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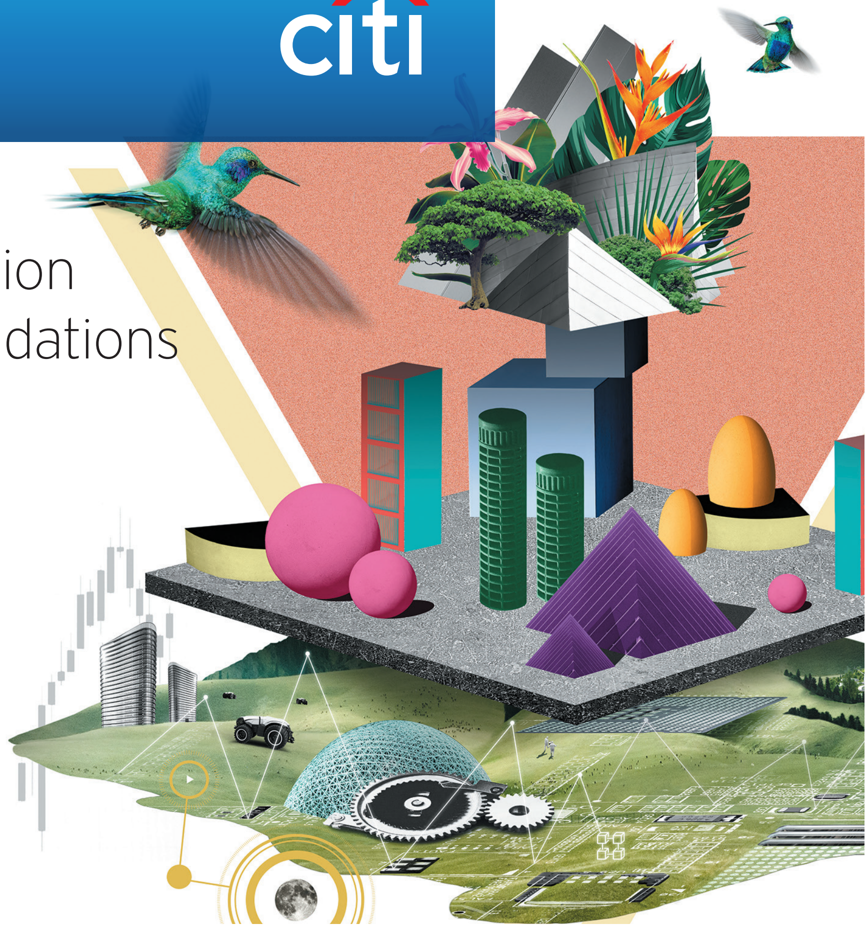

Strategic Asset Allocation for Endowments, Foundations and Non-profits

Fixed Income Component

Greg van Inwegen
Global Head, Quantitative Research and Asset Allocation
Citi Investment Management

Paisan Limratanamongkol
Head, Quantitative Research and Global Asset Allocation
Citi Investment Management

Xin He
Lead, Quantitative Research and Asset Allocation team
Citi Investment Management

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Executive Summary

We explore various possibilities for an appropriate fixed income benchmark for an Endowment, Foundation or Non-profit strategic asset allocation; and review and evaluate several types of benchmarks based on risk and return under various market conditions. We find intermediate investment grade (IG) and two different long duration IG benchmarks (the first more Treasury heavy and the second more credit heavy) offer meaningful protection during market stress, while high yield (HY) and emerging market (EM) debt fail to provide diversification benefit during these adverse conditions.

One way of analyzing benchmarks is to study them as individual indices, in a "stand-alone" context, rather than as a component of a portfolio. In a stand-alone setting (see **Table 2**), among the three IG benchmarks, intermediate IG seems to be more favorable than the two long duration IG benchmarks, given its highest Sharpe Ratio.

However, the Treasury heavy benchmark (long duration IG 1) outperforms the credit heavier long duration benchmark (long duration IG 2) and intermediate IG in many stress environments, including in the recent COVID-19 crisis, better offsetting equity risk.

Another way of analyzing benchmarks is to study the properties of portfolios within which benchmarks are contributors to portfolio risk and return. Within a (long term) portfolio context, portfolios with long duration IG 1 perform similarly to those with a long duration IG 2 or a pure intermediate IG fixed income component. However, in the stress periods, a portfolio with long duration IG 1 has superior risk/reward properties compared to portfolios with intermediate IG or long duration IG 2. This implies that in non-stress periods, portfolios with more credit exposure will perform somewhat better than those with a heavier long duration Treasury exposure.

We conclude, as evidenced by the performance of the long duration IG 1 benchmark in this analysis, long duration treasuries can play a role in an asset allocation. Over full market cycles, portfolios with heavier long duration exposure provide similar returns to portfolios with heavier credit exposures. While heavier credit exposure portfolios outperform in non-stress periods, the long duration Treasury heavy portfolios provide more diversification benefit and downside protection, especially during equity market stress periods. Thus, given similar overall performance over full market cycles, but better downside protection, it may be appropriate to include a higher weighting to long duration Treasuries in the fixed income component of an Endowment, Foundation or Non-profit strategic asset allocation.

