Alpha Research & Management

Are "Active" Fixed Income Funds Active?

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"Active management in Fixed Income is almost impossible."

I've been saying this for many years, since I did my studies of the Fixed Income Market Structure between 2014 and 2018 (papers linked below). **Fixed Income is inherently illiquid in secondary markets, due to a flawed market structure, and portfolios cannot be easily rebalanced. Fixed Income portfolios remain mostly static, in spite of the best intentions of Fixed Income managers.**

This flawed market structure prevents Fixed Income portfolio managers from easily responding to market and regime changes, and returns for most funds are not significantly different from market indices.

This paper updates and shares the analysis I did in 2016, lays out a framework for identification of Active Fixed Income funds, and demonstrates that the majority of the Fixed Income funds are not active, in spite of how the funds are marketed, and what the fund managers and CIOs believe.

(There may be exceptions in their non-fund separate accounts space, but given that most managers are fiduciaries and have to be fair to all clients, I think that their mutual funds are a good proxy for all their other Fixed Income assets under management. It is also possible that other investors that are not managing for outside clients might have succeeded in being active – we have no way to verify this).

What makes a Fixed Income Fund "Active"

I asked ChatGPT some questions, and the answers (bold emphasis is mine) matched my understanding.

"Active fixed income funds have fund managers who actively make decisions to buy and sell securities in an attempt to outperform the market. Passive fixed income funds, on the other hand, aim to replicate the performance of a specific bond index."

"Making fixed income funds active typically involves the fund manager actively managing the portfolio to generate returns that outperform the benchmark. Common active strategies in fixed income funds include:

- ***Security Selection:*** *Actively choosing individual bonds or other fixed-income securities based on the manager's analysis of credit risk, interest rates, and economic conditions.*

- ***Duration Management****: Adjusting the fund's average duration, or interest rate sensitivity, based on expectations for interest rate movements. This can help capitalize on changing interest rate environments.*

- ***Credit Analysis****: Assessing and actively managing credit risk by selecting bonds from issuers with strong creditworthiness or improving credit conditions.*

- ***Sector Rotation:*** *Shifting allocations among different sectors of the fixed income market (e.g., government bonds, corporate bonds, mortgage-backed securities) based on market conditions and economic outlook.*

- ***Yield Curve Strategies:*** *Adjusting the portfolio's exposure along the yield curve to capitalize on anticipated changes in interest rates at different maturities.*

- ***Global Diversification:*** *Actively managing exposure to bonds in different regions and currencies to take advantage of global economic trends.*

These strategies require active monitoring, analysis, and decision-making by the fund manager to navigate market conditions and generate returns beyond what might be achieved through passive management."

<u>Statistical Characteristics for Identification of Active Funds</u>

- A successful actively managed fund would have **low correlation** to their benchmark index
- The **Beta to the benchmark index of an Active manager should also demonstrate volatility and vary though time** as market regimes change and the manager responds though sector rotation or changing portfolio duration

- If the fund manager succeeds in finding Alpha (the intercept of a regression of total returns), **then the Beta to the benchmark index could be lower**
- **A higher or lower Beta could also indicate duration differences** compared to the benchmark, if the correlation is high, and can be used to estimate the implied duration of a fund
- **A lowered Beta in a period would suggest a duration change and active management**

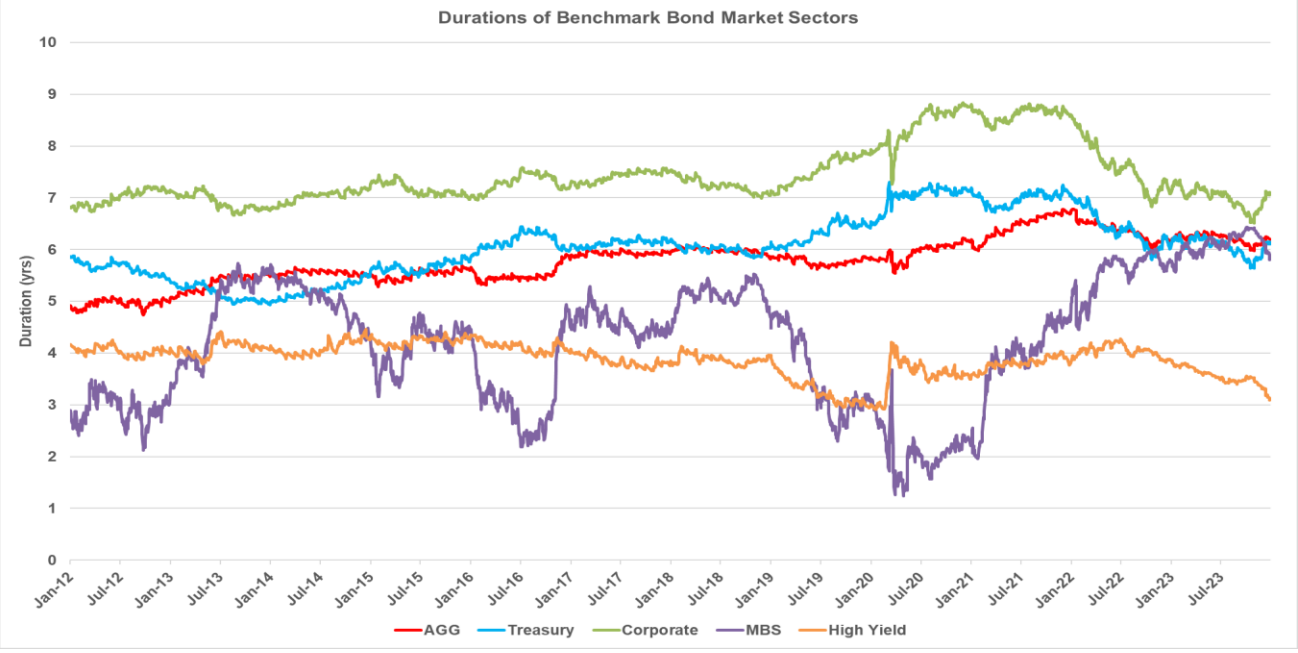
- **<u>Conversely, high correlations and stable Betas would imply that the fund is not truly 'Active'</u>**

The Case for Active Management in Fixed Income

The chart below highlights duration volatility in Fixed Income sectors.

This creates opportunities for Active Management through duration management and sector rotation in response to rate, credit, yield curve and QE regime changes.

As a result, we should expect to see many Active funds that are not "index huggers". We will put this notion to rigorous test in the next section.



Methodology to assess the Activeness of Fixed Income Funds

I identified the universe of US Fixed Income funds flagged as ***'Active'*** on Bloomberg, both open end Mutual Funds as well as ETFs, and computed their monthly total returns. Significant screening was done to match funds to indices to analyze their relative performance in order to determine Activeness.

I compared the Total Returns of 319 selected funds to those of the appropriate benchmark indices (the process of doing so is described in the Appendix), and a number of statistics were computed.

It should be noted that additional research was needed to match these funds against the appropriate benchmark (passive indices). Data needed to be cleaned up due to discrepancies between funds' stated benchmark versus their fund descriptions and actual holdings, with many funds being assigned different benchmark indices based on their Correlations and Betas to that index.

Benchmark Indices

The universe of active funds initially selected for analysis referenced over 100 indices as their benchmarks, making their performance relative to standard benchmarks hard to judge. Since the predominant Fixed Income Index is the Bloomberg AGG (formerly the Lehman AGG), with additional analysis, we reduced the number of core benchmark indices to 7, by removing other indices which showed high correlations to these indices. The core indices in our study are summarized in the tables below.

The correlation and beta (regression slope) of each benchmark's returns against the AGG benchmark for different time periods are also included. These metrics will be key in our analysis.

These indices cover a significant proportion of the US Fixed Income market, with the AGG alone representing $26+T.

