1.00%	1%	3%	1%	1.0%	–
BTAL	5.50%	6%	8%	6%	5.5%	2.0%
EES	3.00%	3%	3%	2%	–	–
MCHI	3.50%	3%	4%	3%	–	–
IHDG	19.00%	17%	12%	14%	9.0%	4.5%
VMBS	–	2%	3%	3%	5.0%	7.5%
GLDM	6.00%	6%	8%	6%	6.0%	2.0%
DGRE	9.50%	8%	8%	7%	6.0%	3.0%
SPAB	4.00%	9%	13%	15%	25.0%	39.0%
USMV	6.00%	6%	4%	5%	3.0%	–
QLTA	2.00%	4%	4%	5%	8.0%	11.5%
LQD	2.00%	4%	4%	5%	8.0%	11.5%
VTIP	1.50%	2%	3%	3%	5.0%	7.5%
VOT	4.00%	4%	3%	3%	3.0%	1.5%
VUG	–	–	3%	–	–	–
PFF	3.50%	3%	3%	3%	1.5%	1.0%
Total	100%	100%	100%	100%	100%	100%

Source: Astoria Portfolio Advisors. ETF holdings and weights as of September 30, 2020.

Per Vanguard's tool, the models are UW North America (150-350bps), OW Greater Asia (100-500bps), and OW Asia EM (250-800bps).

Portfolio Construction Tilts: Equity Region, Country, and Factor Exposure

Model	Country/Region Tilts (bps)				US Factor Exposure (bps)	
	North America	Europe	Greater Asia	Asia EM	Value	Growth
Dynamic Aggressive Model	-299	1	271	505	-226	-1063
Dynamic Growth Model	-302	37	342	469	-183	-929
Multi-Asset Risk Strategy	-347	-208	515	809	-115	-678
Dynamic Growth & Income Model	-259	-7	240	475	-180	-802
Dynamic Conservative Model	-233	27	144	271	-153	-515
Risk Managed Dynamic Income Model	-177	-22	137	275	46	-226

Source: Vanguard, Astoria Portfolio Advisors. Data as of September 30, 2020.

Per Vanguard's tool, the models have a strategic OW to Corporate (2000-3250bps) and Securitized Credit (750-1050bps) which comes mostly at the expense of the UW to Government (2750-3200bps). The models are UW duration (by approximately 3 years) relative to our benchmark.

Portfolio Construction Tilts: Fixed Income Sectors

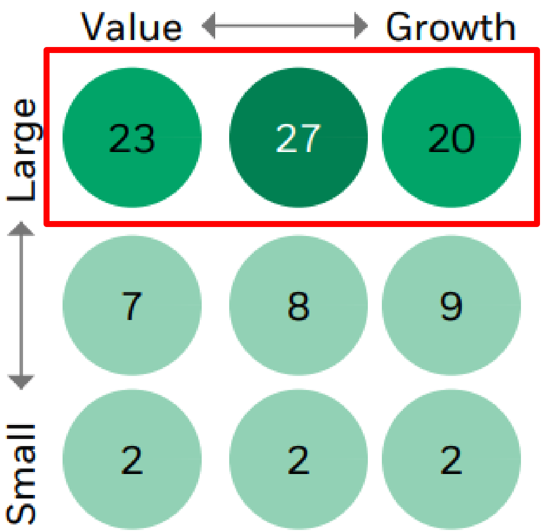
Model	Fixed Income Tilts (bps)				
	Government	Municipal	Corporate	Securitized	Duration
Dynamic Aggressive Model	-2764	-9	3268	-133	-3.1
Dynamic Growth Model	-3212	-8	2732	752	-3.18
Multi-Asset Risk Strategy	-2822	-5	2012	1039	-3.16
Dynamic Growth & Income Model	-2976	-5	2314	912	-3.07
Dynamic Conservative Model	-3034	-5	2423	869	-3.07
Risk Managed Dynamic Income Model	-2974	-4	2316	910	-3.05

Source: Vanguard, Astoria Portfolio Advisors. Data as of September 30, 2020. All data shown is expressed in basis points (bps) aside from Duration.

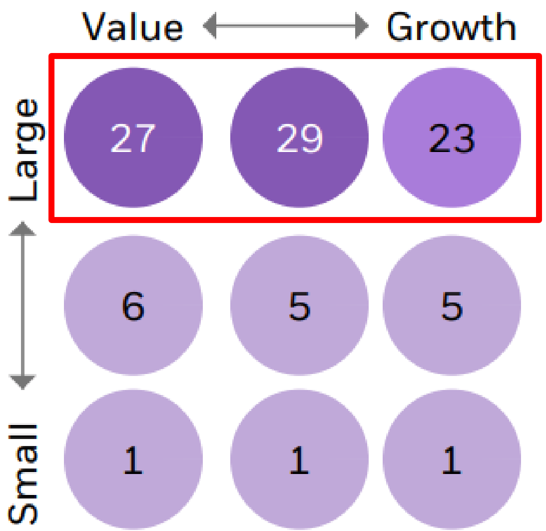
Per BlackRock's tool, APA's Growth & Income Model is strategically in-line with the benchmark and has slight factor tilts.

Equity Style

APA Growth & Income September 2020



APA Growth & Income Benchmark



Source: BlackRock. Data as of August 31, 2020.

According to BlackRock's tool, APA's Core Risk Based ETF Portfolios are OW Size, OW Quality, and UW Value.

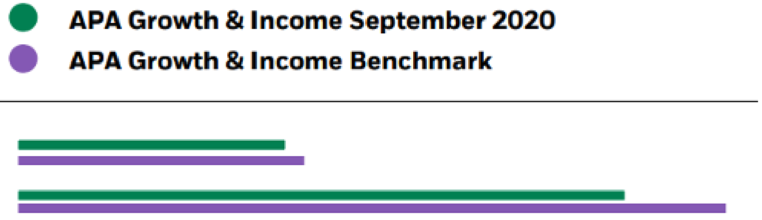
Equity Factors

Source: BlackRock. Data as of August 31, 2020.

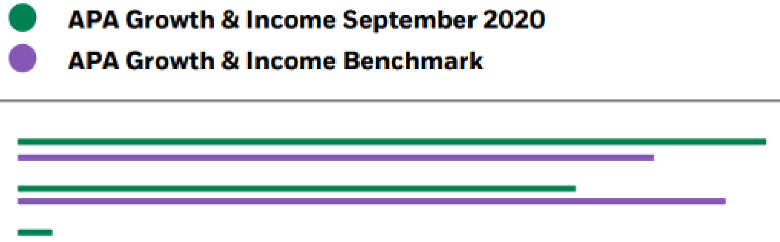
APA's Growth & Income Model is OW AAA credits as they typically provide negative correlation towards stocks. This is contrary to most model portfolios which go down the credit curve to gain yield.

