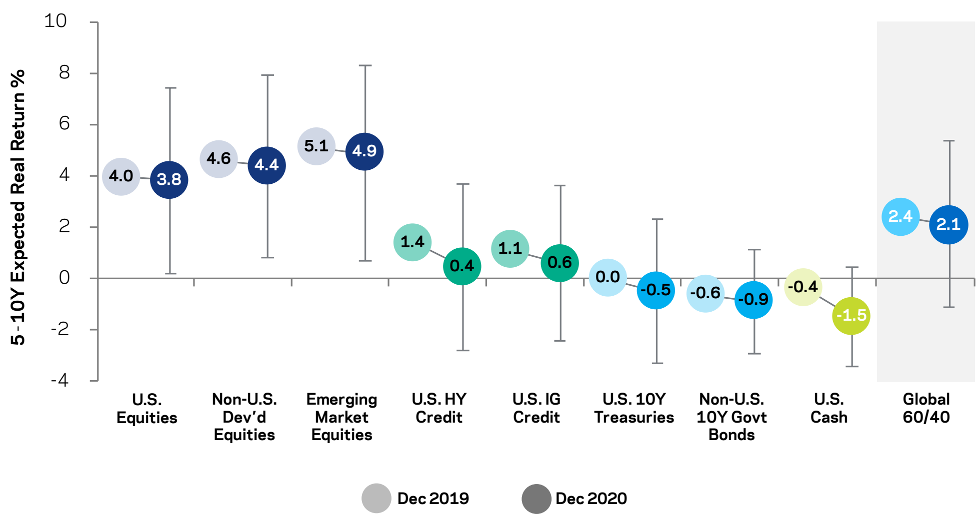
Alternative Thinking | Q1 2021

Capital Market Assumptions for Major Asset Classes

Executive Summary

This article updates our estimates of medium-term (5- to 10-year) expected returns for major asset classes. It also includes a section on the stock-bond correlation. Selected estimates are summarized in **Exhibit 1**. After a volatile 2020, both equity and bond expected returns ended the year lower. The expected real return of a U.S. 60/40 portfolio is just 1.4%,[1] a fraction of its long-term average of nearly 5% (since 1900).

Exhibit 1: Medium-Term Expected Real Returns for Liquid Asset Classes



Source: AQR; see Exhibits 3-5 for details. Estimates as of December 31, 2020. "Non-U.S. developed equities" is cap-weighted average of Euro-5, Japan, U.K., Australia, Canada. "Non-U.S. 10Y govt. bonds" is GDP-weighted average of Germany, Japan, U.K., Australia, Canada. Error bars cover 50% confidence range, based on analysis from the 2018 edition and adjusted for current expected volatilities. These are intended to emphasize the uncertainty around any point estimates. Not only are the return forecasts uncertain, but also any measures of forecast uncertainty are debatable. Forecasting requires humility at many levels. Estimates are for illustrative purposes only, are not a guarantee of performance and are subject to change. Not representative of any portfolio that AQR currently manages.

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1 Based on historical real yields for U.S. large-cap equities and 10-year Treasuries, using a simpler methodology that allows long-term historical comparisons; methodology and sources described in Appendix.

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About the Portfolio Solutions Group

The Portfolio Solutions Group (PSG) provides thought leadership to the broader investment community and custom analyses to help AQR clients achieve better portfolio outcomes.

We thank Alfie Brixton, Thomas Maloney, Nick McQuinn and Jason Mellone for their work on this paper. We also thank Pete Hecht, Antti Ilmanen and Kris Laursen for their helpful comments.

Introduction and Framework

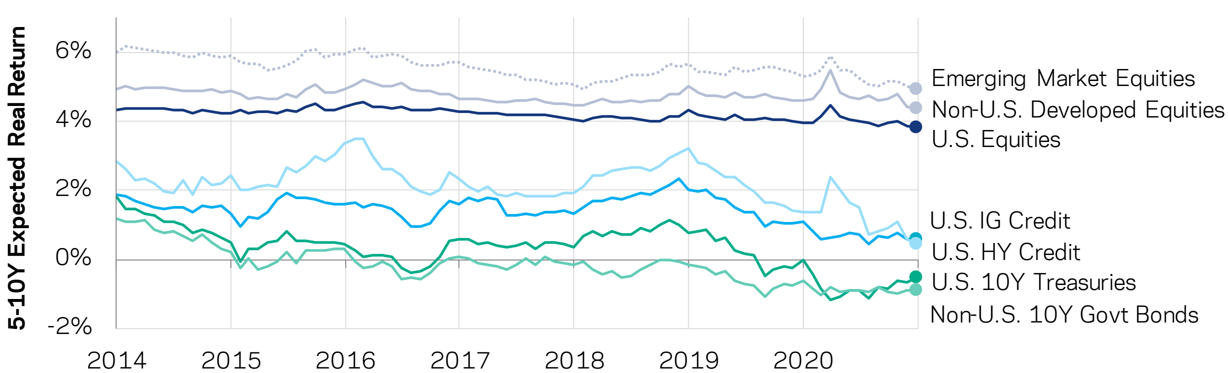
For the past seven years we have published our capital market assumptions for major asset classes, with a focus on medium-term expected returns (see 2014, 2015, 2016, 2017, 2018, 2019 and 2020). Each year, as well as the updated estimates, we provide additional analysis in the form of new asset classes or other new material. This year's article includes a discussion of the prospects for the stock-bond correlation.

