



A P O L L O N

Asset Class Summaries

2024





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U.S. Investment Grade Bonds

Represented by the Barclays U.S. Aggregate Bond Index, the category represents investment grade bonds traded in United States. The index includes Treasury securities, Government agency bonds, Mortgage-backed bonds, Corporate bonds and a small amount of foreign bonds traded in the US. Municipal bonds and TIPS are excluded from the index.

10-Year Forecasts



Pros:

- **Intermediate Duration:** Relatively modest average duration (typically between 5 - 7 years) leads to moderate volatility.
- **High Quality:** Heavy exposure to the highest quality (AAA) U.S. fixed income segments. No high yield (BB or lower) exposure.
- **Deflation/Disinflation Protection:** Declining interest rates lead to short-term price gains.
- **Portfolio Ballast:** Typically provides favorable correlation benefits relative to risk assets in times of economic and/or financial turmoil.

Cons:

- **Modest Return Potential:** High quality nature moderates return potential relative to riskier segments of the portfolio.
- **Credit Risk:** Subject to some relatively modest credit risk.
- **Interest Rate Risk:** Bond prices fall in a rising interest rate (and/or inflationary) environment.

Historical Returns as of 09/30/24

Bloomberg US Agg Bond TR USD					
	1 Year	3 Year	5 Year	10 Year	15 Year
Annualized Total Returns	11.6%	-1.4%	0.3%	1.8%	2.6%
Annualized Standard Deviation	7.3%	7.6%	6.3%	4.9%	4.3%

Highest Correlation:

TIPS
Municipal Bonds
Global Bonds

Lowest Correlation:

EM Equity
U.S. Small Cap
Global Equity

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Dynamic Bonds



Bonds issued in the United States & foreign developed countries including but not limited to, Japan, United Kingdom, France, Germany, Italy, Spain, Canada, Netherlands, Belgium, Australia, Denmark, Sweden and emerging economies. Issues include government securities, corporate credit, structured securities and derivatives. Derivative allocations include futures, swaps and forwards, which may be utilized to hedge exposures or create synthetic exposures.

10-Year Forecasts

Annual
Return

6.5%

Annual
Risk

6.4%

Historical Returns as of 09/30/24

*Custom Blend of Indices

	1 Year	3 Year	5 Year	10 Year	15 Year
Annualized Total Returns	10.6%	2.2%	2.6%	3.1%	3.7%
Annualized Standard Deviation	3.7%	4.7%	4.4%	3.4%	3.1%

* Dynamic bonds are a blend of 33% Cash, 33% Corp HY, and 34% Global Bonds.

Pros:

- **Large Opportunity Set:** There are many fixed income opportunities other than traditional U.S. Government and investment grade corporate bonds. Many of the world's bonds are issued outside of the U.S.
- **Limited Interest Rate Exposure:** Strategies exhibit lower interest rate exposures through the utilization of active duration management, hedging strategies, relative value trades, cash, or derivatives.
- **Diversification Benefits:** Historically, offered low correlation to other fixed income asset classes and global equities.

Cons:

- **Credit risk:** Potential elevated allocations to credit increases default risk and correlations to equity portfolios.
- **Concentration:** Portfolios are structured to be dynamic, tactical, and flexible. Because of this, portfolios may result in concentrated single sector or market exposures depending on prevailing market conditions.
- **Foreign exchange:** Global in nature, these portfolios will oscillate between dollar denominated and non-dollar securities and currency positions. This may result in additional volatility depending on exchange rate movements.

Highest Correlation:

HY Bonds
Broad Real Assets
Global
Infrastructure

Lowest Correlation:

Foreign Bonds
Commodity Futures
Municipal Bonds

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High Yield Bonds



High yield bonds are bonds that are rated below investment grade (BB or lower). These bonds have higher default or other credit event risk, but typically pay higher yields than higher rated bonds to attract investors.

10-Year Forecasts

Annual
Return

7.7%

Annual
Risk

13.5%

Pros:

- **High Current Income:** Offers yield spreads above Treasuries and investment grade corporate bonds which can translate to higher returns.
- **Lower Duration:** Typically, shorter maturities and lower interest rate sensitivity. Changes in credit spreads drive volatility (more than changes in interest rates).
- **Diversification Benefits:** Historically, offered relatively low correlation to investment grade fixed income and modest correlations to equities during normal environments.

Cons:

- **Volatility:** More volatile than investment grade bonds.
- **Credit/Spread Risk:** More susceptible to credit stress and rising credit spreads adversely affecting prices (and returns).
- **Default Risk:** Higher probability of defaults (with lower recovery rates) than investment grade bonds.
- **Correlation to Equities:** Higher correlation to equities (particularly in stress environments) than to other fixed income asset classes.