Fixed Income Characteristics and Credit Quality

Characteristic	APA Growth & Income September 2020	APA Growth & Income Benchmark
12 Month Trailing Yield	2.63%	2.79%
Avg. Effective Duration	5.90yr	6.89yr



Credit Quality	APA Growth & Income September 2020	APA Growth & Income Benchmark
AAA	55.53%	47.35%
Investment Grade	41.59%	52.63%
High Yield	2.88%	0.03%
Not Rated	0.00%	0.00%

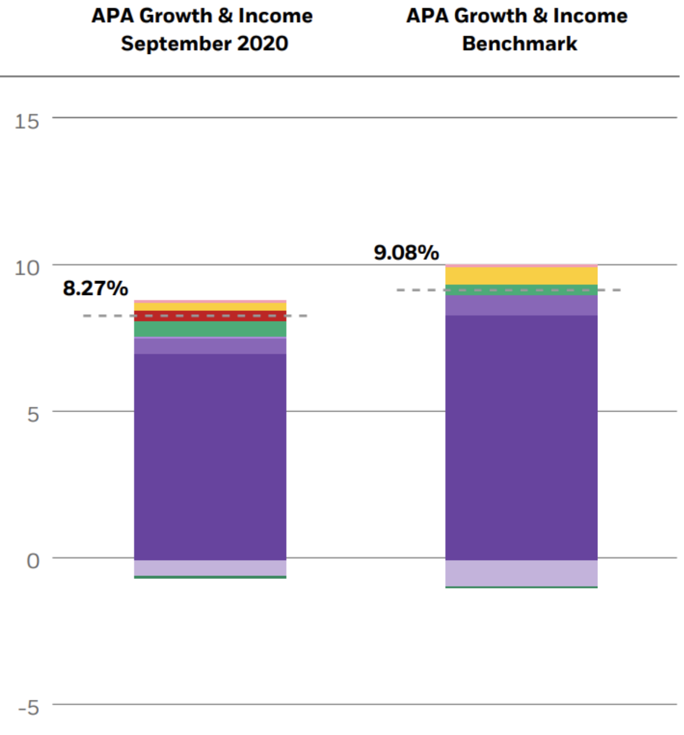


Source: BlackRock. Data as of August 31, 2020.

Per BlackRock's tool, APA's Growth & Income Model is projected to generate less risk than the benchmark from an equity standpoint. On the fixed income side, it is projected to generate more credit spread risk than the benchmark (this is due to the OW to Corporates).

Risk Factors

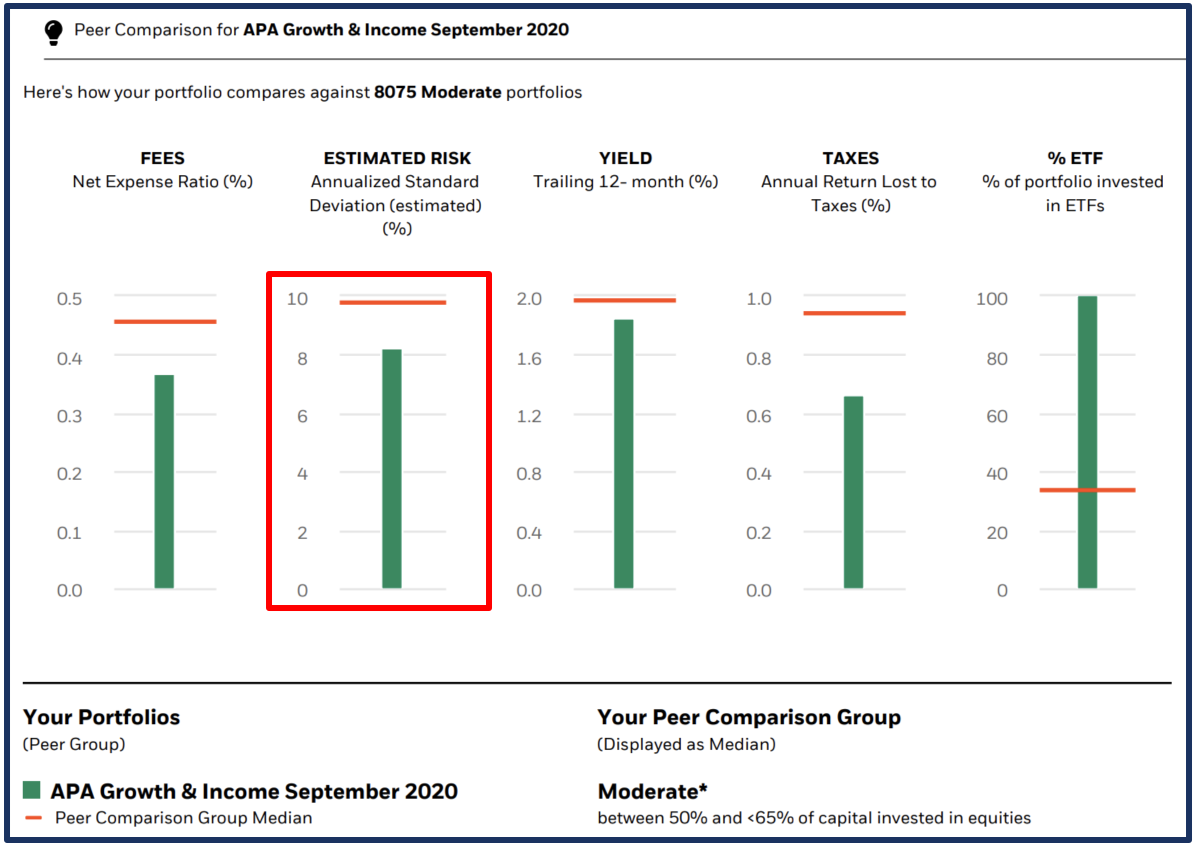
Risk Factor	APA Growth & Income September 2020	APA Growth & Income Benchmark
Equity	7.07%	8.12%
Equity Market	7.02%	8.37%
Equity Country	0.52%	0.64%
Equity Sector	0.07%	-0.04%
Equity Style	-0.55%	-0.85%
Fixed Income	0.50%	0.25%
Rates	-0.06%	-0.11%
Spreads	0.56%	0.36%
Alternatives	0.34%	0.00%
FX	0.29%	0.64%
Idiosyncratic	0.07%	0.06%
Other	0.01%	0.00%
Estimated Risk	**8.27%**	**9.08%**



Source: BlackRock. Data as of August 31, 2020.

Per BlackRock's tool, APA's Growth & Income Model is projected to have less risk than approximately 8,000 other moderately classified portfolios.

Peer Comparison



Source: BlackRock. Data as of August 31, 2020.

Per BlackRock's tool, the estimated risk of all of APA's Core Risk Based ETF Portfolios aside from the Risk Managed Dynamic Income Model is less than the estimated risk of each model's benchmark (by 53-156bps). Is our portfolio risk too low?

Estimated Risk

RISK

Historical Risk A measure of how widely the returns for a portfolio might fluctuate over a year, measured using historical performance.	10.14%	11.63%
Estimated Risk (Powered by Aladdin) A measure of how widely the returns for a portfolio might fluctuate over a year, measured using current holdings.	8.16%	9.28%

Source: BlackRock. Data as of August 31, 2020.

How does BlackRock's Aladdin tool measure risk?

A measure of how widely the returns for a portfolio might fluctuate over a year, measured using current holdings.

Risk in Aladdin is calculated based on the current holdings in the portfolio and their exposure to risk factors. This is a more forward-looking view of risk because it is based on current exposures, as compared to the historical volatility of portfolio returns. An estimated risk of 5% means that a portfolio's return is likely to vary between -5% and +5% over the course of a year.

Estimated Risk is a holdings based ex-ante, or forward looking, annualized volatility (one standard deviation) of the portfolio, which provides an estimate of the range of outcomes that the portfolio may experience over a one year horizon. It is based on BlackRock's proprietary risk model in Aladdin. The risk model measures currently observable, fundamental characteristics of the portfolio's holdings ("risk factors") that are demonstrated to explain the volatility of securities prices. The composition of the portfolio's exposure to these risk factors, the volatility levels of the risk factors themselves, and the correlation between them all come together to determine the risk estimate. This risk estimate may differ (sometimes significantly) from historical, realized volatility, depending on the time period and assumptions of the risk model. In order to estimate a portfolio's ex-ante, or forward looking, risk, the model decomposes a fund's holdings into their underlying risk factors. The level of exposure to a factor for a given security corresponds to the location of that security in the distribution across all securities in the universe for the characteristic in question. Historical volatility and correlations across the factors is taken into account in order to estimate the total risk of the overall portfolio.