As usual, we present local real (inflation-adjusted) annual compound rates of return[2] for a horizon of 5 to 10 years. Over such intermediate horizons, initial market yields and valuations tend to be useful inputs. For multi-decade forecast horizons, the impact of starting yields is diluted, so theory and long-term historical average returns (or yields) may matter more in judging expected returns. For shorter horizons, returns are largely unpredictable and any predictability has tended to mainly reflect momentum and the macro environment.

Our estimates are intended to assist investors with setting appropriate medium-term expectations. They are highly uncertain, and not intended for market timing. The frameworks we present may be more informative than the numbers themselves. As one cautionary example, the error ranges shown in Exhibit 1, based on historical analysis in the 2018 edition, suggest that there is a 50% chance that realized equity market returns over the next 10 years will under- or overshoot our estimates by more than 3% *per annum*.

Since we started publishing our CMAs in 2014, equities have become somewhat more attractive relative to bonds, but estimates for both asset classes have moved lower (see **Exhibit 2**). All assets' expected real returns are depressed by exceptionally low real cash rates.

Exhibit 2: Expected Real Returns for Liquid Asset Classes
Dec-2013 to Dec-2020



Source: AQR; see Exhibits 3-5 for details. "Non-U.S. developed equities" is cap-weighted average of Euro-5, Japan, U.K., Australia, Canada. "Non-U.S. 10Y govt. bonds" is GDP-weighted average of Germany, Japan, U.K., Australia, Canada. Estimates are based on current methodologies, are for illustrative purposes only, are not a guarantee of performance and are subject to change. Not representative of any portfolio that AQR currently manages.

2 For a discussion of expected arithmetic (or simple) vs. geometric (or logarithmic, or compound) rates of return, see the 2018 edition.

Equity Markets

Our starting point for equities is the dividend discount model (DDM), under which expected real return is approximately the sum of dividend yield (DY), expected trend growth (g) in real dividends or earnings per share (EPS), and expected change in valuation (Δv), that is: E(r) ≈ DY+g+Δv. We take the average of two approaches,[3] described below. We assume no change in valuations, i.e., no mean reversion from today's (mostly high) valuations towards historical averages.[4]

1. **Earnings-based:** We start from the inverse of the CAPE ratio (cyclically-adjusted P/E), which is 10-year average inflation-adjusted earnings divided by today's price. We multiply by 0.5 (roughly the U.S. long-run dividend payout ratio), and add real earnings growth of 1.5% (roughly the U.S. long-run average). So earnings-based expected return[5] is: $E(r) \approx 0.5^{*}$ $\textit{Adjusted Shiller } E/P + g_{EPS}$

2. **Payout-based:** We estimate net total payout yield (NTY) as the sum of current dividend yield and smoothed net buyback yield. To this we add an estimate of long-term real growth of aggregate payouts that includes net issuance. This growth estimate, g_{TPagg}, is an average of smoothed historical aggregate earnings growth and forecast GDP growth. So our payout-based expected return is: $E(r) \approx NTY + g_{TPagg}$, *where* $NTY = DY + \textit{net buyback yield } (NBY)$

Most estimates fell slightly during 2020 (after a rising in the first quarter), with Europe and Australia seeing the biggest falls - see **Exhibit 3**. Our U.S. return estimate of 3.8% over inflation remains low by historical standards.

3 See the 2017 edition and its online appendix for details and discussion of the methodology.
4 See the 2015 edition for a discussion of mean reversion in stock and bond valuations and our decision to exclude it. In short, our analysis suggests mean reversion is unreliable and difficult to forecast, and there are plausible arguments for yields remaining lower than historical levels.
5 For our earnings-based estimate, we apply a 50% payout ratio to all countries, and use g = 1.5% for all countries except for emerging markets, where we use a higher growth rate of 2%. *Adjusted Shiller* EP is Shiller EP * 1.075 where the scalar accounts for average earnings growth during the 10-year earnings window of the Shiller EP.