Historical Returns as of 09/30/24

Bloomberg US Corporate High Yield TR USD

	1 Year	3 Year	5 Year	10 Year	15 Year
Annualized Total Returns	15.7%	3.1%	4.7%	5.0%	6.9%
Annualized Standard Deviation	5.8%	8.5%	9.3%	7.6%	7.2%

Highest Correlation:

US Bonds –
Dynamic
Broad Real Assets
Global
Infrastructure

Lowest Correlation:

Foreign Bonds
Muni Bonds
US Bonds

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Global Bonds



Bonds issued in the United States & foreign developed countries including but not limited to, Japan, United Kingdom, France, Germany, Italy, Spain, Canada, Netherlands, Belgium, Australia, Denmark, Sweden and emerging economies.

10-Year Forecasts

Annual
Return

5.6%

Annual
Risk

9.8%

Pros:

- **Large Opportunity Set:** Majority of the world's bond issues are outside the U.S.
- **Non-U.S. Interest Rate Exposure:** Offers some potential insulation from rising U.S. interest rate environment.
- **Diversification Benefits:** Historically, offered low correlations to other fixed income asset classes and global equities.
- **Foreign Currency Exposure:** Unhedged currency can provide protection against a weakening U.S. Dollar.
- **Flexible Mandates:** Managers can allocate risk more tactically across global sovereign, global credit, and global currencies.

Cons:

- **Interest Rate Volatility:** Global bonds traditionally exhibit more interest rate exposure through longer duration bonds.
- **Volatility:** Non-currency hedged bonds can be volatile given foreign currency fluctuations relative to the dollar.
- **Wider Risk Spectrum:** Subject to foreign financial, economic, and geopolitical risk.
- **Non-U.S. Interest Rate Exposure:** Potential exposure to rising interest rates outside the U.S., resulting in price depreciation.

Historical Returns as of 09/30/24

Bloomberg Global Aggregate TR USD

	1 Year	3 Year	5 Year	10 Year	15 Year
Annualized Total Returns	12.0%	-3.1%	-0.8%	0.6%	1.3%
Annualized Standard Deviation	8.1%	9.1%	7.7%	6.3%	5.9%

Highest Correlation:

Foreign Bonds
US Bonds
TIPS

Lowest Correlation:

U.S. Small Cap
U.S. Mid Cap
U.S. Large Cap

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Large Cap U.S. Stocks



Stocks with market capitalizations greater than \$15 Billion. Large cap stocks represents the vast majority of the total U.S. equity market.

10-Year Forecasts

Annual
Return

6.5%

Annual
Risk

16.6%

Pros:

- **Large and Liquid Market:** U.S. large cap stocks represent the largest and most liquid segment of the global equity market.
- **Long Historical Data Set:** The S&P 500 Index performance history dates back to January 1, 1926.
- **Less Volatility:** Lower long-term volatility than mid cap, small cap, or foreign equity markets.

Cons:

- **Risk:** Subject to equity risk.
- **Lower Risk Premium:** Less risk, but potentially less long-term return than mid cap, small cap, or emerging market equities.
- **Concentration:** Some large cap benchmarks (S&P 500 Index and Russell 1000 Growth Index) have become increasingly more concentrated with 5-7 stocks driving most of the return, making it challenging for active managers on a relative performance basis.

Historical Returns as of 09/30/24

S&P 500 TR USD

	1 Year	3 Year	5 Year	10 Year	15 Year
Annualized Total Returns	36.4%	11.9%	16.0%	13.4%	14.1%
Annualized Standard Deviation	11.9%	17.5%	18.0%	15.2%	14.6%

Highest Correlation:

U.S. All Cap
U.S. Mid Cap
Global Equity

Lowest Correlation:

Foreign Bonds
TIPS
Municipal Bonds

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Mid Cap U.S. Stocks



Stocks between \$3 and \$15 billion in market capitalization.

10-Year Forecasts

Annual
Return

6.4%

Annual
Risk

18.4%

Pros:

- **Risk Premium:** Offers a potential risk-premium over large cap stocks.
- **Higher Growth:** Smaller companies can grow earnings faster than larger companies.
- **Less Volatility:** Lower long-term volatility than small cap stocks.

Cons:

- **Risk:** Higher volatility than large cap stocks.
- **Diversification:** High correlation to both large cap and small cap stocks. Mid cap has a very high correlation to a 60/40 large & small cap mix.
- **Arbitrary Classification:** Arbitrary divide between "smaller" large cap and "larger" mid cap stocks. Conflicting definitions of mid-small cap barrier.