The model uses 10 years of monthly history and applies a 36 month half-life in order to estimate the volatility and correlations between factors. This half-life places more emphasis on the last 3 years in the analysis.

Neither BlackRock nor the Aladdin portfolio risk model can predict a portfolio's risk of loss due to, among other things, changing market conditions or other unanticipated circumstances. The Aladdin portfolio risk model is based purely on assumptions using available data and any of its predictions are subject to change. For BlackRock and iShares funds, data about the specific underlying holdings are used when applying the Aladdin risk model. For third party funds, BlackRock uses underlying holdings, or in certain cases, determines appropriate proxies for relevant holdings using a combination of Morningstar and other publicly available data sources. Product specific inputs for BlackRock, iShares and third party funds are typically based on the latest disclosed data, which may be lagged.

Source: BlackRock.

Market Commentary

Below are topics that APA is doing research on with respect to our Dynamic Portfolios.

Are we doing enough to combat inflation?

Should we increase exposure to Small/Mid-caps given the improving US economy and valuation differences?

Will bonds continue to provide the negative beta to equities?

Should we tilt more towards EM Asia/China which is our highest conviction area within International Markets?

APA must track the underlying index methodology as ETFs rebalance and our tilts evolve. Our Portfolio Construction Dashboard will help monitor these changes.

Should we introduce more factors to the portfolio?

APA spends 75% of our day reading research, looking at data, designing portfolios, and talking with both institutional and retail communities. Within the next 2 years, we believe the following could impact investors' portfolios. Each of the below topics are central to many of the discussions we are having with other RIAs.

Higher inflation

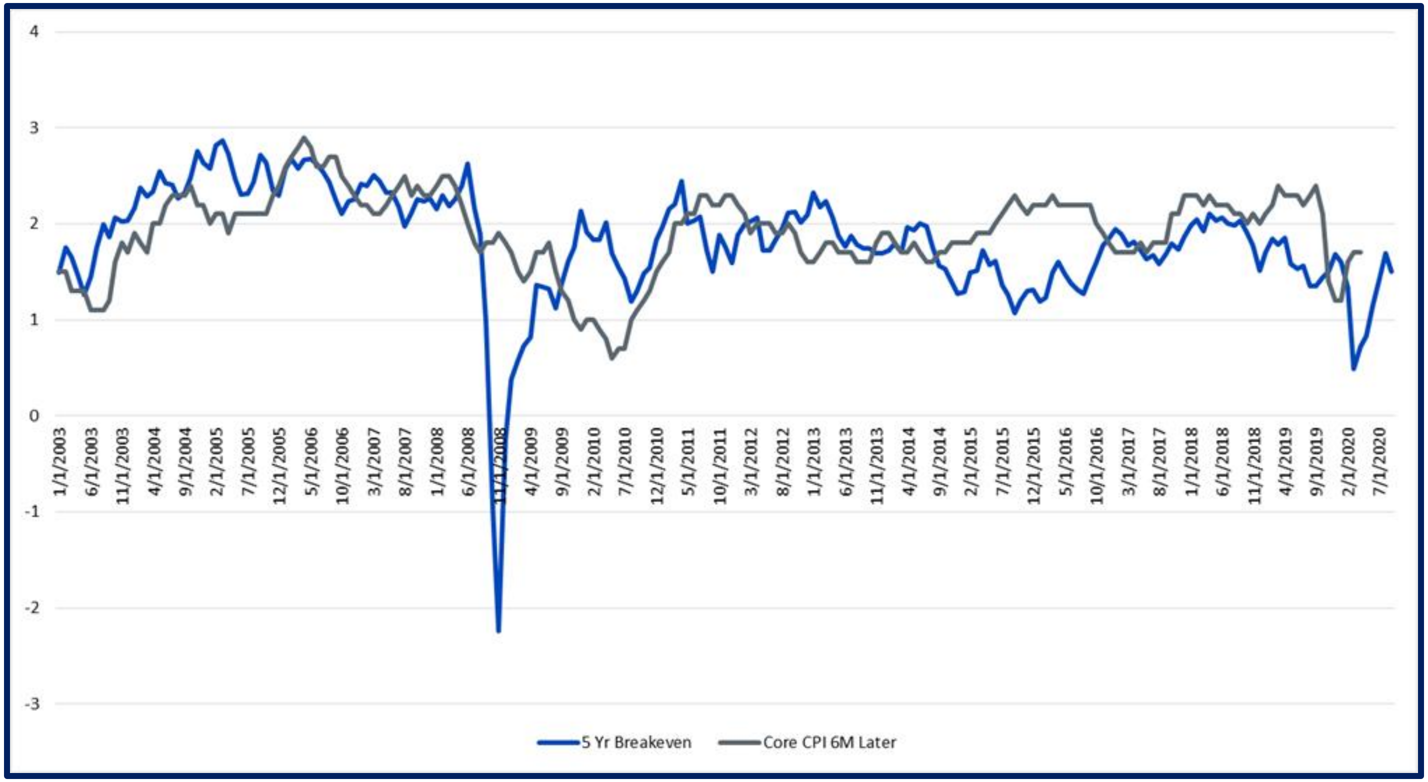
Bonds underperforming stocks on an adjusted inflation basis due to massive fiscal stimulus package and lower boundary of US interest rates. Raise equity exposure?

We don't know if bond yields rise or fall but forward-looking returns for Treasury bonds appear bleak.

There is a lot of research which shows combining more factors in a portfolio can yield better risk adjusted returns. Worth looking at other factors?

One indicator to watch for future inflation are breakevens. Historically, breakevens tend to lead CPI with a 6-month lag.

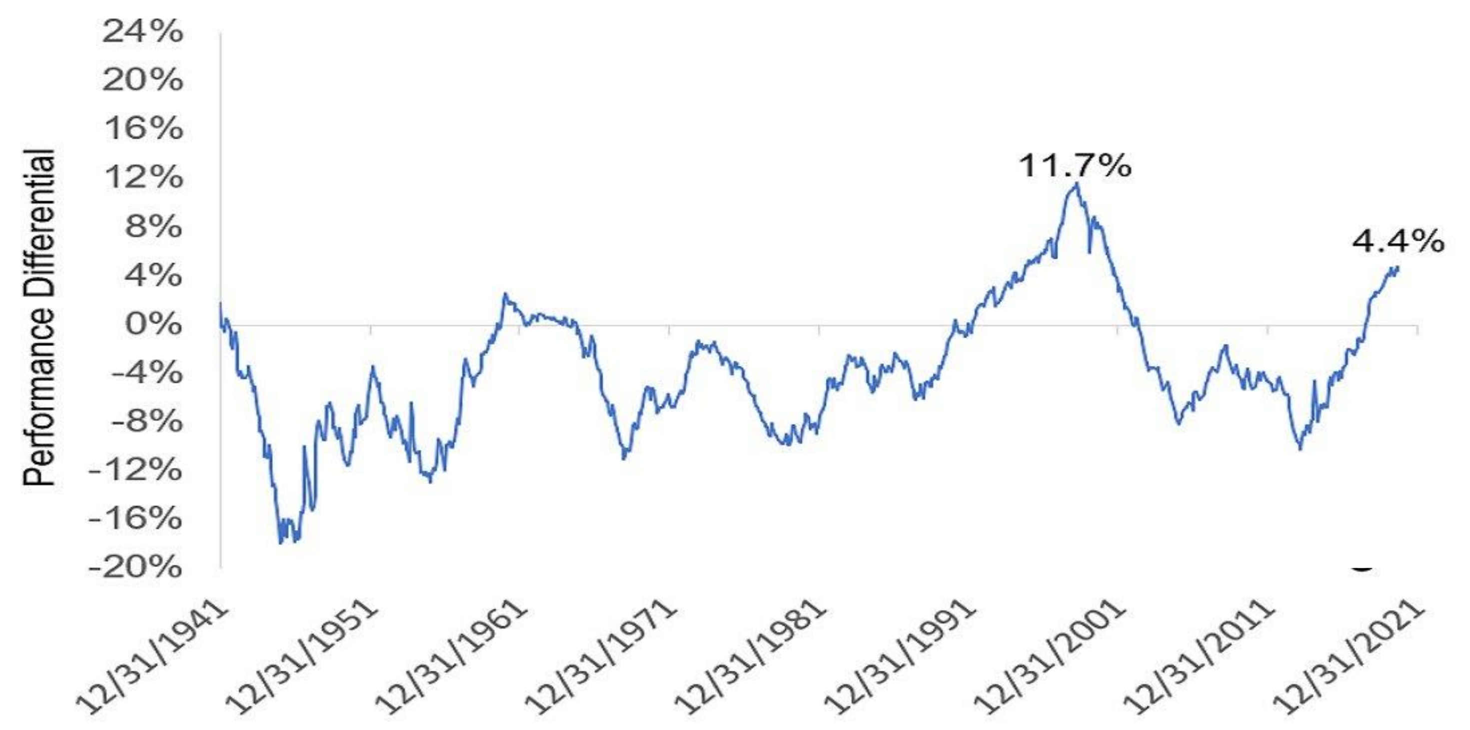
5-Year Breakeven Inflation vs. Core CPI 6M Later