Introduction

Endowments, Foundations and Non-profits (EF&Ns) are mandated to preserve capital over long horizons, while meeting cash flow needs to fund their contributions. Given their mandate, it is appropriate that their investment vehicles are characterized by a long average maturity of payment streams. Public equities have effectively an infinite duration and therefore logically should make up a higher proportion in an EF&N long-term strategic asset allocation.

Diversification considerations suggest that fixed income securities also be included in a well-structured EF&N asset allocation plan. Given the long-term nature of the EF&N investment horizon, it makes sense that there is a significant weighting to long duration fixed income securities, possibly both government and corporate bonds.

In determining the relative size of government versus corporate bonds, one must ask what role in the portfolio this allocation will serve. The answer is that the fixed income allocation will serve as a source of income for EF&Ns' periodic cash flow needs as well as a partial ballast against equity risk within the portfolio.

In order to provide portfolio construction guidance as to what types of fixed income investors should hold in a portfolio to protect against drawdowns, especially in stress periods, it is helpful to analyze the duration, risk, return and correlation properties of the bonds. To carry out this analysis, we study an intermediate IG benchmark, two long duration IG benchmarks, a HY bond benchmark and an Emerging Market bond benchmark, all from a stand-alone basis. This analysis suggests that IG benchmarks are likely to do well in stress periods and we narrow down the benchmark candidates and focus on analyzing intermediate IG and the two long duration IG benchmarks in the portfolio context.

Asset Class Summary Statistics

Table 1 provides duration levels for all of the indices included in the analysis. Notice that the intermediate IG has a duration of 6.5. To see the benefit of having a long duration component in the Fixed Income benchmark, we construct two long duration IG benchmarks, namely, long duration IG 1 and long duration IG 2. Long duration IG 1 is a blended benchmark with 55% in intermediate IG and 45% in the long duration US Treasuries[1].

Long duration IG 2 has weights of 55% in intermediate IG and 45% in long duration Gov/Credit[2]. The two constructed long duration IG benchmarks result in durations of 12.6 and 11, respectively. Long duration IG 2 has more exposure to credits than long duration IG 1. In addition to the IG benchmarks, we also include HY debt, EM debt and US equities in **Table 1.**

Table 1. Description and Duration for Benchmarks Used in Analysis

Index	Description	Duration
Intermediate IG	Bloomberg Barclays US Gov/Credit 5-10 Yr Total Return Unhedged USD	6.5
Long Duration IG 1	55% intermediate IG + 45% Bloomberg Barclays US Treasury 20+	12.6
Long Duration IG 2	55% intermediate IG + 45% Bloomberg Barclays US Long Government/Credit Unhedged USD	11.0
High Yield	Bloomberg Barclays US High Yield Corporate	3.8
EM Debt	Emerging Market USD-Denominated Sovereign Debt from AVS	8.5
US Large Cap	MSCI USA	∞

Source: FactSet, Bloomberg; as of July 7, 2020. Indices are unmanaged. An investor cannot invest directly in an index. They are shown for illustrative purposes only and do not represent the performance of any specific investment. Index returns do not include any expenses, fees, or sales charges, which would lower performance. For illustrative purposes only. Past performance is no guarantee of future results.

For each of the benchmarks described in **Table 1**, we examine monthly data over the period January 1, 1992 through May 31, 2020. The results in **Table 2** indicate on a stand-alone basis, that intermediate IG and the two long duration IG benchmarks have higher Sharpe Ratio than HY bond HY and EM Debt.

Among the three IG benchmarks, long duration IG 1 has a highest return (7.2%) and a highest risk (7.6%), but the lowest Sharpe Ratio. The best among the three IG benchmarks, from Sharpe Ratio perspective, is intermediate IG, due to its low risk.

Table 2. Performance and Risk (using monthly data from January 1, 1992 through May 31, 2020)

Statistics	Intermediate IG	Long Duration IG 1	Long Duration IG 2	High Yield	EM Debt	US Large Cap
Cumulative Return	467.1%	624.1%	593.0%	695.1%	1140.9%	1226.5%
Ann. Return	6.3%	7.2%	7.0%	7.6%	9.3%	9.5%
Ann. Standard Deviation	5.0%	7.6%	6.5%	8.4%	10.7%	14.5%
Sharpe Ratio	1.26	0.96	1.09	0.90	0.87	0.66
Worst 12-Month Return	-5.5%	-8.7%	-7.9%	-31.2%	-35.9%	-43.1%

Source: FactSet, Bloomberg; as of July 7, 2020. Indices are unmanaged. An investor cannot invest directly in an index. They are shown for illustrative purposes only and do not represent the performance of any specific investment. Index returns do not include any expenses, fees or sales charges, which would lower performance. For illustrative purposes only. Past performance is no guarantee of future results. Please see Table 1 for benchmark composition.

[1] Intermediate IG index: Bloomberg Barclays US Agg Gov/Credit Total Return Value Unhedged USD (LD03TRUU) is composed of 48% US Treasuries, 6% US government related, and 46% US corporate bonds.