Historical Returns as of 09/30/24

Russell Mid Cap TR USD

	1 Year	3 Year	5 Year	10 Year	15 Year
Annualized Total Returns	29.3%	5.8%	11.3%	10.2%	12.5%
Annualized Standard Deviation	16.5%	19.6%	21.0%	17.3%	16.6%

Highest Correlation:

U.S. All Cap
U.S. Large Cap
U.S. Small Cap

Lowest Correlation:

Foreign Bonds
Municipal Bonds
TIPS

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Small Cap U.S. Stocks



Stocks with market capitalizations of \$3 billion or less.

10-Year Forecasts

Annual
Return

6.0%

Annual
Risk

21.3%

Pros:

- **Risk Premium:** Offers a potential risk-premium over large and mid cap stocks.
- **Higher Growth:** Smaller companies can grow earnings faster than larger companies.
- **Upside:** Virtually all large cap stocks started as small cap stocks at one time in their history.

Cons:

- **Risk:** Higher volatility than large cap and mid cap stocks.
- **Liquidity/Opportunity Set:** Smaller capitalization stocks have less liquidity and marketability. Access to quality small cap managers is often constrained.

Historical Returns as of 09/30/24

Russell 2000 TR USD

	1 Year	3 Year	5 Year	10 Year	15 Year
Annualized Total Returns	26.8%	1.8%	9.4%	8.8%	10.6%
Annualized Standard Deviation	22.4%	22.5%	24.0%	20.4%	19.7%

Highest Correlation:

U.S. Mid Cap
U.S. All Cap
U.S. Large Cap

Lowest Correlation:

Foreign Bonds
Municipal Bonds
TIPS

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International Developed Equity

Stocks of companies located outside of the U.S. in developed countries. Countries include Japan, the United Kingdom, France, Germany, Australia, Austria, Belgium, Denmark, Finland, Hong Kong, Ireland, Italy, Israel, the Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, and Switzerland. Canada is also considered an international developed market but is not included in the MSCI EAFE Index.

10-Year Forecasts

Annual
Return

8.2%

Annual
Risk

21.7%

Pros:

- **Large Universe:** Consists of publicly traded companies in developed countries domiciled outside of the U.S. Many of the best companies in the world are located outside of the U.S.
- **Diversification:** Higher correlation to U.S. equity markets in recent years, but still low enough to provide diversification benefits.
- **Currency Diversification:** Add diversification through foreign currency exposure (away from the U.S. dollar).

Cons:

- **Equity Risk:** Subject to global economic/financial conditions.
- **Currency Risk:** Subject to currency risk as investment returns are translated back into U.S. dollars.
- **Political, Financial, Currency, and Regulatory Risks:** Each country or region has its own political, financial, currency and regulatory risks.
- **Relative Performance:** Can experience prolonged periods of out- or underperformance relative to U.S. equities. A strong U.S. Dollar can be a major headwind for performance relative to U.S. equities.

Historical Returns as of 09/30/24

MSCI EAFE GR USD

	1 Year	3 Year	5 Year	10 Year	15 Year
Annualized Total Returns	25.4%	6.0%	8.7%	6.2%	6.5%
Annualized Standard Deviation	12.6%	16.9%	17.6%	15.1%	15.6%

**Highest
Correlation:**

Global Equity
Global
Infrastructure
EM Equity

**Lowest
Correlation:**

Municipal Bonds
US Bonds
TIPS

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Emerging Markets Equity



Stocks of companies located outside of the U.S. in developing countries. Emerging markets countries are nations with social or business activity in the process of rapid growth and industrialization. Emerging market countries in the MSCI Emerging Markets index include China, Brazil, South Korea, Taiwan, South Africa, India, Mexico, Israel, Malaysia, Chile, Turkey, Thailand, Poland, Hungary, Greece, Colombia, the Czech Republic, Egypt, the Philippines, Argentina, Indonesia, Kuwait, Peru, and Saudi Arabia.

10-Year Forecasts

Annual
Return

10.1%

Annual
Risk

28.4%

Pros:

- **Higher Return Potential:** Emerging economies may exhibit higher GDP growth than developed markets.
- **Diversification:** Diversification benefits, particularly if measured over longer holding periods (decades).
- **Currency:** Provides diversification through foreign currency exposure (away from the U.S. dollar).
- **Large Opportunity Set:** The universe includes thousands of companies and contains many world class companies.

Cons:

- **Volatility:** Opportunity for high returns comes with increased risk.
- **Sensitivity to Extremes:** More sensitivity to global economic crisis. Correlations with other risky assets rise during periods of extreme stress.
- **Sensitivity to Capital Flows:** Capital flows into and out of the asset class can cause heightened volatility.
- **Political, Financial, Currency, and Regulatory Risks:** Emerging market countries have greater political, financial, currency and regulatory instability than developed markets.
- **Increased Governance Risk:** Companies in emerging markets sometimes have governance structures that are less favorable to minority investors and a lack of transparency can also be an issue for investors.