Benchmark Indices vs AGG			Correlation to AGG			Beta to AGG		
Benchmark Strategy	Bloomberg Ticker	Index Duration Dec-2023	Jan-17 to Dec-23	Jan-17 to Feb-20	Apr-20 to Dec-23	Jan-17 to Dec-23	Jan-17 to Feb-20	Apr-20 to Dec-23
U.S. Aggregate (AGG)	LBUSTRUU	6.3	1.00	1.00	1.00	1.00	1.00	1.00
1-3 Yr Govt/IG	LGC3TRUU	1.9	0.86	0.90	0.86	0.26	0.29	0.26
Intermediate	LF97TRUU	3.9	0.97	0.98	0.97	0.64	0.70	0.63
U.S. MBS	LUMSTRUU	5.7	0.94	0.90	0.96	0.94	0.64	1.00
U.S. Credit (IG)	LUCRTRUU	7.1	0.92	0.92	0.97	1.25	1.09	1.27
Long US Govt/IG Credit	LGC5TRUU	14.5	0.97	0.97	0.97	2.22	2.56	2.15
U.S. Corporate High Yield	LF98TRUU	3.8	0.54	-0.06	0.76	0.83	-0.08	0.99

	Sector Indices		Active FI Funds		
Benchmark Strategy	Assets $T	# Holdings	#Funds Mapped	Mkt Value ($BB)	% of Sector
U.S. Aggregate (AGG)	$ 26.67	13334	**126**	**$ 951.4**	**3.6%**
1-3 Yr Govt/IG	$ 5.54	1986	**67**	**$ 265.9**	**4.8%**
Intermediate	$ 1.26	1919	**27**	**$ 59.4**	**4.7%**
U.S. MBS	$ 14.18	5886	**19**	**$ 92.2**	**0.6%**
U.S. Credit (IG)	$ 7.10	938	**15**	**$ 61.5**	**0.9%**
Long US Govt/IG Credit	$ 7.65	8590	**9**	**$ 30.0**	**0.4%**
U.S. Corporate High Yield	$ 4.82	3385	**51**	**$ 181.7**	**3.8%**
			314	**$1,641.9**	

Only the High Yield index has low and volatile correlations to the AGG in different periods – the remaining indices are highly correlated to interest rates and the AGG, with the primary differences being duration differences in different periods, with the duration ratio estimated by Beta.

The sectors with volatile durations (Beta) relative to the AGG are MBS and HY.

HY and MBS are the 2 sectors in which Active Management can be most easily achieved via over- and under-weighting (and through rebalancing). Indeed, over the years, CIOs and Portfolio Strategists of Active Managers have pointed out that they like to overweight MBS and Credit Risk (to generate Alpha).

Active Fund Analysis

Conclusions

2023 should have been a great year for Active funds to perform and differentiate themselves from their indices and passive benchmark ETFs, by demonstrating lower correlations and Betas versus their Benchmarks, through Active rebalancing and sector rotations. There were significant regime changes, with Powell raising rates in the early part, followed by a massive rally in the last 2 months of 2023. **Yet, correlations and Betas in 2023 were not much different than 2022, for most funds.** (As a reference, our ARAM Active AGG Plus Alpha portfolio's Beta to the AGG dropped from ~0.9 to ~0.4 between 2022 and 2023.)

Summarizing out conclusions, in aggregate, 3yr and longer duration funds, including MBS and High Yield, do not meet the criteria I posited to be considered Active.

While there are a few exceptions with low correlations (< 0.7) and volatile Betas, they are usually smaller funds, with very different portfolios than the AGG.

It is very hard to conclude that most AGG funds and other intermediate and longer Fixed Income funds in our selection can be viewed as 'Active'.

It should be noted that March 2020's deleveraging, and the QE re-leveraging, that did not re-lever all assets equally, created some volatility in the statistics. In our view the lowering of correlations and Betas relative to the respective indices from that event was exogenous and cannot be considered 'Active'. For this reason, I isolate March 2020, and 2020 as a whole.

The following analysis provides details.

Analysis of grouped Active Mutual Funds

These tables show the aggregated performance of the 314 selected funds, grouped by their appropriate benchmarks, for different time periods.

	Correlation to Benchmark (Weighted Average)									
Benchmark Index	Jan-17 to Dec-23	Jan-17 to Feb-20	Apr-20 to Dec-23	2017	2018	2019	2020	2021	2022	2023
U.S. Aggregate (AGG)	0.96	0.95	0.98	0.94	0.95	0.96	0.82	0.96	0.99	0.99
1-3 Yr Govt/IG	0.65	0.74	0.84	0.79	0.62	0.76	0.27	0.76	0.90	0.84
Intermediate	0.91	0.88	0.96	0.91	0.86	0.88	0.74	0.87	0.96	0.98
U.S. MBS	0.94	0.94	0.98	0.95	0.98	0.94	0.42	0.91	0.98	0.99
U.S. Credit (IG)	0.98	0.95	0.98	0.89	0.95	0.95	0.98	0.97	0.99	0.99
Long US Govt/IG Credit	0.97	0.97	0.99	0.94	0.96	0.98	0.90	0.99	0.99	1.00
U.S. Corporate High Yield	0.97	0.96	0.97	0.94	0.96	0.96	0.98	0.92	0.97	0.98

	Beta to Benchmark (Weighted Average)									
Benchmark Index	Jan-17 to Dec-23	Jan-17 to Feb-20	Apr-20 to Dec-23	2017	2018	2019	2020	2021	2022	2023
U.S. Aggregate (AGG)	1.00	0.90	1.02	0.92	0.83	0.90	1.22	0.93	1.00	1.01
1-3 Yr Govt/IG	1.01	0.71	1.14	0.91	0.57	0.71	0.87	1.09	1.10	0.97
Intermediate	0.95	0.81	0.98	0.86	0.79	0.77	1.08	0.73	0.95	1.01
U.S. MBS	0.94	0.94	0.98	0.95	0.86	1.11	0.16	1.08	0.85	0.93
U.S. Credit (IG)	1.14	1.11	1.19	1.01	1.22	1.10	0.94	1.10	1.22	1.26
Long US Govt/IG Credit	1.01	0.96	1.02	0.93	0.93	0.96	1.10	0.99	1.02	0.99
U.S. Corporate High Yield	0.93	0.96	0.92	0.90	0.97	0.96	0.92	0.95	0.94	0.94

Correlations in recent periods, as well as over the longer periods, remain high in almost all the sectors.

Beta's in AGG, HY and IG and Long IG funds are relatively stable. Almost no sectors reduced Beta in 2023.

MBS, 1-3yr, and Intermediate funds do exhibit Beta volatility, but these sectors compromise a greater proportion of funds with smaller AUM investing in specific sub-sectors of their markets.

The 1yr-3yr sector especially does show lower correlations, but the funds mapped to this index are not very homogenous – the percentage difference between the duration of a 1yr bond and a 3yr bond is quite significant. There are some short High Yield funds, and various funds with custom indices included as well.

The lower correlation of the 1yr-3yr sector is useful for active managers. Indeed, in our active strategies, we take advantage of this sector, rotating into it periodically.

	Alpha to Benchmark (Weighted Average)									
Benchmark Index	Jan-17 to Dec-23	Jan-17 to Feb-20	Apr-20 to Dec-23	2017	2018	2019	2020	2021	2022	2023
U.S. Aggregate (AGG)	0.5%	0.7%	1.3%	0.8%	-0.2%	1.3%	-0.3%	0.6%	-0.1%	0.6%
1-3 Yr Govt/IG	0.6%	1.2%	1.7%	1.3%	0.5%	2.1%	0.9%	0.8%	0.3%	1.5%
Intermediate	0.5%	0.6%	1.1%	0.7%	0.2%	1.0%	0.7%	0.7%	0.1%	0.1%
U.S. MBS	0.3%	0.5%	0.5%	0.5%	0.4%	-0.9%	3.7%	0.5%	-1.8%	0.5%
U.S. Credit (IG)	-0.5%	-0.5%	-0.9%	0.7%	-0.3%	0.0%	1.5%	-0.6%	0.4%	-1.7%
Long US Govt/IG Credit	0.4%	0.5%	1.1%	1.8%	-0.9%	1.2%	-1.1%	0.0%	1.4%	1.2%
U.S. Corporate High Yield	0.1%	-0.1%	0.2%	0.2%	-0.1%	0.1%	-0.8%	0.4%	0.9%	-0.2%

Analysis of the Alpha produced by grouped funds does show differentiation between each category. Hence, there are some signs of Active behavior by managers, although they are largely from security selection, risk weighting and static sector weighting bets.