Source: WisdomTree. The breakeven inflation rate is a market-based measure of expected inflation. It is the difference between the yield of a nominal bond and an inflation-linked bond of the same maturity. 10-year breakeven inflation rate = (10-year nominal Treasury yield) - (10-year TIPS yield).

The spread between the returns of the largest and smallest stocks is the second highest since 1941.

15 Year Stock Market Return Differential, Largest Stocks Minus Smallest Stocks

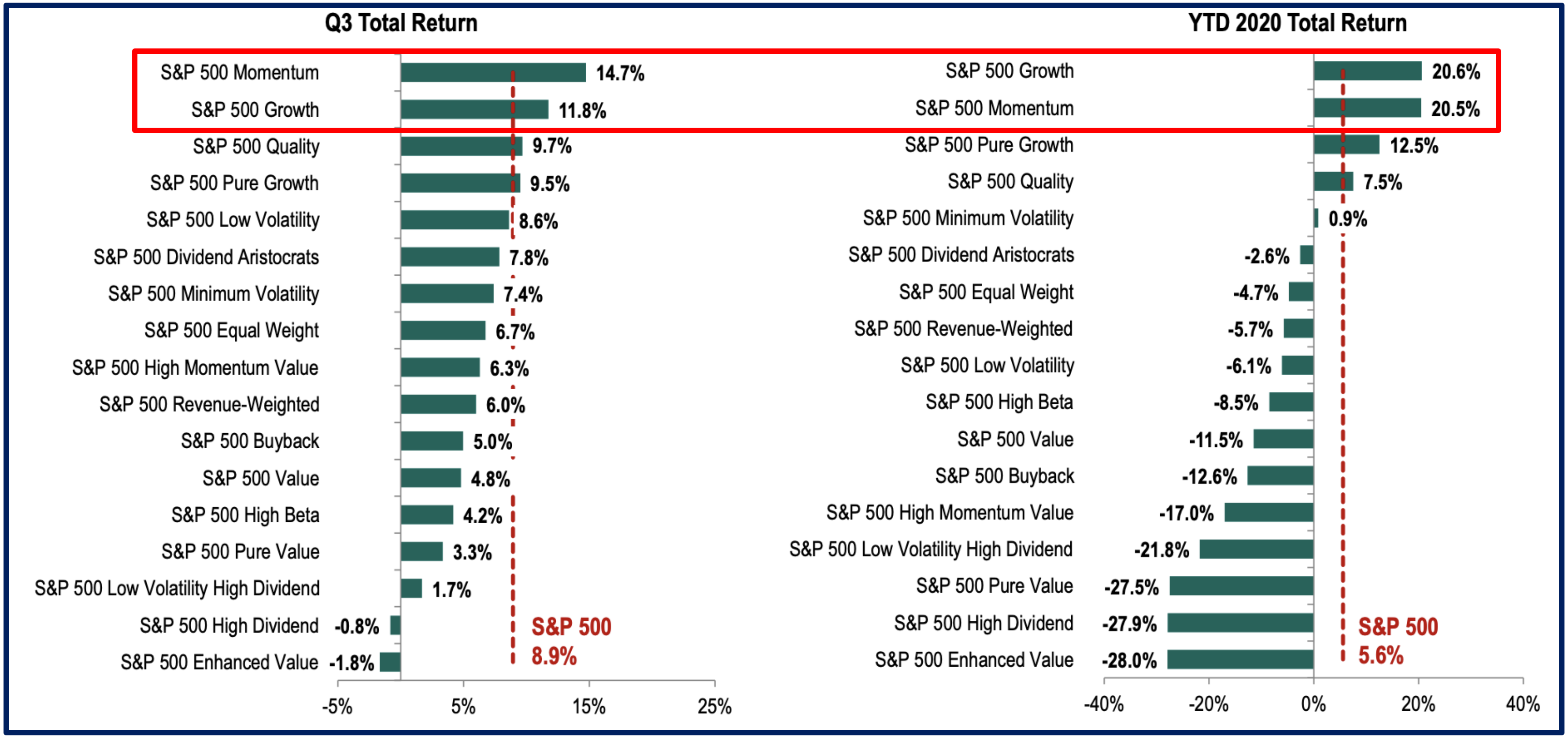


Source: Ken French (Dartmouth) Data Library, using the 202007 CRSP database, measuring the top and bottom deciles of stocks. Data from 7/31/1926 - 9/21/2020, weighting by market capitalization, with the Russell Top 50 and Russell MicroCap indexes used for August and September 2020. File #0237.

Source: Ken French (Dartmouth) Data Library, @JeffWeniger, Twitter.

Momentum and Growth have been strong outperformers in 2020.