Exhibit 3: Expected Local Returns for Equities

December 2020

	1. Earnings-Based		2. Payout-Based				Combined		
	Adjusted Shiller EP	0.5 * EP + g_{EPS}	Dividend Yield	NBY	g_{TPagg}	DY+NBY + g_{TPagg}	Real Return	*1yr Change*	Excess-of-Cash Return
U.S.	3.2%	**3.1%**	1.5%	0.2%	2.8%	**4.5%**	**3.8%**	*-0.1%*	**5.3%**
Eurozone	5.0%	**4.0%**	2.2%	-0.5%	2.6%	**4.4%**	**4.2%**	*-0.3%*	**6.0%**
Japan	4.9%	**3.9%**	2.0%	0.2%	2.4%	**4.5%**	**4.2%**	*0.0%*	**5.0%**
U.K.	6.5%	**4.8%**	3.3%	-0.4%	2.6%	**5.5%**	**5.1%**	*-0.3%*	**7.1%**
Australia	5.1%	**4.1%**	2.8%	-0.6%	2.8%	**5.0%**	**4.5%**	*-0.5%*	**6.2%**
Canada	4.9%	**3.9%**	3.0%	-1.3%	2.8%	**4.5%**	**4.2%**	*+0.1%*	**5.7%**
Global Developed	3.8%	**3.4%**	1.7%	0.0%	2.7%	**4.5%**	**3.9%**	*-0.2%*	**5.5%**
Global Dev. ex U.S.	5.2%	**4.1%**	2.5%	-0.4%	2.6%	**4.7%**	**4.4%**	*-0.2%*	**5.9%**
Emerging Markets	6.2%	**5.1%**	1.9%	--	--	**4.7%**	**4.9%**	*-0.2%*	**4.5%**

Source: AQR, Consensus Economics and Bloomberg. Estimates and methodology subject to change and based on data as of December 31, 2020. See main text for methodology. For earnings yield, U.S. is based on S&P 500; U.K. on FTSE 100 Index; Eurozone is a cap-weighted average of large-cap indices in Germany, France, Italy, Netherlands and Spain; Japan is Topix Index; and "Emerging Markets" is MSCI Emerging Markets Index. Period for net buyback yield (NBY) is 1988 to 2020. For payout-based estimates, all countries are based on corresponding MSCI indices. "Global Developed" is a cap-weighted average. For emerging markets, payout-based estimate is dividend yield + forecast GDP per capita growth. Excess-of-cash return is calculated by subtracting real cash return estimates described later in the article, and is effectively the return accessed by hedged investors irrespective of their base currency. Hypothetical performance results have certain inherent limitations, some of which are disclosed in the back. Estimates are for illustrative purposes only, are not a guarantee of performance and are subject to change. Not representative of any portfolio that AQR currently manages.

Government Bonds

Government bonds' prospective medium-term nominal total returns are strongly anchored by their yields. The so-called *rolling yield* measures the expected return of a constant-maturity bond allocation assuming an unchanged yield curve.[6] For example, a strategy of holding constant-maturity 10-year Treasuries has an expected annual (nominal) return of 1.6%, given the starting yield of 0.9% and expected capital gains of 0.7% from rolldown as the bonds age. **Exhibit 4** shows current local rolling yields for six countries, converted to local real returns by subtracting a survey-based forecast of long-term inflation.

We also show expected excess-of-cash returns, which are effectively the expected returns accessed by hedged investors irrespective of their base currency. While real returns are often the appropriate unit for assessing expectations versus investment objectives, excess-of-cash returns are more relevant for

6 If we assumed a more realistic random-walk (rather than unchanged) yield curve, our estimate would theoretically need to include convexity and variance drag components (see footnote 8). However, since these terms are small and mostly offsetting for concentrated bond portfolios, we ignore them here.

making international allocation decisions and for investors with access to leverage.

Since last year, changes in our real return estimates are mixed, with substantial falls in the U.S., Germany and U.K. Low bond yields should be considered in the context of exceptionally low cash rates—indeed, all excess-of-cash returns are positive. Any adjustment to these expected returns boils down to expected future changes in the yield curve level or shape. Capital gains/losses due to falling/rising yields dominate returns over short horizons but are highly uncertain, and matter less over longer horizons.