The Alpha of aggregated funds does not seem to be consistent from year to year. At the individual fund level, the positive alpha funds are usually smaller funds. The high correlations suggest that this Alpha is periodically wiped out during periods of volatility – often the primary criticism of MBS, such as in 2022. They do not impact the overall statistics significantly.

Fixed Income Market Structure – the reason why Active Management in FI is not possible

It is my stated conclusion that the flawed Fixed Income Market structure (buyer side) is to blame for the inability of Fixed Income managers to actively respond to regime changes by rebalancing their portfolios. This conclusion is based on my studies of flows in the MBS and Fixed Income markets, and 30 years of experience trading MBS and Fixed Income with large asset managers.

Most market structure studies focus on the new issue bonds flows (Sell Side), but few focus on the how the purchasers of bonds are structured (Buy Side) and manage portfolios, resulting in an incomplete picture of the market structure.

Summarizing my research of Fixed Income Market Structure:

- **A large proportion Fixed Income is held in SMAs.** Total size of Fixed Income is $40T or higher. From the tables on page 4, you see that the AGG, which is only IG and does not contain all sectors, references $26T. Funds and ETFs account for about $5T. The rest are in SMAs.
- **There are millions of individual bonds in Fixed Income – issuers issue too many bonds**
- **With millions of bonds, benchmarks have thousands of holdings**, leading to SMAs and funds that need hundreds and thousands of holdings to replicate an index with low tracking error.

- **Fixed Income managers purchase new issue 'roundlots' and then allocate them to SMAs, thereby converting them into 'oddlots' to provide diversity and sector matching in the SMAs. The majority of bonds in SMAs are therefore oddlots.**
- **Furthermore, oddlots are illiquid once seasoned**, trade inefficiently, have few buyers in secondary markets, and have wide bid-offer spreads, making marks and stated returns suspect.
- **This also makes it almost impossible to actively manage portfolios, as selling positions that are oddlots takes time, and is not always possible at a reasonable price.**

- **Active FI management primarily happens in the marginal purchasing decisions of new issue bonds. "Adding duration on dips", for example, is the current theme in Fixed Income.**
- **Selling bonds to change portfolio direction and risk is like turning an aircraft carrier.**

The following are some of the studies and papers I wrote, as I researched Fixed Income market structure, to reach my conclusions. I also made recommendations on how to improve the market structure and liquidity in bonds.

Overview of the US Bond Market Structure - 2014 (published 2015)
Where are the Bonds – Oct 2016
Flaws in Fixed Income Asset Management – April 2017
Letter to SEC's Fixed Income Market Structure Advisory Committee (FIMSAC) – March 2018

Presciently, in 2016's 'Where are the Bonds' (written in response to Vanguard's recommendations to improve bond markets), I described what was to happen in March 2020, and the Fed's response:

> ***"To me, this is a leverage issue, and central bank QE has made this worse. Bond price widening and illiquidity will likely occur when levered investors are all trying to delever at the same time, as they did in the Taper Tantrum of 2013, and in the Crisis years of 2007-2008. When all bond investors are going in the same direction, the proposals listed above will not work.***
>
> ***My recommendation to the Fed, SEC, FINRA and other regulators is to focus on providing emergency balance sheet vehicles at the Fed to absorb excessive supply of bonds from the secondary markets in the event of a run."***

Some more recent data is shown below.

SIFMA provides a wealth of updated data:

https://www.sifma.org/resources/research/us-fixed-income-securities-statistics/

https://www.sifma.org/resources/research/us-corporate-bonds-statistics/
https://www.federalreserve.gov/foia/files/bond-market-liquidity-report-2017Q2.pdf
https://www.fi-desk.com/review-of-2023-trading-trade-sizes-falling-in-parts/

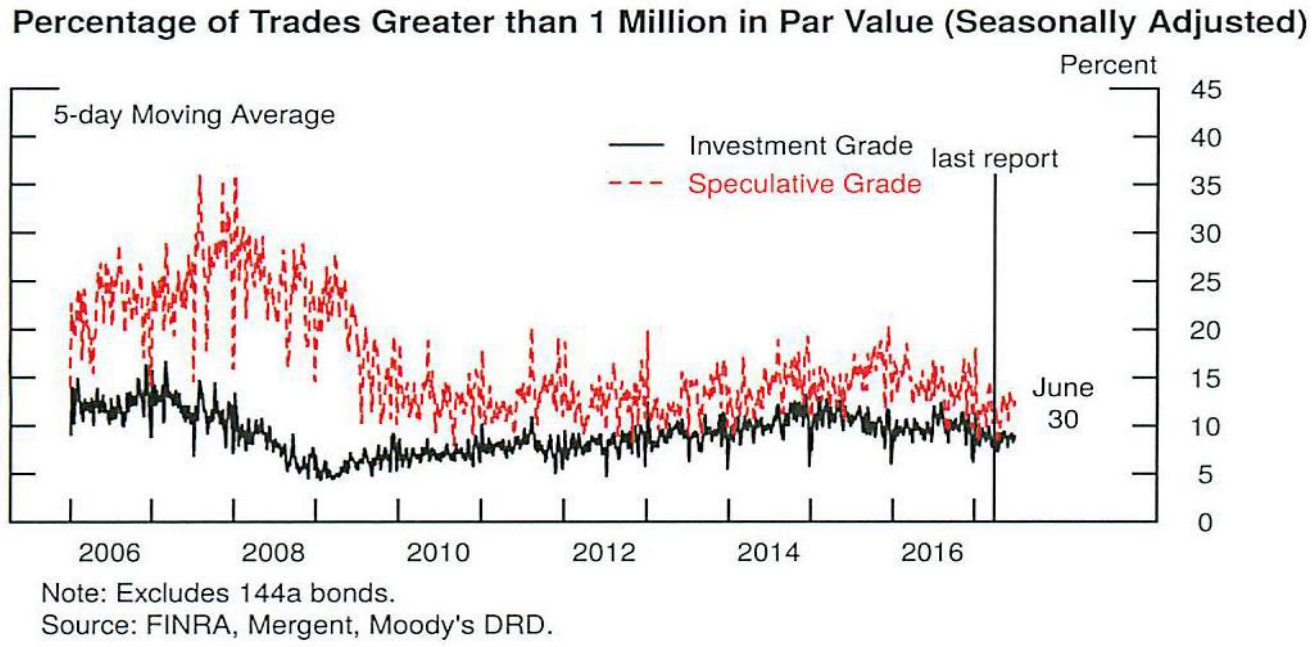
From SIFMA:

> *For Corporate Bonds: YTD 2023 statistics include*
> - *Issuance (as of December) $1,441.3 billion, +5.4% Y/Y*
> - ***Trading (as of December) $40.5 billion ADV, +6.8% Y/Y***
> - ***Outstanding (as of 3Q23) $10.6 trillion, +3.0% Y/Y***

