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Cross-Asset Dispatches | Global

Optimal Fixed Income Portfolios

We solve for optimal portfolios based on both Morgan Stanley forecasts and our capital market assumptions. Both approaches favor 'up in quality', with a preference for taking duration via long-end credit.

What's optimal? A sharp rise in yields makes fixed income asset allocation much more interesting. We solve for optimal portfolios based on two ways to estimate return: 1) Morgan Stanley's 12-month forecasts; and 2) Our long-term return assumptions.

Two versions of 'optimal', across two benchmarks: We solve for the most return for the same level of volatility as the benchmark. We do this for the US Aggregate Bond index ('AGG+'), as well as an index that also contains US high yield and EM debt ('CORE+'). We'll publish these portfolios weekly in the back of *Cross-Asset Dispatches*.

Key takeaways: Optimal US AGG portfolios prefer spread risk instead of duration risk currently. Broader fixed income optimal portfolios hold an implicit up-in-quality bias with IG corporate > HY corporate and/or EM sovereign debt. Agency MBS remains the least favored asset class across all these optimal portfolios.

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Executive Summary

The recent move in yields means that expected returns for fixed income have shifted materially from where they were just a year ago. But how should income-focused investors weigh relative risk/reward? What should asset allocation look like for an investor aiming to beat a benchmark comprised of core fixed income or the USD Bloomberg Barclays Aggregate Bond index ('US AGG')? Should a fixed income portfolio be long/short duration and overweight/underweight quality given Morgan Stanley Research's expected returns?

In this report, we build on the framework we've laid out previously for our [Fixed Income Rotation Model \(FIRM\)](#), using a Markowitz mean-variance portfolio optimization approach to produce core fixed income optimal portfolios ('AGG+'), and liquid fixed income optimal portfolios ('CORE+') over various risk and return targets, with Morgan Stanley expected returns as inputs.

We find that AGG+ portfolios, regardless of whether they are focused on N12M or long-run expected returns, are running slightly lower duration than US AGG, suggesting that, on Morgan Stanley's forecasts, it's still **more attractive to take on spread risk instead of duration risk**. Meanwhile, CORE+ portfolios – which include HY and EM debt – have **an implicit up-in-quality bias**, with IG corporate > HY corporate and/or EM sovereign debt.

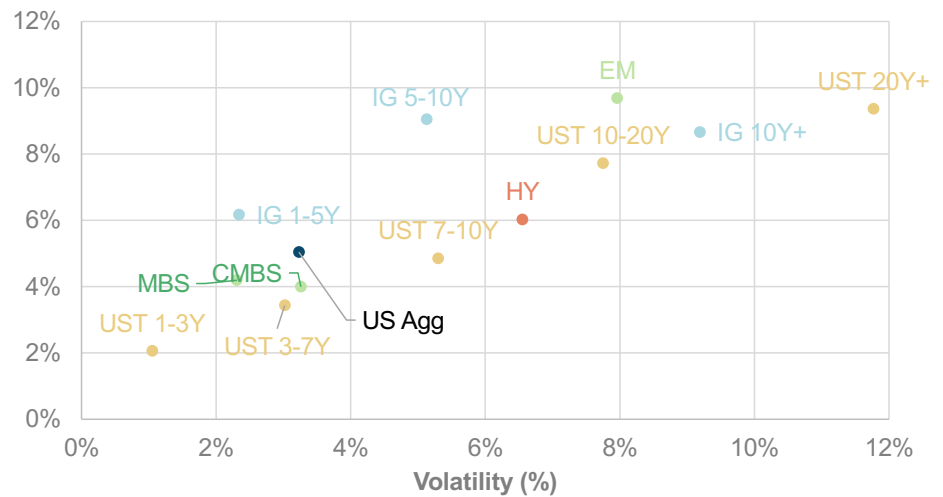
About the framework

AGG+ and CORE+ build on the framework we've previously laid out in our [Fixed Income Rotation Model \(FIRM\)](#), using Markowitz mean-variance portfolio optimizations to determine what the optimal asset allocation for an unlevered, total return-focused investor looks like, subject to constraints. The goal is for these optimal portfolios to beat risk/reward of a benchmark of core fixed income – the US AGG – or a custom benchmark comprised of liquid fixed income (what we will call the 'CORE+ benchmark'), while still keeping volatility as close to these benchmarks as possible.

Unlike FIRM, which considers the gamut of US fixed income assets, **AGG+ and CORE+ focus on the more liquid segments; AGG+ includes segments within US AGG, while CORE+ includes the 'core' fixed income assets in US AGG, but also liquid fixed income markets like HY corporate and EM sovereign debt.**

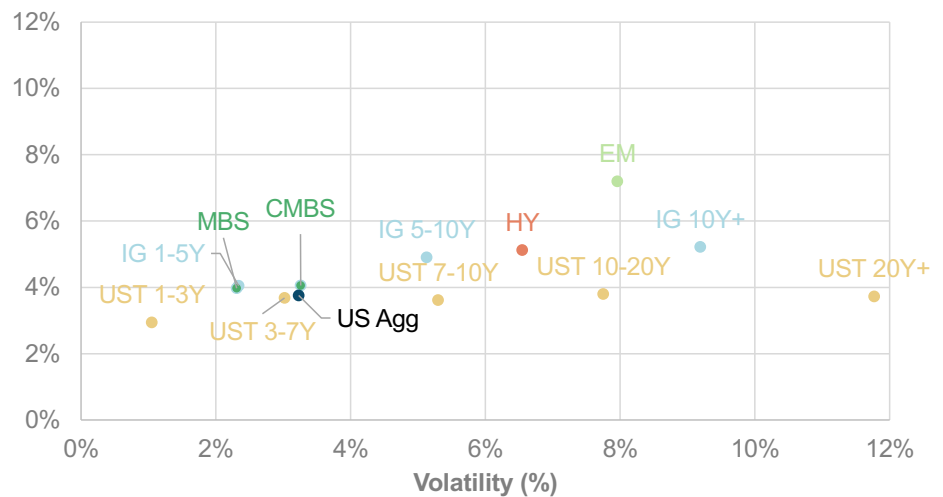
Our optimal portfolios make use of: 1) Morgan Stanley fixed income strategists' forecasts – usually updated twice a year; 2) The cross-asset team's long-term capital market assumptions – updated weekly; and 3) Historical volatility and covariances as inputs for the portfolio-optimization process. See [Appendix I: The Framework](#) for more details on methodology.

Exhibit 1: USD fixed income risk/reward based on Morgan Stanley N12M forecasts

N12M Expected Return (%)


Source: Bloomberg, Morgan Stanley Research forecasts; Note: Volatility is trailing 10-year volatility.

Exhibit 2: USD fixed income risk/reward based on Morgan Stanley long-term capital markets assumptions

Long-Run Expected Return (%)


Source: Bloomberg, Morgan Stanley Research forecasts; Note: Volatility is trailing 10-year volatility.

About our benchmarks

The benchmarks we use for this exercise are based on assets' relative market value, similar to how we think about our own cross-asset benchmark: [Exhibit 3](#) shows what both the AGG+ and CORE+ benchmarks look like. For the optimization process, we set weight constraints around these benchmarks due to how the various segments vary in terms of liquidity. See [The benchmarks](#) for more details on how we set weight constraints for our model.

Exhibit 3: AGG+ and CORE+ benchmark weights

	MV (US\$ bn)	Share Within US AGG	Market Share	Our Benchmarks	
				AGG+	CORE+
US CORE	23,513	94%	91%	100%	90%
Treasuries	9,993	40%	39%	42%	35%
1-3Y	3,371	14%	13%	14%	12%
3-7Y	3,759	15%	15%	16%	13%
7-10Y	922	4%	4%	4%	3%
10-20Y	600	2%	2%	3%	2%
20Y+	1,340	5%	5%	6%	5%
Securitized	7,372	30%	29%	31%	30%
MBS	6,877	28%	27%	29%	28%
CMBS	495	2%	2%	2%	2%
IG Corporate	6,148	25%	24%	26%	25%
1-5Y	2,207	9%	9%	9%	9%
5-10Y	1,729	7%	7%	7%	7%
10Y+	2,212	9%	9%	9%	9%
OTHER	2,338	0%	9%	0%	10%
HY Corporate	1,441	0%	6%	0%	6%
EM Sovereign	897	0%	3%	0%	4%

Source: Bloomberg, Morgan Stanley Research

AGG+ fixed income optimal portfolios

AGG+ portfolios focus on the core fixed income segments within US AGG – US Treasuries, securitized (dominated by Agency MBS) and IG corporate debt – aiming to maximize expected returns while targeting a US AGG-level of volatility. Currently, whether focused on N12M or long-run expected returns, AGG+ portfolios are running slightly lower duration than US AGG, and Agency MBS is the least favored asset class.