Exhibit 4: Expected Local Returns for Government Bonds

December 2020

	Y	RR	I	Y + RR - I		
	10-Year Nominal Bond Yield	Rolldown Return	10-Year Forecast Inflation	Expected Real Return	*1yr Change*	Excess-of-Cash Return
U.S.	0.9%	0.7%	2.1%	**-0.5%**	*-0.5%*	**1.0%**
Japan	0.0%	0.6%	0.8%	**-0.2%**	*+0.2%*	**0.7%**
Germany	-0.6%	0.5%	1.7%	**-1.8%**	*-0.6%*	**0.6%**
U.K.	0.2%	0.4%	2.1%	**-1.5%**	*-1.0%*	**0.5%**
Canada	0.7%	0.8%	2.0%	**-0.5%**	*0.0%*	**1.0%**
Australia	1.0%	1.0%	2.3%	**-0.3%**	*+0.5%*	**1.4%**
Global Developed	0.5%	0.7%	1.8%	**-0.7%**	*-0.5%*	**0.8%**
Global Developed ex U.S.	0.1%	0.6%	1.6%	**-0.9%**	*-0.3%*	**0.7%**

Source: Bloomberg, Consensus Economics and AQR. Estimates as of December 31, 2020. "Global Developed" and "Global Developed ex US" are GDP-weighted averages. Rolldown return is estimated from fitted yield curves and based on annual rebalance. Excess-of-cash return is calculated by subtracting real cash return estimates described later in the article, and is effectively the return accessed by hedged investors irrespective of their base currency. Estimates are for illustrative purposes only, are not a guarantee of performance and are subject to change. Not representative of any portfolio that AQR currently manages.

Credit Indices

To estimate expected real returns for credit indices, we first apply a haircut of 50% to both investment grade (IG) and high yield (HY) spreads to represent the combined effects of expected default losses, downgrading bias and bad selling practices.[7] We assume no change in the spread curve, say, through mean reversion. We add the expected real yield of a duration-matched Treasury and rolldown from both Treasury and spread curves. Finally, we

7 Consistent with Giesecke et al (2011) and Ben Dor, Desclée, Dynkin, Hyman and Polbennikov (2021), who find that over the long term, the average credit risk premium is roughly half the average spread. 'Bad selling' refers to the practice of selling bonds that no longer meet the rating or maturity criteria of the index.

include corrections for convexity and variance drag.[8] **Exhibit 5** shows our updated estimates for U.S. credit indices[9] and hard-currency emerging market sovereign debt. Estimates fell substantially during 2020, mostly due to lower Treasury yields. The HY-IG spread narrowed, and even reversed in our latest estimates (HY's modest spread advantage over IG is no longer enough to offset its lower Treasury yield, rolldown and convexity).

Exhibit 5: Expected Returns for Credit Indices

December 2020

	A. Spread Return	B. Treasury Real Yield	C. Rolldown Return	D. Convexity & Variance			
	OAS * 0.5	Y - I	R_T+R_C	C - V	A+B+C+D		
	Expected Excess Return	Real Tsy Yield (I=2.1%)	Rolldown (Tsy & Spread)	Convexity Adj. - Var. Drag	Expected Real Return	*1yr Change*	Excess-of-Cash Return
U.S. IG	0.5%	-1.3%	1.0%	0.5%	**0.6%**	*-0.5%*	**2.1%**
U.S. HY	1.8%	-1.5%	0.3%	-0.1%	**0.4%**	*-0.9%*	**1.9%**
EM HC Debt	1.5%	-1.2%	0.4%	0.5%	**1.2%**	*-1.3%*	**2.7%**

Source: Bloomberg, AQR. Estimates as of December 31, 2020. OAS and duration data are for Bloomberg Barclays U.S. Corporate Investment Grade (IG), U.S. Corporate High Yield (HY) and Emerging USD Sovereign (EM HC Debt) Indices. Index durations are 8.8 years, 3.6 years and 8.8 years, respectively. Excess-of-cash return is calculated by subtracting real cash return estimates described later in the article, and is effectively the return accessed by hedged investors irrespective of their base currency. Estimates are for illustrative purposes only, are not a guarantee of performance and are subject to change. Not representative of any portfolio that AQR currently manages.

Commodities

Commodities do not have obvious yield measures, and we find no statistically significant predictability in medium-term returns (see the 2016 edition). Our estimate of 5- to 10-year expected return is therefore simply the long-run average return of an equal-weighted portfolio of commodity futures. This portfolio has earned 3.0% geometric average excess return over cash since 1877, and a similar return if measured since 1951.[10] To this we add a (negative) U.S. real cash return to give our expected real return of 1.5%.

Gold has attracted renewed attention during the past year. When real rates are low, so is the opportunity cost of holding this yield-less asset. We do not have a medium-term return estimate for individual commodities but would expect gold to have a substantially lower risk-adjusted return than a diversified basket over the long term.[11] A gold investment has

8 These terms, both related to volatility, are not as closely offsetting for broad indices as they are for single bonds, due to diversification effects. Briefly, the convexity term estimates the impact of non-linearities assuming yields will change, while the variance drag term estimates the impact of compounding effects assuming return volatility will be non-zero.