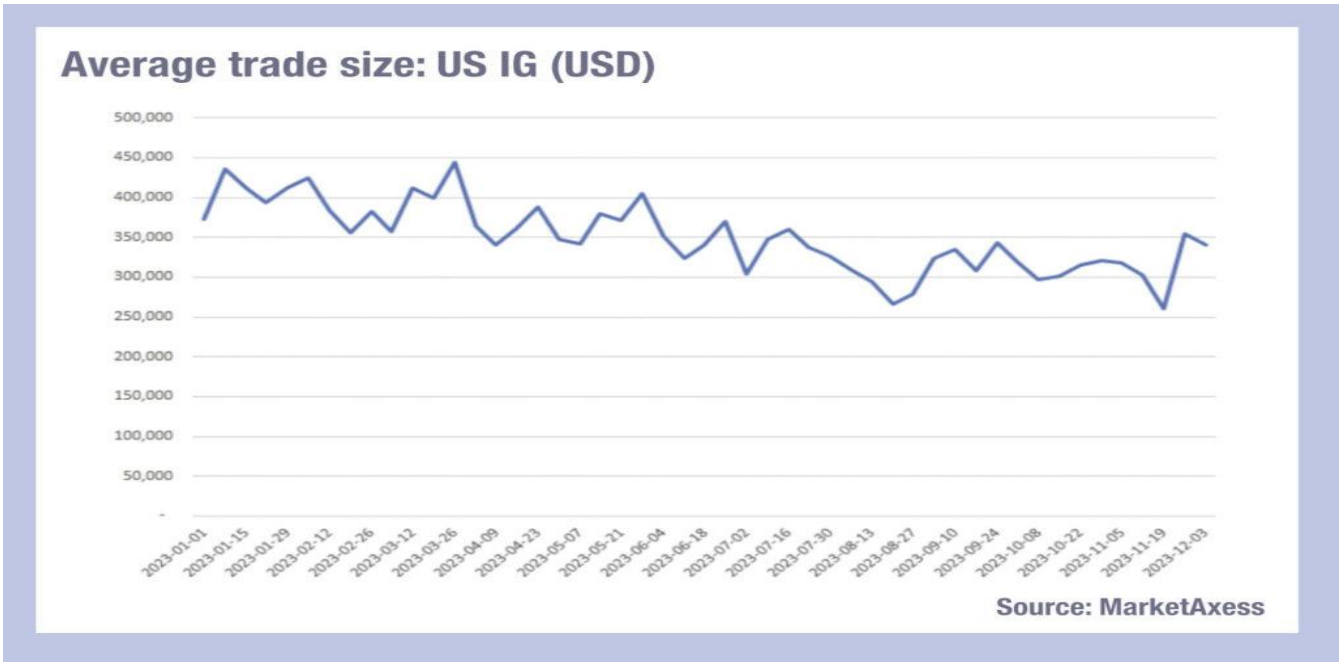
Fannie Mae now has an MBS Float dashboard as well.

https://capitalmarkets.fanniemae.com/tools-applications/data-dynamics/data-dynamics-single-family-mbs-data

This graph shows that the majority of corporate bonds (> 80%) traded are 'oddlots'.



The average trade size is still an oddlot.



This table shows the float in Agency MBS 30-year pools for Oct 2020 – about half of the universe is locked up.

https://www.machinesp.com/post/mortgage-float

Float Calculations by Coupon for GSE 30-year TBA-eligible Pools: October 2020

Coupon	Vintage	UBP($mm)	CohortCPR	Float($mm)	FloatCPR	CMOLock($mm)	CMOCPR	FedLock($mm)	FedCPR	Spec($mm)	SpecCPR	TBADeliv($mm)	TBADelivCPR
2.00	All	389,010	4.6	239,706	4.9	18,056	7.3	131,248	2.9	62,945	2.4	176,761	6.0
2.50	All	615,274	20.3	315,947	16.9	11,033	36.3	288,294	21.0	120,472	5.3	195,475	23.5
3.00	All	1,001,739	40.8	561,775	37.3	36,090	35.5	403,874	44.8	196,668	19.9	365,107	45.2
3.50	All	856,308	43.4	534,317	41.4	45,317	35.2	276,674	47.0	228,160	28.3	306,157	49.7
4.00	All	605,167	41.0	331,967	41.0	105,877	33.1	167,323	44.1	166,722	31.9	165,245	49.1
4.50	All	259,917	34.7	144,097	36.3	73,162	28.9	42,658	36.4	83,692	32.5	60,405	41.1
5.00	All	87,603	26.9	39,387	29.4	35,451	23.1	12,765	26.4	15,551	28.1	23,836	30.2
5.50	All	40,393	18.6	14,565	20.3	22,460	16.7	3,368	19.5	3,940	22.7	10,625	19.5
6.00	All	24,800	16.0	8,197	16.8	16,158	15.0	445	15.1	2,075	17.0	6,122	16.8
6.50	All	9,668	13.9	1,879	15.1	7,723	13.5	66	13.6	477	15.6	1,402	14.9

<u>The conversion of roundlots into oddlots for SMAs by Fixed Income managers creates the illiquidity in Fixed Income secondary markets, and creates a barrier for Active Management of Fixed Income.</u>

Understanding the AGG

The AGG is the primary benchmark index in Fixed Income, with the largest number of assets targeting its performance.

It was originally created at Lehman Brothers and was called the Lehman Agg (Aggregate), and was made up of Lehman Brothers Government/Corporate Bond Index, Mortgage-Backed Securities Index, and Asset-Backed Securities Index. To be included, securities are required to be of investment-grade quality or better, have at least one year to maturity, and have an outstanding par value of at least $100 million.

Today, the AGG index is owned by Bloomberg, and is called the "Bloomberg US Agg Total Return Value Unhedged USD" index, aka "Bloomberg AGG" or "AGG". Besides only incorporating IG fixed rate securities of a certain minimum size, including ABS and CMBS, it also adjusts for float, including bonds owned by the FEDs SOMA account making it a more realistic benchmark. It also includes global bonds.

https://assets.bbhub.io/professional/sites/27/US-Aggregate-Index.pdf

In Bloomberg's nomenclature, the AGG Index is identified as 'LBUSTRUU Index'. The current constituents and weights are:

ISIN	Par Val	MV	Weight
Treasury (285 members)	12,069,198,324.80	11,020,008,693.49	41.731
Securitized (4063 members)	8,483,191,109.32	7,578,561,906.83	28.699
Corporate (7756 members)	7,007,436,516.51	6,545,572,947.28	24.787
Government-Related (1230 members)	1,329,358,119.17	1,263,255,115.13	4.784
Total	**28,889,184,069.80**	**26,407,398,662.73**	**100.00**

Given that there are millions of bonds outstanding, the AGG is representative of the larger issues, but still captures a significant proportion, in dollar terms, of the bonds outstanding.

Is Active Management in Fixed Income possible?

The answer is "Yes", but the prior analysis suggests that, in aggregate, Fixed Income managers have not figured out how to do this.

There are 2 large sectors within Fixed Income that can be liquid and used for Active Management: US Treasuries, and Agency MBS TBA pools.

- **USTs are issued in much larger size than other bonds**, and have many potential buyers for smaller pieces. Being lower yielding, they tend to form the Beta base for most funds. However, off-the-run USTs trade at a discount, albeit not as much of a discount as other sectors.

- **Agency MBS initially have liquidity as TBAs**, as do some of the large pools that get delivered from TBAs. But, a significant quantity of MBS pools are converted into CMOs, each of which are then unique and become illiquid, with each CMO tranche only purchased by a few buyers. This makes them more illiquid in the secondary market than even corporate bonds. Also, CMOs reduce the "float" in the MBS markets, shrinking the tradable universe. Fed ownership of MBS further confuses liquidity. Once pools are delivered ("Specified" or "Spec") they become unique and illiquid, for many of the same reasons as corporate bonds. Most funds purchase TBAs at the margin initially, but own spec pools in their funds.
- Many Hedge Funds ("HFs") tend to focus on these two liquid sectors in Fixed Income, as they can be leveraged, and the HFs are unconstrained by benchmarks. But, HFs are small market participants, relative to the size of the long-only Fixed Income asset managers that manage largely in SMAs for pensions, and who also manage the mutual funds that are being analyzed in this paper.