Historical Returns as of 09/30/24

MSCI EM GR USD

	1 Year	3 Year	5 Year	10 Year	15 Year
Annualized Total Returns	26.5%	0.8%	6.1%	4.4%	4.5%
Annualized Standard Deviation	13.2%	17.6%	18.6%	17.1%	17.5%

**Highest
Correlation:**

Global Equity
EM Bonds
International Equity

**Lowest
Correlation:**

U.S. Bonds
Municipal Bonds
Foreign Bonds

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Real Estate Investment Trusts



Real Estate Investment Trusts (or REITs) is a tax designation for a companies investing in real estate that reduces or eliminates corporate income taxes. In return for the favorable tax treatment, REITs are required to distribute 90% of their (taxable) income to investors. REITs can be publicly or privately held. Public REITs may be listed on public stock exchanges like shares of common stock in other firms.

10-Year Forecasts



Pros:

- **Dividend Yield:** While an equity asset class, dividend yields have historically exceeded other equity classes.
- **Diversification Benefits:** Have often offered relatively low correlation to both stocks and bonds.

Cons:

- **Volatility:** Relatively high volatility.
- **Heavy Reliance on Credit:** REITs are unique in their heavy reliance on the credit markets, subjecting them to added risk in difficult credit environments.
- **Fat Tails:** Relatively high fixed cost businesses coupled with leverage make REITs vulnerable to extreme events (or fat left tails).

Historical Returns as of 09/30/24

FTSE Nareit All Equity REITs TR USD					
	1 Year	3 Year	5 Year	10 Year	15 Year
Annualized Total Returns	34.8%	3.5%	5.1%	8.0%	10.7%
Annualized Standard Deviation	19.9%	21.8%	21.0%	17.6%	17.2%

Highest Correlation:

Broad Real Assets
Global
Infrastructure
U.S. Mid Cap

Lowest Correlation:

Foreign Bonds
Municipal Bonds
U.S. Bonds

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Broad Real Assets



A real asset is a value-generating, physical/tangible asset that has intrinsic value in and of itself. Examples of real assets include land, metals, real estate, infrastructure and commodities. Diversified real asset portfolios strategically and tactically allocate among the various real asset categories, with the goal of providing investors with absolute return, a hedge against rising inflation, and low correlation to more traditional investments.

10-Year Forecasts



Pros:

- **Hedge against rising inflation:** Due to their inherent physical nature, real assets provide a hedge against rising levels of inflation, especially unexpected inflation. Additionally, many real asset securities have cash flows and revenue streams that are directly linked to CPI.
- **Diversification:** Real assets have low correlations with traditional asset classes, such as stocks and bonds.
- **Alternative Income:** Select areas, such as Real Estate and Infrastructure, often have an attractive income component that helps to mitigate volatility.

Historical Returns as of 09/30/24

S&P Real Asset TR USD					
	1 Year	3 Year	5 Year	10 Year	15 Year
Annualized Total Returns	18.6%	3.5%	4.9%	4.2%	5.9%
Annualized Standard Deviation	10.2%	12.8%	14.0%	11.2%	10.7%

Cons:

- **Short history:** Diversified Real Assets are a relatively new asset class. While many of the underlying components themselves have longer track records, others, such as TIPS (late 1990's) and MLPs (early 1990's) remain limited.
- **Exposure to super-cycles:** The more tangible real asset categories (direct commodities, natural resources) have historically gone through super-cycles. This can result in lower returns for extended periods when inflation is subdued. This risk is mitigated through diversified portfolios' exposure to equities, which should mitigate prolonged periods of muted returns.
- **Unique Risk Exposures:** Real assets may be more heavily exposed to geopolitical, weather-related, and regulatory risks. These risks can often be sudden and unavoidable.
- **Heterogeneity:** Due to the breadth of the investable universe with multiple underlying categories, real asset portfolios can look quite different from another. This can create challenges in benchmarking and in comparing portfolios.

*Broad Real Assets is 20% REITS, 20% Global Infrastructure, 20% Commodities, 20% US Bonds, 15% Corp High Yield, 5% TIPS. **Any forecast represent median expectations and actual returns, volatilities and correlations will differ from forecasts. Please see Apollon's most recent 10-Year Capital Market Forecasts white paper for additional information.** Use of Indices and Benchmark Return Indices cannot be invested in directly. Index performance is gross of fees and expenses and assumes the reinvestment of dividends and capital gains. January 31, 2023 Ten –Year Forecasted CMAs. Historical mix return calculations assume a weighted average excess return assumption of 0.5% with a hypothetical asset manager fee of 2%. Past performance does not indicate future performance and there is a possibility of a loss. For additional information on forecast methodologies, please speak with your advisor. Please see Index Proxy Summary slide at the end of this presentation for summary of indexes used to represent each asset class. Please see the Frontier Engineer Hypothetical Performance Disclosures at the end of the presentation for additional information.*

Marketable Alternatives



A portfolio that allocates to a diversified pool of underlying hedge fund strategies and managers.