CORE+ fixed income optimal portfolios

CORE+ portfolios focus on the core fixed income segments within US AGG, plus HY corporate and EM sovereign debt, aiming to maximize expected returns while targeting a CORE+ benchmark-level of volatility. Currently, whether focused on N12M or long-run expected returns, CORE+ portfolios are relatively neutral on risk, and prefer quality.

AGG+ Optimal Portfolios

AGG+ portfolios focus on the core fixed income segments within US AGG, and use Morgan Stanley forecasts as inputs to explore optimal asset allocation over various risk and return targets, with the aim of beating the US AGG benchmark.

Our frameworks seek optimal portfolios for various volatility levels (e.g., same as US AGG, 5% target, etc.) and return targets (e.g., US AGG expected returns +100bp, 6% long-run expected returns), and can accommodate conditions like weight constraints or risk budget. To keep things simple, we will focus on two AGG+ portfolios:

- **AGG+ N12M, vol target:** Portfolio targeting the same volatility as US AGG while maximizing N12M expected returns, based on Morgan Stanley strategists' forecasts.
- **AGG+ LR, vol target:** Portfolio targeting the same volatility as US AGG while maximizing long-run expected returns, based on the cross-asset team's long-term capital market assumptions.

While the optimal allocations across these portfolios vary, there are some common themes:

- Both AGG+ portfolios focused on N12M and longer-run expected returns are running slightly lower duration than US AGG, suggesting that, on Morgan Stanley's forecasts, it's still more attractive to take on spread risk instead of duration risk.
- Agency MBS remains the least favored asset in both approaches.

AGG+ N12M vol target portfolio

Targeting same volatility as US AGG while maximizing N12M expected returns.

Portfolio preference: IG corporates > Treasury > MBS.

The AGG+ N12M optimal portfolio is **EW Treasuries, UW Agency MBS, OW IG corporates**.

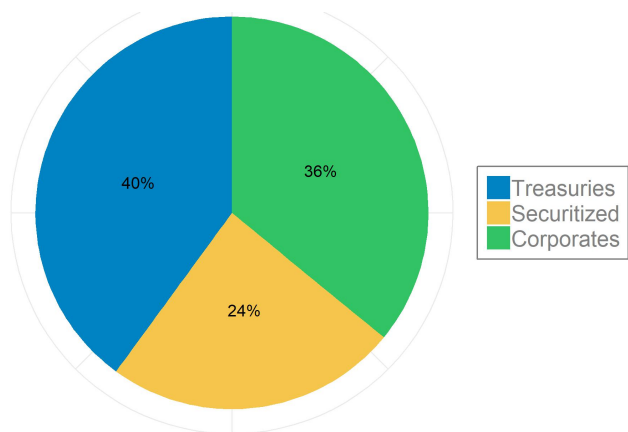
The portfolio has higher duration than the benchmark, mostly via an OW in long-dated IG corporates. The same is true for portfolio volatility – AGG+ N12M **prefers taking risk in and IG 1-10Y** instead of, say, long-end UST. The risk profile of CORE+ N12M is worse than the benchmark across most risk metrics like semi deviation, max drawdown, etc.

Exhibit 4: AGG+ N12M vol target portfolio allocation

AGG+ N12M Portfolio	EW	Neu	OW
TREASURIES	●	●	●
MBS	●	●	●
CORPORATE	●	●	●

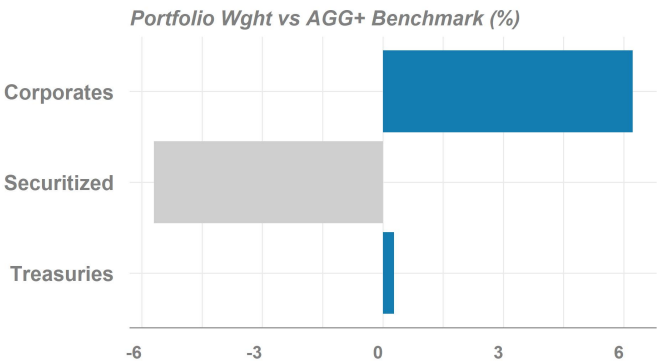
Source: Morgan Stanley Research

Exhibit 5: AGG+ N12M vol target portfolio breakdown by broad asset



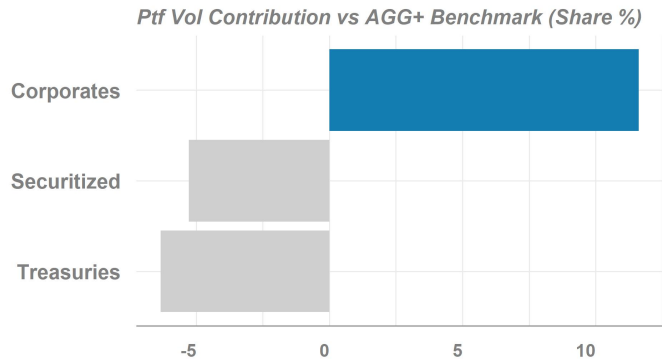
Source: Morgan Stanley Research

Exhibit 6: AGG+ N12M vol target portfolio weight versus benchmark



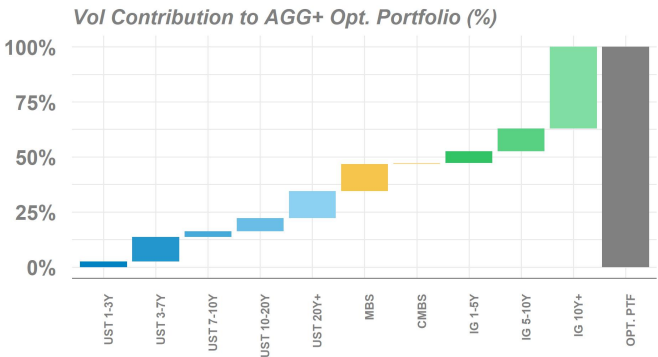
Source: Morgan Stanley Research

Exhibit 7: AGG+ N12M vol target portfolio volatility contribution versus benchmark



Source: Morgan Stanley Research

Exhibit 8: AGG+ N12M vol target portfolio volatility contribution by asset



Source: Morgan Stanley Research

Exhibit 9: Summary statistics for AGG+ N12M vol target portfolio

AGG+ N12M Portfolio

Targeting Same Volatility As AGG While Maximizing Long-Run Expected Returns

	AGG+ Wght	AGG+Bench. Wght	AGG+ Tilt	1M Wght Chg	UW	Neu	OW
US CORE FIXED INCOME	100%	100%	+0%	n/a	○	○	○
Treasuries	40%	40%	-0%	n/a	○	○	○
1-3Y	14%	14%	-0%	n/a	○	○	○
3-7Y	17%	15%	+2%	n/a	○	○	○
7-10Y	2%	3%	-1%	n/a	○	○	○
10-20Y	3%	2%	+1%	n/a	○	○	○
20Y+	4%	6%	-2%	n/a	○	○	○
Securitized	24%	30%	-6%	n/a	○	○	○
MBS	23%	28%	-5%	n/a	○	○	○
CMBS	1%	2%	-1%	n/a	○	○	○
Corporate	36%	30%	+6%	n/a	○	○	○
1-5Y	11%	11%	+0%	n/a	○	○	○
5-10Y	8%	8%	+0%	n/a	○	○	○
10Y+	16%	11%	+5%	n/a	○	○	○
					vs AGG+ Bench		
RISK REWARD	AGG+	AGG+ Bench	Diff	1M Chg	Higher		
N12M Exp Rtn (%)	5.5	5.1	0.4	n/a	○	○	○
LR Exp Rtn (%)	4.1	3.9	0.1	n/a	○	○	○
Risk-free Rtn (%)	4.2	4.2	0.0	n/a	○	○	○
XS Rtn (bp)	139	98	41	n/a	○	○	○
10Y Vol (%)	3.7	3.7	0.0	n/a	○	○	○
Exp Sharpe	1.5	1.4	0.1	n/a	○	○	○
Historical Sharpe	0.6	0.6	0.0	n/a	○	○	○
Exp Sortino	1.5	2.2	-0.7	n/a	○	○	○
Historical Sortino	0.6	0.9	-0.3	n/a	○	○	○
RISK PROFILE					Riskier		
Downside Deviation	3.6	2.0	1.6	n/a	○	○	○
Semi Deviation	3.7	2.3	1.4	n/a	○	○	○
Max Drawdown	9.0	7.6	1.4	n/a	○	○	○
Historical VaR	-5.4	-4.4	-1.0	n/a	○	○	○
Historical CVaR	-11.7	-7.0	-4.8	n/a	○	○	○
PORTFOLIO METRICS					Higher		
YTW	3.6	3.5	0.1	n/a	○	○	○
OAS	62	51	11	n/a	○	○	○
MDur	7.1	6.6	0.5	n/a	○	○	○
MTY	8.9	8.1	0.8	n/a	○	○	○
Rtg	AA3	AA2	n/a	n/a	○	○	○
CORRELATION & BETA					Higher		
Correl. Vol	1.0	1.0	0.0	n/a	○	○	○
Correl. UST 10Y	0.9	0.9	0.0	n/a	○	○	○
Beta Vol	1.1	1.0	0.1	n/a	○	○	○
Beta vs UST 10Y	0.5	0.5	0.0	n/a	○	○	○