[2] Long duration Gov/Credit index: Bloomberg Barclays US Long Government/Credit (LGC5TRUU) is composed of 39% US Treasuries, 8% US government related and 53% US corporate bonds.

Stress Tests

Of additional interest is how each of these benchmarks performs in stress environment. We performed two types of stress tests: scenario-based and historical event based.

For the scenario-based stress test, the definition of variables used to represent each scenario is provided in **Table 3** and the index returns in case of a shock are available in **Figure 1**[1].

Table 3. Definition of Variables Used to Represent Each Scenario

Scenario	Underlying Variable	Shock
Credit Spreads Widen	Change in OAS of Barclays US Corp Investment Grade Index	1.3%
Dollar Strengthens	Change in DXY Index	14.3%
Volatility Up	Change in VIX Index	183.9%

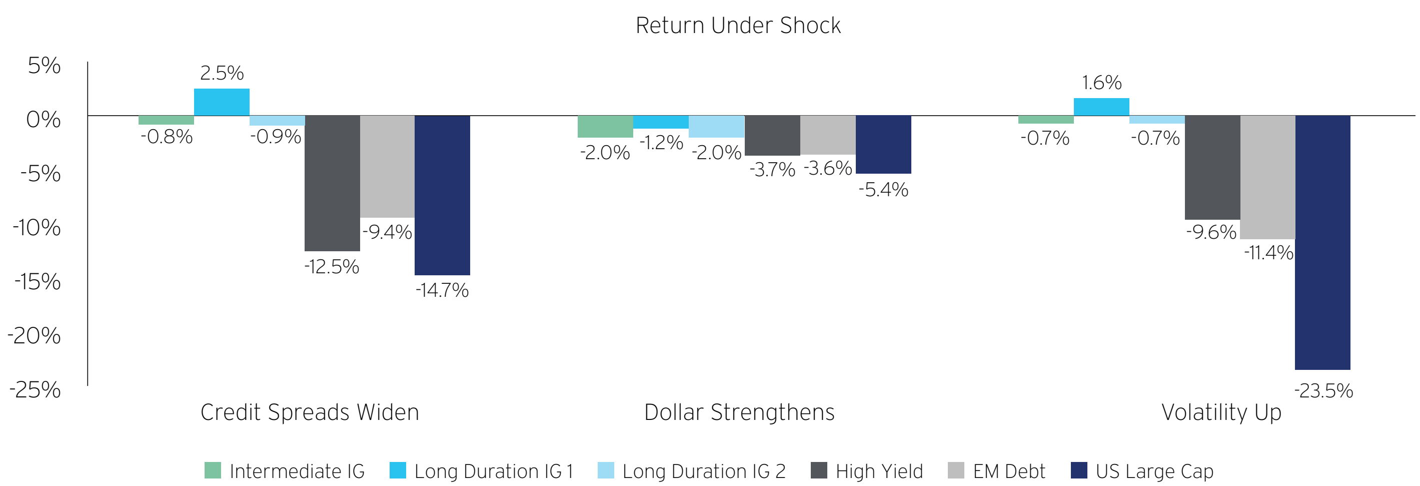
Source: FactSet, Bloomberg; as of June 24, 2020. Indices are unmanaged. An investor cannot invest directly in an index. They are shown for illustrative purposes only and do not represent the performance of any specific investment. Index returns do not include any expenses, fees or sales charges, which would lower performance. For illustrative purposes only. Past performance is no guarantee of future results. Please see Glossary for definitions.

Reviewing the stress scenarios, under a credit spread widening, US equities perform the worst with a loss of 14.7%, followed by HY and EM Debt, with losses of 12.5% and 9.4%, respectively. The three IG benchmarks do better under this scenario. Intermediate IG and long duration IG 2 lose only 0.8% and 0.9%, respectively. Long duration IG 1 performs even better and is the only benchmark that has positive return (2.5%) under this scenario, which is consistent it including a higher quality and long duration treasuries component.

In a volatility spike scenario, it's a similar picture. US equities is down 23.5%. HY and EM Debt drop 9.6% and 11.4%, respectively. On the contrast, intermediate IG and long duration IG 2 are down only 0.7% while long duration IG 1 is up 1.6%, outperforming all other benchmarks.

In the USD FX appreciation scenario, US equities loses 5.4%, followed by HY and EM Debt with negative performance of -3.7% and -3.6%. The three IG benchmarks are hit the least with intermediate IG and long duration IG 2 down 2% each, and long duration IG 1 down only 1.2%.

Figure 1. Scenario-Based Stress Test
Note: In all the regressions except for the ones under credit spread widen scenario, the data used is from January 1, 1992 through May 31, 2020. For those under credit spread widen scenario, the data used is from December 1, 1998 through May 31, 2020.