10-Year Forecasts

Annual
Return

8.3%

Annual
Risk

8.7%

Pros:

- *Capital Preservation:* Ability to make money and/or limit losses in down markets. High (relative) historical risk-adjusted return.
- *Diversification:* Provides investors ability to generate a higher expected return for an aggregate portfolio while reducing overall equity allocation.
- *Alignment of Interests:* Managers invest alongside their clients and charge incentive fees.

Cons:

- *Transparency:* Holdings, style, strategy and leverage may be constantly changing. By definition, hedge fund strategies are constantly evolving.
- *Fees:* High management fees and (trading) expenses. Funds of hedge funds have another layer of management fees.
- *Leverage:* Underlying hedge fund strategies often require leverage, increasing return potential and risk.
- *Esoteric Risks:* Illiquidity, fraud, regulatory, herd behavior, blind pool, extreme non-normal returns (or fat tails), fluid structure and terms, and others.

Historical Returns as of 09/30/24

HFRI Fund of Funds Composite USD

	1 Year	3 Year	5 Year	10 Year	15 Year
Annualized Total Returns	8.2%	1.9%	5.0%	3.5%	3.5%
Annualized Standard Deviation	3.6%	4.0%	6.0%	5.0%	4.7%

**HFRI Fund of Funds Index subject to periodic revisions.*

Highest Correlation:

Global
Infrastructure
EM Equity
U.S. Mid Cap

Lowest Correlation:

Foreign Bonds
Municipal High
Yield Bonds
Municipal Bonds

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Private Equity



Private equity is a non-publicly traded asset class with a wide range of investment strategies and styles. Investment strategies typically follow the corporate lifecycle; **Venture Capital (VC)**, **Growth Equity**, **Levered Buyout** and **Distressed/Special Situations**.

10-Year Forecasts



Pros:

- **Inefficiency & Risk Premiums:** Greater opportunity for active management to add value. Theoretically requires an illiquidity risk premium.
- **Board Representation:** Ability to proactively influence business strategy and operations.
- **Excess Return Potential:** Top managers have historically outperformed publicly traded equity indexes.
- **Access to Smaller Companies:** Ability to access a part of the market not available to public equity investors.

Cons:

- **Illiquidity Risk:** 10 plus year investment cycles. Illiquidity and J-Curve investment cycle makes it difficult to hold a targeted allocation percentage (and rebalance).
- **Higher Performance Dispersion:** High dispersion of returns between top and bottom performing managers compared to most other asset classes.
- **Blind Pool Risk and Low Transparency:** Inability to preview investments before committing capital and more difficult to monitor investments.
- **Leverage:** Some private equity strategies require substantial leverage adding risk.
- **Fees:** Very high management and incentive fees as well as administrative expenses.
- **Esoteric Risks:** Fraud, regulatory, disparate/complex structures and terms, and others.

Historical Returns as of 09/30/24

Cambridge PE 67% Buyout vs. 33% Venture

	1 Year	3 Year	5 Year	10 Year	15 Year
Annualized Total Returns	0.0%	-2.6%	11.0%	11.5%	13.1%
Annualized Standard Deviation	0.0%	3.2%	7.4%	5.4%	4.8%

*Returns are typically lagged by 1-2 quarters.

*Illiquidity makes performance volatility impossible to measure precisely.

Any forecast represent median expectations and actual returns, volatilities and correlations will differ from forecasts. Please see Apollon's most recent 10-Year Capital Market Forecasts white paper for additional information. Use of Indices and Benchmark Return Indices cannot be invested in directly. Index performance is reported gross of fees and expenses and assumes the reinvestment of dividends and capital gains. January 31, 2023 Ten –Year Forecasted CMAs. Historical mix return calculations assume a weighted average excess return assumption of 0.5% with a hypothetical asset manager fee of 2%. Past performance does not indicate future performance and there is a possibility of a loss. For additional information on forecast methodologies, please speak with your advisor. Please see Index Proxy Summary slide at the end of this presentation for summary of indexes used to represent each asset class. Please see the Frontier Engineer Hypothetical Performance Disclosures at the end of the presentation for additional information.



