



C.W. O'Conner Wealth Advisors, Inc.

10-Year Capital Market Forecasts (2021-2030)

Asset Class Returns, Standard Deviations, Correlations and Tail Assumptions

Greetings,

We'd like to share our capital market forecasts for this decade. We update asset class assumptions annually to reflect 10-year estimates for asset class returns, standard deviations, skewness, kurtosis and correlations. This paper describes our input assumptions for the investment period from January 2021 to December 2030. Please don't hesitate to contact us if you have any questions.

Executive Summary of Year-Over-Year Return Assumption Changes

Asset Class	12/1/20 E(R)	4/1/20 E(R)	Since 4/1 Rebalance
Cash*	0.08%	0.05%	0.0%
TIPS	0.7%	0.9%	-0.2%
Muni Bond**	1.0%	2.7%	-1.7%
Muni High Yield**	6.7%	8.3%	-1.6%
US Bond	1.2%	1.6%	-0.4%
Dynamic Bonds***	1.7%		
Global Bonds	0.8%		
For. Dev. Bond	0.4%	0.4%	0.1%
HY Bond	3.4%	5.2%	-1.8%
EM Bond	1.7%	2.8%	-1.0%
Global Equity	6.8%	7.3%	-0.6%
US Equity (AC)	5.5%	5.8%	-0.3%
US Equity (LC)	5.4%	5.6%	-0.3%
US Equity (MC)	5.7%	6.0%	-0.3%
US Equity (SC)	5.8%	6.1%	-0.3%
Int'l Dev. Equity	7.0%	7.7%	-0.7%
EM Equity	8.5%	10.1%	-1.6%
Real Estate	5.3%	5.1%	0.2%
Broad Real Assets****	3.9%		
Midstream Energy	8.1%	13.5%	-5.4%
Commod. Fut.	2.3%	3.3%	-1.0%
HFoF Multi-Strat	5.4%	5.9%	-0.5%
Private Equity	8.5%	8.8%	-0.3%

Our Investment Themes for 2021-2030

- Cash remains an expensive opportunity cost for investors.
- Given the reductions in forward looking returns for bonds across the globe, generating positive real returns will be challenging moving forward.
- Global stock market valuations rose in 2020 with prices expanding faster than earnings capacity.
- Real Assets remain an important diversifier as the events of 2020 have likely planted some seeds for rising future inflation.
- Midstream return assumptions are down materially as the asset class has appreciated dramatically off the COVID-induced (March) lows. We expect the asset class to remain volatile in 2021.

*3-month forecast

**Tax equivalent yield based on highest marginal tax rate (37%)

***33% Cash, 33% Corp HY, and 34% Global Bonds

****25% TIPS, 15% Bank Loans, 30% Infrastructure, 15% REITs and 15% Commodities

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10-YEAR RETURN FORECASTS BY ASSET CLASS

INFLATION (CPI): Inflation is used as a building block of total return for several asset classes. Our forecast of inflation is the difference between the 10-year nominal U.S. Treasury yield and the 10-year TIPS real yield. As of November 30, 2020, this difference was 1.80% (i.e., 0.84% - -0.96%). We believe this implied breakeven inflation rate (of 1.80%) is a rational median case assumption regarding CPI inflation for all items in the Consumer Price Index over the next 10 years. The following are the implied breakeven and our forward CPI expectations based on current breakeven inflation relationships.

Implied Breakeven CPI (11/30/20)

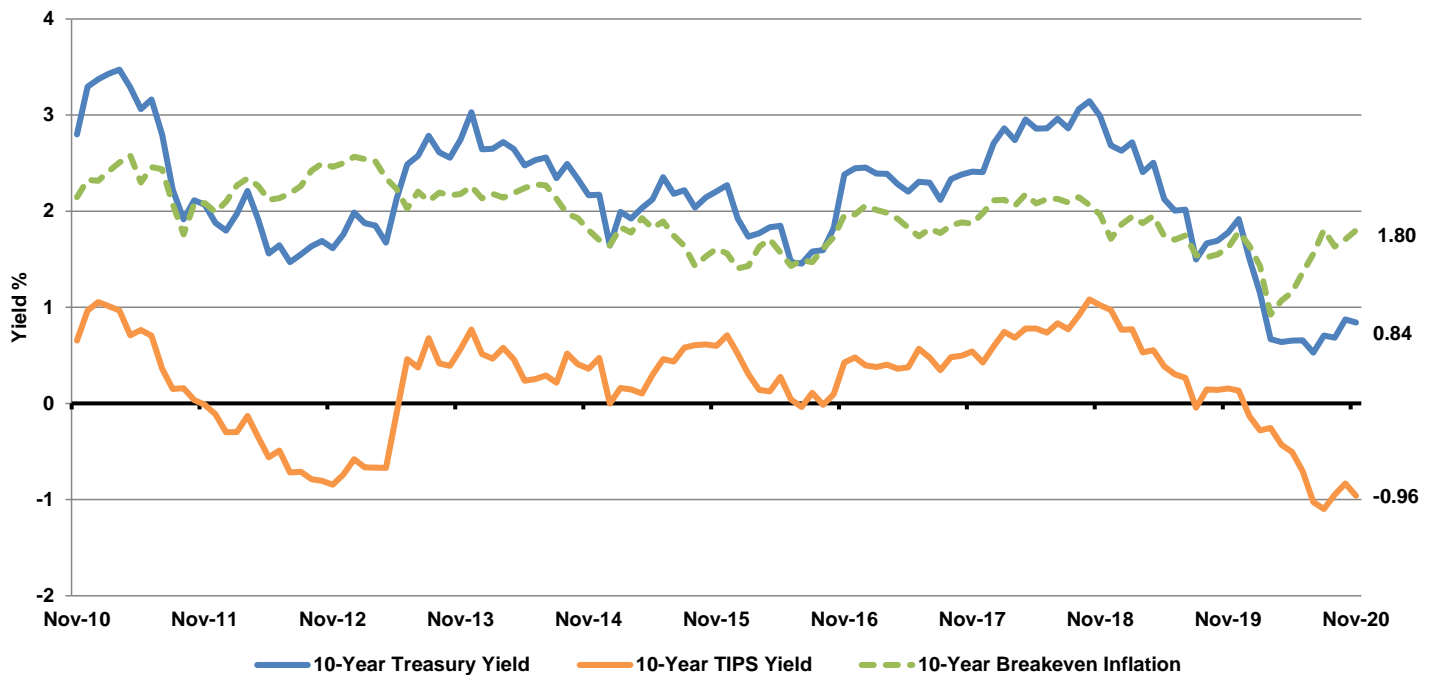
Maturity	Nominal	TIPS	Implied CPI
5 Years	0.36%	-1.35%	1.71%
7 Years	0.61%	-1.41%	2.02%
10 Years	0.84%	-0.96%	1.80%
20 Years	1.36%	-0.56%	1.92%
30 Years	1.57%	-0.37%	1.94%

Implied Forward CPI (11/30/20)

Forward CPI	Implied CPI
1-5 Years	1.71%
5-10 Years	1.89%
10-20 Years	2.04%
20-30 Years	1.97%

Source: Bloomberg

Historical 10-Year U.S. Nominal and Real Rates (as of November 30, 2020)



Source: Bloomberg

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While the 10-year CPI forecast is 1.80%, we expect lower inflation (1.71%) in the first five years and higher inflation (1.89%) in the following five years.

10-Year Forecast of Annual CPI: 1.80%

TIPS: As of November 30, 2020, the Bloomberg Barclays Capital U.S. TIPS Index had 43 issues (all U.S. Sovereign) with an average real yield of -1.07% and an average maturity of 8.19 years.

Bloomberg Barclays U.S. TIPS (11/30/20)

Summary Statistics	Value
Average Maturity (Yrs)	8.19
Average Real Duration (Yrs)	7.74
Average Coupon (%)	0.67
Yield to Worst (%)	0.73
Number of Issues	43

Source: Bloomberg, Barclays

Combining the real yield of the Bloomberg Barclays Capital U.S. TIPS Index (-1.07%) with our forecasted inflation (1.80%) leads to an expected return of 0.73%.

10-Year Forecast of Annualized Geometric Return: 0.7%

SHORT TERM BONDS: The historical duration of the asset class has been steady at approximately 2.00 years, which is calculated using blended return assumptions for cash and U.S. investment-grade fixed income. The blended return comes two-thirds from cash and one third from U.S. Investment Grade Fixed Income. Our expected geometric return forecast is 0.5%.

10-Year Forecast of Annualized Geometric Return: 0.5%

U.S. TAX-EXEMPT (MUNICIPAL) FIXED INCOME: As of November 30, 2020, the Bloomberg Barclays Capital U.S. Municipal Bond: 5 Year (4-6) Index had 6,088 issues with an average maturity of 4.99 years and an average duration of 3.93 years. The index is investment-grade rated.

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Bloomberg Barclays 5-Year U.S. Municipal Bond (11/30/20)

Summary Statistics	Value
Average Maturity (Yrs)	4.99
Average Duration (Yrs)	3.93
Average Coupon (%)	4.65
Yield to Worst (%)	0.63
Number of Issues	6,088

Source: Bloomberg, Barclays

Our tax-adjusted return forecast for the Bloomberg Barclays Capital Municipal Bond: 5 Year (4-6) Index is found by dividing the current yield to worst by one minus the highest marginal federal tax rate $[(0.63\% / (1 - 0.37))] = 0.99\%$.

10-Year Forecast of Annualized Geometric Return: 1.0%¹

U.S. TAX-EXEMPT (MUNICIPAL) HIGH YIELD FIXED INCOME: As of November 30, 2020, the Bloomberg Barclays Capital U.S. Municipal High Yield Index had 4,891 issues with an average maturity of 20.81 years and an average duration of 5.85 years. The index is below investment-grade rated.

Bloomberg Barclays U.S. Municipal High Yield Bond (11/30/20)

Summary Statistics	Value
Average Maturity (Yrs)	20.81
Average Duration (Yrs)	5.85
Average Coupon (%)	4.73
Yield to Worst (%)	4.22
Number of Issues	4,891

Source: Bloomberg, Barclays

¹The 0.9% annualized return assumption is used for optimization purposes to advantage municipal bonds over taxable bonds in taxable accounts as appropriate. However, 0.6% in annualized return is used when looking at portfolio level forward looking returns that are a weighted average of the underlying asset class return expectations.

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Asset Class Returns, Standard Deviations, Correlations and Tail Assumptions

Our tax-adjusted return forecast for the Bloomberg Barclays Capital U.S. Municipal High Yield Index is found by dividing the current yield to worst by one minus the highest marginal federal tax rate $[(4.22\% / (1 - 0.37))] = 6.70\%$.

10-Year Forecast of Annualized Geometric Return: 6.7%²

U.S. INVESTMENT GRADE FIXED INCOME: As of November 30, 2020, the Bloomberg Barclays Capital U.S. Aggregate Bond Index had 11,998 issues with an average maturity of 8.28 years and an average duration of 6.44 years. The index is investment-grade rated.