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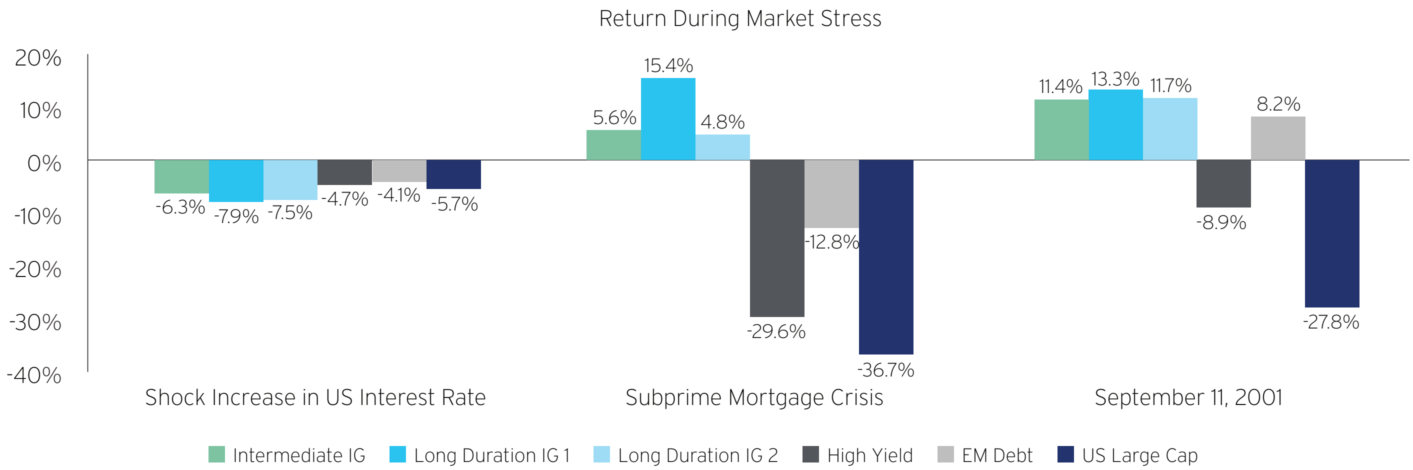
[1] The shock is defined as 2 times the annualized standard deviation of the underlying variable (using last 10 years of data).

Table 4. List of Market Stress Events

Stress Events	Start	End
1994 US Interest Rate Shock	2/1/1994	4/1/1994
Subprime Mortgage Crisis	8/1/2007	11/1/2008
September 11, 2001	9/1/2001	9/1/2002

Moving to the historical-based stress test, the definition of the stress events are provided in **Table 4** and the index returns over the relevant period are provided in **Figure 2.**

Figure 2. Historical-Based Stress Test



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Reviewing the historical stress events, in the September 11, 2001 terrorist attack, US equities were down 27.8% followed by HY bond with a loss of 8.9%. In contrast, EM Debt was up 8.2%, intermediate IG and long duration IG 2 were up 11.4% and 11.7% respectively, while long duration IG 1 was up even higher (13.3%).

During the subprime crisis, US equities dropped 36.7% and HY bond plunged about 30%. EM Debt performed better, but still experienced a decline of 12.8%. The three IG benchmarks all performed positively, with intermediate IG and long duration IG 1 up 5.6% and 4.8%, respectively. Long duration IG 2, performed best with a return of 15.4%. Again, this can be attributed to its higher quality and longer duration Treasury component. In the 1994 US Interest Rate Shock event, all benchmarks had similar performance. Long duration IG 1 performed the worst among all, which dropped by 7.9% during the event, dragged by its high sensitivity to interest rate.

These results provide evidence that IG offers meaningful protection as a hedge against equity performance in many stress environments. Long duration IG 1 protects in all stress scenarios, except for the interest rates up stress case. This can be explained by the fact that intermediate IG and long duration IG 2 embed more equity exposure through its credit component, which reduces their effectiveness as a hedge against equity risk.

Portfolio Analysis

While the analysis of benchmarks on a stand-alone asset class basis is of some interest, what is of most importance in a strategic asset allocation is the behavior of the asset classes in a portfolio context. From the previous stand-alone stress analysis, it can be concluded that the intermediate IG and two long duration IG benchmarks provided reasonable downside protection. In this section, we take a closer look at these three benchmarks from the portfolio construction perspective.

Table 5 provides the pairwise correlations among the benchmarks being considered. Long duration IG 1 has a -0.13 correlation with US equities. Intermediate IG and long duration IG 2 have close to zero correlation with US equities. These correlations are consistent with the stress test results showing the improved downside protection long duration IG 1 versus intermediate IG and long duration IG 2 during periods of equity market stress. High yield and EM Debt both have positive correlations with US Equities, indicating the least potential benefit of forming a portfolio of those fixed incomes with US Equities. Of course, the negative correlation of long duration IG 1 with equities implies that when equities rally post-stress, it will be a drag on the portfolio relative to intermediate IG.