Index Proxy Summary Proxy Slide

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 Index2	Index Dates		
Cash	FTSE Treasury Bill 3 Mon USD	11/22	-	1/79	N.A.	N.A.	-	N.A.	N.A.	N.A.	-	N.A.	N.A.	N.A.	-	N.A.
ST Bonds	Bloomberg US Govt/Credit 1-3 Yr TR USD	11/22	-	1/79	N.A.	N.A.	-	N.A.	N.A.	N.A.	-	N.A.	N.A.	N.A.	-	N.A.
TIPS	Bloomberg US Treasury US TIPS TR USD	11/22	-	3/97	Bloomberg US Agg Bond TR USD	2/97	-	1/79	N.A.	N.A.	-	N.A.	N.A.	N.A.	-	N.A.
Muni Bond	Bloomberg Municipal 5 Yr 4-6 TR USD	11/22	-	1/88	Bloomberg US Agg Bond TR USD	12/87	-	1/79	N.A.	N.A.	-	N.A.	N.A.	N.A.	-	N.A.
Muni High Yield	Bloomberg HY Muni TR USD	11/22	-	11/95	Bloomberg Municipal 5 Yr 4-6 TR USD	10/95	-	1/88	Bloomberg US Agg Bond TR USD	12/87	-	1/79	N.A.	N.A.	-	N.A.
US Bond	Bloomberg US Agg Bond TR USD	11/22	-	1/79	N.A.	N.A.	-	N.A.	N.A.	N.A.	-	N.A.	N.A.	N.A.	-	N.A.
US Bonds - Dynamic	*Custom Blend of Indices	11/22	-	2/90	Bloomberg US Agg Bond TR USD	1/90	-	1/79	N.A.	N.A.	-	N.A.	N.A.	N.A.	-	N.A.
For. Dev. Bond	50% CITI WGBI NonUSD Hdg 50% CITI WGBI NonUSD	11/22	-	1/85	Bloomberg US Agg Bond TR USD	12/84	-	1/79	N.A.	N.A.	-	N.A.	N.A.	N.A.	-	N.A.
HY Bond	Bloomberg US Corporate High Yield TR USD	11/22	-	7/83	Bloomberg US Agg 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	11/22	-	1/03	JPM EMBI Global Diversified TR USD	12/02	-	1/94	Bloomberg US Corporate High Yield TR USD	12/93	-	7/83	Bloomberg US Agg Bond TR USD	6/83	-	1/79
Global Bonds	Bloomberg Global Aggregate TR USD	11/22	-	2/90	Bloomberg US Agg Bond TR USD	1/90	-	1/79	N.A.	N.A.	-	N.A.	N.A.	N.A.	-	N.A.
Long Term Bonds	Bloomberg US Govt/Credit Long TR USD	11/22	-	1/79	N.A.	N.A.	-	N.A.	N.A.	N.A.	-	N.A.	N.A.	N.A.	-	N.A.
Global Equity	MSCI ACWIGR USD	11/22	-	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	11/22	-	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	11/22	-	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	11/22	-	1/79	N.A.	N.A.	-	N.A.	N.A.	N.A.	-	N.A.	N.A.	N.A.	-	N.A.

Note: Private Equity Index is frequently 3-6 months behind the other indices. For historical return calculation purposes, it is given 0% returns during the most recent period where gaps may exist. Past performance, actual or hypothetical, is no guarantee of future results and there is a possibility of a loss. Please see Frontier Engineer Hypothetical Performance Disclosures at the end of the presentation for additional information, including index proxies used to represent each asset class.

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Index Proxy Summary Proxy Slide

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		
US Equity (SC)	Russell 2000 TR USD	11/22	-	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	11/22	-	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	11/22	-	1/79	N.A.	N.A.	-	N.A.	N.A.	N.A.	-	N.A.	N.A.	N.A.	-	N.A.
EM Equity	MSCI EMGR USD	11/22	-	1/88	MSCI EAFE GR USD	12/87	-	1/79	N.A.	N.A.	-	N.A.	N.A.	N.A.	-	N.A.
Real Estate	FTSE Nareit All Equity REITs TR USD	11/22	-	1/79	N.A.	N.A.	-	N.A.	N.A.	N.A.	-	N.A.	N.A.	N.A.	-	N.A.
Private Real Estate	Wilshire US RESI TR USD	11/22	-	1/79	N.A.	N.A.	-	N.A.	N.A.	N.A.	-	N.A.	N.A.	N.A.	-	N.A.
Broad Real Assets	S&P Real Asset TR USD	11/22	-	5/05	*Custom Real Assets Index	4/05	-	1/79	N.A.	N.A.	-	N.A.	N.A.	N.A.	-	N.A.
Commod. Fut.	BCI+TIPS-CASH	11/22	-	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 Brookfld Global Infra TR USD	11/22	-	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.
Marketable Alternatives	HFRI Fund of Funds Composite USD	11/22	-	1/90	HFN Hedge Fund Aggregate Average	12/89	-	1/79	N.A.	N.A.	-	N.A.	N.A.	N.A.	-	N.A.
Hedge Funds (Liquid)	HFRI Fund of Funds Composite USD	11/22	-	1/90	HFN 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	11/22	-	4/86	Russell 2000 TR USD	3/86	-	1/79	N.A.	N.A.	-	N.A.	N.A.	N.A.	-	N.A.