Bloomberg Barclays U.S. Aggregate (11/30/20)

Sector Breakdown	%	Credit Breakdown	%	Maturity Breakdown	%	Summary Statistics	Value
Govt / Agency	43.2	AAA	69.6	1-3 Years	24.5	Average Maturity (Yrs)	8.28
Corporate	27.6	AA	3.4	3-5 Years	33.1	Average Duration (Yrs)	6.44
MBS	26.6	A	12.1	5-7 Years	12.6	Average Coupon (%)	2.81
ABS	0.3	BBB	14.9	7-10 Years	9.6	Yield to Worst (%)	1.15
CMBS	2.2	BB or lower	0.0	> 10 Years	20.3	Number of Issues	11,998

Source: Bloomberg, Barclays

The return forecast for the Bloomberg Barclays Capital U.S. Aggregate Bond Index is its current yield to worst of 1.15%.

10-Year Forecast of Annualized Geometric Return: 1.2%

Dynamic Bonds: The asset class is calculated using blended return assumptions for cash (1/3), corporate high yield (1/3) and global bonds (1/3). The (unbiased) expected geometric return forecast is 1.7%.

10-Year Forecast of Annualized Geometric Return: 1.7%

²The 6.7% annualized return assumption is used for optimization purposes to advantage municipal bonds over taxable bonds in taxable accounts as appropriate. However, 4.2% in annualized return is used when looking at portfolio level forward looking returns that are a weighted average of the underlying asset class return expectations.

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HIGH YIELD BONDS: As of November 30, 2020, the FTSE U.S. High Yield Market Index had 1,729 issues (all BB rated or lower) representing \$1.27 trillion in market value. The yield to worst was 4.78% with an average maturity of 6.11 years and a 3.30-year average duration. The following charts reflect current high yield bond market metrics and historical spread data.

FTSE U.S. High Yield Market Index (November 30, 2020)

Market Value (\$B)	Par Value (\$B)	MV / PV Premium (Discount)	Average Coupon (per \$100 Par)	Coupon/ MV Yield	Current YTW
\$1,271	\$1,218	104%	6.07%	5.82%	4.78%

Source: Bloomberg, FTSE

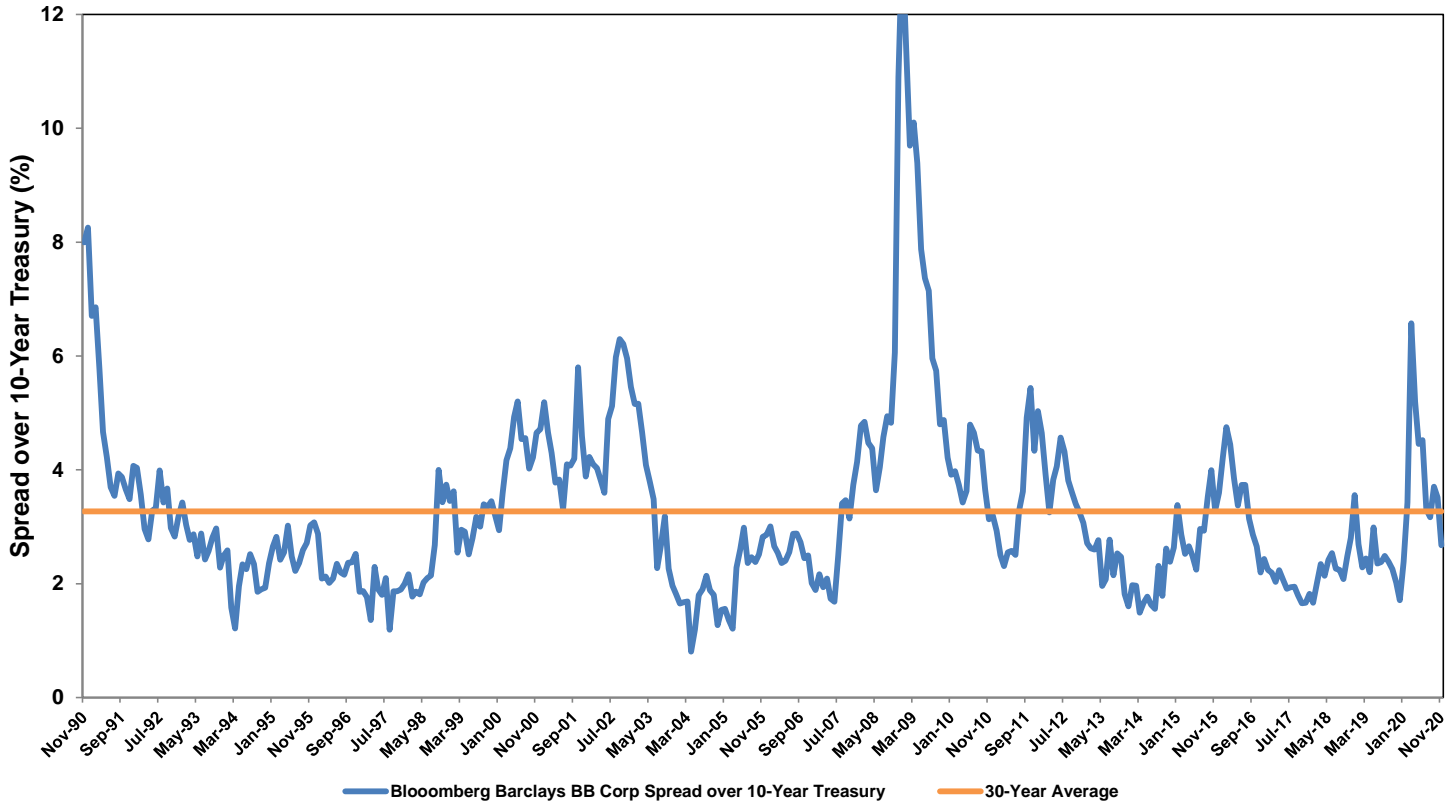
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BB-Rated Corporate Spread vs. 10-Year U.S. Treasury (1990-2020)



Source: Bloomberg

- As of November 30, 2020, the Bloomberg Barclays BB-rated Corporate Bond spread over the 10-year U.S. Treasury was 2.67%, which is 0.60% below the long-term historical average of 3.27% since November 1990. This represents a spread expansion of 66 basis points on a year-over-year basis, largely attributed to a higher yield on the Index.
- From August 1983 to November 2020, the Bloomberg Barclays U.S. Corporate High Yield Index returned an annualized 8.82% versus 7.12% for the Bloomberg Barclays Capital U.S. Aggregate Bond Index. This represents a historical risk premium of 1.69% for high yield bonds (over investment-grade intermediate bonds).
- Moody's 2020 forecast for U.S. high yield default rate is 8.5%³, which is a significant increase year-over-year.

³https://www.moodys.com/research/Moodys-US-speculative-grade-default-tally-falls-in-Q3-2020--PBC_1251731

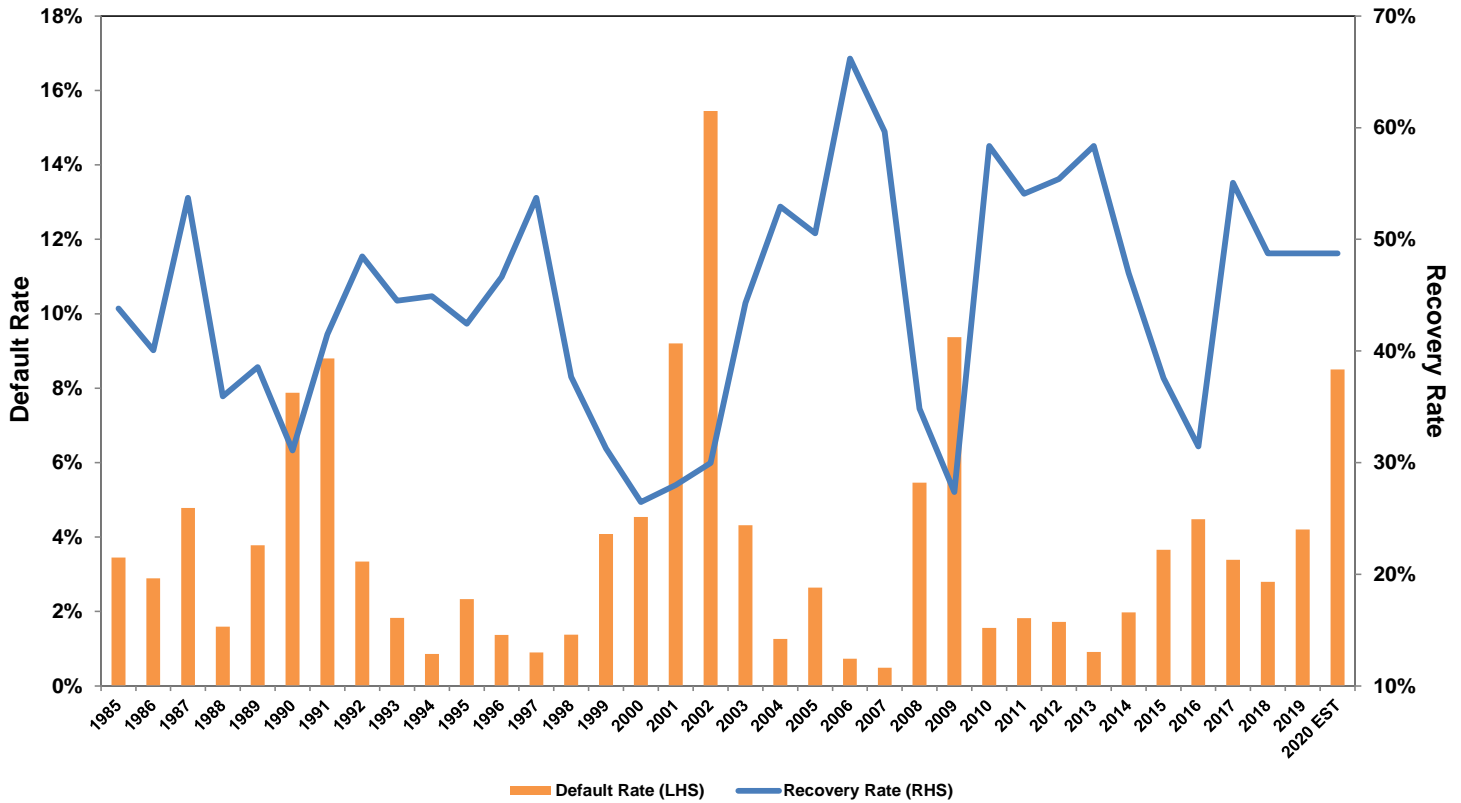
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Historical High Yield Bond Default and Recovery Rates



Source: Credit Suisse through 2013 and Moody's since 2014. Moody's default rate estimate used for 2020 and last year's recovery rate carried over until recovery rates are quantified in the future.