Table 5. Pairwise Correlation (monthly data from January 1, 1992 through May 31, 2020)

Statistics	Intermediate IG	Long Duration IG 1	Long Duration IG 2	High Yield	EM Debt	US Large Cap
Intermediate IG	1	0.91	0.97	0.23	0.32	0.04
Long Duration IG 1	0.91	1	0.96	-0.01	0.17	-0.13
Long Duration IG 2	0.97	0.96	1	0.22	0.31	0.03
High Yield	0.23	-0.01	0.22	1	0.59	0.64
EM Debt	0.32	0.17	0.31	0.59	1	0.52
US Large Cap	0.04	-0.13	0.03	0.64	0.52	1

Source: FactSet, Bloomberg; as of July 7, 2020. Correlation is the extent to which the values of different types of investments move in tandem with one another in response to changing economic and market conditions. Correlation is measured on a scale of 1 to +1. Investments with a positive correlation tend to rise and fall in value at the same time, while investments with a negative correlation tend to move in opposite directions. An asset class has a correlation of 1 with itself. Indices are unmanaged. An investor cannot invest directly in an index. They are shown for illustrative purposes only and do not represent the performance of any specific investment. Index returns do not include any expenses, fees or sales charges, which would lower performance. For illustrative purposes only. Past performance is no guarantee of future results. Please see Table 1 for benchmark composition.

We next combine the impact of stand-alone asset class return, risk and correlation to create a range of portfolios. We do this in order to evaluate the efficacy of various fixed income asset classes as a complement to the equity component of a portfolio. We create a simplified strategic asset allocation with two sets of portfolios. The first set has 60% US equities combined with 40% IG, chosen from Intermediate IG, long duration IG 1 and long duration IG 2. The second set has 80% US equities combined with 20% IG. Table 6 shows the weightings and summary statistics for the various portfolios on an asset class level[1]. Each portfolio's return and risk is plotted in **Figure 3**.

Table 6. Portfolio Summary Statistics

Portfolio Name	Cumulative Return	Ann. Return	Ann. Standard Deviation	Sharpe Ratio	Worst 12-Month Return
Intermediate IG	467.1%	6.3%	5.0%	1.26	-5.5%
Long Duration IG 1	624.1%	7.2%	7.6%	0.96	-8.7%
Long Duration IG 2	593.0%	7.0%	6.5%	1.09	-7.9%
US Large Cap	1226.5%	9.5%	14.5%	0.66	-43.1%
60 Equity/40 Intermediate IG	922.4%	8.5%	9.0%	0.95	-28.3%
60 Equity/40 Long Duration IG 1	1052.8%	9.0%	8.8%	1.02	-26.4%
60 Equity/40 Long Duration IG 2	1013.7%	8.9%	9.2%	0.97	-28.3%
80 Equity/20 Intermediate IG	1080.3%	9.1%	11.7%	0.78	-36.0%
80 Equity/20 Long Duration IG 1	1158.2%	9.3%	11.5%	0.81	-35.1%
80 Equity/20 Long Duration IG 2	1133.1%	9.2%	11.7%	0.79	-36.0%

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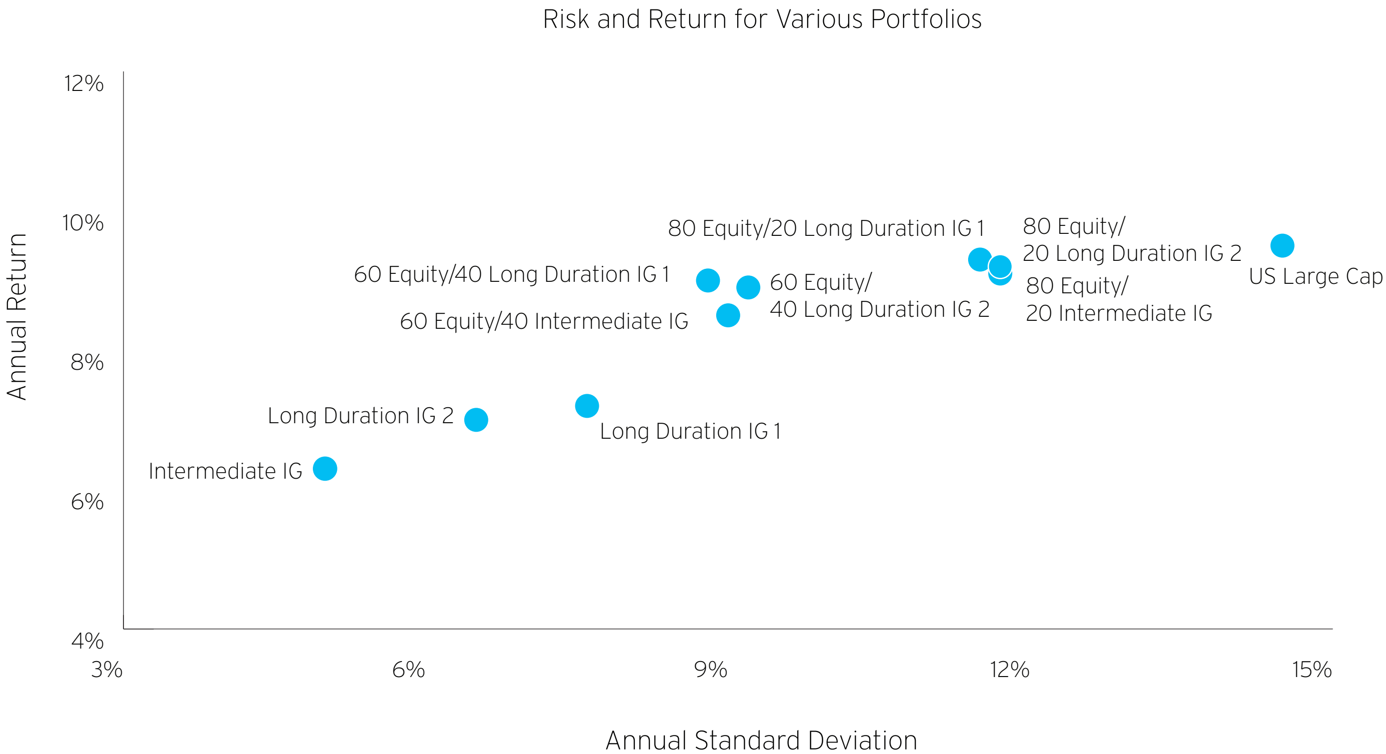
[1] We assume monthly rebalancing using the data since January 1, 1992 through May 31, 2020.