Note: Private Equity Index is frequently 3-6 months behind the other indices. For historical return calculation purposes, it is given 0% returns during the most recent period where gaps may exist. Past performance, actual or hypothetical, is no guarantee of future results and there is a possibility of a loss. Please see Frontier Engineer Hypothetical Performance Disclosures at the end of the presentation for additional information, including index proxies used to represent each asset class.

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Frontier Engineer Hypothetical Performance Disclosures



The historical performance information derived from the Frontier Engineer and used or presented in charts, tables, or graphs represent simulated historical performance, which has been derived by retroactively applying an asset allocation modeling process in its most recently developed form with its most recently derived ten-year (forward-looking) capital market assumptions. Such historical return simulations (or back testing) was performed by simulating the combination of actual index returns for the historical period with a buy and hold strategy effective January 1, 1988 through the most recently available month-end date with simulated rebalancing occurring every month-end (with the reinvestment of dividends and capital gains from each index).

Back tested performance is hypothetical and does not reflect actual trades or actual client performance. As with all models, there are inherent limitations which are derived from the retroactive application developed with the benefit of hindsight, including the risk that certain factors such as material economic and market conditions could have contributed to materially different (either higher or lower) performance results than those depicted, or that certain material factors may have been included or excluded from consideration. As such, actual results during the applicable back tested period would have been different than those depicted.

The asset allocation modeling process currently used was initially developed in 2002, and was not offered as a strategy prior to that time. The output of a forward-looking model (or process) is a representation of allocation percentages among specific asset classes. Clients cannot invest directly in a target allocation, but rather, in underlying securities within designated asset classes. Advisor may change its models from time to time, and regularly updates its model as additional capital market assumption information becomes available or to increase or decrease relative weightings or emphasis on certain factors. Consequently, the Advisor may choose to deviate from a stated model over time as the model itself is revised, which could have a materially positive or negative impact on performance.

During the period represented, numerous modelling changes were made, including the regular changes in (ten- year) forward-looking expected returns, expected volatilities, expected non-normal return distribution assumptions, as well as tracking-error assumptions and risk budgets. Furthermore, such assumptions can be modified client-by-client depending on certain preferences, priorities, constraints or unique considerations applicable to each client.

All investments bear the risk of loss, including the loss of principal. Past performance, actual or hypothetical, is no guarantee of future results.

The hypothetical annual fee is divided by 12 and subtracted from the historical monthly (index) returns. The hypothetical excess return assumption is divided by 12 and added to the historical monthly (index) returns. Furthermore, for forecasted total portfolio (index-based) annual returns based on capital market assumptions, the annual Apollon' fee assumption is subtracted from the hypothetical annual manager excess return assumption.



Index Definition

FTSE Treasury Bill 3 Month measures return equivalents of yield averages and are not marked to market. It is an average of the last three three-month Treasury bill month-end rates.

Bloomberg Capital US Treasury Inflation

Protected Securities Index consists of Inflation-Protection securities issued by the U.S. Treasury.

Bloomberg Muni 5 Year Index is the 5 year (4-6) component of the Municipal Bond index.

Bloomberg High Yield Municipal Bond Index covers the universe of fixed rate, non-investment grade debt.

Bloomberg U.S. Aggregate Index covers the U.S. investment grade fixed rate bond market, with index components for government and corporate securities, mortgage pass-through securities, and asset-backed securities.

FTSE World Government Bond Index (WGBI) (Unhedged) provides a broad benchmark for the global sovereign fixed income market by measuring the performance of fixed-rate, local currency, investment-grade sovereign debt from over 20 countries,

FTSE World Government Bond Index (WGBI) (Hedged) is designed to represent the FTSE WGBI without the impact of local currency exchange rate fluctuations.

Bloomberg US Corporate High Yield TR USD covers the universe of fixed rate, non-investment grade debt. Eurobonds and debt issues from countries designated as emerging markets (sovereign rating of Baa1/BBB+/BBB+ and below using the middle of Moody's, S&P, and Fitch) are excluded, but Canadian and global bonds (SEC registered) of issuers in non-EMG countries are included.

JP Morgan Government Bond Index-Emerging Market Index (GBI-EMI) is a comprehensive, global local emerging markets index, and consists of regularly traded, liquid fixed-rate, domestic currency government bonds to which international investors can gain exposure.

JPMorgan EMBI Global Diversified is an unmanaged, market-capitalization weighted, total-return index tracking the traded market for U.S.-dollar-denominated Brady bonds, Eurobonds, traded loans, and local market debt instruments issued by sovereign and quasi-sovereign entities.

MSCI ACWI is designed to represent performance of the full opportunity set of large- and mid-cap stocks across multiple developed and emerging markets, including cross-market tax incentives.