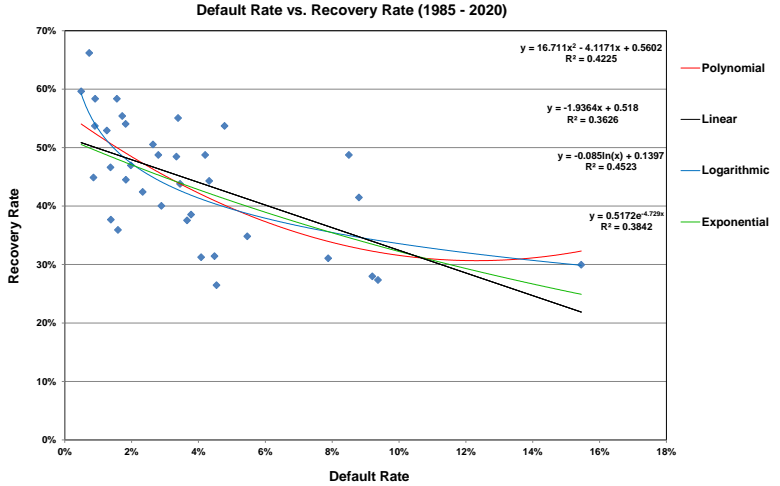
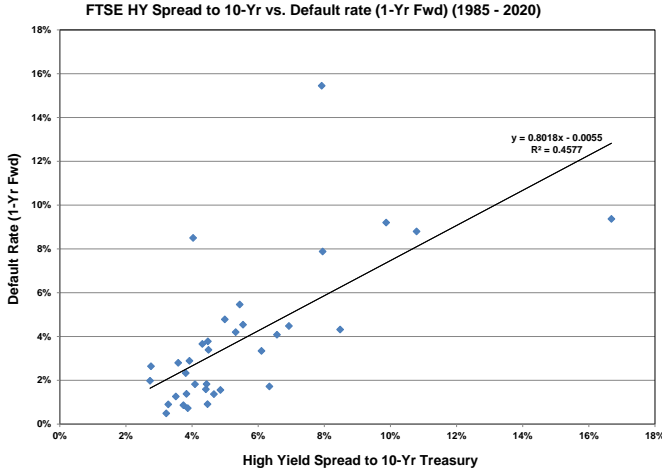
- The geometric return forecast is derived from the *High Yield Default-Loss Method*, where expected return is a function of current credit spreads, our internal expected default rates and expected recovery rates.
- Each year end's high yield credit spread is used to estimate the following year's default rate (left pane below) from 1985 to 2020 and each year's actual default rate is used to predict an implied recovery rate using four different mathematical relationships (right pane below).

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Source: Credit Suisse, Moody's, DiMeo Schneider & Associates, L.L.C. Analysis

High Yield Default-Loss Method applied as of November 30, 2020⁴

Polynomial Default-Recovery Regression

10-Year Treasury	Current Yield-to-Worst	Current Spread	Assumed Annual Default Rate	Assumed Annual Recovery Rate	Assumed Annual Loss Rate	Expected Return
0.84%	4.78%	3.94%	2.61%	46.42%	-1.40%	3.38%

Linear Default-Recovery Regression

10-Year Treasury	Current Yield-to-Worst	Current Spread	Assumed Annual Default Rate	Assumed Annual Recovery Rate	Assumed Annual Loss Rate	Expected Return
0.84%	4.78%	3.94%	2.61%	46.74%	-1.39%	3.39%

Logarithmic Default-Recovery Regression

10-Year Treasury	Current Yield-to-Worst	Current Spread	Assumed Annual Default Rate	Assumed Annual Recovery Rate	Assumed Annual Loss Rate	Expected Return
0.84%	4.78%	3.94%	2.61%	45.01%	-1.43%	3.35%

Exponential Default-Recovery Regression

10-Year Treasury	Current Yield-to-Worst	Current Spread	Assumed Annual Default Rate	Assumed Annual Recovery Rate	Assumed Annual Loss Rate	Expected Return
0.84%	4.78%	3.94%	2.61%	45.72%	-1.42%	3.36%

Source: Credit Suisse, Moody's, FTSE, Bloomberg, DiMeo Schneider & Associates, L.L.C. Analysis

- Based on the *High Yield Default-Loss Method*, the market is pricing in a 12-month forward looking 2.61% annual expected default rate as of November 30, 2020. This implies an expected recovery rate of around 46%, and subsequent annual loss rate of approximately 1.40%. This represents an estimate based on recent default and recovery rates. We believe the midpoint of the range of all methods reflects a sensible view of default losses over a full market cycle.

⁴Default Rate = $-0.0055 + 0.8018 * [\text{HY Yield-to-Worst Spread vs. 10-Year Treasury}]$. $R^2 = 0.4577$. Recovery Rate algorithm combines linear, polynomial, logarithmic and exponential factors; additional details available upon request.

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10-Year Forecast of Annualized Geometric Return: 3.4%

FOREIGN DEVELOPED FIXED INCOME: As of November 30, 2020, the FTSE World Government Bond ex-U.S. Index had an average yield to maturity of 0.10% with an average maturity of 10.6 years and a 9.99-year average duration.

Expected return is calculated by isolating the *sovereign index yield* and *currency and/or credit* components of the foreign developed bond market. The *sovereign index yield* component is calculated by taking the weighted average local bond market yield. Interest rate parity is then used to calculate the expected *currency* impact embedded in the foreign developed bond markets (in U.S. dollar terms). The difference in like-maturity rates across borders explains the currency Spot-Futures exchange rate relationship. If not, one could borrow in one currency, lend in the other and lock in an arbitrage profit.

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Foreign Developed Bond Market Data as of November 30, 2020⁵

Country	Global Allocation Ex-US (%)	Local Bond Market Maturity (Years)	Local Bond Market YTM (%)	U.S. Treasury Equivalent YTM (%)	Interest Parity (Currency) Spread (%)	Gross Debt to GDP Ratio (%)	Sovereign Credit and/or Currency Premium / (Discount) (%)
Japan	27.5%	12.6	0.15	0.72	0.57	238	(1.00)
France	13.6%	9.6	(0.36)	0.59	0.95	98	0.01
Italy	12.1%	8.9	0.35	0.53	0.18	135	(0.06)
Germany	9.9%	8.3	(0.61)	0.55	1.16	60	0.20
United Kingdom	8.5%	16.0	0.49	0.93	0.44	85	0.05
Spain	7.8%	9.3	(0.04)	0.66	0.70	95	0.01
Australia	3.5%	8.2	0.64	0.59	(0.05)	46	0.33
Belgium	3.2%	11.0	(0.30)	0.68	0.98	99	0.01
Canada	2.5%	8.0	0.54	0.63	0.09	89	0.03
Netherlands	2.5%	9.1	(0.51)	0.68	1.19	48	0.31
Austria	1.9%	11.9	(0.39)	0.84	1.23	70	0.12
Mexico	1.1%	8.1	5.35	0.51	(4.84)	54	0.26
Ireland	1.1%	9.4	(0.32)	0.66	0.98	57	0.22
Finland	0.8%	8.1	(0.50)	0.60	1.10	59	0.21
Poland	0.8%	4.7	0.47	0.36	(0.11)	46	0.33
Denmark	0.7%	10.1	(0.42)	0.63	1.05	29	0.53
Malaysia	0.6%	9.3	2.76	0.65	(2.11)	57	0.22
Singapore	0.6%	9.1	0.71	0.59	(0.12)	130	(0.04)
Israel	0.6%	7.7	0.65	0.49	(0.16)	60	0.20
Sweden	0.4%	6.1	(0.18)	0.46	0.64	35	0.46
Norway	0.3%	5.5	0.54	0.38	(0.16)	41	0.38
Total / WTD Average	100.00%	10.6	0.10	0.66	0.56	129	(0.21)
United States	N/A*	7.9	0.56			109	

*The United States is 35.8% of the Total World Government Bond Index.

Source: Bloomberg, FTSE

⁵Source: FTSE (FTSE World Government Bond ex-U.S. Index data); DSA Calculation. Formerly the Citi World Government Bond ex-U.S. Index.

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Fixed Income Returns Decomposition Method: (YLD) +/- (IRP) +/- (CRE/CUR)

10-Year Forecast (2021 - 2030): (0.10%) + (0.56%) + (-0.21%) = 0.44%

- YLD = Index Yield
- IRP = Interest Rate Parity Currency Adjustment
- CRE/CUR = Sovereign Credit/Currency Adjustment

The sovereign credit and/or currency premium / (discount) adjustment is applied to individual countries based on their debt-to-GDP ratios and reflects our opinion of how interest parity relationships do not fully reflect the potential for currency debasement (a form of implicit default) or actual potential principal losses due to explicit default.

10-Year Forecast of Annualized Geometric Return: 0.4%

EMERGING MARKETS (LOCAL CURRENCY) FIXED INCOME: As of November 30, 2020, the JPMorgan GBI-EM Global Diversified Index had an average yield to maturity of 4.47% with an average maturity of 7.46 years and a 5.38-year average duration. Expected return is calculated by isolating the *sovereign index yield, currency and/or credit* components of the emerging markets bond market. The *sovereign index yield* component is calculated by taking the weighted average local bond market yield. Interest rate parity is then used to calculate the expected *currency* impact embedded in the emerging markets bond markets (in U.S. dollar terms).

The difference in like-maturity rates across borders explains the currency Spot-Futures exchange rate relationship. If not, one could borrow in one currency, lend in the other and lock in an arbitrage profit. In order to isolate each country's implied credit spread, credit default swaps for each country are used to quantify credit risk above and beyond that of U.S. denominated bonds. This amount is then backed out of each country's yield in order to be removed from the interest rate parity calculation since implied credit risk is captured in the local bond yield and therefore should not be accounted for in the interest rate parity calculation as well.