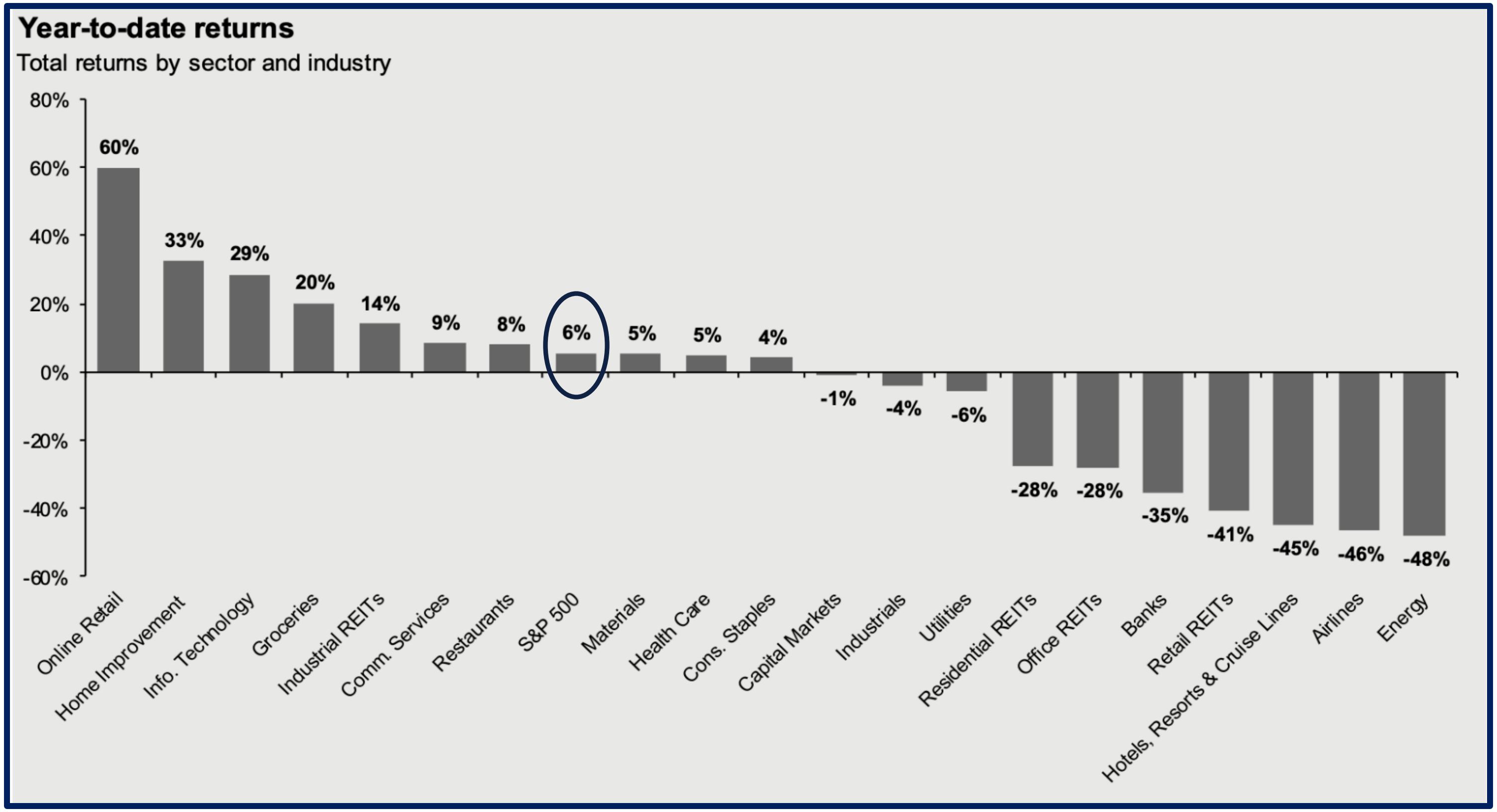
3rd Quarter and YTD Factor Performance Summary



Source: S&P Dow Jones Indices LLC and/or its affiliates. Data as of September 30, 2020.

Financials, energy, and real estate make up 25% of IVE.

S&P Performance by Sector



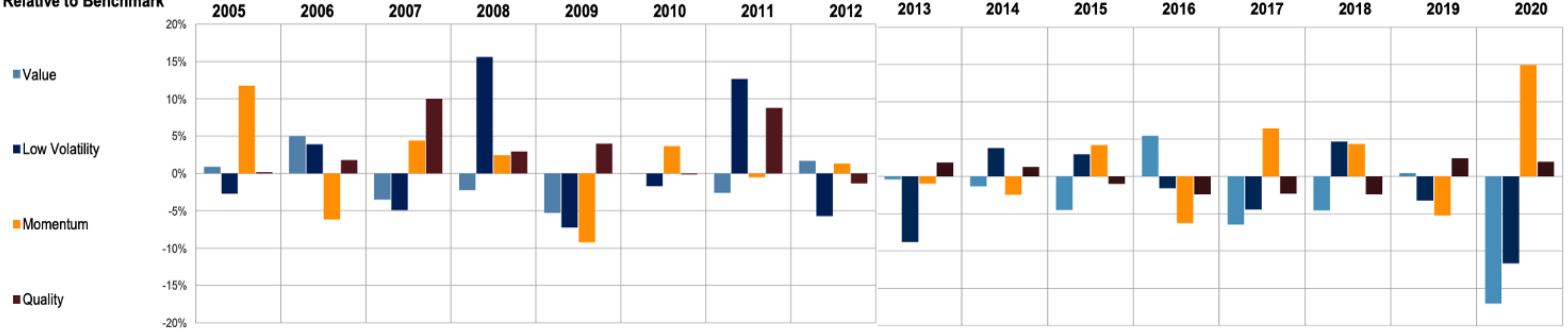
Source: FactSet, Standard & Poor's, J.P. Morgan Asset Management. *Guide to the Markets – U.S.* Data are as of September 30, 2020.

The spread amongst factors can be quite large in any given year. This is a key reason why some models diversify across factors.

Annual Factor Performance by Calendar Year, 2005-Present

Total Return	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Value	5.82%	20.80%	1.99%	-39.22%	21.18%	15.10%	-0.48%	17.68%	31.99%	12.36%	-3.13%	17.40%	15.36%	-8.95%	31.93%	-11.47%
Low Volatility	2.20%	19.69%	0.58%	-21.41%	19.22%	13.36%	14.78%	10.30%	23.59%	17.49%	4.34%	10.37%	17.41%	0.27%	28.26%	-6.09%
Momentum	16.69%	9.61%	9.89%	-34.56%	17.24%	18.72%	1.60%	17.33%	31.42%	11.23%	5.56%	5.70%	28.27%	-0.04%	26.25%	20.48%
Quality	5.07%	17.59%	15.50%	-34.06%	30.46%	14.95%	10.89%	14.68%	34.24%	14.95%	0.38%	9.56%	19.51%	-6.79%	33.91%	7.52%
S&P 500	4.91%	15.79%	5.49%	-37.00%	26.46%	15.06%	2.11%	16.00%	32.39%	13.69%	1.38%	11.96%	21.83%	-4.38%	31.49%	5.57%