As-Of Date: 2022-04-24

Source: Morgan Stanley Research

AGG+ LR vol target portfolio

Targeting same volatility as US AGG while maximizing long-run expected returns.

Portfolio preference: IG corporates > Treasuries > Agency MBS.

The CORE+ N12M optimal portfolio is **UW UST, UW MBS, OW IG corporates**.

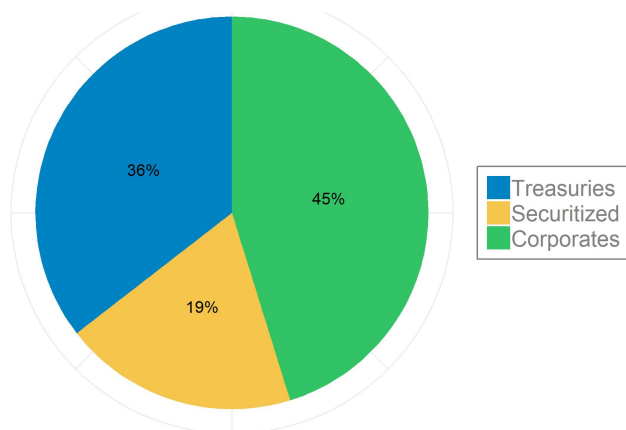
The portfolio has slightly similar duration as the benchmark, mostly with the duration contribution of being OW 10Y+ IG corporates offsetting a small UW in UST 20Y+. The same is true for portfolio volatility – **CORE+ N12M prefers taking risk in long-end IG corporates** instead of long-end UST. The risk profile of AGG+ N12M is worse than the benchmark across most risk metrics like semi deviation, max drawdown, etc.

Exhibit 10: AGG+ LR vol target portfolio allocation



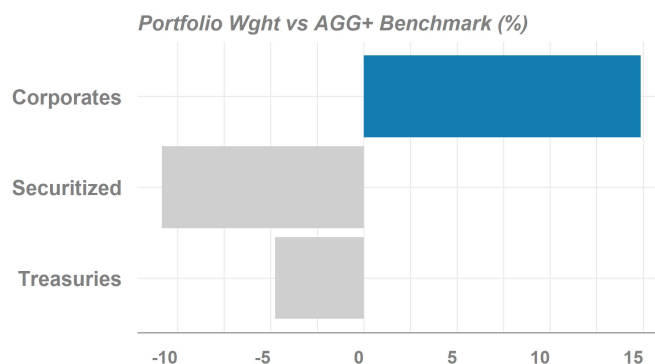
Source: Morgan Stanley Research

Exhibit 11: AGG+ LR vol target portfolio breakdown by broad asset



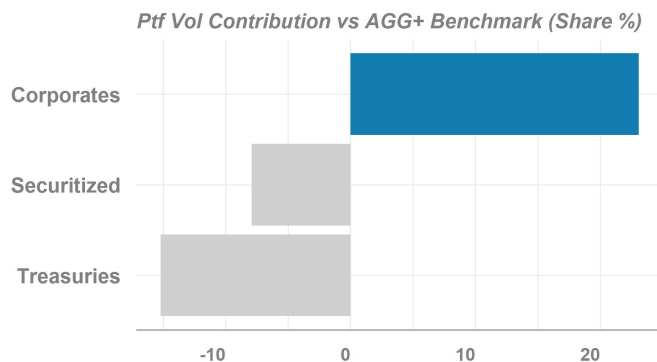
Source: Morgan Stanley Research

Exhibit 12: AGG+ LR vol target portfolio weight versus benchmark



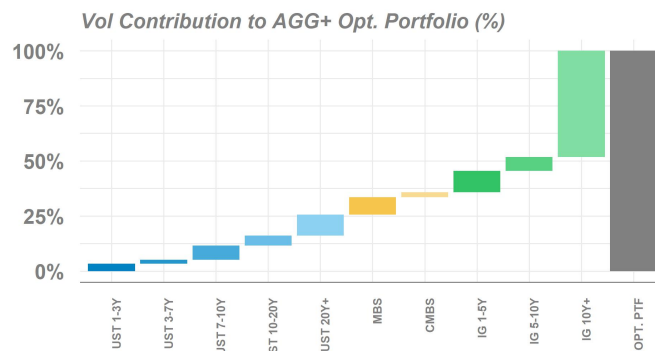
Source: Morgan Stanley Research

Exhibit 13: AGG+ LR vol target portfolio volatility contribution versus benchmark



Source: Morgan Stanley Research

Exhibit 14: AGG+ LR vol target portfolio volatility contribution by asset



Source: Morgan Stanley Research

Exhibit 15: Summary statistics for AGG+ LR vol target portfolio

AGG+ LR Portfolio

Targeting Same Volatility As AGG While Maximizing Long-Run Expected Returns

	AGG+ Wght	AGG+Bench. Wght	AGG+ Tilt	1M Wght Chg	UW	Neu	OW
US CORE FIXED INCOME	100%	100%	+0%	n/a	○	○	○
Treasuries	36%	40%	-4%	n/a	○	○	○
1-3Y	21%	14%	+7%	n/a	○	○	○
3-7Y	3%	15%	-12%	n/a	○	○	○
7-10Y	6%	3%	+3%	n/a	○	○	○
10-20Y	3%	2%	+1%	n/a	○	○	○
20Y+	4%	6%	-2%	n/a	○	○	○
Securitized	19%	30%	-11%	n/a	○	○	○
MBS	16%	28%	-12%	n/a	○	○	○
CMBS	3%	2%	+1%	n/a	○	○	○
Corporate	45%	30%	+15%	n/a	○	○	○
1-5Y	19%	11%	+8%	n/a	○	○	○
5-10Y	5%	8%	-3%	n/a	○	○	○
10Y+	21%	11%	+10%	n/a	○	○	○
					vs AGG+ Bench		
RISK REWARD	AGG+	AGG+ Bench	Diff	1M Chg	Higher		
N12M Exp Rtn (%)	5.6	3.9	1.6	n/a	○	○	○
LR Exp Rtn (%)	4.0	3.9	0.1	n/a	○	○	○
Risk-free Rtn (%)	4.2	4.2	0.0	n/a	○	○	○
XS Rtn (bp)	141	-21	162	n/a	○	○	○
10Y Vol (%)	3.7	3.7	0.0	n/a	○	○	○
Exp Sharpe	1.5	1.1	0.4	n/a	○	○	○
Historical Sharpe	0.6	0.6	0.0	n/a	○	○	○
Exp Sortino	1.5	1.7	-0.2	n/a	○	○	○
Historical Sortino	0.6	0.9	-0.3	n/a	○	○	○
RISK PROFILE					Riskier		
Downside Deviation	3.6	2.0	1.6	n/a	○	○	○
Semi Deviation	3.7	2.3	1.4	n/a	○	○	○
Max Drawdown	9.0	7.6	1.4	n/a	○	○	○
Historical VaR	-5.4	-4.4	-1.0	n/a	○	○	○
Historical CVaR	-11.7	-7.0	-4.8	n/a	○	○	○
PORTFOLIO METRICS					Higher		
YTW	3.6	3.5	0.1	n/a	○	○	○
OAS	69	51	19	n/a	○	○	○
MDur	6.8	6.6	0.2	n/a	○	○	○
MTY	8.7	8.1	0.6	n/a	○	○	○
Rtg	AA3	AA2	n/a	n/a	○	○	○
CORRELATION & BETA					Higher		
Correl. Vol	1.0	1.0	0.0	n/a	○	○	○
Correl. UST 10Y	0.9	0.9	0.0	n/a	○	○	○
Beta Vol	1.1	1.0	0.1	n/a	○	○	○
Beta vs UST 10Y	0.5	0.5	0.0	n/a	○	○	○

As-Of Date: 2022-04-24

Source: Morgan Stanley Research

CORE+ Optimal Portfolios

CORE+ portfolios focus on the more liquid segments ('core' fixed income segments within US AGG, plus HY and EM \$ credit), and use Morgan Stanley forecasts as inputs to explore optimal asset allocation over various risk and return targets, with the aim of beating the CORE+ benchmark.