9 Exhibit 5 shows spreads for cash bonds in the popular Bloomberg Barclays indices. Actively traded synthetic indices (Markit North America CDX) have tended to have slightly tighter spreads (e.g., this basis averaged around 1.0% for HY in 2020). For EM debt we use US HY OAS rolldown due to data limitations.

10 For more details see the 2016 edition, Levine, Ooi, Richardson and Sasseville (2018), and the AQR data library.

11 From February 1975 to November 2020, an investment in gold futures delivered around 1% real return, approximately the same as cash.

exhibited useful tail-hedging properties, but arguably it lacks the premium associated with growth-sensitive commodities, and it forgoes the considerable diversification found within the broader asset class.

Alternative Risk Premia

Style-Tilted Long-Only Portfolios

We believe a hypothetical value-tilted, diversified long-only equity portfolio that is carefully implemented and reasonably priced may be assumed to have an expected real return 0.5% higher than the cap-weighted index, after fees, with 2-3% tracking error. An integrated multi-style strategy—which we assume to include balanced allocations to value, momentum and defensive styles—may achieve a higher expected net active return of around 1% at a similar tracking error. Finally, we think a defensive or low-risk equity portfolio may be assumed to have an expected return similar to that of the relevant cap-weighted index but may achieve this with lower volatility.[12] These are long-term estimates—we discuss tactical considerations below.

Long/Short Style Premia

Alternative risk premia strategies apply similar tilts as long-only smart beta strategies, but in a market-neutral fashion and often in multiple asset classes. Because long/short strategies can be invested at any volatility level, it makes sense to focus on expected Sharpe ratios. The degree of diversification is essential. A single long/short style applied in a single asset class might have an expected Sharpe ratio of only 0.2-0.3. For a diversified composite, we believe an expected Sharpe ratio of 0.7-0.8, net of trading costs and fees, can be feasible when multiple styles are applied in multiple asset classes. At a target volatility of 10%, such a hypothetical portfolio would have an expected return of 7-8% over cash.[13] We stress that this requires careful craftsmanship in portfolio construction as well as great efficiency in controlling trading, financing and shorting costs.[14] Strategies that are less well-designed or poorly implemented may have much lower long-term expected returns.

Current valuations

Aggregate valuations across multiple styles are near long-term averages. Among equity styles, defensive and momentum styles are mildly rich by some measures, while value looks extremely cheap. Our research suggests there is only a weak link between the value spreads of style factors and their future returns, making it difficult to use tactical timing based on valuations to outperform a strategic multi-style portfolio.[15] However, we believe the current extreme cheapness of value warrants an overweight to that style in multi-factor strategies.[16]

12 Style-tilted strategies exhibit many design variations. Our estimates are purely illustrative and do not represent any AQR product or strategy.

13 Consistent with historical data, we assume low correlations between the styles to produce our Sharpe ratio range for a diversified composite of long/short styles. As transaction costs depend on implementation and both transaction costs, and fees vary with target volatility, our estimates are based on a transaction-cost-optimized strategy targeting 10% volatility with fees of 1 to 1.5%. Refer to the 2015 edition for details of our style premia assumptions, which we believe are plausible and conservative. All assumptions are purely illustrative and do not represent any AQR product or strategy.

14 See Israel, Jiang and Ross (2017), "Craftsmanship Alpha: An Application to Style Investing".

15 See Asness, Chandra, Ilmanen and Israel (2017), "Contrarian Factor Timing Is Deceptively Difficult".

16 See *Cliff's Perspective* blogs, 'Is (Systematic) Value Investing Dead?' May 2020, and 'A Gut Punch' December 2020.

Private Equity and Real Estate

Illiquid assets are inherently harder to model than public markets, and this is exacerbated by a lack of good quality data. Nevertheless, in recent years we extended our discounted-cashflow-based approach into the illiquid realm and we update these estimates below. For private equity (PE) our estimate is for U.S. buyout funds. We present net-of-fee expected returns, as fees are a substantial component of returns for illiquid assets. Each of our inputs is debatable, as data limitations necessitate lots of simplifying assumptions, and each input can substantially affect the final estimate. **Exhibit 6** illustrates our framework and current inputs.[17] First, we estimate unlevered expected return using the DDM: $E(r) \approx y_U + g_U$, where y_U = unlevered payout yield and g_U = real earnings-per-share growth rate. Then, we estimate the levered return by applying leverage and the cost of debt, and finally we add expected multiple expansion and subtract fees.

Our yield-based real return estimate is 4.7% net of fees, higher than last year due to lower cost of debt and a larger estimate for multiple expansion. An alternative approach, which applies simple size and leverage adjustments to a public proxy and assumes zero net alpha, generates a higher estimate of 5.8%.[18] Taking a simple average of the two approaches gives a final estimate of 5.2%, compared to our U.S. large cap equity estimate of 3.8%.