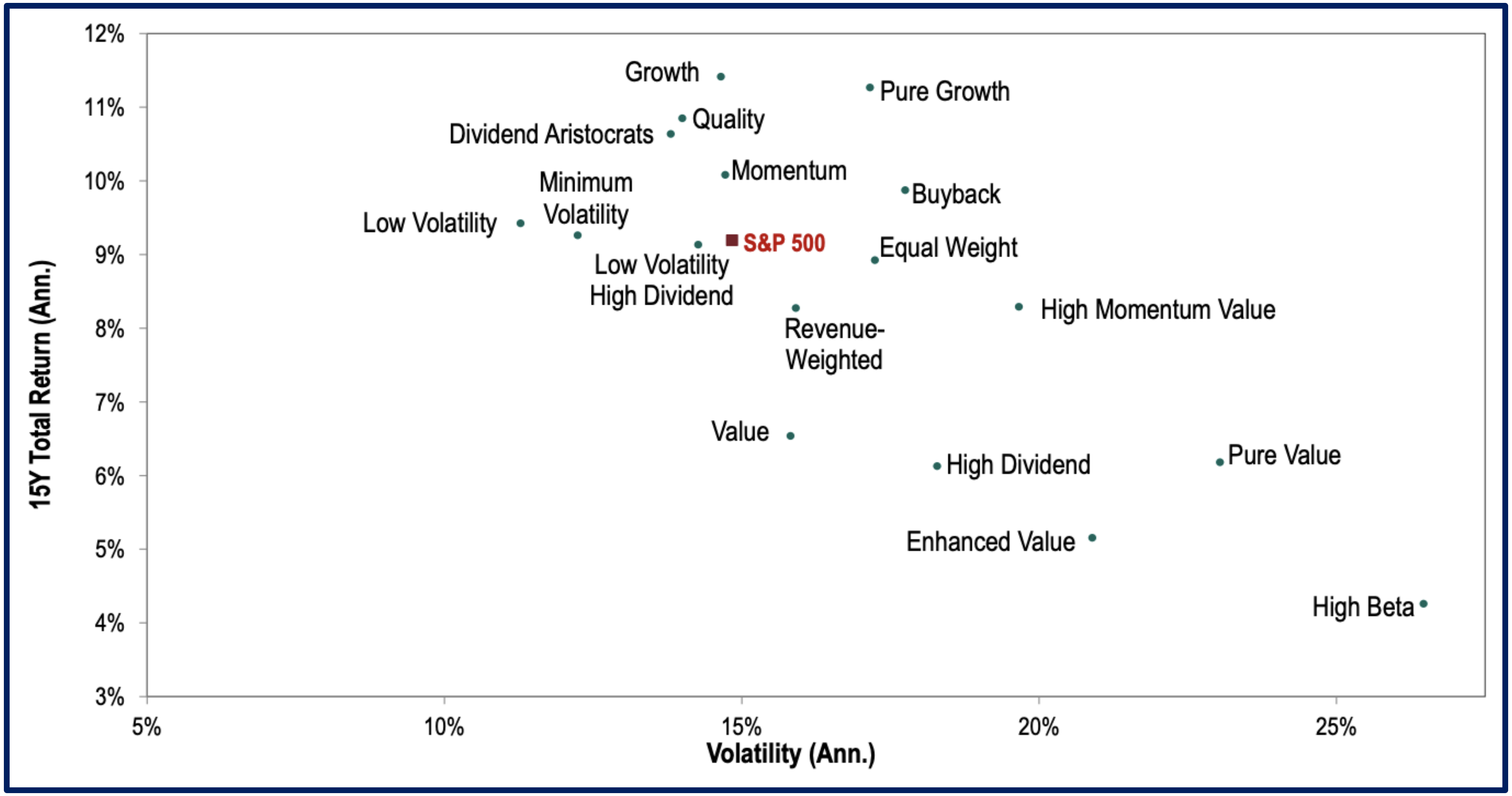
Relative to Benchmark



Source: S&P Dow Jones Indices LLC and/or its affiliates. Data as of September 30, 2020.

The Sharpe Ratio of factors can be quite different. This is another reason to diversify across factors.

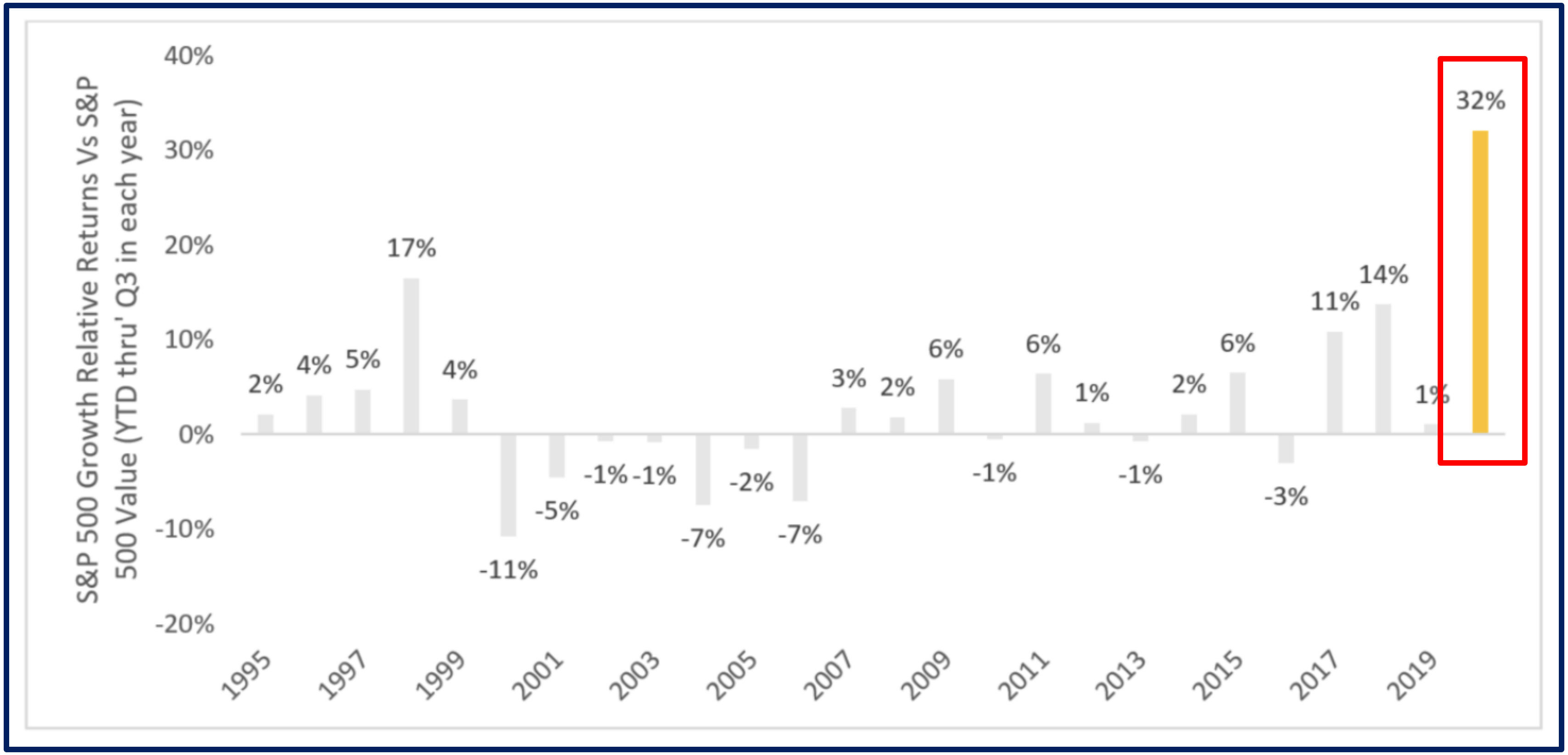
15 Year Factor Return/Risk - Absolute



Source: S&P Dow Jones Indices LLC and/or its affiliates. Data as of September 30, 2020.

Growth's outperformance versus Value has been quite extreme. Should we give up on Value? No!