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JPMorgan GBI-EM Emerging Markets Bond Data as of November 30, 2020⁶

Country	Allocation (%)	Local Bond Market Maturity (Years)	Local Bond Market YTM (%)	U.S. Treasury Equivalent YTM (%)	Market Implied Credit Spread	Interest Parity (Currency) Spread (%)	Gross Debt to GDP Ratio (%)	Sovereign Credit and/or Currency Premium / (Discount) (%)
Mexico	9.6%	8.8	5.9	0.6	0.8	(4.5)	54	0.3
Indonesia	9.6%	8.6	6.2	0.5	0.8	(4.8)	30	0.5
China	9.0%	7.2	3.2	0.6	0.3	(2.3)	53	0.3
Thailand	8.7%	9.1	1.4	0.6	0.3	(0.5)	41	0.4
Brazil	8.5%	3.4	6.5	0.4	1.6	(4.5)	89	0.0
Poland	8.2%	4.7	0.6	0.4	0.5	0.2	46	0.3
Russia	7.5%	6.8	5.6	0.5	0.8	(4.4)	14	0.8
South Africa	7.5%	13.4	9.9	1.0	2.3	(6.7)	62	0.2
Malaysia	6.9%	6.1	2.7	0.4	0.3	(1.9)	57	0.2
Colombia	5.5%	7.7	5.2	0.6	0.8	(3.7)	52	0.3
Hungary	4.0%	5.8	1.6	0.4	0.7	(0.6)	66	0.2
Czech Republic	3.9%	6.7	1.0	0.5	0.7	0.2	30	0.5
Romania	3.1%	4.5	2.9	0.4	0.7	(1.9)	37	0.4
Peru	2.9%	10.7	3.9	0.6	0.6	(2.7)	27	0.6
Chile	2.6%	10.1	2.8	0.6	0.4	(1.8)	28	0.6
Turkey	2.1%	3.6	12.4	0.4	3.8	(8.2)	33	0.5
Philippines	0.2%	11.1	3.7	0.7	0.3	(2.7)	37	0.4
Dominican Republic	0.2%	4.3	8.2	0.4	4.7	(3.1)	54	0.3
Uruguay	0.1%	4.2	7.5	0.4	0.5	(6.7)	66	0.2
Argentina	0.0%	4.4	53.7	0.4	5.5	(47.8)	90	0.0
Total / WTD Average	100.0%	7.5	4.5	0.5	0.9	(3.1)	48	0.3
United States		7.9	0.6				109	

Source: Bloomberg, JPMorgan

Fixed Income Returns Decomposition Method: (YLD) +/- (IRP) +/- (CRE/CUR)

10-Year Forecast (2021 - 2030): (4.47%) + (-3.07%) + (0.35%) = 1.74%

- YLD = Index Yield
- IRP = Interest Rate Parity Currency Adjustment
- CRE/CUR = Sovereign Credit/Currency Adjustment

⁶Source: JPMorgan (JPMorgan GBI-EM Global Diversified Index data); Bloomberg (CDS Spreads); DSA Calculation.

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C.W. O'Conner Wealth Advisors, Inc.

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Asset Class Returns, Standard Deviations, Correlations and Tail Assumptions

The sovereign credit and/or currency premium / (discount) adjustment is applied to individual countries based on their debt-to-GDP ratios and reflects our bias for how interest parity relationships do not fully reflect the potential for currency debasement (a form of implicit default) or actual potential principal losses due to explicit default.

10-Year Forecast of Annualized Geometric Return: 1.7%

GLOBAL FIXED INCOME: The asset class is calculated using blended return assumptions for U.S. investment-grade fixed income (40%) and foreign investment grade developed sovereign bonds (60%). Our expected geometric return forecast is 0.8%.

10-Year Forecast of Annualized Geometric Return: 0.8%

U.S. LARGE CAP EQUITIES: The expected geometric return forecast for U.S. Large Cap Equities (S&P 500) is derived by applying the *Cyclically-Adjusted Earnings Yield Method* where return is a function of the historical 10-year average real earnings, current price and our 10-year inflation assumption (CPI).

Cyclically-Adjusted Earnings Yield Method: $\{[1 + (\text{EARNINGS}/\text{PRICE})] * (1 + \text{CPI})\} - 1$

10-Year Forecast (2021 - 2030): $\{[1 + (126.46 / 3,621.63)] * (1 + 1.80\%)\} - 1$

10-Year Forecast (2021 - 2030): $\{(1 + 3.49\%) * (1 + 1.80\%)\} - 1 = 5.36\%$

- *EARNINGS* = Historical 10-year average real earnings of the S&P 500 Index as of November 30, 2020
- *PRICE* = Current S&P 500 Index real price as of November 30, 2020
- *CPI* = Our Inflation Forecast

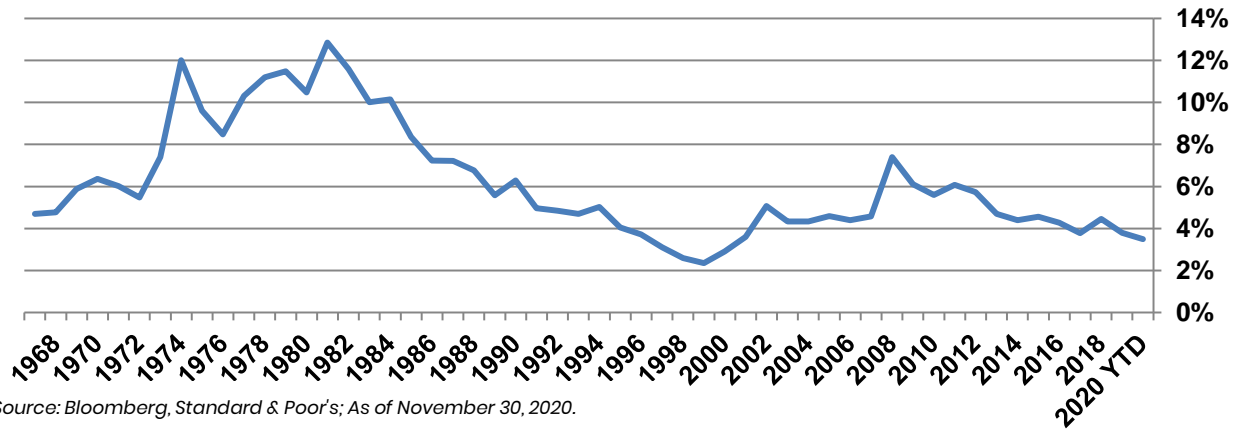
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10-Year Capital Market Forecasts (2021-2030)

Asset Class Returns, Standard Deviations, Correlations and Tail Assumptions

S&P 500 Cyclically-Adjusted Earnings Yield



Source: Bloomberg, Standard & Poor's; As of November 30, 2020.

10-Year Forecast of Annualized Geometric Return: 5.4%

Use of Indices and Benchmark Return Indices cannot be invested in directly. Index performance is reported gross of fees and expenses and assumes the reinvest dividends and capital gains. Past performance does not indicate future performance and there is a possibility of a loss. See disclosure page for indices representing each asset class. See the appendix for additional information about the Black-Litterman method.

U.S. MID CAP EQUITIES: Using historical correlations and volatility for Large, Mid and Small Cap U.S. Equities (from 1979-2020) and U.S. market cap weights, the Black-Litterman arithmetic return forecast for Mid Cap is 7.3% (vs. 5.4% for Large Cap). Adjusting for forecasted volatility (17.8% Annual Standard Deviation), our expected geometric return is 5.7%.

10-Year Forecast of Annualized Geometric Return: 5.7%

U.S. SMALL CAP EQUITIES: Using historical correlations and volatility for Large, Mid and Small Cap U.S. Equities (from 1979-2020) and U.S. market cap weights, the (unbiased) Black-Litterman arithmetic return forecast for Small Cap is 7.9% (vs. 5.4% for Large Cap). Adjusting for forecasted volatility (20.3% Annual Standard Deviation), our expected geometric return is 5.8%.

10-Year Forecast of Annualized Geometric Return: 5.8%

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10-Year Capital Market Forecasts (2021-2030)

Asset Class Returns, Standard Deviations, Correlations and Tail Assumptions

Black-Litterman (U.S. Mid and Small Cap Equities)^{7,8}

As of: **11/30/2020**

Market Caps

	% MC
Large Cap	69.8%
Mid Cap	20.5%
Small Cap	9.7%

Volatility

	St. Dev.
S&P 500	15.1%
RMID	16.9%
R2000	19.7%

1979-2020

Correlation Matrix

	S&P 500	RMID	R2000
S&P 500	1.00	0.94	0.84
RMID	0.94	1.00	0.94
R2000	0.84	0.94	1.00

1979-2020

Covariance Matrix

	S&P 500	RMID	R2000
S&P 500	2.28%	2.40%	2.51%
RMID	2.40%	2.86%	3.14%
R2000	2.51%	3.14%	3.89%

1979-2020

Mkt St. Dev.	16.66%
Mkt Variance	2.78%
Mkt RP	7.93%
RA Coefficient	2.86
RFR	0.08%

$$[MC_1\% \cdot COV_1 + MC_2\% \cdot COV_2 + MC_3\% \cdot COV_3] \times RA \text{ Coeff.} + RFR$$

Ar. Ret.	6.7%	7.3%	7.9%
St. Dev.	16.4%	17.8%	20.3%
Ge. Ret.	5.36%	5.73%	5.83%

Solve for Mkt RP w/ Large Cap = 5.4%

Risk Aversion Coefficient = MRP/VAR

Source: Morningstar, Bloomberg, MSCI

U.S. ALL CAP EQUITIES: Using relative market capitalization weights⁹, historical correlation, volatility and our forecasted expected returns for Large, Mid and Small Cap U.S. Equities, the expected geometric return forecast for All Cap is 5.5%.

10-Year Forecast of Annualized Geometric Return: 5.5%

FOREIGN DEVELOPED EQUITIES: The expected geometric return forecast for Foreign Developed Equities (MSCI EAFE) is derived by applying the *Cyclically-Adjusted Earnings Yield Method* where return is a function of the 10-year average real earnings, current price and our 10-year inflation assumption (CPI).

⁷RA Coefficient (i.e., Risk Aversion Coefficient) = Market Risk Premium/Market Variance.

⁸10-Year forecast standard deviation different from 1979-2020 historical standard deviation.

⁹As of 11/30/20, the U.S. equity market capitalization was comprised as follows: 76.7% Large Cap, 12.6% Mid Cap and 10.7% Small Cap. Source: Bloomberg, MSCI.

See disclosures for list of indices representing each asset class. Indices cannot be invested in directly. Performance is reported gross of fees and expenses and assumes the reinvest dividends and capital gains. Past performance does not indicate future performance and there is a possibility of a loss.

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10-Year Capital Market Forecasts (2021-2030)

Asset Class Returns, Standard Deviations, Correlations and Tail Assumptions

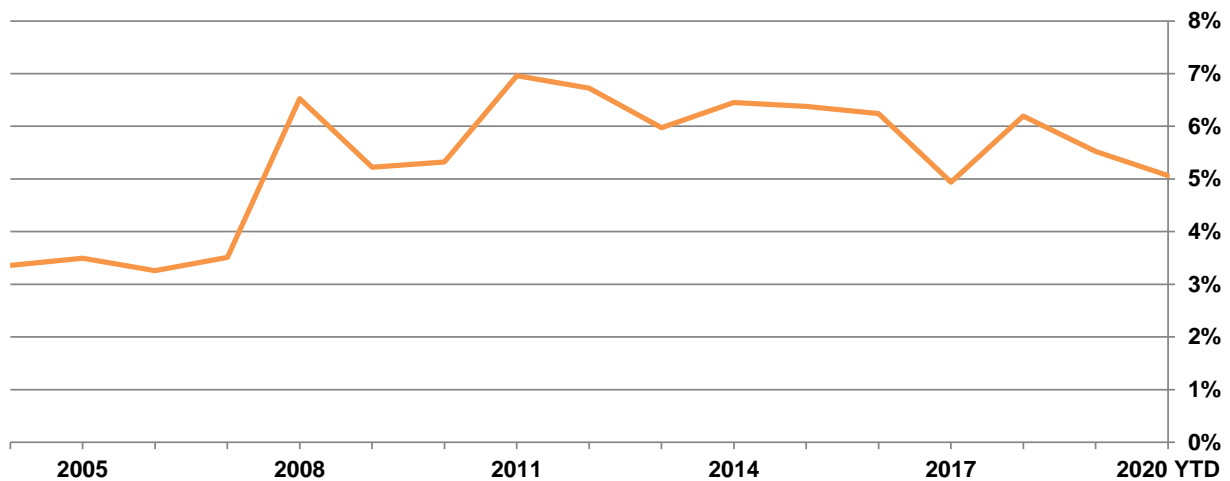
Cyclically-Adjusted Earnings Yield Method: $\{[1 + (\text{EARNINGS}/\text{PRICE})] * (1 + \text{CPI})\} - 1$

10-Year Forecast (2021 - 2030): $\{[1 + (103.98 / 2,053.83)] * (1 + 1.80\%)\} - 1$

10-Year Forecast (2021 - 2030): $\{(1 + 5.06\%) * (1 + 1.80\%)\} - 1 = 6.96\%$

- EARNINGS = 10-Year average real earnings of the MSCI EAFE Index as of November 30, 2020
- PRICE = Current MSCI EAFE Index real price as of November 30, 2020
- CPI = Inflation Forecast

MSCI EAFE Cyclically-Adjusted Earnings Yield



Source: Bloomberg, MSCI; As of November 30, 2020.