Our framework seeks optimal portfolios for various volatility levels (e.g., same as the CORE+ benchmark, 5%, etc.) and return targets (e.g., CORE+ benchmark expected returns +100bp, 6% long-run expected returns), and can accommodate conditions like weight constraints or risk budget. To keep things simple, we will focus on two CORE+ portfolios:

- **CORE+ N12M, vol target:** Portfolio targeting the same volatility as CORE+ benchmark while maximizing N12M expected returns, based on Morgan Stanley strategists' forecasts.
- **CORE+ LR, vol target:** Portfolio targeting the same volatility as CORE+ benchmark while maximizing long-run expected returns, based on the cross-asset team's long-term capital market assumptions.

While the optimal allocations across these portfolios vary, there are some common themes:

- Both CORE+ portfolios focused on N12M and longer-run expected returns have similar risk profiles as the CORE+ benchmark across duration, semi deviation, max drawdown, CVaR. etc., suggesting that on Morgan Stanley's forecasts, **fixed income investors should be neutral on risk.**
- **IG corporate is the most favored asset class** across both approaches; **Agency MBS is the least favored**; both portfolios have a **quality bias**, with IG corporate > HY corporate and/or EM sovereign debt.

CORE+ N12M vol target portfolio

Targeting same volatility as CORE+ benchmark while maximizing N12M expected returns.

Portfolio preference: IG corporates > Treasuries > EM sovereign > HY corporates > Agency MBS.

The CORE+ N12M optimal portfolio is **OW UST**, **UW MBS**, **OW IG corporates**, **UW HY corporates**, **EW EM sovereign**.

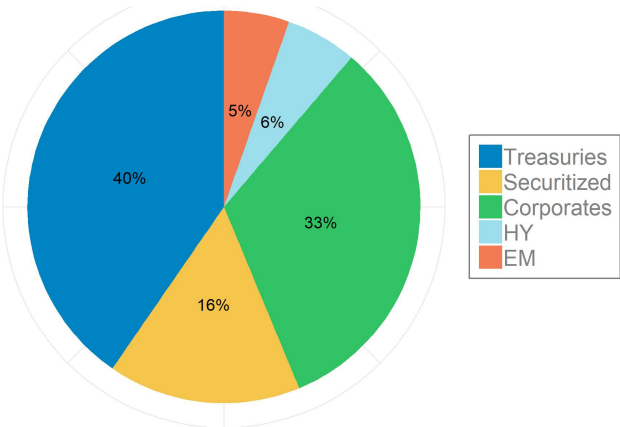
The portfolio has similar duration as the benchmark. For portfolio volatility **CORE+ N12M** prefers taking risk in long-end UST and IG 5-10Y, instead of, say, HY corporates. The risk profile of CORE+ N12M is similar to the CORE+ benchmark across most risk metrics like semi deviation, max drawdown, etc.

Exhibit 16: CORE+ N12M vol target portfolio allocation



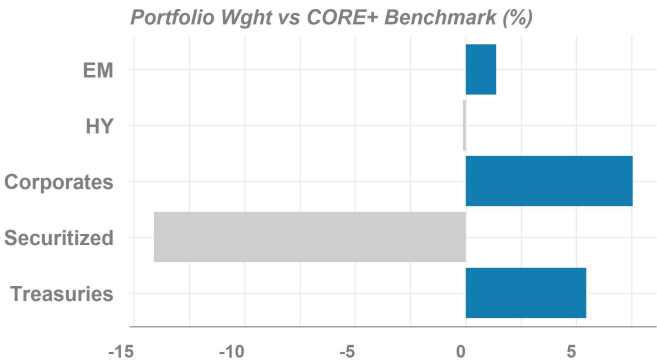
Source: Morgan Stanley Research

Exhibit 17: CORE+ N12M vol target portfolio breakdown by broad asset



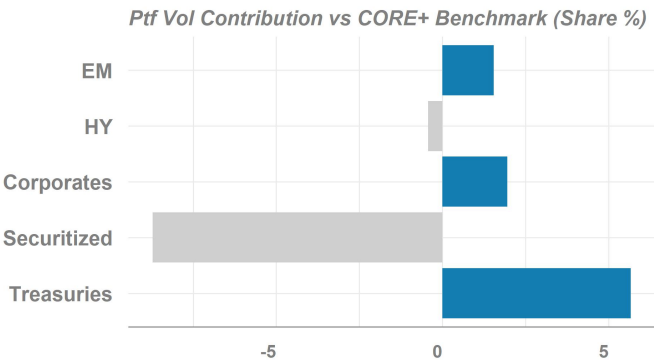
Source: Morgan Stanley Research

Exhibit 18: CORE+ N12M vol target portfolio weight versus benchmark



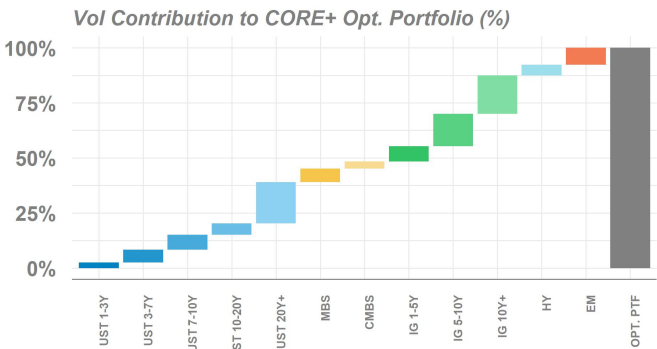
Source: Morgan Stanley Research

Exhibit 19: CORE+ N12M vol target portfolio volatility contribution versus benchmark



Source: Morgan Stanley Research

Exhibit 20: CORE+ N12M vol target portfolio volatility contribution by asset



Source: Morgan Stanley Research

Exhibit 21: Summary statistics for CORE+ N12M vol target portfolio

CORE+ N12M Portfolio

Targeting Same Volatility As CORE+ Benchmark While Maximizing Long-Run Expected Returns

	CORE+ Wght	CORE+Bench. Wght	CORE+ Tilt	1M Wght Chg	UW	Neu	OW
US CORE FIXED INCOME	89%	90%	-1%	n/a			
Treasuries	40%	35%	+5%	n/a			
1-3Y	15%	12%	+3%	n/a			
3-7Y	9%	13%	-4%	n/a			
7-10Y	6%	3%	+3%	n/a			
10-20Y	3%	2%	+1%	n/a			
20Y+	7%	5%	+2%	n/a			
Securitized	16%	30%	-14%	n/a			
MBS	12%	28%	-16%	n/a			
CMBS	4%	2%	+2%	n/a			
Corporate	33%	25%	+8%	n/a			
1-5Y	14%	9%	+5%	n/a			
5-10Y	11%	7%	+4%	n/a			
10Y+	8%	9%	-1%	n/a			
OTHER FIXED INCOME	11%	10%	+1%	n/a			
HY Corporate	6%	6%	-0%	n/a			
EM Sovereign	5%	4%	+1%	n/a			
					vs CORE+ Bench		
RISK REWARD	CORE+	CORE+ Bench	Diff	1M Chg	Higher		
N12M Exp Rtn (%)	5.9	5.4	0.4	n/a			
LR Exp Rtn (%)	4.2	4.2	0.0	n/a			
Risk-free Rtn (%)	4.2	4.2	0.0	n/a			
XS Rtn (bp)	173	128	45	n/a			
10Y Vol (%)	3.7	3.7	0.0	n/a			
Exp Sharpe	1.6	1.5	0.1	n/a			
Historical Sharpe	0.7	0.7	0.0	n/a			
Exp Sortino	2.2	2.0	0.2	n/a			
Historical Sortino	1.0	1.0	0.0	n/a			
RISK PROFILE	Riskier						
Downside Deviation	2.3	2.3	-0.1	n/a			
Semi Deviation	2.6	2.7	-0.1	n/a			
Max Drawdown	7.4	7.6	-0.2	n/a			
Historical VaR	-5.1	-5.4	0.3	n/a			
Historical CVaR	-7.9	-8.1	0.2	n/a			
PORTFOLIO METRICS	Higher						
YTW	3.9	3.8	0.0	n/a			
OAS	92	86	7	n/a			
MDur	6.7	6.5	0.2	n/a			
MTY	8.3	8.3	0.0	n/a			
Rtg	A1	AA3	n/a	n/a			
CORRELATION & BETA	Higher						
Correl. Vol	1.0	1.0	0.0	n/a			
Correl. UST 10Y	0.8	0.8	0.0	n/a			
Beta Vol	1.0	1.0	0.0	n/a			
Beta vs UST 10Y	0.5	0.5	0.0	n/a			

As-Of Date: 2022-04-24

Source: Morgan Stanley Research

CORE+ LR vol target portfolio

Targeting same volatility as CORE+ benchmark while maximizing long-run expected returns.