Recent innovations, such as portfolio trading by ETF market makers, (primarily in corporate bonds) have improved the ability to sell portfolios of oddlot bonds. However, bid lists of individual bonds are still prevalent, as most managers have compliance requirements to prove 'best execution' by getting multiple bids on each bond.

In Flaws in Fixed Income Asset Management, I disclosed that ***"Our analysis of the problem has led us to the identification of a second solution that is possible to execute within the SMA structure".*** This resulted in our 'AGG Plus Alpha' product in 2017. The strategy created active FI portfolios using FI Funds (there were not enough ETFs in 2017). This had limitations in liquidity and fungibility, as mutual fund managers have the choice to decline investment, and also to drop gates, preventing the exit from a fund if an exit was needed to rebalance. Also, since marks are often set by the manager, often NAVs can drift from market value.

We have restructured the strategy to now use Fixed Income ETFs, which is an almost ideal way to actively manage Fixed Income. We have a suite of 'Plus Alpha' model Fixed Income portfolios, all of which are Active, target the AGG's risk, have low correlations to the AGG, with controllable Beta, and result in positive Alpha.

Comparison of Active Fixed Income Management using ETFs versus Mutual Funds

In this section, I will compare some of our ARAM Plus Alpha portfolio models with those of the "Active" mutual funds analyzed in the previous sections.

Since we target the volatility of the AGG in our active strategies, we limit the rest of the analysis in our paper to AGG-benchmarked funds.

The following is a summary of our analysis showing how different the correlations and Betas of the AGG Plus Alpha portfolios are compared to those of AGG-benchmarked Mutual Funds.

We use 4 of ARAM's Active Model Portfolios (MP) to compare against the performance of AGG Mutual Funds. The four Model Portfolios chosen each represent different portfolio construction and risk parameters.

All ARAM portfolios dynamically match the risk of a Risk target. For the AGG Plus Alpha portfolios we target the volatility of the AGG.

- MP1 includes all US Fixed Income ETFs, including Convertible bonds
- MP20 is our Baseline model portfolio and excludes convertible bonds
- MP33 limits sectors to "Core AGG", excluding TIPs, HY, Convertibles, Bank loans etc
- MP55 scales risk to attempt to reach Beta=1

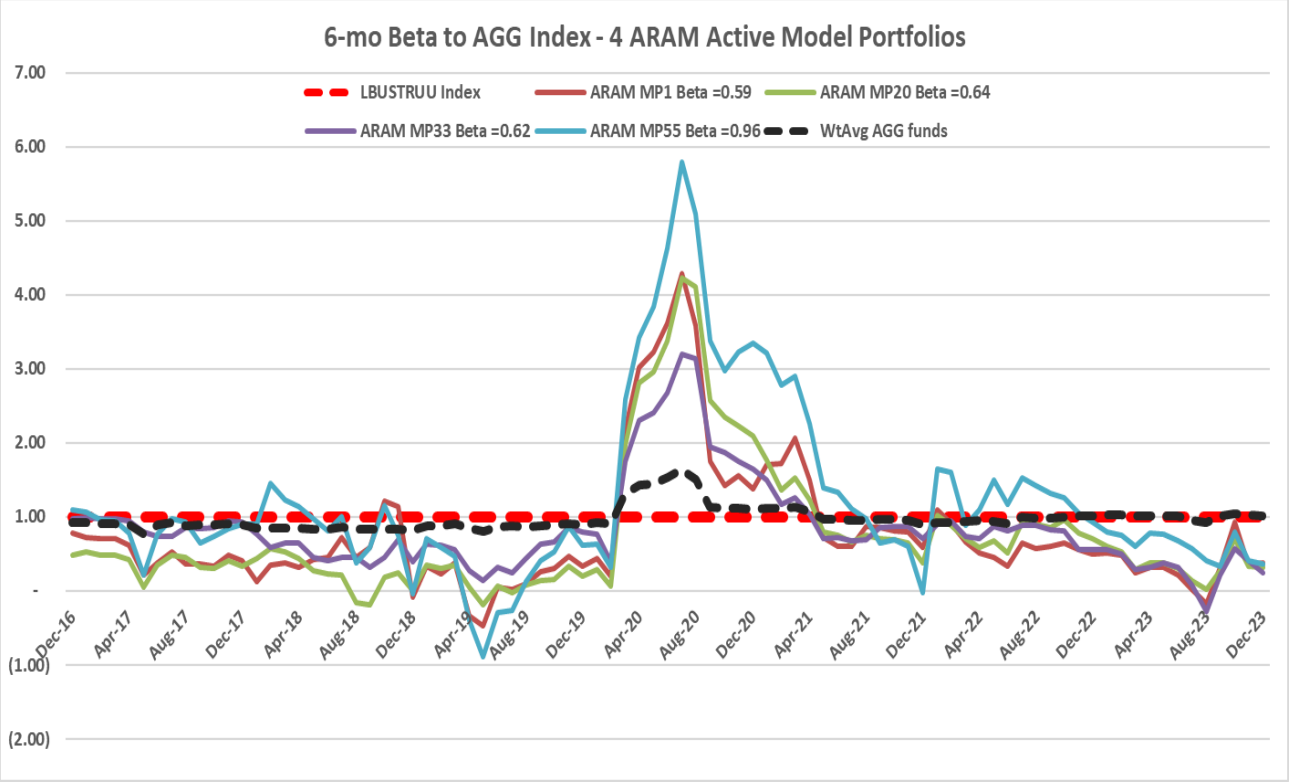
Model Portfolios	Correlation to AGG			Beta to AGG		
	Jan-17 to Dec-23	Jan-17 to Feb-20	Apr-20 to Dec-23	Jan-17 to Dec-23	Jan-17 to Feb-20	Apr-20 to Dec-23
ARAM MP1	0.48	0.34	0.63	0.59	0.31	0.63
ARAM MP20	0.55	0.35	0.70	0.64	0.23	0.71
ARAM MP33	0.65	0.75	0.73	0.62	0.59	0.61
ARAM MP55	0.59	0.40	0.71	0.96	0.58	1.01
Wt-ed Avg AGG Funds	0.96	0.95	0.98	1.00	0.90	1.02