10-Year Forecast of Annualized Geometric Return: 7.0%

EMERGING MARKETS EQUITIES: The expected geometric return forecast for Emerging Markets Equities (unhedged MSCI Emerging Markets) is derived by applying the *Cyclically-Adjusted Earnings Yield Method* where return is a function of the 10-year average real earnings, current price and our 10-year inflation assumption (CPI).

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10-Year Capital Market Forecasts (2021-2030)

Asset Class Returns, Standard Deviations, Correlations and Tail Assumptions

Cyclically-Adjusted Earnings Yield Method: $\{[1 + (\text{EARNINGS}/\text{PRICE})] * (1 + \text{CPI})\} - 1$

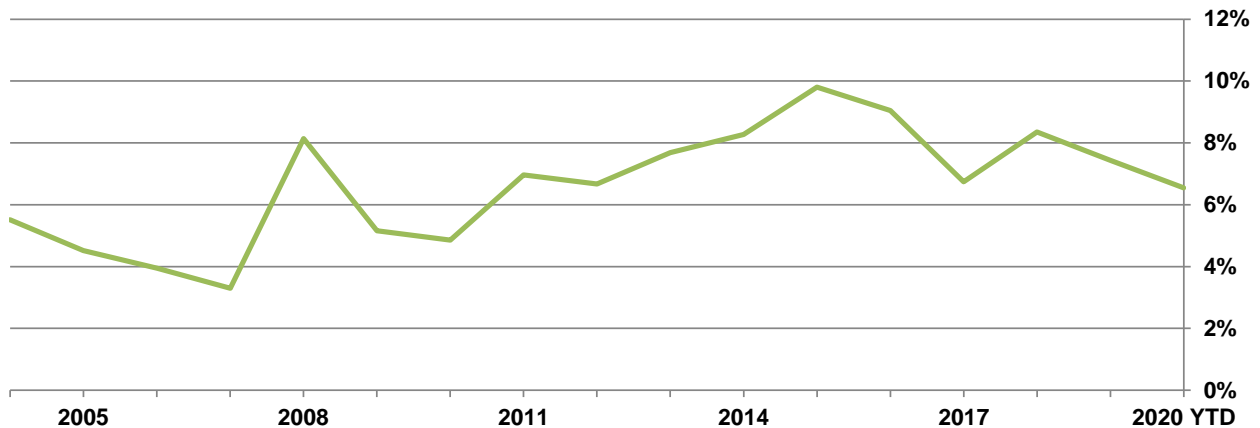
10-Year Forecast (2021 - 2030): $\{[1 + (78.85 / 1,205.07)] * (1 + 1.80\%)\} - 1$

10-Year Forecast (2021 - 2030): $\{(1 + 6.54\%) * (1 + 1.80\%)\} - 1 = 8.46\%$

- EARNINGS = 10-year average real earnings of the MSCI Emerging Markets Index as of November 30, 2020
- PRICE = Current MSCI Emerging Markets Index real price as of November 30, 2020
- CPI = Inflation Forecast

Use of Indices and Benchmark Return Indices cannot be invested in directly. Index performance is reported gross of fees and expenses and assumes the reinvest dividends and capital gains. Past performance does not indicate future performance and there is a possibility of a loss. See disclosure page for indices representing each asset class.

MSCI EM Cyclically-Adjusted Earnings Yield



Source: Bloomberg, MSCI; As of November 30, 2020.

10-Year Forecast of Annualized Geometric Return: 8.5%

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10-Year Capital Market Forecasts (2021-2030)

Asset Class Returns, Standard Deviations, Correlations and Tail Assumptions

GLOBAL EX-U.S. EQUITIES: Using relative market capitalization weights¹⁰ (excluding the U.S.), historical correlation, volatility and forecasted expected returns for Foreign Developed and Emerging Markets Equity, our expected geometric return forecast for Global ex-U.S. is 7.7%.

10-Year Forecast of Annualized Geometric Return: 7.7%

GLOBAL EQUITIES: Using relative market capitalization weights¹¹, correlation, volatility and forecasted expected returns for U.S. All Cap, Foreign Developed and Emerging Markets Equity, our expected geometric return forecast for Global is 6.8%.

10-Year Forecast of Annualized Geometric Return: 6.8%

REAL ESTATE (REITs): From 1972–2020, the FTSE NAREIT Equity REITs Total Return Index had a total annualized return of 11.04%. The price component of return was 3.77% with 0.90% (annualized) coming from yield compression (as the dividend yield fell from 6.13% in 1972 to 3.98% in 2020). CPI averaged 3.93% annually, so real price return (excluding yield compression) was -1.06% annually. At 7.27% annually, the dividend was the largest component of return. The following returns decomposition method is used to forecast returns where total return is a function of dividend yields, real price return, yield compression and inflation (CPI).

Given the uncertainty related to real estate as the effects of COVID continue to manifest in the economy, our forecasted yield contains a 12% adjustment downward on the expected dividend (the numerator of the yield calculation) in addition to an already observed decline of approximately 12% to the dividend in the last 12 months. Taken together, together, our forward return estimate is revised downward by 25% in total compared to last year's calculation.

Use of Indices and Benchmark Return Indices cannot be invested in directly. Index performance is reported gross of fees and expenses and assumes the reinvest dividends and capital gains. Past performance does not indicate future performance and there is a possibility of a loss. See disclosure page for indices representing each asset class.

¹⁰As of 11/30/20, the Global ex-U.S. equity market capitalization was comprised as follows: 70.0% Foreign Developed and 30.0% Emerging Markets. Source: Bloomberg, MSCI.

¹¹As of 11/30/20, the Global equity market capitalization was comprised as follows: 57.7% U.S., 29.6% Foreign Developed and 12.7% Emerging Markets. Source: Bloomberg, MSCI.

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C.W. O'Conner Wealth Advisors, Inc.

10-Year Capital Market Forecasts (2021-2030)

Asset Class Returns, Standard Deviations, Correlations and Tail Assumptions

Modified Returns Decomposition Method: [(DY) + (RPR¹²) + (YLD C) + (CPI)]

Historical FTSE NAREIT Equity REITs Total Return Index (1972-2020): [(7.27%) + (-1.06%) + (0.90%) + (3.93%)] = 11.04%

10-Year Forecast (2021-2030): [(3.50%) + (0.00%) + (0.00%) + (1.80%)] = 5.30%

- *DY* = Dividend Yield
- *RPR* = Real price return excluding yield compression
- *YLD C* = Return resulting from yield compression
- *CPI* = Inflation Forecast

10-Year Forecast of Annualized Geometric Return: 5.3%

MIDSTREAM ENERGY: As the energy infrastructure asset class has continued to evolve, so too has our methodology for calculating an applicable capital market return assumption. Part of the change in methodology is due to a change in the opportunity set that continues to include more C-Corps, which are infrastructure companies that are structured as corporations instead of master limited partnerships (MLPs).

Additionally, we have observed that more companies in the space are starting to retain some operating cash flow on their balance sheets for growth purposes instead of borrowing in the capital markets continuously to finance new projects. This change contradicts the previous assumption that yield generated by each company will eventually be paid out to shareholders. To account for these changes in 2019, we believe a better approach is to approximate free cash flow generation regardless of how much is paid out to shareholders, which we derive below.

In 2019, the opportunity set also expanded and we believe the Alerian North American Midstream Energy index is the broadest and most appropriate opportunity set since it contains both MLPs and C-Corps, whereas the Alerian MLP index only contains MLPs.

Given the uncertainty related to Midstream as the effects of COVID continue to manifest in the economy, our forecasted yield contains a 25% adjustment downward on the expected dividend (the numerator of the yield calculation) in addition to an already observed decline of approximately 13% to the dividend in the last 12

¹²Unlike traditional stocks, REITs pay out virtually all their earnings (or FFO) in dividends and rely on the issuance of new equity (and debt) to grow earnings (or FFO). Therefore, the expected long-term RPR is capped at zero.

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10-Year Capital Market Forecasts (2021-2030)

Asset Class Returns, Standard Deviations, Correlations and Tail Assumptions

months. Taken together, our forward return is revised downward by 35% in total compared to last year's calculation.

Additionally, our assumed Distribution Coverage ratio has been revised down to 1.1x with our belief that midstream companies will continue to need use some of their built up "cash cushions." This ratio measures the difference between how much cash is generated in the business and how much is paid out through dividends. A number greater than 1 implies the business is generating more cash than is expected to be paid out to shareholders.

Modified Returns Decomposition Method: $[(DY) * (DCR^{13})] = FCFP + (CPI)$

Historical Alerian North American Midstream Energy Total Return Index (October 2013 – November 2020):

$$[5.72\% * -0.75x^{14}] = -4.29\% + 2.19\% = -2.09\%$$

*Historical Alerian MLP Total Return Index (January 1996 – November 2020): $[7.44\% * 0.89x] = 6.62\% + 2.19\% = 8.81\%$*

*10-Year Forecast (2021-2030): $[5.71\% * 1.1x] = 6.28\% + 1.80\% = 8.08\%$*

Source: Alerian

- *DY* = Distribution Yield
- *DCR* = Distribution Coverage Ratio (or market-implied Distribution Coverage Ratio for historical calculations)
- *FCFP* = Free Cash Flow Proxy
- *CPI* = Our Inflation Forecast

10-Year Forecast of Annualized Geometric Return: 8.1%

¹³The Distribution Coverage ratio is calculated by Alerian for each underlying security and rolled up into a median calculation across the Alerian MLP index. According to Alerian, Distribution coverage is defined as "...the cushion between cash flow being generated and cash being paid out as distributions to unitholders." A number of 1.0x or greater means cash flow generation by the company is higher than the expected distribution payout, and a number below 1.0x indicates the expected distribution is greater than what was generated by the company.