Portfolio preference: IG corporates, MBS > HY corporates, EM Sovereign > MBS > Treasuries.

The CORE+ LR optimal portfolio is **EW Treasuries, UW MBS, OW IG corporates, OW HY corporates, OW EM sovereign.**

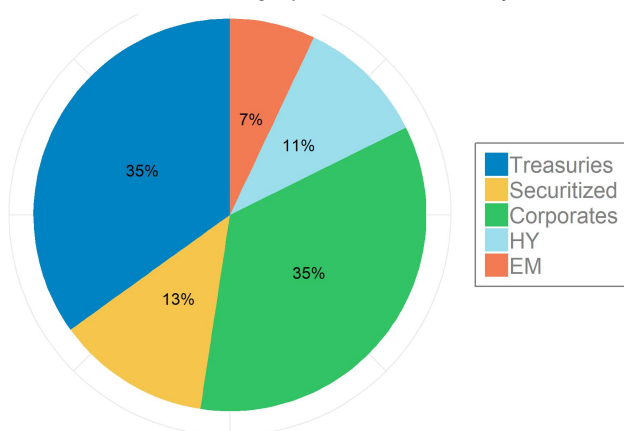
The portfolio has similar duration as the benchmark, mostly with duration contribution from being OW in IG corporate 5-10Y+ offsetting a small UW in UST 10-20Y+. The same is true for portfolio volatility – **CORE+ LR prefers taking risk in IG corporates** instead of UST or HY and EM sovereign debt. The risk profile of CORE+ LR is similar to the CORE+ benchmark across most risk metrics like semi deviation, max drawdown, etc.

Exhibit 22: CORE+ LR vol target portfolio allocation



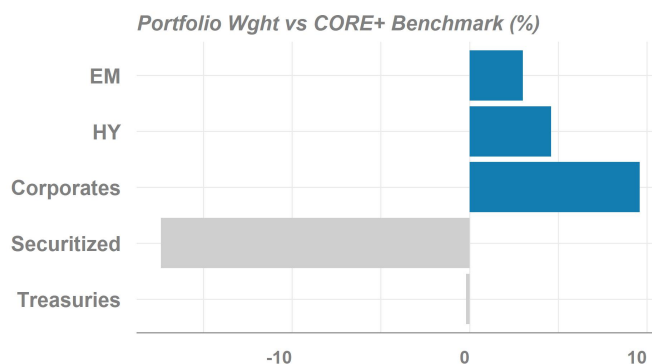
Source: Morgan Stanley Research

Exhibit 23: CORE+ LR vol target portfolio breakdown by broad asset



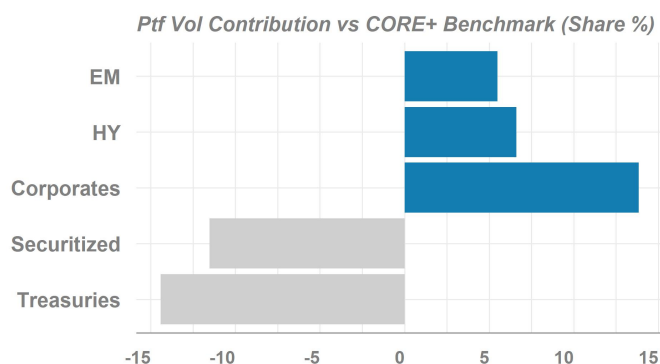
Source: Morgan Stanley Research

Exhibit 24: CORE+ LR vol target portfolio weight versus benchmark



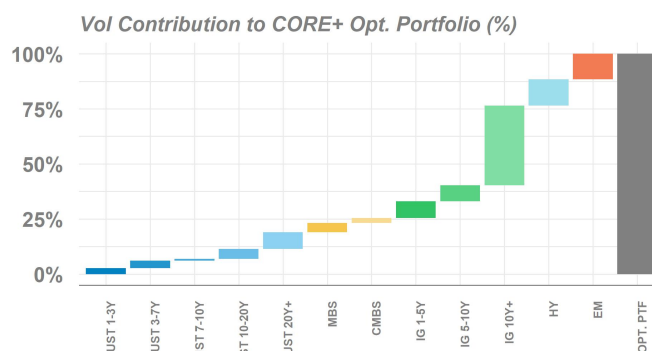
Source: Morgan Stanley Research

Exhibit 25: CORE+ LR vol target portfolio volatility contribution versus benchmark



Source: Morgan Stanley Research

Exhibit 26: CORE+ LR vol target portfolio volatility contribution by asset



Source: Morgan Stanley Research

Exhibit 27: Summary statistics for CORE+ LR vol target portfolio

CORE+ LR Portfolio

Targeting Same Volatility As CORE+ Benchmark While Maximizing Long-Run Expected Returns

	CORE+ Wght	CORE+Bench. Wght	CORE+ Tilt	1M Wght Chg	UW	Neu	OW
US CORE FIXED INCOME	82%	90%	-8%	n/a	●	○	○
Treasuries	35%	35%	-0%	n/a	○	○	○
1-3Y	20%	12%	+8%	n/a	○	○	○
3-7Y	7%	13%	-6%	n/a	○	○	○
7-10Y	1%	3%	-2%	n/a	○	○	○
10-20Y	3%	2%	+1%	n/a	○	○	○
20Y+	4%	5%	-1%	n/a	○	○	○
Securitized	13%	30%	-17%	n/a	○	○	○
MBS	10%	28%	-18%	n/a	○	○	○
CMBS	3%	2%	+1%	n/a	○	○	○
Corporate	35%	25%	+10%	n/a	○	○	○
1-5Y	14%	9%	+5%	n/a	○	○	○
5-10Y	5%	7%	-2%	n/a	○	○	○
10Y+	15%	9%	+6%	n/a	○	○	○
OTHER FIXED INCOME	18%	10%	+8%	n/a	○	○	○
HY Corporate	11%	6%	+5%	n/a	○	○	○
EM Sovereign	7%	4%	+3%	n/a	○	○	○
					vs CORE+ Bench		
RISK REWARD	CORE+	CORE+ Bench	Diff	1M Chg	Higher		
N12M Exp Rtn (%)	5.8	4.2	1.6	n/a	○	○	○
LR Exp Rtn (%)	4.3	4.2	0.1	n/a	○	○	○
Risk-free Rtn (%)	4.2	4.2	0.0	n/a	○	○	○
XS Rtn (bp)	163	1	162	n/a	○	○	○
10Y Vol (%)	3.7	3.7	0.0	n/a	○	○	○
Exp Sharpe	1.6	1.1	0.4	n/a	○	○	○
Historical Sharpe	0.7	0.7	0.0	n/a	○	○	○
Exp Sortino	2.2	1.5	0.7	n/a	○	○	○
Historical Sortino	1.0	1.0	0.0	n/a	○	○	○
RISK PROFILE	Riskier						
Downside Deviation	2.3	2.3	-0.1	n/a	○	○	○
Semi Deviation	2.6	2.7	-0.1	n/a	○	○	○
Max Drawdown	7.4	7.6	-0.2	n/a	○	○	○
Historical VaR	-5.1	-5.4	0.3	n/a	○	○	○
Historical CVaR	-7.9	-8.1	0.2	n/a	○	○	○
PORTFOLIO METRICS	Higher						
YTW	4.1	3.8	0.3	n/a	○	○	○
OAS	119	86	33	n/a	○	○	○
MDur	6.4	6.5	-0.1	n/a	○	○	○
MTY	8.5	8.3	0.2	n/a	○	○	○
Rtg	A2	AA3	n/a	n/a	○	○	○
CORRELATION & BETA	Higher						
Correl. Vol	1.0	1.0	0.0	n/a	○	○	○
Correl. UST 10Y	0.8	0.8	0.0	n/a	○	○	○
Beta Vol	1.0	1.0	0.0	n/a	○	○	○
Beta vs UST 10Y	0.5	0.5	0.0	n/a	○	○	○

As-Of Date: 2022-04-24

Source: Morgan Stanley Research

Appendix I: The Framework

The building blocks

N12M expected returns

For next 12 month returns, we look to our Morgan Stanley strategists' forecasts. These forecasts are usually updated at least twice a year in our macro strategy outlooks around May and November, but also refreshed in between when market conditions change, as they have been over the last few months.