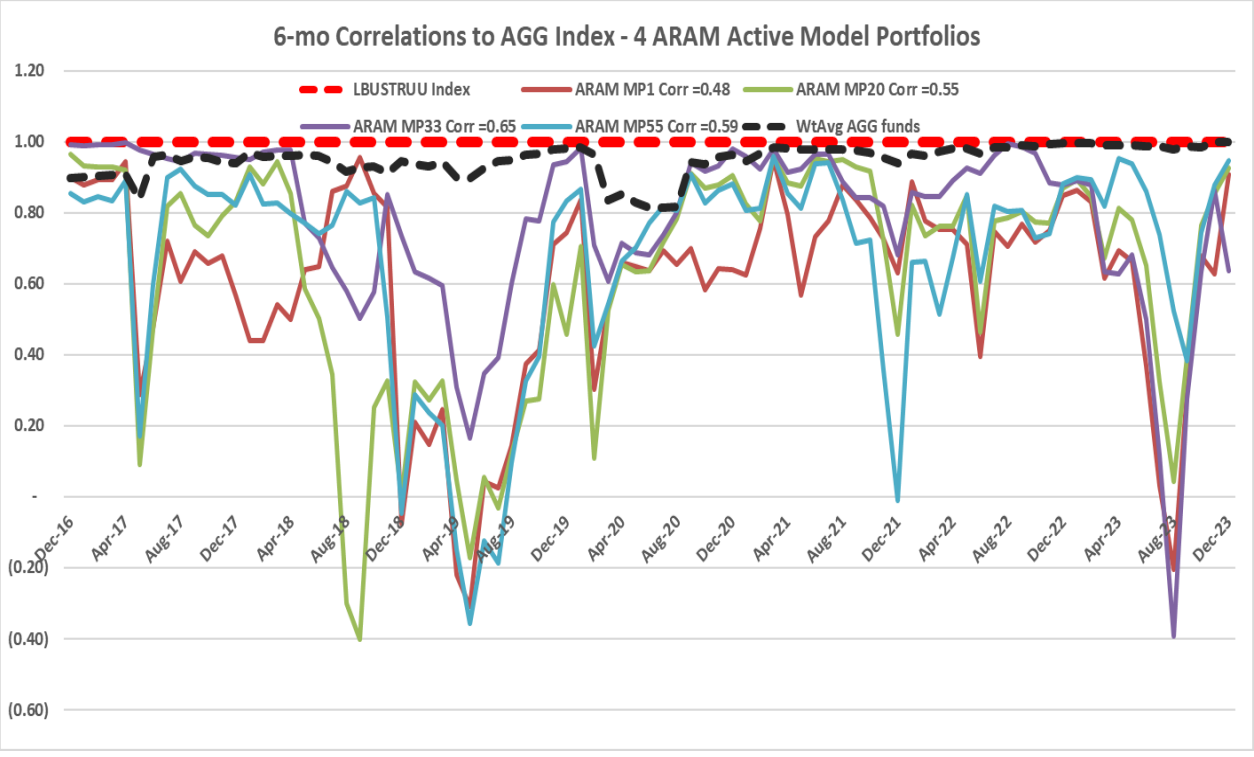
The following charts compare the performance of ARAM's Active Model portfolios to the Universe of AGG targeting mutual funds that are supposed to be "Active" (almost $1T AUM).

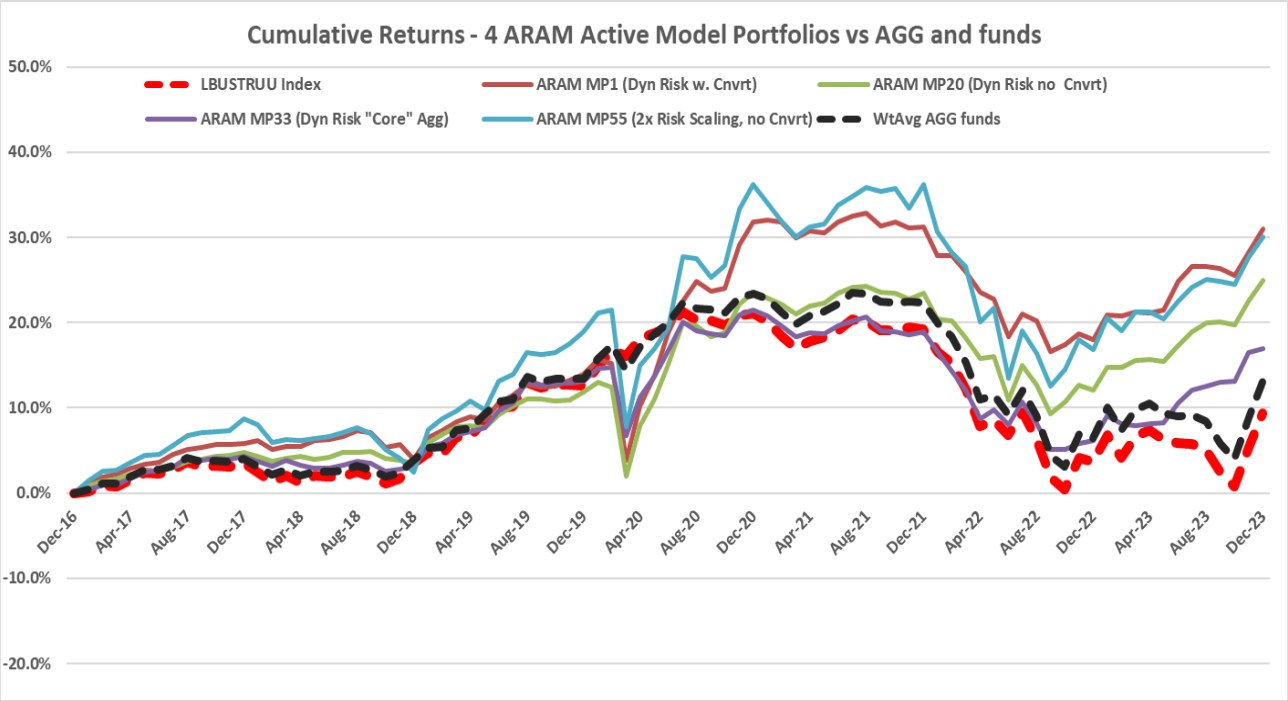
MP33, the Core AGG model portfolio, demonstrates that it is possible to be active even within the confines of the AGG's sectors, lowering Beta and Correlations and generating Alpha.

As a whole, the mutual funds mostly track the AGG Index, with a small amount of Alpha mostly from investing in sectors outside of the AGG's definition, which shows up as greater risk in times of stress. The 6-month Beta's and Correlations shown in the following graphs, in aggregate are also closely related to the AGG's risk.

The ARAM Agg Plus Alpha returns demonstrate volatile Correlations and Betas relative to the AGG, in spite of frequently rebalancing to match the risk of the AGG. This volatility in Beta and Correlation is a sign of Active Management through sector rotation.


6-mo Beta to AGG Index - 4 ARAM Active Model Portfolios
LBUSTRUU Index
ARAM MP1 Beta =0.59
ARAM MP20 Beta =0.64
ARAM MP33 Beta =0.62
ARAM MP55 Beta =0.96
WtAvg AGG funds
7.00
6.00
5.00
4.00
3.00
2.00
1.00
-
(1.00)
(2.00)
Dec-16
Apr-17
Aug-17
Dec-17
Apr-18
Aug-18
Dec-18
Apr-19
Aug-19
Dec-19
Apr-20
Aug-20
Dec-20
Apr-21
Aug-21
Dec-21
Apr-22
Aug-22
Dec-22
Apr-23
Aug-23
Dec-23


6-mo Correlations to AGG Index - 4 ARAM Active Model Portfolios
LBUSTRUU Index
ARAM MP1 Corr =0.48
ARAM MP20 Corr =0.55
ARAM MP33 Corr =0.65
ARAM MP55 Corr =0.59
WtAvg AGG funds
1.20
1.00
0.80
0.60
0.40
0.20
-
(0.20)
(0.40)
(0.60)
Dec-16
Apr-17
Aug-17
Dec-17
Apr-18
Aug-18
Dec-18
Apr-19
Aug-19
Dec-19
Apr-20
Aug-20
Dec-20
Apr-21
Aug-21
Dec-21
Apr-22
Aug-22
Dec-22
Apr-23
Aug-23
Dec-23



A tiny percentage of AGG-targeting Mutual funds can be classified as Active. They mostly add investments in bonds and sectors outside of the AGG, such as MBS Credit, foreign bonds, preferred stock, etc. to attempt to outperform the AGG. They are less than 10% of all funds in number, and about 2% of the total AUM in AGG-targeting funds.

Our Conclusion: For the most part, Fixed Income is not actively managed.

A more granular look at AGG-targeting Funds

In this section, we'll look at the rolling 6-month correlations and rolling 6-month Beta statistics for the extremes in distributions of the various funds: the largest funds, the highest and lowest Correlation funds, the highest and lowest Beta funds.