The S&P 500 is a capitalization-weighted index designed to measure performance of the broad domestic economy through changes in the aggregate market value of 500 stocks representing all major industries.

Russell 3000 is a market-cap-weighted index which consists of roughly 3,000 of the largest companies in the U.S. as determined by market capitalization. It represents nearly 98% of the investable U.S. equity market.

Russell Mid Cap measures the performance of the 800 smallest companies in the Russell 1000 Index.

Russell 2000 consists of the 2,000 smallest U.S. companies in the Russell 3000 index.

MSCI EAFE is an equity index which captures large and mid-cap representation across Developed Markets countries around the world, excluding the US and Canada. The index covers approximately 85% of the free float-adjusted market capitalization in each country.

MSCI Emerging Markets captures large and mid-cap representation across Emerging Markets countries. The index covers approximately 85% of the free-float adjusted market capitalization in each country

The Wilshire US Real Estate Securities Index (Wilshire US RESI) is comprised of publicly-traded real estate equity securities and designed to offer a market-based index that is more reflective of real estate held by pension funds.

Alerian MLP Index is a float adjusted, capitalization-weighted index, whose constituents represent approximately 85% of total float-adjusted market capitalization, is disseminated real-time on a price-return basis (AMZ) and on a total-return basis.



Index Definitions

Bloomberg Commodity Index (BCI) is calculated on an excess return basis and reflects commodity futures price movements. The index rebalances annually weighted $\frac{2}{3}$ by trading volume and $\frac{1}{3}$ by world production and weight-caps are applied at the commodity, sector and group level for diversification.

Treasury Inflation-Protected Securities (TIPS) are Treasury bonds that are indexed to inflation to protect investors from the negative effects of rising prices. The principal value of TIPS rises as inflation rises.

HFRI Fund of Funds Composite is an equal-weighted index consisting of over 800 constituent hedge funds, including both domestic and offshore funds.

Cambridge Associates U.S. Private Equity Index (67% Buyout vs. 33% Venture) is based on data compiled from more than 1,200 institutional-quality buyout, growth equity, private equity energy, and mezzanine funds formed between 1986 and 2015.

HFN Hedge Fund Aggregate Average is an equal weighted average of all hedge funds and CTA/managed futures products reporting to the HFN Database. Constituents are aggregated from each of the HFN Strategy Specific Indices.

Goldman Sachs Commodity Index (GSCI) is a broadly diversified, unleveraged, long-only composite index of commodities that measures the performance of the commodity market.



Material Risks & Limitations

- **Fixed Income** securities are subject to interest rate risks, the risk of default and liquidity risk. U.S. investors exposed to non-U.S. fixed income may also be subject to currency risk and fluctuations.
- **Cash** may be subject to the loss of principal and over longer period of time may lose purchasing power due to inflation.
- **Domestic Equity** can be volatile. The rise or fall in prices take place for a number of reasons including, but not limited to changes to underlying company conditions, sector or industry factors, or other macro events. These may happen quickly and unpredictably.
- **International Equity** can be volatile. The rise or fall in prices take place for a number of reasons including, but not limited to changes to underlying company conditions, sector or industry impacts, or other macro events. These may happen quickly and unpredictably. International equity allocations may also be impact by currency and/or country specific risks which may result in lower liquidity in some markets.
- **Real Assets** can be volatile and may include asset segments that may have greater volatility than investment in traditional equity securities. Such volatility could be influenced by a myriad of factors including, but not limited to overall market volatility, changes in interest rates, political and regulatory developments, or other exogenous events like weather or natural disaster.
- **Private Equity** involves higher risk and is suitable only for sophisticated investors. Along with traditional equity market risks, private equity investments are also subject to higher fees, lower liquidity and the potential for leverage that may amplify volatility and/or the potential loss of capital.
- **Private Credit** involves higher risk and is suitable only for sophisticated investors. These assets are subject to interest rate risks, the risk of default and limited liquidity. U.S. investors exposed to non-U.S. private credit may also be subject to currency risk and fluctuations.
- **Private Real Estate** involves higher risk and is suitable only for sophisticated investors. Real estate assets can be volatile and may include unique risks to the asset class like leverage and/or industry, sector or geographical concentration. Declines in real estate value may take place for a number of reasons including, but are not limited to economic conditions, change in condition of the underlying property or defaults by the borrow.
- **Marketable Alternatives** involves higher risk and is suitable only for sophisticated investors. Along with traditional market risks, marketable alternatives are also subject to higher fees, lower liquidity and the potential for leverage that may amplify volatility or the potential for loss of capital. Additionally, short selling involved certain risks including, but not limited to additional costs, and the potential for unlimited loss on certain short sale positions.



A P O L L O N

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