For Treasuries, total returns forecasts for 2Y, 5Y, 10Y and 30Y incorporate our strategists' expectations of yield changes, as well as roll-down, based on our macro strategy team's yield targets across the curve. Because we are estimating returns assuming an investor holds the bond for one year, price appreciation for, say, a 10Y bond is calculated based on that bond's yield today, and the yield and duration of a 9Y bond in one year's time. Forecasts for Treasury US AGG sub-indices (e.g., 1-3Y, 3-5Y buckets) are then estimated on a duration-matched basis.

For credit, we estimate excess returns by summing the carry (i.e., the current spread) and the price appreciation (i.e., the change from the current to target spread multiplied by the index spread duration), subtracting an expected loss where relevant, based on our credit strategists' assumptions about the recovery rate and probability of default of the index constituents.

Long-term capital market assumptions

Our long-run expected returns for fixed income assets are based on the 'rolling yield' framework introduced by Martin Leibowitz (see [Portfolio Strategy: Rolling Yields and Return Convergence](#), March 4, 2014).

For government bonds, this simply means long-run return is roughly equal to the asset's starting yield, adjusted for average roll-down.

For bonds which incorporate credit risk – e.g., IG corporates, HY corporates, EM sovereign – we extend the framework to account for defaults that may be encountered over time, such that long-run returns roughly equal to the asset's starting yield, adjusted for average roll-down and average credit loss. For more details on our methodology, see [Cross-Asset Dispatches: What Will Markets Return? - 2021 Edition](#), October 25, 2021).

[Exhibit 28](#) shows the N12M and long-run expected returns we use in our CORE+ optimal portfolios.

Exhibit 28: Morgan Stanley's US fixed income yield and spread forecasts

Assets	As of 21 Apr, 2022	N12M XS Rtn (%)	N12M Total Rtn (%)	LR Exp Rtn (%)	T10Y Vol (%)
CORE FIXED INCOME					
Government Bonds (Yld)					
UST 2Y	2.6	n/a	1.8	2.85	1.1
UST 5Y	2.9	n/a	3.0	3.59	3.2
UST 10Y	2.8	n/a	4.6	3.55	6.1
UST 30Y	2.9	n/a	8.8	3.55	13.3
Securitized (Sprd)					
MBS	43	1.23	4.7	4.26	2.3
CMBS	82	0.35	3.5	4.35	3.3
IG Corporate (Sprd)					
IG Corp 1-3Y	67	0.72	2.5	3.53	1.6
IG Corp 3-5Y	94	1.45	4.0	4.29	3.2
IG Corp 5-7Y	117	2.45	5.7	4.68	4.4
IG Corp 7-10Y	140	3.52	7.5	4.83	5.7
IG Corp 10-25Y	165	3.97	9.7	5.14	8.4
IG Corp 25Y+	161	3.81	11.1	5.03	10.3
OTHER FIXED INCOME (Sprd)					
HY Corporate	347	2.47	5.3	4.96	6.6
EM Sovereign	396	5.92	8.7	7.07	8.0

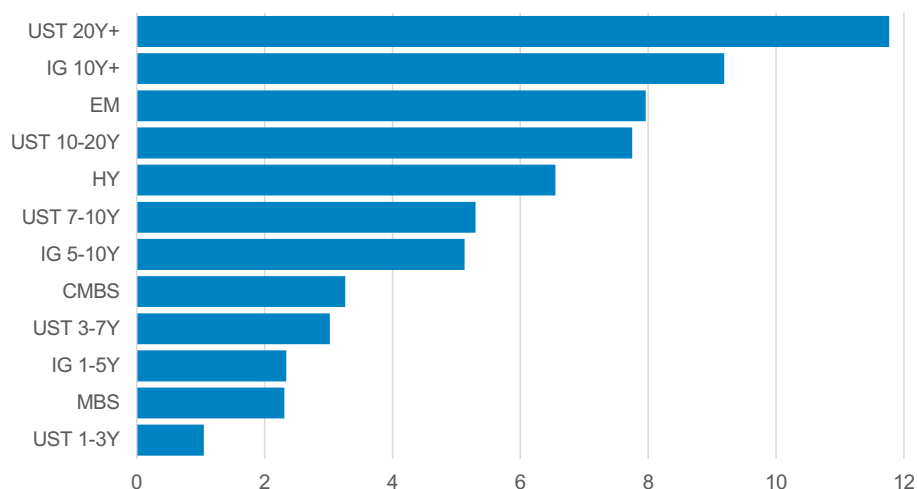
Source: Bloomberg, Morgan Stanley Research forecasts

Volatility

Returns make up the 'reward' part of risk/reward, while **volatility represents the 'risk' part in our framework**, and we estimate it by calculating the standard deviation of trailing 10-year monthly returns, annualized ([Exhibit 29](#)).

Exhibit 29: Volatility across fixed income assets

Annualized Volatility (%)



Source: Bloomberg, Morgan Stanley Research; Note: Based on trailing 10-year monthly data.

There are also other popular measures of risk that are considered when constructing portfolios like CVaR, VaR, downside deviation, duration, beta, etc. – see [Exhibit 30](#) for some of these – but the CORE+ framework for now will focus on volatility, with our optimization process solving for the asset allocation which would give the highest return, given a volatility target.

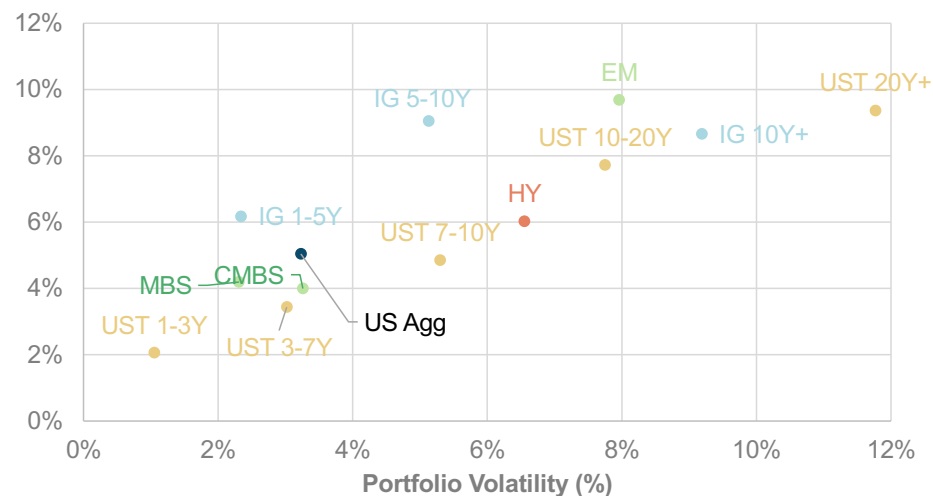
Exhibit 30: Risk metrics for US CORE fixed income assets

Assets	As of 23 Apr, 2022	N12M XS Rtn (%)	N12M Total Rtn (%)	LR Exp Rtn (%)	T10Y Vol (%)
CORE FIXED INCOME					
Government Bonds (Yld)					
UST 2Y	2.7	n/a	2.0	3.0	1.1
UST 5Y	2.9	n/a	3.4	3.7	3.2
UST 10Y	2.9	n/a	5.2	3.6	6.1
UST 30Y	2.9	n/a	10.3	3.6	13.3
Securitized (Sprd)					
MBS	48	0.29	4.2	4.0	2.3
CMBS	84	0.47	4.0	4.1	3.3
IG Corporate (Sprd)					
IG Corp 1-3Y	72	0.86	2.9	3.7	1.6
IG Corp 3-5Y	100	1.70	4.6	4.4	3.2
IG Corp 5-7Y	125	2.90	6.5	4.8	4.4
IG Corp 7-10Y	148	4.14	8.6	5.0	5.7
IG Corp 10-25Y	172	4.88	11.4	5.3	8.4
IG Corp 25Y+	167	4.90	13.3	5.2	10.3
OTHER FIXED INCOME (Sprd)					
HY Corporate	355	2.86	6.0	5.1	6.6
EM Sovereign	402	6.52	9.7	7.2	8.0

Source: Bloomberg, Morgan Stanley Research; Note: Historical figures are from trailing 10-year monthly returns. 'Max DD' shows max monthly drawdown, while all other metrics are annualized.