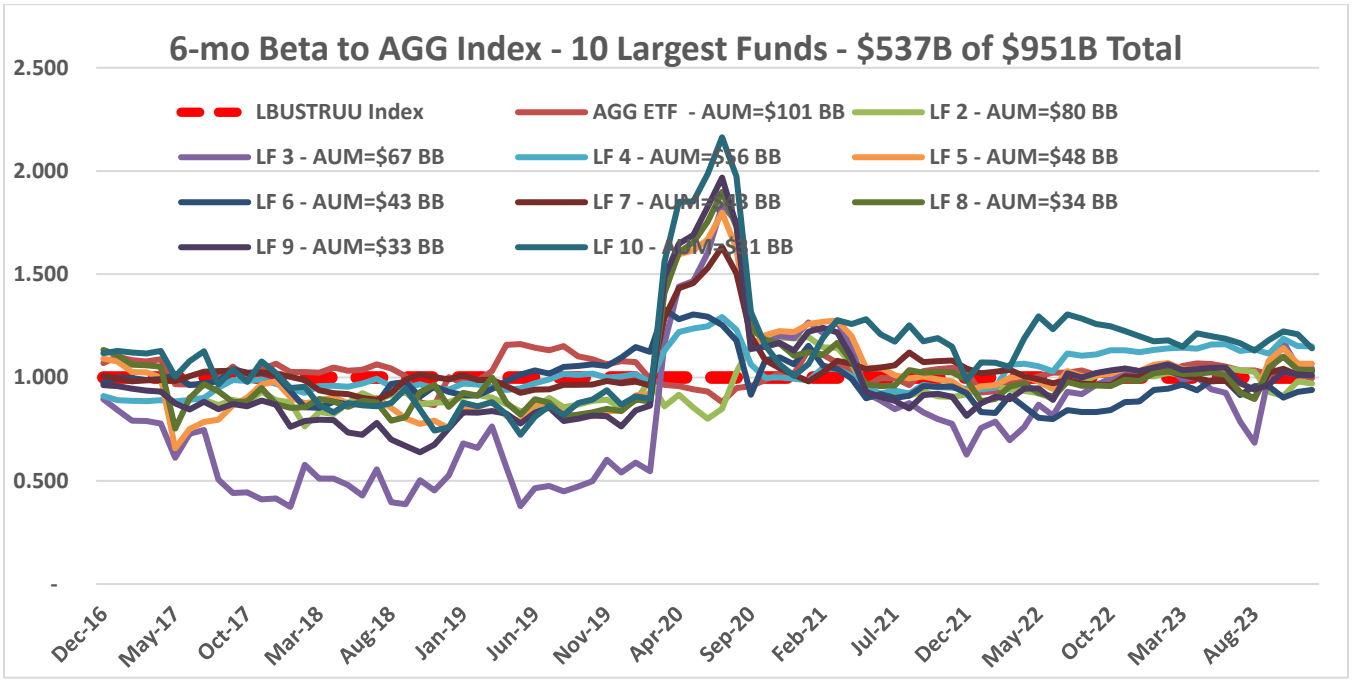
The Y-axis scales will also be kept consistent in some of the sections to show how dramatic some of the differences are.

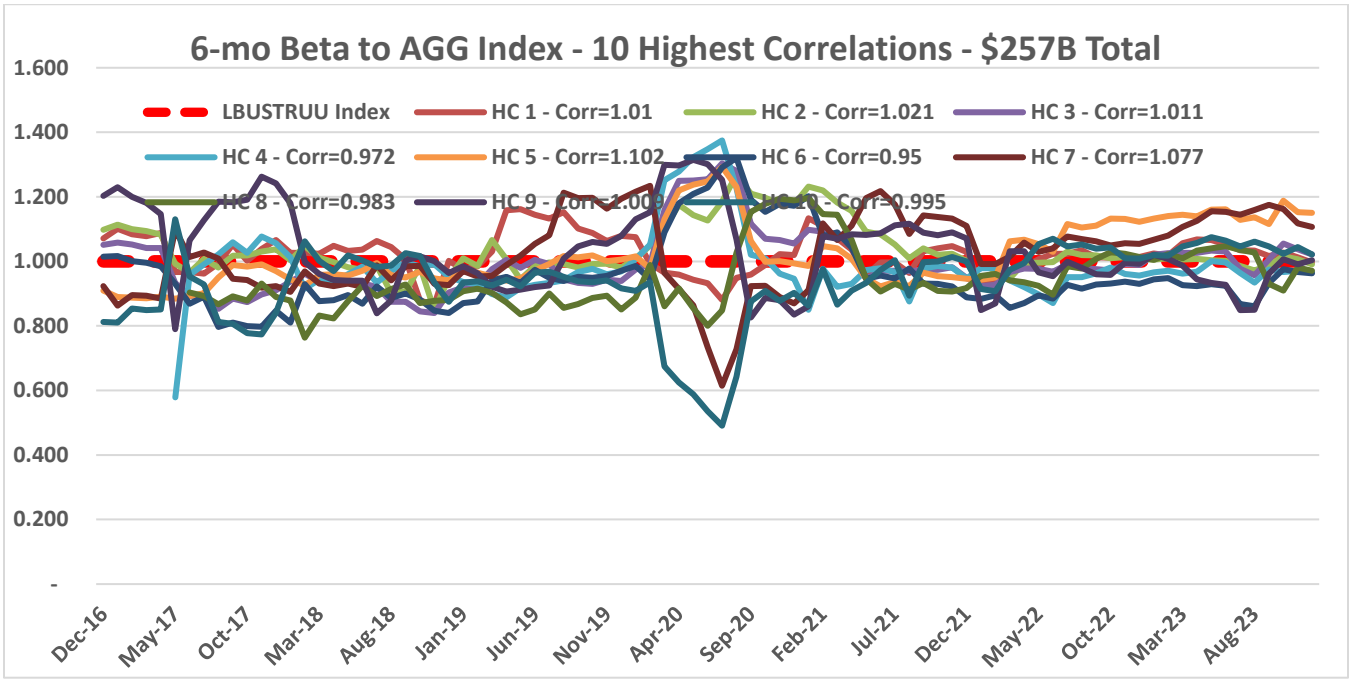
Keen readers will notice how "bunched up" the grouping of the metrics are across most charts. This in turn translates to "sameness" in performance – both overall, and also across economic regime changes, which is what investors ultimately care about – even for their Fixed Income portfolios.

We added comparable results for ARAM active strategies for each metric (Beta, Correlation and Performance), to differentiate and highlight how active management in Fixed Management should benefit fund managers and ultimately investors.