¹⁴The market-implied historical distribution coverage ratio was calculated using the historical total return, income return, and average inflation for the Alerian MLP index (starting January 1996) and the Alerian North American Midstream Energy index (starting October 2013).

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C.W. O'Conner Wealth Advisors, Inc.

10-Year Capital Market Forecasts (2021-2030)

Asset Class Returns, Standard Deviations, Correlations and Tail Assumptions

BROAD REAL ASSETS: The asset class is calculated using blended return assumptions for TIPS (25%), Global Infrastructure (30%), Bank Loans (15%), REITs (15%) and Commodities (15%). Our expected geometric return forecast is 3.9%.

10-Year Forecast of Annualized Geometric Return: 3.9%

HEDGE FUNDS (DIVERSIFIED MULTI-STRATEGY PORTFOLIO): The hedge fund return forecast is unique in that it (along with private equity) are the only investment categories with net positive manager alpha assumptions. That is, the hedge fund return forecast is not meant to represent a return expectation for the aggregate hedge fund market, but rather a skillful portfolio of hedge funds. For purposes of measuring historical risk exposures (correlations to other asset classes) of hedge funds, the HFRI Fund of Funds Index, an equal-weighted composite, is used as the proxy. The return, risk, correlation, skewness and kurtosis assumptions are expected to differ on a strategy-by-strategy basis.

Our current 10-year standard deviation (or volatility) forecast for a diversified multi-strategy portfolio of hedge funds is 8.7%, the same volatility expected of hypothetical portfolio consisting of 58% investment grade U.S. fixed income and 42% global equity mix based on our 10-year forecasts. This fixed/equity mix has a 3.91% 10-year geometric expected return forecast. Our expectation is for a skillful and diversified portfolio of hedge fund managers to add 1.5% of excess return (i.e., $3.9\% + 1.5\% = 5.4\%$) net of manager fees at approximately the same volatility level. For liquid alternatives, the same process is employed but a zero percent excess return is used to arrive at a 3.9% return assumption.

10-Year Forecast of Annualized Geometric Return: 5.4% for FOHF¹⁵ & 3.9% for Liquid Alternatives

PRIVATE EQUITY: We assume investors demand a 3% risk premium over U.S. All Cap Equity net of manager fees to justify the risk and illiquidity of investing in private equity. The private equity return forecast is not meant to represent a return expectation for the aggregate private equity market, but rather a portfolio of skillful private equity funds. This return forecast is expected to differ depending upon the unique properties of the private equity investment product (i.e., buyout, venture, etc.).

¹⁵While our 10-year return forecast is expressed as if hedge fund returns were normally distributed, the Frontier Engineer™ model treats the return forecast as a median (rather than mean), and fattens the left tail, increasing the magnitude of lower probability events. Additional detail surrounding forecast assumptions at the individual hedge fund sub-strategy level is available upon request.

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10-Year Capital Market Forecasts (2021-2030)

Asset Class Returns, Standard Deviations, Correlations and Tail Assumptions

10-Year Forecast of Annualized Geometric Return: 8.5%

APPENDIX I: RETURN, RISK, AND CORRELATION ASSUMPTIONS (ANNUALIZED)

Return & Risk Assumptions (Forecasts)	Arithmetic Return	Geometric Return	Standard Deviation	Skewness	Kurtosis
Cash	0.1%	0.1%	0.0%	0	0
ST Bonds	0.5%	0.5%	2.3%	0.52	1.02
TIPS	1.2%	0.7%	10.1%	-0.79	5.27
Muni Bond	0.7%	0.6%	4.7%	-0.38	1.75
Muni High Yield	5.3%	4.2%	14.7%	-1.55	10.70
US Bond	1.4%	1.1%	6.8%	-0.23	1.01
US Bonds - Dynamic	2.0%	1.8%	5.7%	-1.11	8.21
For. Dev. Bond	0.8%	0.4%	8.9%	0.00	0.69
HY Bond	4.4%	3.4%	14.1%	-1.18	8.90
EM Bond	3.2%	1.7%	17.0%	-1.71	9.62
Bank Loans	3.0%	1.9%	14.9%	-2.69	24.20
Global Bonds	1.1%	0.8%	7.2%	-0.15	0.07
Global Equity	8.4%	6.8%	17.7%	-0.68	1.59
US Equity (AC)	6.9%	5.5%	16.6%	-0.63	1.26
US Equity (LC)	6.7%	5.4%	16.4%	-0.58	1.04
US Equity (MC)	7.3%	5.7%	17.6%	-0.75	2.49
US Equity (SC)	7.9%	5.8%	20.3%	-0.50	1.37
Non-US Equity (ACWI)	10.2%	7.7%	22.1%	-0.65	1.72
Int'l Dev. Equity	9.3%	7.0%	21.9%	-0.57	1.42
EM Equity	12.6%	8.5%	28.9%	-0.70	1.98
Real Estate	7.5%	5.3%	21.1%	-0.72	7.62
Broad Real Assets	4.7%	3.9%	12.9%	-1.89	11.36
Midstream Energy	15.2%	8.1%	37.6%	0.01	19.69
Commod. Fut.	4.2%	2.3%	19.9%	-0.78	3.88
Global Infrastructure	7.2%	5.4%	18.9%	-0.92	2.30
HFoF Multi-Strat	5.8%	5.4%	8.7%	-0.93	5.30
Private Equity	11.1%	8.5%	22.9%	0.00	0.00

Correlation Assumptions (Forecasts)	Cash	ST Bonds	TIPS	Muni Bond	Muni High Yield	US Bond	US Bonds - Dynamic	For. Dev. Bond	HY Bond	EM Bond	Bank Loans	Global Bonds	Global Equity	US Equity (AC)	US Equity (LC)	US Equity (MC)	US Equity (SC)	Non-US Equity (ACWI)	Int'l Dev. Equity	EM Equity	Real Estate	Broad Real Assets	Midstream Energy	Commod. Fut.	Global Infrastructure	HFoF Multi-Strat	Private Equity
Cash	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ST Bonds	0	1.00	0.59	0.66	0.11	0.89	0.21	0.51	0.17	0.23	-0.11	0.78	0.01	0.11	0.11	0.11	0.05	0.01	0.11	-0.01	0.14	0.07	0.09	0.29	0.12	0.06	-0.16
TIPS	0	0.59	1.00	0.57	0.36	0.76	0.47	0.58	0.29	0.34	0.19	0.68	0.10	0.06	0.05	0.10	0.02	0.14	0.12	0.16	0.25	0.56	0.17	0.54	0.39	0.14	-0.04
Muni Bond	0	0.66	0.57	1.00	0.47	0.75	0.44	0.46	0.25	0.27	0.13	0.72	0.08	0.10	0.10	0.11	0.03	0.08	0.08	0.05	0.16	0.23	0.16	0.14	0.27	0.12	-0.09
Muni High Yield	0	0.11	0.36	0.47	1.00	0.32	0.53	0.20	0.47	0.24	0.58	0.32	0.26	0.23	0.22	0.28	0.19	0.28	0.26	0.25	0.33	0.47	0.28	0.28	0.43	0.36	0.14
US Bond	0	0.89	0.76	0.75	0.32	1.00	0.35	0.55	0.29	0.30	-0.01	0.94	0.09	0.18	0.19	0.19	0.10	0.08	0.15	0.03	0.21	0.20	0.09	0.31	0.29	0.08	-0.11
US Bonds - Dynamic	0	0.21	0.47	0.44	0.53	0.35	1.00	0.26	0.95	0.60	0.72	0.49	0.59	0.54	0.53	0.57	0.51	0.55	0.47	0.53	0.54	0.65	0.45	0.30	0.76	0.50	0.17
For. Dev. Bond	0	0.51	0.58	0.46	0.20	0.55	0.26	1.00	0.12	0.33	-0.04	0.66	0.26	0.04	0.05	0.03	-0.03	0.33	0.37	0.12	0.11	0.25	0.09	0.28	0.41	0.04	-0.08
HY Bond	0	0.17	0.29	0.25	0.47	0.29	0.95	0.12	1.00	0.57	0.79	0.20	0.63	0.63	0.61	0.67	0.63	0.60	0.54	0.59	0.61	0.66	0.47	0.32	0.74	0.52	0.22
EM Bond	0	0.23	0.34	0.27	0.24	0.30	0.60	0.33	0.57	1.00	0.35	0.29	0.64	0.57	0.57	0.58	0.52	0.66	0.61	0.74	0.47	0.59	0.38	0.46	0.74	0.57	0.21
Bank Loans	0	-0.11	0.19	0.13	0.58	-0.01	0.72	-0.04	0.79	0.35	1.00	-0.03	0.54	0.51	0.49	0.58	0.51	0.54	0.52	0.48	0.52	0.67	0.56	0.40	0.60	0.57	0.27
Global Bonds	0	0.78	0.68	0.72	0.32	0.94	0.49	0.66	0.20	0.29	-0.03	1.00	0.08	0.07	0.09	0.08	-0.01	0.07	0.07	0.02	0.18	0.24	0.08	0.15	0.28	0.09	-0.10
Global Equity	0	0.01	0.10	0.08	0.26	0.09	0.59	0.26	0.63	0.64	0.54	0.08	1.00	0.90	0.90	0.87	0.78	0.97	0.95	0.77	0.57	0.63	0.41	0.34	0.83	0.64	0.40
US Equity (AC)	0	0.11	0.06	0.10	0.23	0.18	0.54	0.04	0.63	0.57	0.51	0.07	0.90	1.00	0.99	0.97	0.89	0.77	0.69	0.69	0.65	0.57	0.42	0.30	0.77	0.62	0.40
US Equity (LC)	0	0.11	0.05	0.10	0.22	0.19	0.53	0.05	0.61	0.57	0.49	0.09	0.90	0.99	1.00	0.94	0.84	0.77	0.69	0.67	0.62	0.55	0.41	0.29	0.78	0.59	0.38
US Equity (MC)	0	0.11	0.10	0.11	0.28	0.19	0.57	0.03	0.67	0.58	0.58	0.08	0.87	0.97	0.94	1.00	0.94	0.76	0.67	0.70	0.71	0.62	0.45	0.32	0.78	0.65	0.39
US Equity (SC)	0	0.05	0.02	0.03	0.19	0.10	0.51	-0.03	0.63	0.52	0.51	-0.01	0.78	0.89	0.84	0.94	1.00	0.69	0.62	0.66	0.70	0.57	0.40	0.27	0.69	0.62	0.38
Non-US Equity (ACWI)	0	0.01	0.14	0.08	0.28	0.08	0.55	0.33	0.60	0.66	0.54	0.07	0.97	0.77	0.77	0.76	0.69	1.00	0.99	0.77	0.52	0.63	0.38	0.37	0.83	0.62	0.37
Int'l Dev. Equity	0	0.11	0.12	0.08	0.26	0.15	0.47	0.37	0.54	0.61	0.52	0.07	0.95	0.69	0.69	0.67	0.62	0.99	1.00	0.71	0.50	0.55	0.36	0.35	0.82	0.58	0.35
EM Equity	0	-0.01	0.16	0.05	0.25	0.03	0.53	0.12	0.59	0.74	0.48	0.02	0.77	0.69	0.67	0.70	0.66	0.77	0.71	1.00	0.47	0.56	0.33	0.38	0.77	0.67	0.30
Real Estate	0	0.14	0.25	0.16	0.33	0.21	0.54	0.11	0.61	0.47	0.52	0.18	0.57	0.65	0.62	0.71	0.70	0.52	0.50	0.47	1.00	0.75	0.32	0.28	0.68	0.35	0.21
Broad Real Assets	0	0.07	0.56	0.23	0.47	0.20	0.65	0.25	0.66	0.59	0.67	0.24	0.63	0.57	0.55	0.62	0.57	0.63	0.55	0.56	0.75	1.00	0.53	0.60	0.91	0.50	0.25
Midstream Energy	0	0.09	0.17	0.16	0.28	0.09	0.45	0.09	0.47	0.38	0.56	0.08	0.41	0.42	0.41	0.45	0.40	0.38	0.36	0.33	0.32	0.53	1.00	0.44	0.65	0.45	0.19
Commod. Fut.	0	0.29	0.54	0.14	0.28	0.31	0.30	0.28	0.32	0.46	0.40	0.15	0.34	0.30	0.29	0.32	0.27	0.37	0.35	0.38	0.28	0.60	0.44	1.00	0.58	0.44	0.12
Global Infrastructure	0	0.12	0.39	0.27	0.43	0.29	0.76	0.41	0.74	0.74	0.60	0.28	0.83	0.77	0.78	0.78	0.69	0.83	0.82	0.77	0.68	0.91	0.65	0.58	1.00	0.71	0.45
HFoF Multi-Strat	0	0.06	0.14	0.12	0.36	0.08	0.50	0.04	0.52	0.57	0.57	0.09	0.64	0.62	0.59	0.65	0.62	0.62	0.58	0.67	0.35	0.50	0.45	0.44	0.71	1.00	0.49
Private Equity	0	-0.16	-0.04	-0.09	0.14	-0.11	0.17	-0.08	0.22	0.21	0.27	-0.10	0.40	0.40	0.38	0.39	0.38	0.37	0.35	0.30	0.21	0.25	0.19	0.12	0.45	0.49	1.00