Exhibit 31: USD fixed income risk/reward based on Morgan Stanley N12M forecasts

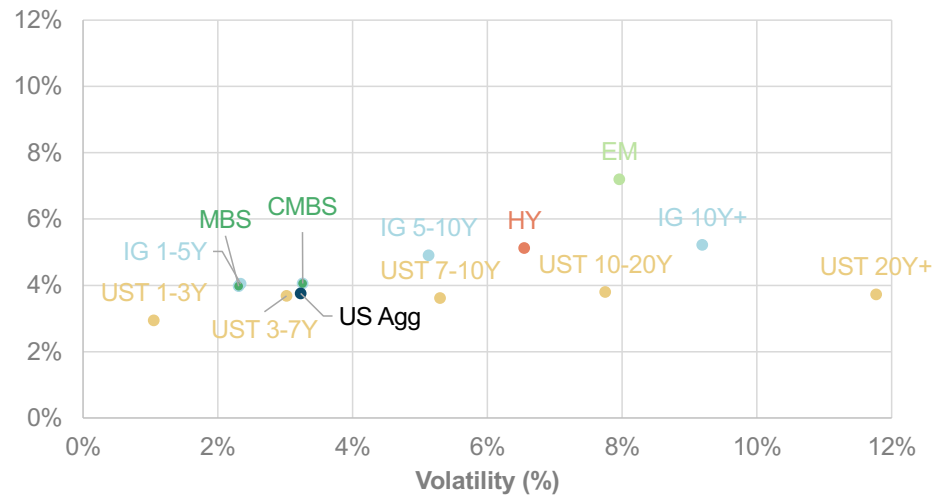
N12M Expected Return (%)



Source: Bloomberg, Morgan Stanley Research; Note: Volatility is trailing 10-year volatility.

Exhibit 32: USD fixed income risk/reward based on Morgan Stanley long-term capital markets assumptions

Long-Run Expected Return (%)



Source: Bloomberg, Morgan Stanley Research; Note: Volatility is trailing 10-year volatility.

Covariance and correlations

Covariance and its standardized cousin, correlation, tell us how two assets move versus each other, and is another key piece we consider in building our portfolios; our optimization framework uses a covariance matrix calculated based on trailing 10-year monthly returns. [Exhibit 33](#) and [Exhibit 34](#) show what these look like for our universe of fixed income assets.

Exhibit 33: Covariance matrix

	Treasuries	UST 1-3Y	UST 3-7Y	UST 7-10Y	UST 10-20Y	UST 20Y+	Securitized	MBS	CMBS	Corporate	IG Corp 1-5Y	IG Corp 5-10Y	IG Corp 10Y+	HY Corporate	EM Sovereign
Treasuries	0.1	0.0	0.1	0.2	0.3	0.4	0.1	0.1	0.1	0.1	0.0	0.1	0.2	-0.0	0.0
UST 1-3Y	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.0	0.0
UST 3-7Y	0.1	0.0	0.1	0.2	0.2	0.3	0.1	0.1	0.1	0.1	0.0	0.1	0.1	-0.0	0.0
UST 7-10Y	0.2	0.0	0.2	0.3	0.4	0.6	0.1	0.1	0.1	0.2	0.1	0.2	0.3	-0.0	0.1
UST 10-20Y	0.3	0.1	0.2	0.4	0.6	0.9	0.1	0.1	0.2	0.2	0.1	0.2	0.5	-0.0	0.1
UST 20Y+	0.4	0.1	0.3	0.6	0.9	1.4	0.2	0.2	0.2	0.4	0.1	0.3	0.7	-0.1	0.1
Securitized	0.1	0.0	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.0	0.1
MBS	0.1	0.0	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.0	0.1
CMBS	0.1	0.0	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.2
Corporate	0.1	0.0	0.1	0.2	0.2	0.4	0.1	0.1	0.1	0.3	0.1	0.3	0.5	0.2	0.3
IG Corp 1-5Y	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.1	0.1
IG Corp 5-10Y	0.1	0.0	0.1	0.2	0.2	0.3	0.1	0.1	0.1	0.3	0.1	0.3	0.4	0.2	0.3
IG Corp 10Y+	0.2	0.0	0.1	0.3	0.5	0.7	0.1	0.1	0.2	0.5	0.2	0.4	0.8	0.4	0.5
HY Corporate	-0.0	-0.0	-0.0	-0.0	-0.0	-0.1	0.0	0.0	0.1	0.2	0.1	0.2	0.4	0.4	0.4
EM Sovereign	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.1	0.3	0.5	0.4	0.6

Source: Bloomberg, Morgan Stanley Research; Note: Based on last 10-year monthly data.

Exhibit 34: Correlation matrix

	Treasuries	UST 1-3Y	UST 3-7Y	UST 7-10Y	UST 10-20Y	UST 20Y+	Securitized	MBS	CMBS	Corporate	IG Corp 1-5Y	IG Corp 5-10Y	IG Corp 10Y+	HY Corporate	EM Sovereign
Treasuries	1.0	0.8	1.0	1.0	1.0	0.9	0.8	0.8	0.7	0.6	0.4	0.5	0.6	-0.1	0.2
UST 1-3Y	0.8	1.0	0.9	0.8	0.7	0.6	0.8	0.8	0.6	0.3	0.3	0.3	0.3	-0.2	0.1
UST 3-7Y	1.0	0.9	1.0	1.0	0.9	0.8	0.9	0.9	0.7	0.5	0.4	0.5	0.5	-0.1	0.2
UST 7-10Y	1.0	0.8	1.0	1.0	1.0	0.9	0.9	0.9	0.7	0.6	0.4	0.6	0.6	-0.1	0.2
UST 10-20Y	1.0	0.7	0.9	1.0	1.0	1.0	0.8	0.8	0.7	0.6	0.4	0.6	0.6	-0.1	0.2
UST 20Y+	0.9	0.6	0.8	0.9	1.0	1.0	0.8	0.8	0.6	0.6	0.3	0.5	0.7	-0.1	0.2
Securitized	0.8	0.8	0.9	0.9	0.8	0.8	1.0	1.0	0.8	0.6	0.6	0.7	0.6	0.1	0.4
MBS	0.8	0.8	0.9	0.9	0.8	0.8	1.0	1.0	0.7	0.6	0.5	0.6	0.6	0.1	0.3
CMBS	0.7	0.6	0.7	0.7	0.7	0.6	0.8	0.7	1.0	0.8	0.8	0.9	0.8	0.4	0.6
Corporate	0.6	0.3	0.5	0.6	0.6	0.6	0.6	0.6	0.8	1.0	0.9	1.0	1.0	0.7	0.8
IG Corp 1-5Y	0.4	0.3	0.4	0.4	0.4	0.3	0.6	0.5	0.8	0.9	1.0	0.9	0.8	0.7	0.8
IG Corp 5-10Y	0.5	0.3	0.5	0.6	0.6	0.5	0.7	0.6	0.9	1.0	0.9	1.0	0.9	0.7	0.8
IG Corp 10Y+	0.6	0.3	0.5	0.6	0.6	0.7	0.6	0.6	0.8	1.0	0.8	0.9	1.0	0.6	0.7
HY Corporate	-0.1	-0.2	-0.1	-0.1	-0.1	-0.1	0.1	0.1	0.4	0.7	0.7	0.7	0.6	1.0	0.8
EM Sovereign	0.2	0.1	0.2	0.2	0.2	0.2	0.4	0.3	0.6	0.8	0.8	0.8	0.7	0.8	1.0

Source: Bloomberg, Morgan Stanley Research; Note: Based on last 10-year monthly data.