Exhibit 6: Expected Real Returns for U.S. Private Equity

	Unlevered			Leverage		Levered					
	y_u	g_u	$r_u = y_u + g_u$	D/E	k_d	$r_l = r_u + (D/E) * (r_u - k_d)$	m	$r_g = r_l + m$	f	$r_n = r_g - f$	
	Income Yield	Real Growth Rate	Real Return	Debt to Equity	Real Cost of Debt	Levered Real Return	Multiple Expansion (Ann.)	Gross Real ER	Fees	Net Exp. Real Return	*1yr Change*
U.S. PE	2.0%	+ 3.0%	= 5.0%	81%	0.3%	8.8%	+ 0.9%	= 9.7%	5.0%	= **4.7%**	*(+1.6%)*

Source: AQR, Pitchbook, Bloomberg, CEM Benchmarking. Estimates as of September 30, 2020. Strictly speaking, our inputs are log returns and should be converted to simple returns before leverage is applied, then converted back to log returns. This 'round-trip' has only a small impact, so we omit it here. Estimates are for illustrative purposes only, are not a guarantee of performance and are subject to change. Not representative of any AQR product or strategy.

We estimate expected returns for unlevered U.S. direct real estate (RE) as represented by the NCREIF indices. We caveat that returns for individual RE funds can vary vastly from the industry average (this is also true of PE). As with our DDM-based approach for equities,

17 See Ilmanen, Chandra and McQuinn (2020) for a detailed discussion of the framework, our input choices, and the sources, as well as a literature review. Strictly speaking, the framework applies to the current vintage rather than the entire PE market. This paper also discusses the theoretical rationales and historical average returns to assess expected PE returns.

18 See the 2019 edition for details of this alternative method. This estimate has risen mainly because our expected cash return has fallen sharply, implying a higher equity excess return that is magnified by PE leverage in this calculation.

we sum the payout yield and expected long-term growth rate.[19] **Exhibit 7** shows a slight fall in our expected real return for RE (unlevered to make it comparable to the unlevered returns reported by NCREIF) to 2.5%.

Exhibit 7: Expected Real Returns for U.S. Private Real Estate

	NOI	C ≈ NOI / 3	CF ≈ NOI - C	g	ER = CF + g	
	NOI Yield	Capital Expenditure	Cashflow Yield	Real Growth	Unlevered Real Return	*1yr Change*
U.S. Real Estate	3.8%	1.3%	2.5%	0.0%	**2.5%**	*(-0.6%)*

Source: AQR, NCREIF Webinar Q3 2020. Estimates as of September 30, 2020. Estimates are for illustrative purposes only, are not a guarantee of performance and are subject to change. Not representative of any AQR product or strategy.

Cash

As discussed in the 2020 edition, our yield-based cash return assumption is a weighted average of current short-term and long-term yields. We are effectively averaging between the pure expectations and pure risk premium hypotheses. Giving a larger weight to the 10-year yield implies market rate expectations explain a larger portion of the yield curve slope than the required term premium, a conjecture arguably justified by relatively low inflation uncertainty and the role of forward guidance from central banks.

Exhibit 8 shows negative real cash returns for all major markets, with our U.S. estimate falling sharply in 2020. If expected returns for equities and bonds are low, they are even lower for cash—and this important fact will be true for almost any methodology.

Exhibit 8: Expected Local Real Returns for Cash

December 2020

	S	L	I	(L*2/3 + S*1/3) - I	
	3-Month Yield	10-Year Yield	10Y Forecast Inflation	Expected Real Cash Return	*1yr Change*
U.S.	0.1%	0.9%	2.1%	**-1.5%**	*-1.1%*
Japan	-0.1%	0.0%	0.8%	**-0.8%**	*0.0%*
Germany	-0.8%	-0.6%	1.7%	**-2.4%**	*-0.3%*
U.K.	0.0%	0.2%	2.1%	**-2.0%**	*-0.7%*
Australia	0.0%	1.0%	2.3%	**-1.6%**	*-0.6%*
Canada	0.1%	0.7%	2.0%	**-1.5%**	*-1.2%*

Source: Bloomberg, Consensus Economics and AQR. Estimates as of December 31, 2020. Estimates are for illustrative purposes only, are not a guarantee of performance and are subject to change. Not representative of any portfolio that AQR currently manages.