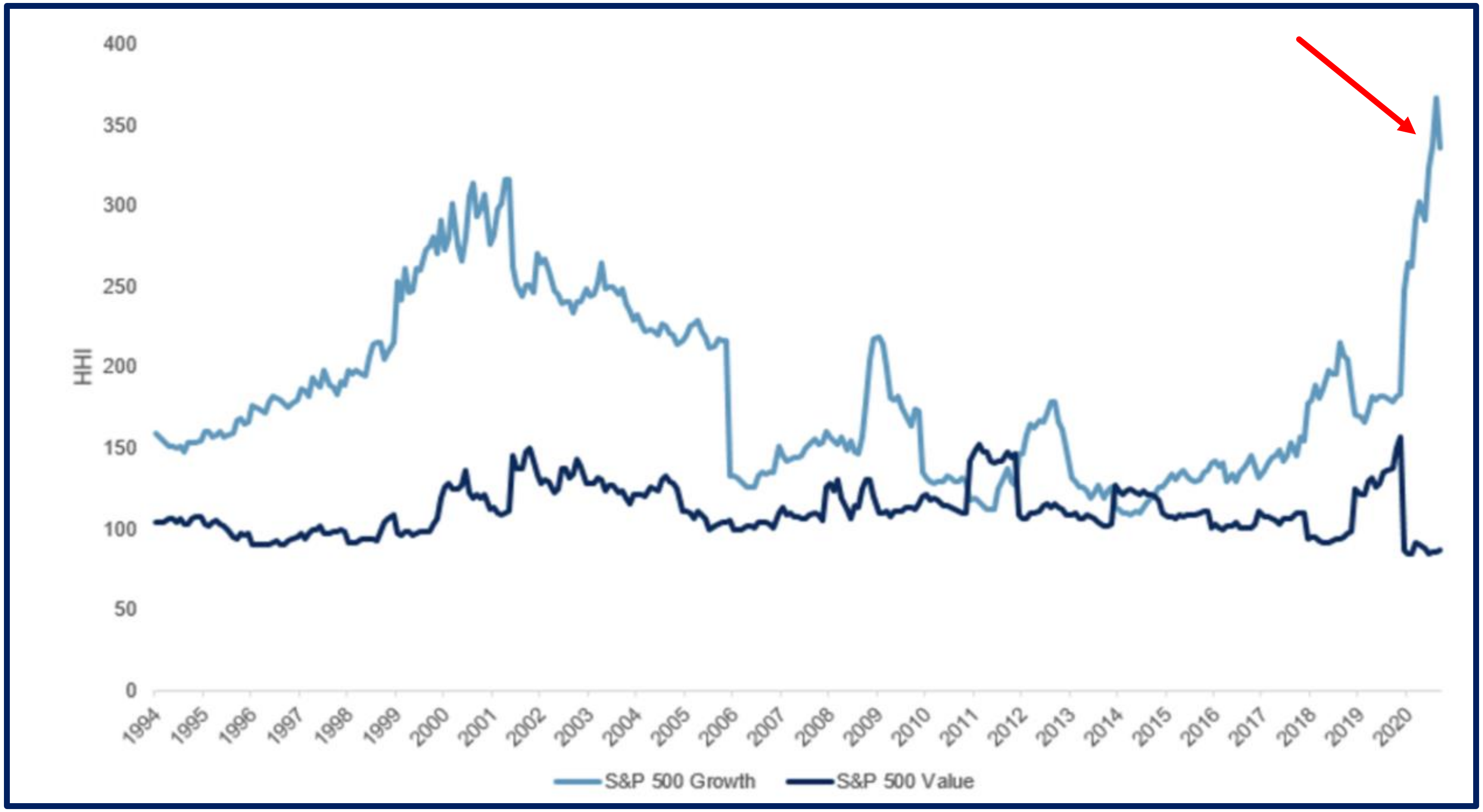
S&P Growth has Outperformed Value by 32% so far in 2020



Source: S&P Dow Jones Indices LLC. Chart based on monthly total returns between Dec. 31, 1994 and Sep. 30, 2020.
https://www.indexologyblog.com/2020/10/12/continued-dominance-of-growth-style-investing

The concentration in S&P 500 Growth Index is the greatest it's been in the past few decades. We think this bodes well for Value stocks as its pretty rare for market leaders to stay at the top of the index.

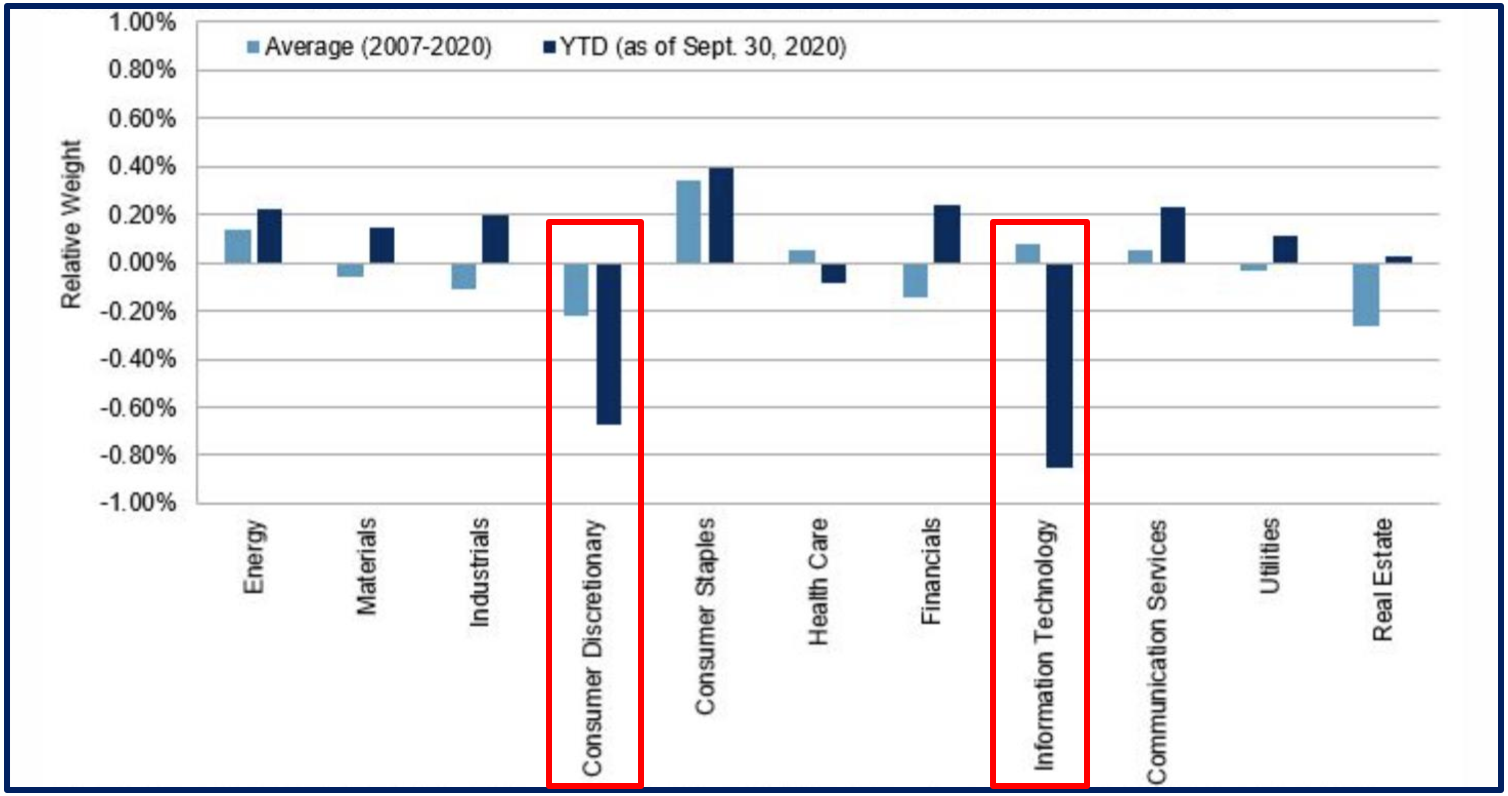
Concentration Increased in the S&P 500 Growth Index



Source: S&P Dow Jones Indices LLC. Chart based on monthly weights between Jan. 31, 1994 and Sep. 30, 2020.

Technology and Consumer Discretionary have become a large part of the Total Market Index. If history is any guidance, this is unlikely to stay the same.