DISCLOSURES

This report does not represent a specific investment recommendation. Comparisons to any indices referenced herein are for illustrative purposes only and are not meant to imply that actual returns or volatility will be similar to the indices. Indices cannot be invested in directly. Unmanaged index returns assume reinvestment of any and all distributions and are reported gross of any fees and expenses. Any forecasts represent future

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C.W. O'Conner Wealth Advisors, Inc.

10-Year Capital Market Forecasts (2021-2030)

Asset Class Returns, Standard Deviations, Correlations and Tail Assumptions

expectations and actual returns; volatilities and correlations will differ from forecasts. When referencing asset class returns or statistics, the following indices are used to represent those asset classes, unless otherwise notes. Each index is unmanaged and investors can not actually invest directly into an index:

APPENDIX 2: INDEX DISCLOSURES

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Indices used to generate historical risk and return metrics	Most Recent Index	Index Dates		Linked Index 1	Index Dates		Linked Index 2	Index Dates		Linked Index 2	Index Dates	
Cash	FTSE Treasury Bill 3 Mon USD	11/20	- 1/79	N.A.	N.A.	- N.A.	N.A.	N.A.	- N.A.	N.A.	N.A.	- N.A.
ST Bonds	BBgBarc US Govt/Credit 1-3 Yr TR USD	11/20	- 1/79	N.A.	N.A.	- N.A.	N.A.	N.A.	- N.A.	N.A.	N.A.	- N.A.
TIPS	BBgBarc US Treasury US TIPS TR USD	11/20	- 3/97	BBgBarc USAgg Bond TR USD	2/97	- 1/79	N.A.	N.A.	- N.A.	N.A.	N.A.	- N.A.
Muni Bond	BBgBarc Municipal 5 Yr 4-6 TR USD	11/20	- 1/88	BBgBarc USAgg Bond TR USD	12/87	- 1/79	N.A.	N.A.	- N.A.	N.A.	N.A.	- N.A.
Muni High Yield	BBgBarc HY Muni TR USD	11/20	- 11/95	BBgBarc Municipal 5 Yr 4-6 TR USD	10/95	- 1/88	BBgBarc USAgg Bond TR USD	12/87	- 1/79	N.A.	N.A.	- N.A.
US Bond	BBgBarc US Agg Bond TR USD	11/20	- 1/79	N.A.	N.A.	- N.A.	N.A.	N.A.	- N.A.	N.A.	N.A.	- N.A.
US Bonds - Dynamic	11/20 - 11/20	11/20	- 2/90	BBgBarc USAgg Bond TR USD	1/90	- 1/79	N.A.	N.A.	- N.A.	N.A.	N.A.	- N.A.
For. Dev. Bond	50% CitiWGBI NonUSD Hdq 50% CitiWGBI NonUSD	11/20	- 1/85	BBgBarc USAgg Bond TR USD	12/84	- 1/79	N.A.	N.A.	- N.A.	N.A.	N.A.	- N.A.
HY Bond	BBgBarc US Corporate High Yield TR USD	11/20	- 7/83	BBgBarc USAgg Bond TR USD	6/83	- 1/79	N.A.	N.A.	- N.A.	N.A.	N.A.	- N.A.
EM Bond	JPM GBI-EM Global Diversified TR USD	11/20	- 1/03	JPM EMBI Global Diversified TR USD	12/02	- 1/94	BBgBarc US Corporate High Yield TR USD	12/93	- 7/83	BBgBarc USAgg Bond TR USD	6/83	- 1/79
Bank Loans	S&P/LSTA Leveraged Loan TR	11/20	- 12/96	BBgBarc US Corporate High Yield TR USD	11/96	- 7/83	BBgBarc USAgg Bond TR USD	6/83	- 1/79	N.A.	N.A.	- N.A.
Global Bonds	BBgBarc Global Aggregate TR Hdq USD	11/20	- 2/90	BBgBarc USAgg Bond TR USD	1/90	- 1/79	N.A.	N.A.	- N.A.	N.A.	N.A.	- N.A.
Global Equity	MSCI ACWI GR USD	11/20	- 1/88	S&P 500 TR USD	12/87	- 1/79	N.A.	N.A.	- N.A.	N.A.	N.A.	- N.A.
US Equity (AC)	Russell 3000 TR USD	11/20	- 1/79	N.A.	N.A.	- N.A.	N.A.	N.A.	- N.A.	N.A.	N.A.	- N.A.
US Equity (LC)	S&P 500 TR USD	11/20	- 1/79	N.A.	N.A.	- N.A.	N.A.	N.A.	- N.A.	N.A.	N.A.	- N.A.
US Equity (MC)	Russell Mid Cap TR USD	11/20	- 1/79	N.A.	N.A.	- N.A.	N.A.	N.A.	- N.A.	N.A.	N.A.	- N.A.
US Equity (SC)	Russell 2000 TR USD	11/20	- 1/79	N.A.	N.A.	- N.A.	N.A.	N.A.	- N.A.	N.A.	N.A.	- N.A.
Non-US Equity (ACWI)	MSCI ACWI Ex USA GR USD	11/20	- 1/88	MSCI EAFE GR USD	12/87	- 1/79	N.A.	N.A.	- N.A.	N.A.	N.A.	- N.A.
Int'l Dev. Equity	MSCI EAFE GR USD	11/20	- 1/79	N.A.	N.A.	- N.A.	N.A.	N.A.	- N.A.	N.A.	N.A.	- N.A.
EM Equity	MSCI EM GR USD	11/20	- 1/88	MSCI EAFE GR USD	12/87	- 1/79	N.A.	N.A.	- N.A.	N.A.	N.A.	- N.A.
Real Estate	Wilshire US RESI TR USD	11/20	- 1/79	N.A.	N.A.	- N.A.	N.A.	N.A.	- N.A.	N.A.	N.A.	- N.A.
Broad Real Assets	*Custom Real Assets Index	11/20	- 1/79	N.A.	N.A.	- N.A.	N.A.	N.A.	- N.A.	N.A.	N.A.	- N.A.
Midstream Energy	Alerian MLP TR USD	11/20	- 1/96	BCI+AGG-CASH	12/95	- 1/91	GSCI+AGG-CASH	12/90	- 1/79	N.A.	N.A.	- N.A.
Commod. Fut.	BCI+TIPS-CASH	11/20	- 3/97	BCI+AGG-CASH	2/97	- 1/91	GSCI+AGG-CASH	12/90	- 1/79	N.A.	N.A.	- N.A.
Global Infrastructure	DJ Brookfield Global Infra TR USD	11/20	- 2/03	Alerian MLP TR USD	1/03	- 1/96	Wilshire US RESI TR USD	12/95	- 1/79	N.A.	N.A.	- N.A.
HFoF Multi-Strat	HFRI Fund of Funds Composite USD	11/20	- 1/90	HFRI Hedge Fund Aggregate Average	12/89	- 1/79	N.A.	N.A.	- N.A.	N.A.	N.A.	- N.A.
Private Equity	Cambridge PE 67% Buyout vs. 33% Venture	11/20	- 4/86	Russell 2000 TR USD	3/86	- 1/79	N.A.	N.A.	- N.A.	N.A.	N.A.	- N.A.

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APPENDIX 3: STANDARD DEVIATION FORECASTS

Annualizing a historical monthly standard deviation by multiplying by $\sqrt{12}$ understates true annual volatility (because of monthly serial correlation). Therefore, standard deviation is derived (for all asset classes) by calculating the annual standard deviation of all historical 12-month periods.

An adjustment will be made to asset classes with shorter return streams that will attempt to normalize volatility between asset classes. The methodology is used for the following asset classes:

Asset Classes

- TIPS (March 1997)
- Emerging Markets Bonds (January 1994)
- Hedge Funds Portfolio (January 1990)
- Midstream Energy (January 1990)
- Emerging Market Equities (January 1988)
- Foreign Bonds (January 1985)
- High Yield Bonds (November 1984)

Methodology

$$\text{Standard Deviation } (\sigma) \text{ of Asset} = \frac{[\text{short-term } \sigma \text{ of asset}] * [\text{long-term } \sigma \text{ of comparable asset}]}{[\text{short-term } \sigma \text{ of comparable asset}]}$$

APPENDIX 4: DIFFERENTIATING ARITHMETIC AND GEOMETRIC ASSUMPTIONS

1. ARITHMETIC RETURNS VS. GEOMETRIC RETURNS

The arithmetic average annual return is always equal to or greater than a geometric (or compounded) annualized return. Since the CAPM and the Black-Litterman are single time period models, they forecast an arithmetic return (i.e., one-year). On the other hand, geometric returns are more appropriate for quantifying expected holding period returns (i.e., 10-years).

$$\text{Geometric Return} = [\text{Arithmetic Return}] - \frac{[(\text{Standard Deviation})^2]}{2}$$

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10-Year Capital Market Forecasts (2021-2030)

Asset Class Returns, Standard Deviations, Correlations and Tail Assumptions

The Frontier Engineer™ asset allocation modeling seeks to optimize (the median expected) aggregate portfolio geometric returns (per unit risk) rather than arithmetic returns (per unit risk).