Figure 3. Portfolio Risk and Return (January 1, 1992 through May 31, 2020)



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Recall that as a stand-alone investment long duration IG 1 compares unfavorably to intermediate IG and long duration IG 2, given its much higher risk. However, when used as an asset class component in a portfolio, for both the 60/40 and the 80/20 weightings, the portfolios with long duration IG 1 are quite competitive, and have even have slightly better risk/return properties relative to those portfolios using either intermediate IG or long duration IG 2.

COVID-19 Stress Scenario

To complete the analysis, we look at stand-alone and portfolio risk and returns over a short horizon during the COVID-19 crisis, using the Q1 2020 daily data.

Table 7 shows that on a stand-alone basis, long duration IG 1 has a substantially higher return than both intermediate IG and long duration IG 2 (11% versus 2.8% and 4.4%). Even though it also has higher standard deviation than the intermediate IG and long duration IG 2, it is in fact still leading to a highest Sharpe Ratio (0.65).

From a portfolio perspective, the benefit of having the long duration Treasury exposure in the fixed income sleeve is also evident. In Table 7, the Sharpe Ratio for the 60/40 and 80/20 portfolios are highest with the portfolios with long duration IG 1 included relative to the intermediate IG and long duration IG 2. For example, for the 60/40 portfolio the Sharpe Ratios are -0.32 for the portfolio with long duration IG 1 versus -0.43 and -0.41 for portfolios with either intermediate IG or long duration IG 2. Figure 4 also illustrates this point: Portfolios with long duration IG 1 are further to the north and west in the figure have lower risk and higher return than the intermediate IG and long duration IG 2 portfolios.

Table 7. Summary Statistics (using Q1 2020 daily data)

Portfolio Name	Cumulative Return	Monthly Return	Monthly Standard Deviation	Sharpe Ratio
Intermediate IG	2.8%	1.0%	2.6%	0.38
Long Duration IG 1	11.0%	3.8%	5.8%	0.65
Long Duration IG 2	4.4%	1.5%	4.8%	0.31
US Large Cap Equities	-19.6%	-7.5%	16.8%	-0.44
60 Equity/40 intermediate IG	-10.7%	-3.9%	9.1%	-0.43
60 Equity/40 Long Duration IG 1	-7.4%	-2.7%	8.4%	-0.32
60 Equity/40 Long Duration IG 2	-10.0%	-3.7%	9.0%	-0.41
80 Equity/20 intermediate IG	-15.2%	-5.7%	12.8%	-0.44
80 Equity/20 Long Duration IG 1	-13.5%	-5.0%	12.2%	-0.41
80 Equity/20 Long Duration IG 2	-14.8%	-5.5%	12.6%	-0.44