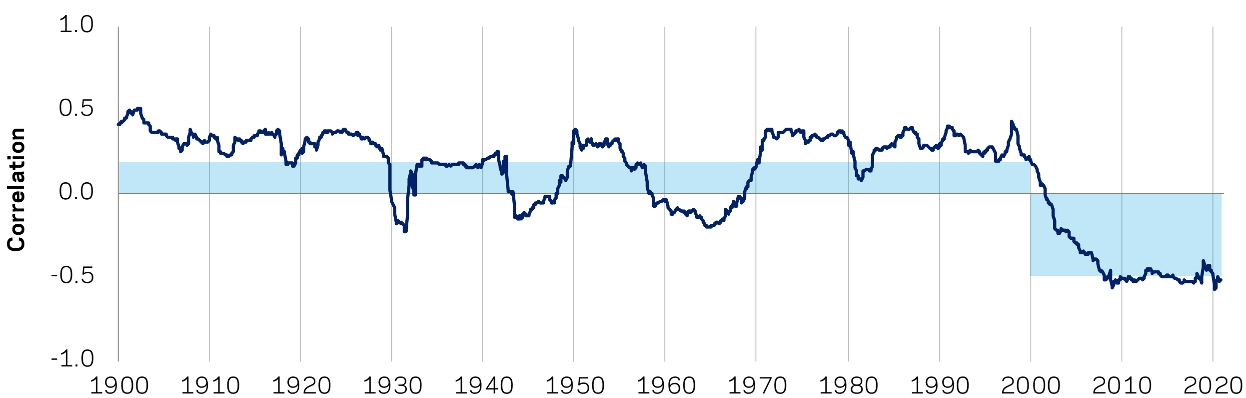
19 See Ilmanen, Chandra and McQuinn (2019) for full details of our methodology and assumptions.

The Stock-Bond Correlation

The stock-bond correlation (and stock-bond diversification defined more broadly) is a determinant of portfolio risk rather than return. However, it is so important for most investors that we dedicate this section to a brief discussion of what investors should expect from it in the coming decade.

Since around 2000 when the stock-bond correlation (henceforth SBC) turned negative, investors have benefitted from the tendency of their two main allocations to offset each other's losses, while both also earning positive returns (see **Exhibit 9**). Many researchers and commentators attribute this negative correlation to the credibility of central banks and the strong anchoring of inflation expectations during this period. Since growth shocks tend to drive stocks and bonds in opposite directions, while inflation shocks tend to drive them in the same direction, it makes sense that when growth shocks predominate, the SBC is likely to be lower.[20]

Exhibit 9: Rolling 10-Year Correlation Between U.S. Equities and U.S. Treasuries
1900-2020



Sources: Bloomberg, Global Financial Data, AQR. Based on overlapping 3-month returns at monthly frequency. Shading shows average correlations in 20th and 21st Centuries.

Are these conditions set to continue? In the 2010s central banks struggled to raise inflation towards their targets, but their ability to bring it down remains credible (albeit untested). On other hand, equity markets have arguably become increasingly reliant on ultra-easy monetary policy, and any indications of policy tightening could hurt both stocks and bonds (as seen briefly during the 'taper tantrum' of 2013). On balance, given the continued strong anchoring of inflation expectations, the negative SBC also seems likely to continue over the medium term, though episodes of higher correlation are also possible.

20 As well as the relative size of growth and inflation shocks, we may consider the impact of the relationship between growth and inflation. If we assume equities are more sensitive to growth and bonds are more sensitive to inflation, then during periods when upside growth and inflation shocks tend to coincide (demand-driven inflation), the SBC is more likely to be negative. During periods when upside growth shocks coincide with downside inflation shocks (supply-driven inflation), the SBC is more likely to be positive.

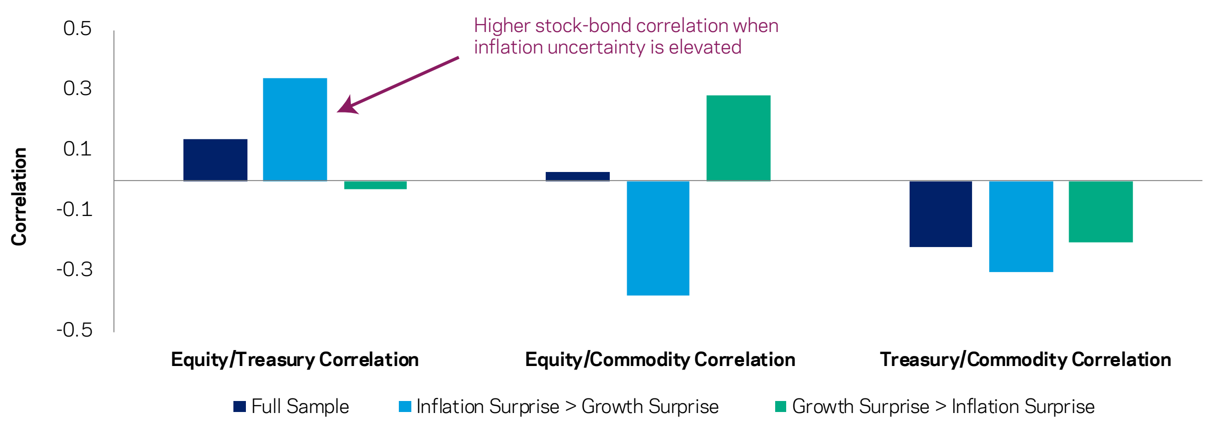
Many investors say they are not concerned with correlations between short-term fluctuations, but rather with the ability of bonds to meaningfully offset large equity market losses. Some feel that yields could not now fall far enough in response to a negative growth shock for bonds to fulfill this role. Our colleagues addressed this question in a recent paper,[21] and here we just note that if there is a lower bound for bond yields, nobody knows where it is, and even modest positive returns may be extremely valuable in a crisis.