2. OPTIMIZING FOR GEOMETRIC RETURN

If two assets have the same expected return (and low correlation), they can be combined in a portfolio to generate a higher holding period return (geometric) than either two investments on a segregated basis. The following example shows how two investments with 10% expected arithmetic returns and 20% expected annual standard deviations can be combined in a portfolio to generate a higher time horizon return (geometric) than either on a segregated basis (*correlation = 0*).

$$\text{Expected Arithmetic Return (2 asset portfolio)} = w_1 \cdot (AR_1) + w_2 \cdot (AR_2)$$

$$\text{Expected Arithmetic Return (2 asset portfolio)} = 0.50 \cdot 10\% + 0.50 \cdot 10\% = \mathbf{10.0\%}$$

AR_1 = Arithmetic Return of asset 1

AR_2 = Arithmetic Return of asset 2

w_1 = weight of asset 1

w_2 = weight of asset 2

$$\text{Expected Standard Deviation (2 asset portfolio)} = \sqrt{[(w_1^2 \cdot \sigma_1^2 + w_2^2 \cdot \sigma_2^2) + (2 \cdot w_1 \cdot w_2 \cdot \sigma_1 \cdot \sigma_2 \cdot r_{(1,2)})]}$$

$$\text{Expected Standard Deviation (2 asset portfolio)} = \sqrt{[(0.50^2 \cdot 0.20^2 + 0.50^2 \cdot 0.20^2) + (2 \cdot 0.50 \cdot 0.50 \cdot 0.20 \cdot 0.20 \cdot 0.00)]} = \mathbf{14.1\%}$$

w_1 = weight of asset 1

w_2 = weight of asset 2

σ_1 = standard deviation of asset 1

σ_2 = standard deviation of asset 2

$r_{(1,2)}$ = Correlation between asset 1 and 2

As previously stated, geometric return = arithmetic return - $\sigma^2/2$

- Expected Geometric Return (Asset 1 in vacuum) = $10\% - 20\%^2/2 = \mathbf{8.0\%}$
- Expected Geometric Return (Asset 2 in vacuum) = $10\% - 20\%^2/2 = \mathbf{8.0\%}$
- Expected Geometric Return (50/50 Portfolio) = $10\% - 14.1\%^2/2 = \mathbf{9.0\%}$

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10-Year Capital Market Forecasts (2021-2030)

Asset Class Returns, Standard Deviations, Correlations and Tail Assumptions

3. CONCLUSION

Two low correlating assets with the same arithmetic return have a higher geometric return when combined within a portfolio (and rebalanced) than either has on a stand-alone basis.

APPENDIX 5: DEFINITIONS

The Frontier Engineer™ portfolio optimization requires 10-year forecasts of the following metrics:

1. **Expected Median Annual Return¹⁶** of each asset class
2. **Expected Annual Geometric Return¹⁷** of each asset class
3. **Expected Annual Standard Deviation** of each asset class
4. **Expected Correlation** among all asset classes
5. **Expected Skewness** of each asset class (corrected for asymmetry)
6. **Expected Excess Kurtosis** of each asset class (corrected for tails)

Expected 10-Year Median Annual Return Forecast

Our annual median return forecast represents the expected midpoint of all possible future 10-year returns for an asset class. These return forecasts (or expected returns) are highly unlikely to be precisely correct over the 10-year time horizon. We expect the actual 10-year return to have a 50% probability of being higher or lower than the forecast.

Expected 10-Year Geometric Annual Return¹⁸ Forecast

Our geometric return forecast represents the expected midpoint of all possible future 10-year outcomes for an asset class. These geometric return forecast estimates (or expected returns) are highly unlikely to be precisely correct over the 10-year time horizon. We expect the actual 10-year return to have a 50% probability of being higher or lower than the forecast.

¹⁶Median return is used because it does not require a normal return distribution assumption.

¹⁷The expression of the expected geometric return forecast (from median returns) requires a normal return distribution assumption (i.e., that mean = median). This is for illustrative purposes only. The geometric return forecasts are expressed as if returns were normal (i.e., median = mean). For Frontier Engineer™ optimization, asset class return distributions do not have to be normally (Gaussian) distributed.

¹⁸Geometric Return = Arithmetic Mean or Median Return – $\sigma^2/2$.

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Expected 10-Year Annual Standard Deviation Forecast

Our 10-year standard deviation forecast represents the median expected (normally distributed) variability of annual returns about the mean. The higher the standard deviation, the more uncertain the outcome.

Expected Correlation

Our 10-year forecast of asset class correlation coefficients quantifies the degree to which two assets are expected to move together. The correlation coefficient can range from -1 (perfect negative correlation) to +1 (perfect positive correlation).

Expected Skewness

Our 10-year skewness forecast quantifies the degree of expected asymmetry of the return distribution. If the left tail is more pronounced than the right tail, the asset has negative skewness. If the reverse is true, it has positive skewness. If the two are equal, it has zero skewness (normally distributed).

Expected Excess Kurtosis

Our 10-year excess kurtosis forecast of each asset class quantifies the degree of expected *peakedness* (or flatness) of the return distribution. If excess kurtosis is positive, the distribution is more peaked (with extreme events). If excess kurtosis is negative, the distribution is flatter (with fewer extreme events).

APPENDIX 6: FORECASTING METHODS

RETURNS:

10-year asset class return forecasts are developed using various methodologies including:

1. Risk Premium Method
2. Equity Returns Decomposition Method
3. Cyclically-Adjusted Earnings Yield (Modified CAPE) Method
4. Black-Litterman Method
5. Fixed Income Returns Decomposition Method
6. High Yield Default-Loss Method
7. Commodity Futures Returns Decomposition Method
8. Corrections for extreme asset class over/under valuation (or other disequilibrium in capital market assumptions)

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10-Year Capital Market Forecasts (2021-2030)

Asset Class Returns, Standard Deviations, Correlations and Tail Assumptions

1. The Risk Premium Method adds a risk premium to a referenced asset's return forecast.

$$\text{Return} = (\text{RA}) \pm (\text{RP})$$

- RA = Forecasted Return of "Reference Asset"
- RP = Appropriate "Risk Premium" added to the Referenced Asset's forecast

2. The Equity Returns Decomposition Method breaks out the components of equity returns.

$$\text{Return} = [(1 + \text{DIV}) * (1 + \text{P/E}) * (1 + \text{REG}) * (1 + \text{CPI})] - 1$$

- DIV = Dividend Yield
- P/E = P/E Expansion/Contraction
- REG = Real Earnings Growth = [Return on Equity] * [Earnings Retention Ratio]
- CPI = Inflation (Consumer Price Index)

The following is the Modified Equity Returns Decomposition Method for REITs and MLPs:

$$\text{Return} = [(DY) \pm (RPR) \pm (YLD C) \pm (CPI)]$$

- DY = Dividend/Distribution Yield
- RPR = Real price return excluding yield compression
- YLD C = Price return resulting from yield compression
- CPI = Inflation (Consumer Price Index)

3. The Cyclically-Adjusted Earnings Yield Method incorporates a smoothing technique to earnings by dividing the average real earnings by the current (real) Index price. The result is a cyclically-adjusted real earnings yield of an individual equity asset class, to which forward-looking inflation expectations are applied to garner an unbiased nominal expected return.

$$\text{Return} = \{[1 + (\text{EARNINGS/PRICE})] * (1 + \text{CPI})\} - 1$$

- EARNINGS = 10-year average real earnings of Index
- PRICE = Current real price of Index
- CPI = Inflation (Consumer Price Index)

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10-Year Capital Market Forecasts (2021-2030)

Asset Class Returns, Standard Deviations, Correlations and Tail Assumptions

4. The Black-Litterman Method uses reverse mean-variance optimization to arrive at unbiased asset class return forecasts by inputting correlation, volatility and market capitalization weights, then solving for (equilibrium) expected returns (or risk premiums).
 - *Market capitalization weights for each asset*
 - *Correlation between the assets*
 - *Volatility (or standard deviation) of assets*
 - *Risk free rate*
 - *The risk aversion coefficient of the reference market portfolio*

5. The Fixed Income Returns Decomposition Method forecasts the components of fixed income Index returns (Yield Δ and Price Δ) and combines them for a total return forecast.

Returns = (YLD) +/- (CUR) +/- (PE) +/- (CRED)
 - *YLD = Bond Index YTM*
 - *CUR = Expected currency effect derived from interest rate parity*
 - *PE = Bond Index "Price Effect"*
 - *CRED = Credit spread premium*

6. The High Yield Default-Loss Method forecasts fixed income returns by regressing default rates, recovery rates and credit spreads to generate an expected loss rate, then combines the Index yield to solve for a total return forecast.
 - *Bond Index Yield*
 - *U.S. Treasury Yield*
 - *Historical Default Rates*
 - *Historical Recovery Rates*

7. The Commodity Futures Index Returns Decomposition Method forecasts and aggregates the components of a commodity futures Index's total return.

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10-Year Capital Market Forecasts (2021-2030)

Asset Class Returns, Standard Deviations, Correlations and Tail Assumptions

Returns = (SPOT) +/- (ROLL) +/- (COLLATERAL)

- SPOT = Spot price return, which is assumed to keep pace with inflation as measured by CPI forecast
- ROLL = Roll return expected to be earned from holding a futures contract to (near) maturity
- COLLATERAL = Collateral return, which is earned by the return of the asset used to collateralize futures/swaps (i.e. T-Bills)

8. We reserve the right to make corrections for over or undervaluation of asset classes (or what we believe is capital markets disequilibrium) when developing forecasts. An expectation of mean-reversion in relative valuations (convergence of relationships) may be used when developing 10-year capital market assumptions.

STANDARD DEVIATION:

Standard deviation is derived by calculating the rolling annual standard deviation of all historical 12-month periods. For asset classes with short track records, adjustments to historical standard deviations may be made where appropriate. Such adjustments may be made using the following methodology:

Standard Deviation (σ) of Asset = $\frac{[\text{short-term } \sigma \text{ of asset}] * [\text{long-term } \sigma \text{ of comparable asset}]}{[\text{short-term } \sigma \text{ of comparable asset}]}$

CORRELATION:

For all but two asset classes, correlation is calculated using long-term historical monthly data over common time periods. Cash is assumed to have a zero correlation to all asset classes. Private Equity's correlation is calculated using long-term historical (calendar year) annual data over common time periods.

SKEWNESS AND KURTOSIS:

We observe (monthly) skewness and excess kurtosis for each asset class over a uniform period of time (1997 to present). Failing to observe skewness and excess kurtosis over a uniform period of time for each asset class, especially during periods of stress (i.e., no emerging markets equity data for October 1987), will likely understate the impact of extreme events for asset classes with shorter return streams relative to those with longer return streams. Adjustments may be made to skewness and excess kurtosis from historical measures if warranted.

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