The benchmarks

The benchmarks we use for this exercise are based on assets' relative market value:

Exhibit 35 shows the AGG+ benchmark, which includes core segments making up 95% of US AGG, and the CORE+ benchmark, which includes all the core fixed income assets, HY corporate and EM sovereign debt. Given that US AGG and AGG+ overlap significantly in terms of assets and risk profile, we use 'US AGG' and 'the AGG+ benchmark' interchangeably through this report.

Exhibit 35: AGG+ and CORE+ benchmark weights

	MV (US\$ bn)	Share Within US AGG	Market Share	Our Benchmarks	
				AGG+	CORE+
US CORE	23,415	94%	91%	100%	90%
Treasuries	9,860	40%	38%	42%	35%
1-3Y	3,324	13%	13%	14%	12%
3-7Y	3,664	15%	14%	16%	13%
7-10Y	922	4%	4%	4%	3%
10-20Y	602	2%	2%	3%	2%
20Y+	1,348	5%	5%	6%	5%
Securitized	7,384	30%	29%	32%	30%
MBS	6,889	28%	27%	29%	28%
CMBS	495	2%	2%	2%	2%
IG Corporate	6,171	25%	24%	26%	25%
1-5Y	2,208	9%	9%	9%	9%
5-10Y	1,732	7%	7%	7%	7%
10Y+	2,230	9%	9%	10%	9%
OTHER	2,351	0%	9%	0%	10%
HY Corporate	1,447	0%	6%	0%	6%
EM Sovereign	904	0%	4%	0%	4%

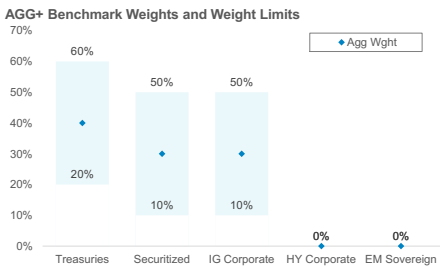
Source: Bloomberg, Morgan Stanley Research

For the optimization process, we set weight constraints around these benchmarks, given that the various segments of the fixed income market vary in terms of liquidity:

The upper weight limit is set at the lower of: i) Benchmark weight x 2; and ii) Benchmark weight + 20%; the lower weight limit is the higher of: i) 0%; and ii) Benchmark weight - 20%. For example, HY credit has a weight of 6% within the CORE+ benchmark. The upper weight limit would be the lower of 6% x 2 and 6% + 20%, i.e., 12%. The lower

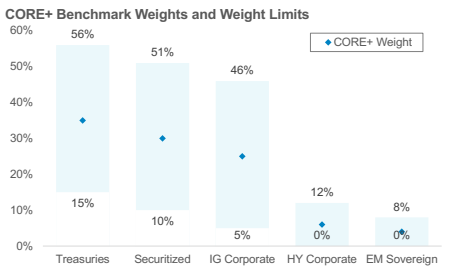
weight limit would be the higher of 0% or 6% - 20%, i.e., 0%. [Exhibit 36](#) and [Exhibit 37](#) show the weight limits around each of the broad assets in the AGG+ and CORE+ portfolios.

Exhibit 36: Weight constraints for broad fixed income asset classes within the AGG+ benchmark



Source: Morgan Stanley Research

Exhibit 37: Weight constraints for broad fixed income asset classes within the CORE+ benchmark



Source: Morgan Stanley Research

For thoroughness' sake, we run the CORE+ model on a constrained and unconstrained basis. Apart from portfolio weight constraints, our models also have the flexibility to allow for risk budgeting – i.e., limiting volatility exposure of specific assets, but for now, we focus only on weight-constrained portfolios.

Appendix II: Summary Statistics

Exhibit 38: Income assets summary statistics

	10Y Vol	Down.Dev.	Semi Dev.	Max DD	VaR	CVaR
US CORE FIXED INCOME						
Treasuries	3.7	2.2	2.5	9.4	-5.3	-7.3
1-3Y	1.1	0.6	0.7	3.2	-0.9	-2.1
3-7Y	3.0	1.9	2.1	7.6	-4.2	-6.1
7-10Y	5.3	3.3	3.7	11.2	-8.1	-10.7
10-20Y	7.8	4.9	5.3	18.9	-11.0	-15.9
20Y+	11.8	7.1	7.8	20.9	-15.6	-21.1
Securitized	2.3	1.5	1.7	6.1	-3.4	-5.4
MBS	2.3	1.5	1.7	6.0	-3.3	-5.5
CMBS	3.3	2.0	2.4	7.1	-4.1	-7.0
Corporate	5.3	3.5	3.9	8.7	-7.0	-12.0
1-5Y	2.3	1.5	1.8	4.6	-1.8	-5.5
5-10Y	5.1	3.5	3.9	8.6	-6.2	-12.5
10Y+	9.2	5.9	6.7	12.4	-12.6	-19.4
OTHER FIXED INCOME						
HY Corporate	6.6	4.5	5.1	12.7	-7.4	-14.0
EM Sovereign	8.0	5.8	6.3	13.6	-9.4	-19.6

Source: Bloomberg, Morgan Stanley Research; Note: Historical figures are from trailing 10-year monthly returns. 'Max DD' shows max monthly drawdown, while all other metrics are annualized.

Exhibit 39: Income assets risk/reward

	N12M Expected					Long-Run Expected					Historical				
	N12M ER	Sharpe	Sortino	Treynor	IR	L/R ER	Sharpe	Sortino	Treynor	IR	12M Rtn	Sharpe	Sortino	Treynor	IR
US CORE FIXED INCOME															
Treasuries	4.2	1.1	1.7	0.1	6.1	3.6	1.0	1.4	0.0	5.3	1.7	0.4	0.7	0.0	2.5
1-3Y	2.1	2.0	3.0	0.1	2.3	2.9	2.8	4.2	0.2	3.2	0.8	0.8	1.2	0.0	0.9
3-7Y	3.4	1.1	1.7	0.1	5.0	3.7	1.2	1.8	0.1	5.3	1.5	0.5	0.7	0.0	2.1
7-10Y	4.9	0.9	1.3	0.0	5.3	3.6	0.7	1.0	0.0	3.9	2.2	0.4	0.6	0.0	2.4
10-20Y	7.7	1.0	1.4	0.0	5.1	3.8	0.5	0.7	0.0	2.5	2.7	0.3	0.5	0.0	1.8
20Y+	9.4	0.8	1.2	0.0	3.5	3.7	0.3	0.5	0.0	1.4	4.1	0.4	0.5	0.0	1.6
Securitized	4.2	1.8	2.4	0.1	6.9	4.4	1.9	2.5	0.1	7.2	1.8	0.8	1.0	0.0	2.9
MBS	4.2	1.8	2.4	0.1	6.5	4.0	1.7	2.3	0.1	6.1	1.7	0.7	1.0	0.0	2.6
CMBS	4.0	1.2	1.7	0.0	8.7	4.1	1.2	1.7	0.1	8.8	2.7	0.8	1.1	0.0	6.0
Corporate	6.1	1.1	1.5	0.0	9.0	4.7	0.9	1.2	0.0	7.1	3.7	0.7	0.9	0.0	5.4
1-5Y	6.2	2.6	3.5	0.1	9.4	4.0	1.7	2.3	0.1	6.1	2.3	1.0	1.3	0.0	3.4
5-10Y	9.1	1.8	2.3	0.1	13.3	4.9	1.0	1.3	0.0	7.2	3.8	0.7	1.0	0.0	5.6
10Y+	8.7	0.9	1.3	0.0	5.0	5.2	0.6	0.8	0.0	3.0	5.2	0.6	0.8	0.0	3.0
OTHER FIXED INCOME															
HY Corporate	6.0	0.9	1.2	0.1	3.6	5.1	0.8	1.0	0.1	3.1	5.8	0.9	1.1	0.1	3.4
EM Sovereign	9.7	1.2	1.5	0.1	5.4	7.2	0.9	1.1	0.1	4.0	3.6	0.4	0.6	0.0	2.0

Source: Morgan Stanley Research forecasts; Note: Historical figures are from trailing 10-year monthly returns.

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	COUNT	% OF TOTAL	COUNT	% OF TOTAL IBC	% OF RATING CATEGORY	COUNT	% OF TOTAL OTHER MSC
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Equal-weight/Hold	1539	44%	365	45%	24%	712	46%
Not-Rated/Hold	0	0%	0	0%	0%	0	0%
Underweight/Sell	552	16%	87	11%	16%	207	13%
TOTAL	3,529		818			1549	

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