The negative SBC may be a mixed blessing for bond investors, as it may reduce the required term premium: insurance doesn't usually come for free. The falling yields that have contributed to positive bond returns in recent decades cannot fall forever. However, bonds continue to offer protection against deflationary scenarios where other asset classes are likely to struggle. Such scenarios cannot be ruled out.

In the opposite scenarios of rising inflation and heightened inflation uncertainty, both stocks and (especially) bonds would be vulnerable, and history suggests the SBC may become positive in that outcome. This is illustrated in **Exhibit 10**, which also shows that commodities have tended to be an especially valuable diversifier in such environments. Therefore, while low inflation and a negative SBC remain our central assumption for the medium term, an allocation to commodities and other real assets may help to increase a portfolio's resilience to a range of macroeconomic outcomes.

Exhibit 10: Major Asset Class Correlations for Different Inflation vs. Growth Surprise Periods

January 1972 – June 2020



Sources: Bloomberg, Global Financial Data, Survey of Professional Forecasters, AQR. Correlations are for U.S. equities and Treasuries and are based on contemporaneous 12-month returns and surprises, at overlapping quarterly frequency. Surprise is defined as realized 12-month CPI or real GDP growth minus SPF starting forecast. Sample is divided into periods when magnitude of inflation surprise was bigger/smaller than growth surprise (ignoring sign of surprise), as a proxy for relative uncertainty. See Appendix for asset class proxies.

21 See Fader, Mees and Mendelson (2020), "It's Not a Bound, It's an Opinion". Additional simulation analysis suggests that if yields are expected to have room to fall 50-100 basis points from their present level, then near-term correlations and tail hedging properties are not seriously affected by a potential lower bound (depending on other assumptions). This analysis will be explored in a later article.

Concluding Thoughts

Yield-based expected returns for equities and bonds may be our best estimates of medium-term prospects for these asset classes. As of January 2021, these estimates are soberingly low. They suggest that during the 2020s, many investors may struggle to meet return objectives anchored to a rosier past. Low expected cash returns are one clear culprit, dragging down expected total returns on all risky investments.

We again emphasize that our return estimates for all asset classes are highly uncertain. The estimates in this report do not in themselves warrant aggressive tactical allocation responses—but they may warrant other kinds of responses. For example, investment objectives may need to be reassessed, even if this necessitates higher contribution rates and lower expected payouts. And although some diversifiers disappointed investors in 2020 (especially those with exposure to the equity value theme), the case for diversifying away from traditional equity and term premia is arguably stronger than ever.

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Appendix

Sources for Long-Term Historical Expected Returns

Sources for historical equity and bond expected returns are AQR, Robert Shiller's data library, Kozicki-Tinsley (2006), Federal Reserve Bank of Philadelphia, Blue Chip Economic Indicators, Consensus Economics and Morningstar. Prior to 1926, stocks are represented by a reconstruction of the S&P 500 available on Robert Shiller's website which uses dividends and earnings data from Cowles and associates, interpolated from annual data. After that, stocks are the S&P 500. Bonds are represented by long-dated Treasuries. The equity yield is a 50/50 mix of two measures: 50% Shiller E/P * 1.075 and 50% Dividend/ Price + 1.5%. Scalars are used to account for long term real Earnings Per Share (EPS) Growth. Bond yield is 10-year real Treasury yield minus 10-year inflation forecast as in *Expected Returns* (Ilmanen, 2011), with no rolldown added.

Methodology for Forecast Error Analysis (Exhibit 1)

We first produce historical time series of yield-based estimates for U.S. equities and U.S. Treasuries (analysis starts in 1900, but we use data from 1870s onwards). We test their predictive power using quarterly overlapping 10-year periods since 1900 and measure the distribution of errors. See the 2018 edition for more details. Error ranges in Exhibit 1 are based on interquartile ranges of these distributions, adjusted for current volatility estimates.

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