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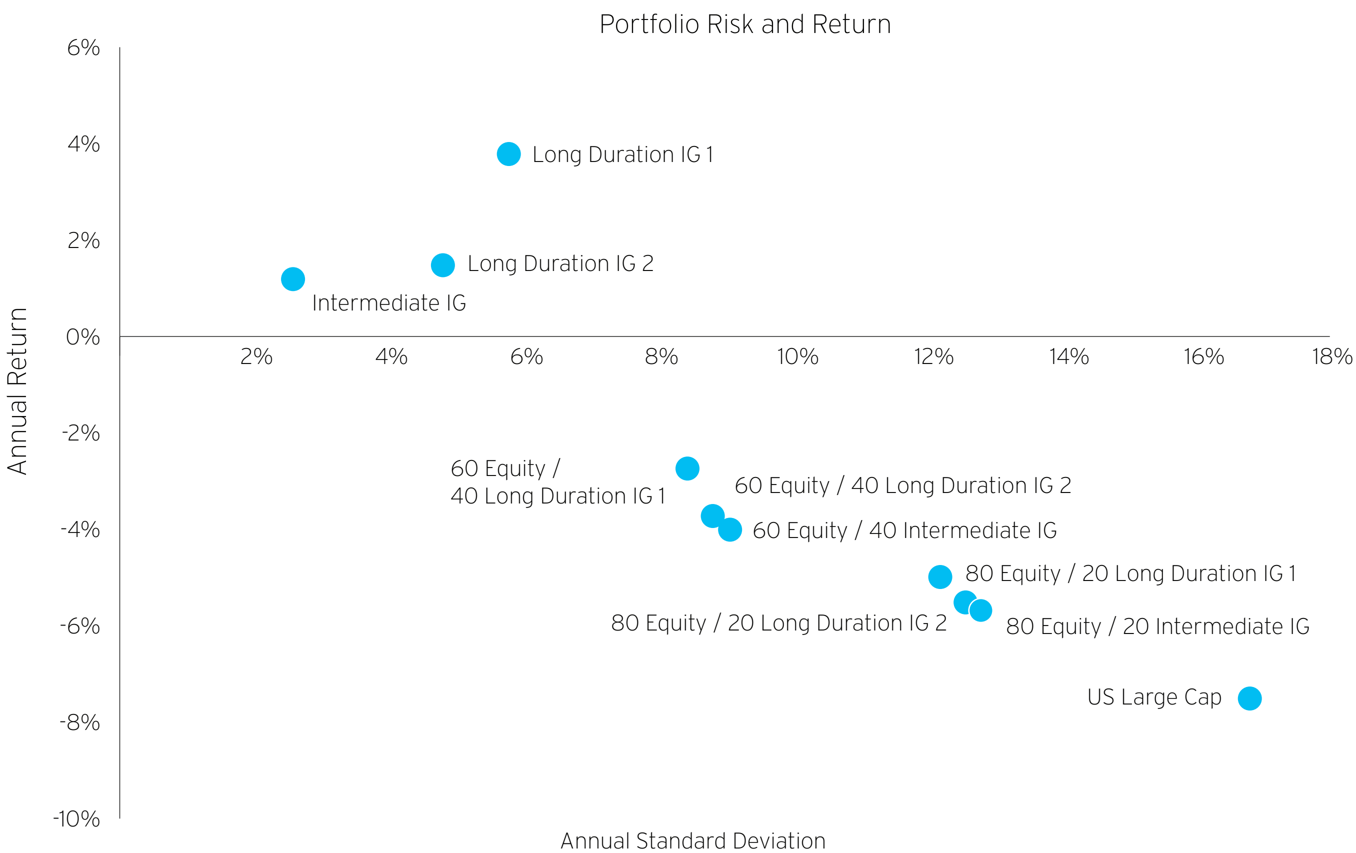
Figure 4. COVID-19 stress period (Q1 2020)



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Summary and Conclusion

In this article, we attempted to answer the question of what is an appropriate fixed income benchmark for a typical EF&N strategic asset allocation. We reviewed several possible asset class benchmarks, evaluating them on the basis of risk and return under various market conditions.

We find the Intermediate IG and two long duration IG benchmarks have relatively better stand-alone statistics than HY and EM Debt over a long-term period. The IG benchmarks also offer downside protection during market stress.

Among the three IG benchmarks in a stand-alone setting, intermediate IG seems to be more favorable than the two long duration IG benchmarks, given its highest Sharpe Ratio. However, long duration IG 1 outperforms in many stress environments (including in the recent COVID-19 crisis), better offsetting equity risk.

Within a long term portfolio context, portfolios with long duration IG 1 performs similarly to those with a long duration IG 2 or a pure intermediate IG fixed income component. However, in the stress periods, the portfolio with long duration IG 1 has superior risk/reward properties compared to portfolios with intermediate IG or long duration IG 2. This implies that in non-stress periods, portfolios with more credit exposure will perform somewhat better those with a heavier long duration Treasury exposure.

In conclusion, as evidenced by the performance of the long duration IG 1 benchmark in this analysis, long duration treasuries can play role in an asset allocation. Over full market cycles, portfolios with heavier long duration exposure provide similar returns to portfolios with heavier credit exposures. While heavier credit exposure portfolios out perform in non-stress periods, the long duration Treasury heavy portfolios provide a higher level of diversification benefit and downside protection, especially during equity market stress periods. Thus, given similar overall performance over full market cycles, but better downside protection, it may be appropriate to include a higher or increased weighting to long duration Treasuries in the fixed income component of an Endowment, Foundation and Non-profit strategic asset allocations.

Glossary

Index Definitions

Description and Duration for Benchmarks Used in Analysis

Index	Description	Duration
Intermediate IG	Bloomberg Barclays US Gov/Credit 5-10 Yr Total Return Unhedged USD	6.5
Long Duration IG 1	55% intermediate IG + 45% Bloomberg Barclays US Treasury 20+	12.6
Long Duration IG 2	55% intermediate IG + 45% Bloomberg Barclays US Long Government/Credit Unhedged USD	11.0
High Yield	Bloomberg Barclays US High Yield Corporate	3.8
EM Debt	Emerging Market USD-Denominated Sovereign Debt from AVS	8.5
US Large Cap	MSCI USA	∞

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Bloomberg Barclays US Gov/Credit 5-10 Yr Total Return Unhedged USD is a broad-based flagship benchmark that measures the non-securitized component of the US Aggregate Index with 5 to 10 years to maturity. The index includes investment grade, US dollar-denominated, fixed-rate treasuries, government-related and corporate securities.