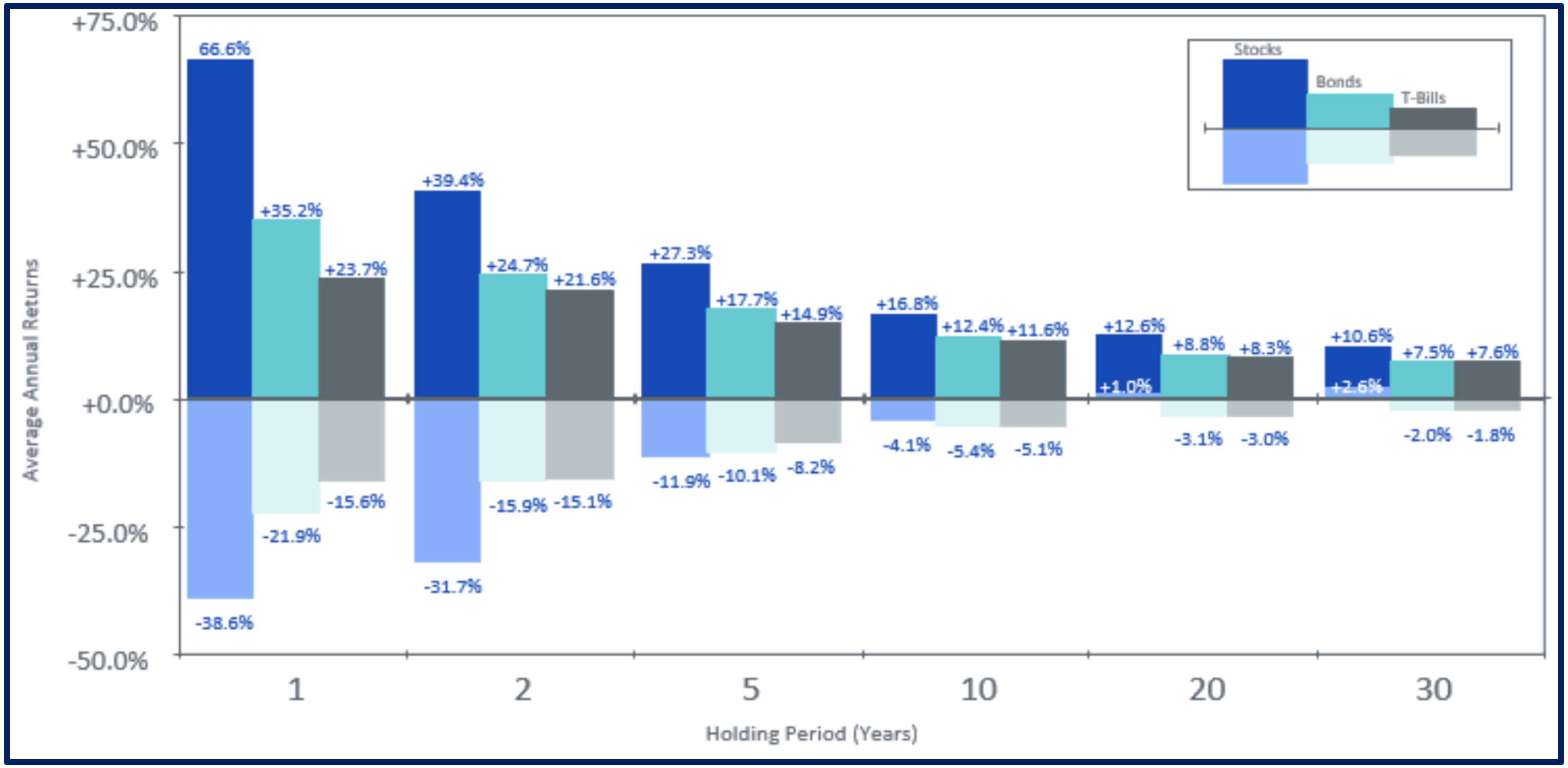
Relative Weight of S&P 500 versus the LargeCap Portion of the S&P TMI



Source: S&P Dow Jones Indices LLC. Data as of Sept. 30, 2020.

We all know the ‘Stocks for the Long Run’ theory. Is it the same for Bonds? Not quite.

Maximum and Minimum Returns 1802 - 2019



Source: Siegal, Jeremy, Stocks for the Long Run (2014), With Updates to 2019. Copyright Jeremy J. Siegal. T-Bill history extended by analysis of interest rates, default risk, and term structures of comparable bonds with available information.

Is Value's recent underperformance unusual? What's the benefit of mixing factors in a portfolio?

Should we give up on Value? No! Factor tilts can take 5-10 years to play out.

Market Beta, Size, Value, Momentum, Profitability, and Quality (1927-2015)

	Market Beta	Size	Value	Momentum	Profitability	Quality
Annual Premium (%)	8.3	3.3	4.8	9.6	3.1	3.8
Sharpe Ratio	0.40	0.24	0.34	0.61	0.33	0.38
1-Year Odds of Outperformance (%)	66	59	63	73	63	65
3-Year Odds of Outperformance (%)	76	66	72	86	72	75
5-Year Odds of Outperformance (%)	82	70	78	91	77	80
10-Year Odds of Outperformance (%)	90	77	86	97	85	89
20-Year Odds of Outperformance (%)	96	86	94	100	93	96

Source: Berkin, Andrew L. and Swedore, Larry E. *Your Complete Guide to Factor-Based Investing.*

Value & Quality are negatively correlated to the Beta factor which is the key reason to include them in a portfolio. Momentum is one other key factor which is grounded in academia and provides negative correlation to Beta, Size, and Value.

Historical Correlations (1964-2015)

Factor	Market Beta	Size	Value	Momentum	Profitability	Quality
Market Beta	1.00	0.29	-0.27	-0.17	-0.27	-0.52
Size	0.29	1.00	0.01	-0.12	-0.22	-0.53
Value	-0.27	0.01	1.00	-0.20	0.09	0.04
Momentum	-0.17	-0.12	-0.20	1.00	0.08	0.30
Profitability	-0.27	-0.22	0.09	0.08	1.00	0.74
Quality	-0.52	-0.53	0.04	0.30	0.74	1.00

Source: Berkin, Andrew L. and Swedore, Larry E. *Your Complete Guide to Factor-Based Investing.*

Notice that the portfolios which equal weight multiple factors have produced 2x and 3x the Sharpe Ratio of a single Beta portfolio.

Return and Risk (1927-2015)

Portfolio 1 (P1) 25% Market Beta
25% Size
25% Value
25% Momentum

Portfolio 2 (P2) 20% Market Beta
20% Size
20% Value
20% Momentum
20% Profitability

Portfolio 3 (P3) 20% Market Beta
20% Size
20% Value
20% Momentum
20% Quality

	Mean Return (%)	Standard Deviation (%)	Sharpe Ratio
Market Beta	8.3	20.6	0.40
Size	3.3	13.9	0.24
Value	4.8	14.1	0.34
Momentum	9.6	15.7	0.61
Profitability	3.1	9.3	0.33
Quality	3.8	10.0	0.38
P1	6.5	8.8	0.74
P2	5.3	5.5	0.96
P3	5.6	5.6	1.12

Source: Berkin, Andrew L. and Swedore, Larry E. *Your Complete Guide to Factor-Based Investing.*

The longer the timeframe a portfolio is diversified across factors, the greater the probability it can outperform.

Odds of Underperformance (%) (1927-2015)

Portfolio 1 (P1) 25% Market Beta, 25% Size, 25% Value, 25% Momentum

Portfolio 2 (P2) 20% Market Beta, 20% Size, 20% Value, 20% Momentum, 20% Profitability

Portfolio 3 (P3) 20% Market Beta, 20% Size, 20% Value, 20% Momentum, 20% Quality

	1-Year	3-Year	5-Year	10-Year	20-Year
Market Beta	34	24	18	10	4
Size	41	24	30	23	14
Value	37	28	22	14	6
Momentum	27	14	9	3	0
Profitability	37	28	23	15	7
Quality	35	25	19	11	4
P1	23	10	5	1	0
P2	17	5	2	0	0
P3	13	5	1	0	0

Source: Berkin, Andrew L. and Swedore, Larry E. *Your Complete Guide to Factor-Based Investing.*

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