Bloomberg Barclays US Treasury 20+ Index, measures US dollar-denominated, fixed-rate, nominal debt issued by the US Treasury with 20+ years to maturity. Treasury bills are excluded by the maturity constraint, but are part of a separate Short Treasury Index. STRIPS are excluded from the index because their inclusion would result in double-counting.

Bloomberg Barclays US Long Government/Credit Unhedged USD Index, is a broad-based flagship benchmark that measures the non-securitized component of the US Aggregate Index with 10 or more years to maturity. The index includes investment grade, US dollar-denominated, fixed-rate treasuries, government-related and corporate securities.

Bloomberg Barclays US High Yield Corporate Index, measures the USD-denominated, high yield, fixed-rate corporate bond market. Securities are classified as high yield if the middle rating of Moody's, Fitch and S&P is Ba1/BB+/BB+ or below.

DXY Index, is an index (or measure) of the value of the United States dollar relative to a basket of foreign currencies, often referred to as a basket of U.S. trade partners' currencies.

Emerging Market USD-Denominated Sovereign Debt, follows the same definition as the Emerging Market Debt asset class in AVS. This asset class is composed of Bloomberg Barclays indices measuring performance of fixed and floating-rate US dollar-denominated emerging markets sovereign debt for 3 different regions including Latin America, EMEA and Asia.

MSCI USA Index, measures the performance of the large and mid-cap segments of the US market. It covers approximately 84% of the free float-adjusted market capitalization in the US.

Barclays US Corp Investment Grade Index, measures the investment grade, fixed-rate, taxable corporate bond market. It includes USD-denominated securities publicly issued by US and non-US industrial, utility and financial issuers.

The VIX or the Chicago Board Options Exchange (CBOE) Volatility Index, is a real-time index representing the market's expectation of 30-day forward-looking volatility, derived from the price inputs of the S&P 500 index options.

Other Terminology

Adaptive Valuations Strategies is Citi Private Bank's own strategic asset allocation methodology. It determines the suitable long-term mix of assets for each client's investment portfolio.

Correlation is a statistical measure of how two assets or asset classes move in relation to one another. Correlation is measured on a scale of 1 to -1. A correlation of 1 implies perfect positive correlation, meaning that two assets or asset classes move in the same direction all of the time. A correlation of -1 implies perfect negative correlation, such that two assets or asset classes move in the opposite direction to each other all the time. A correlation of 0 implies zero correlation, such that there is no relationship between the movements in the two over time.

OAS is the yield spread that has to be added to a benchmark yield curve to discount a security's payments to match its market price, using a dynamic pricing model that accounts for embedded options.

Sharpe Ratio is a measure of risk-adjusted return, expressed as excess return per unit of deviation, typically referred to as risk.

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Bond rating equivalance
Alpha and/or numeric symbols used to give indications of relative credit quality. In the municipal market, these designations are published by the rating services. Internal ratings are also used by other market participants to indicate credit quality.

Bond credit quality ratings		**Ratings agencies**	
Credit risk	**Moody's**[1]	**Standard and Poor's**[2]	**Fitch Ratings**[2]
Investment Grade			
Highest quality	Aaa	AAA	AAA
Highest quality (very strong)	Aa	AA	AA
Upper medium grade (Strong)	A	A	A
Medium grade	Baa	BBB	BBB
Not Investment Grade			
Lower medium grade (somewhat speculative)	Ba	BB	BB
Low grade (speculative)	B	B	B
Poor quality (may default)	Caa	CCC	CCC
Most speculative	Ca	CC	CC
No interest being paid or bankruptcy petition filed	C	D	C
In default	C	D	D

[1] The ratings from Aa to Ca by Moody's may be modified by the addition of a 1, 2, or 3 to show relative standing within the category.
[2] The ratings from AA to CC by Standard and Poor's and Fitch Ratings may be modified by the addition of a plus or a minus to show relative standing within the category.

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Additionally, the underlying collateral supporting non-Agency MBS may default on principal and interest payments. In certain cases, this could cause the income stream of the security to decline and result in loss of principal. Further, an insufficient level of credit support may result in a downgrade of a mortgage bond's credit rating and lead to a higher probability of principal loss and increased price volatility. Investments in subordinated MBS involve greater credit risk of default than the senior classes of the same issue. Default risk may be pronounced in cases where the MBS security is secured by, or evidencing an interest in, a relatively small or less diverse pool of underlying mortgage loans.

MBS are also sensitive to interest rate changes which can negatively impact the market value of the security. During times of heightened volatility, MBS can experience greater levels of illiquidity and larger price movements. Price volatility may also occur from other factors including, but not limited to, prepayments, future prepayment expectations, credit concerns, underlying collateral performance and technical changes in the market.

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