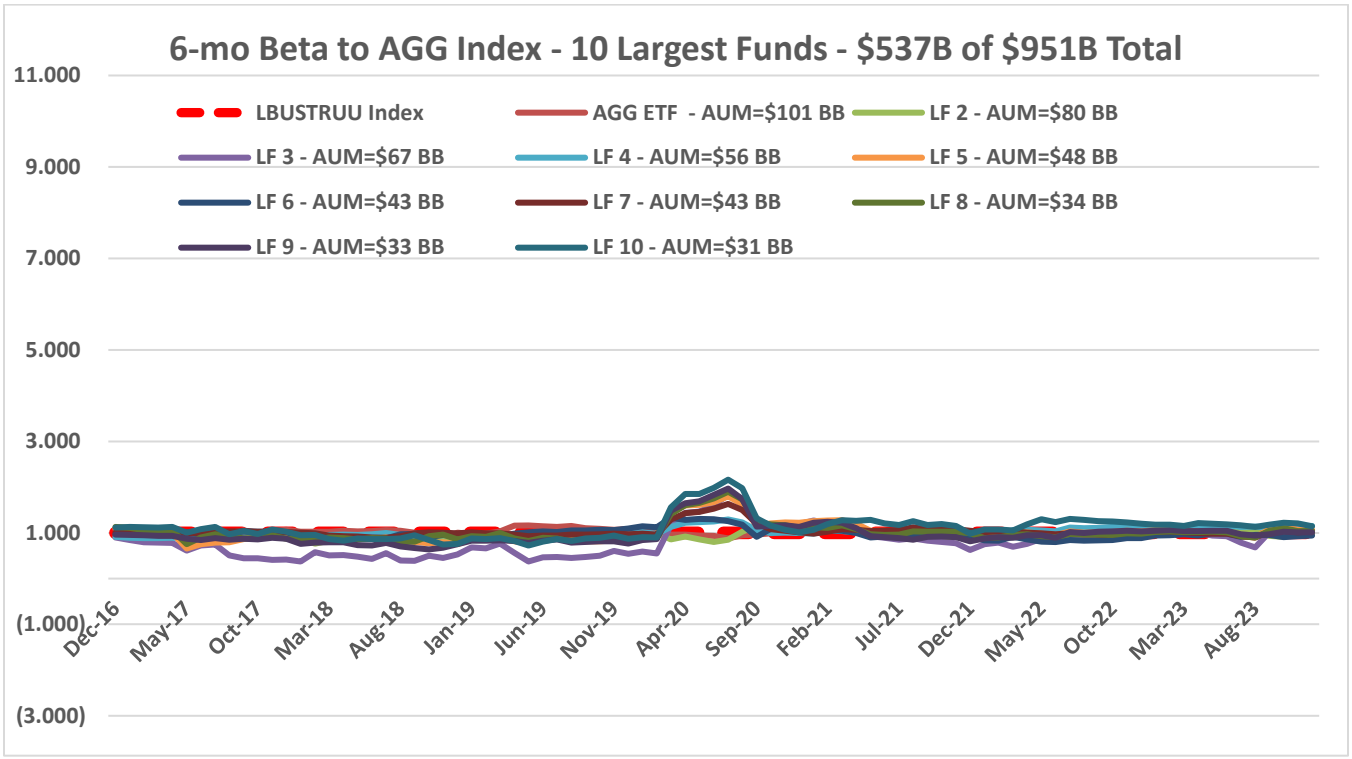
6-month Beta comparisons

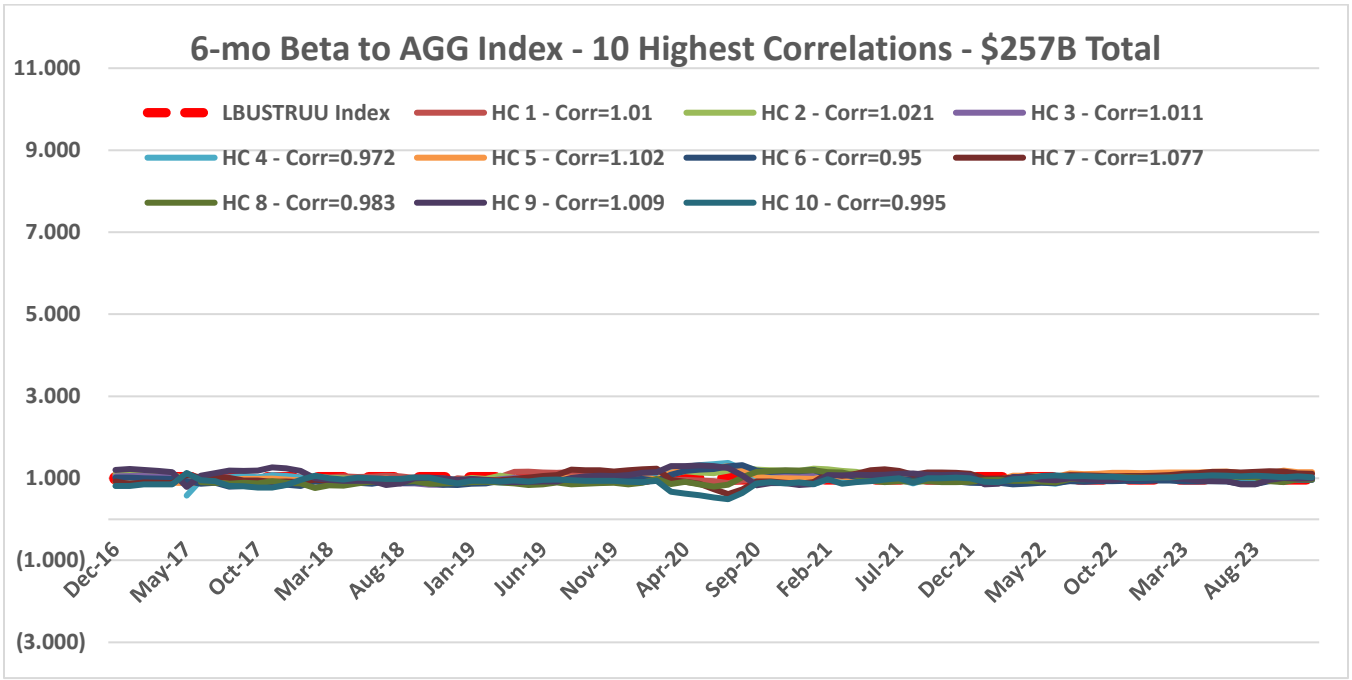
The volatility in these two graphs is misleading due to the granular scaling.

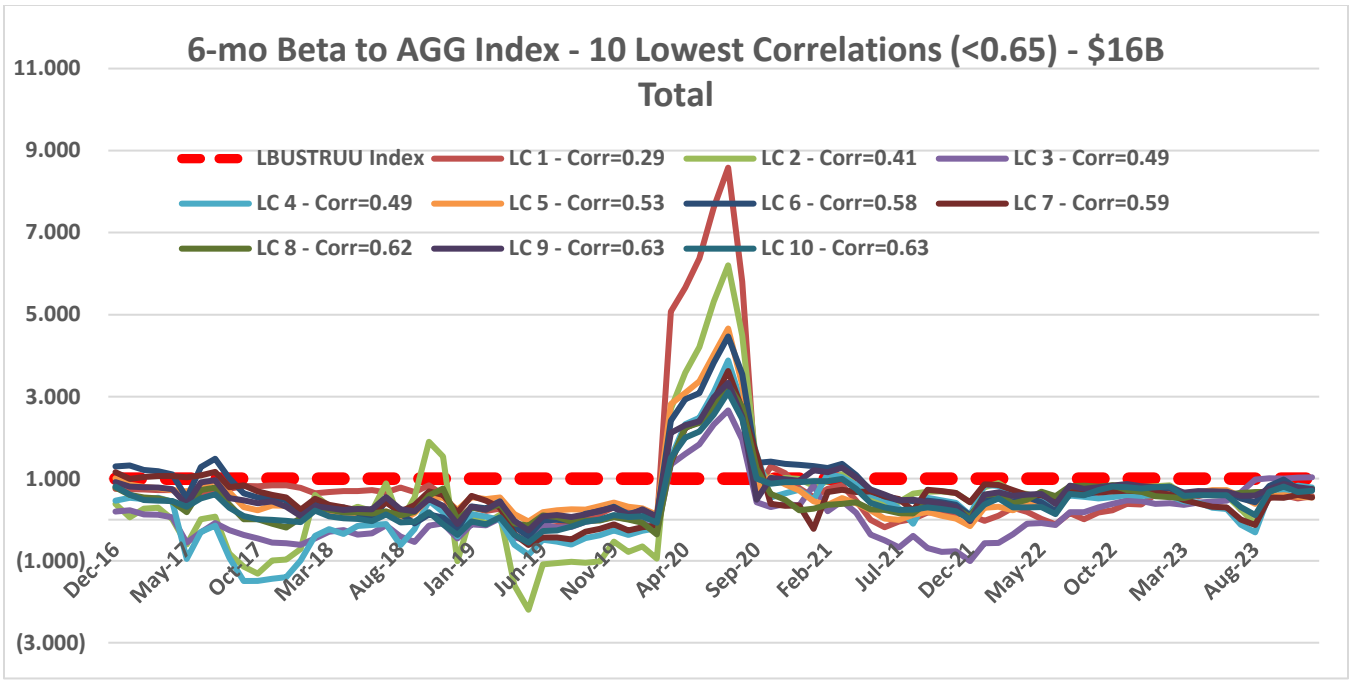


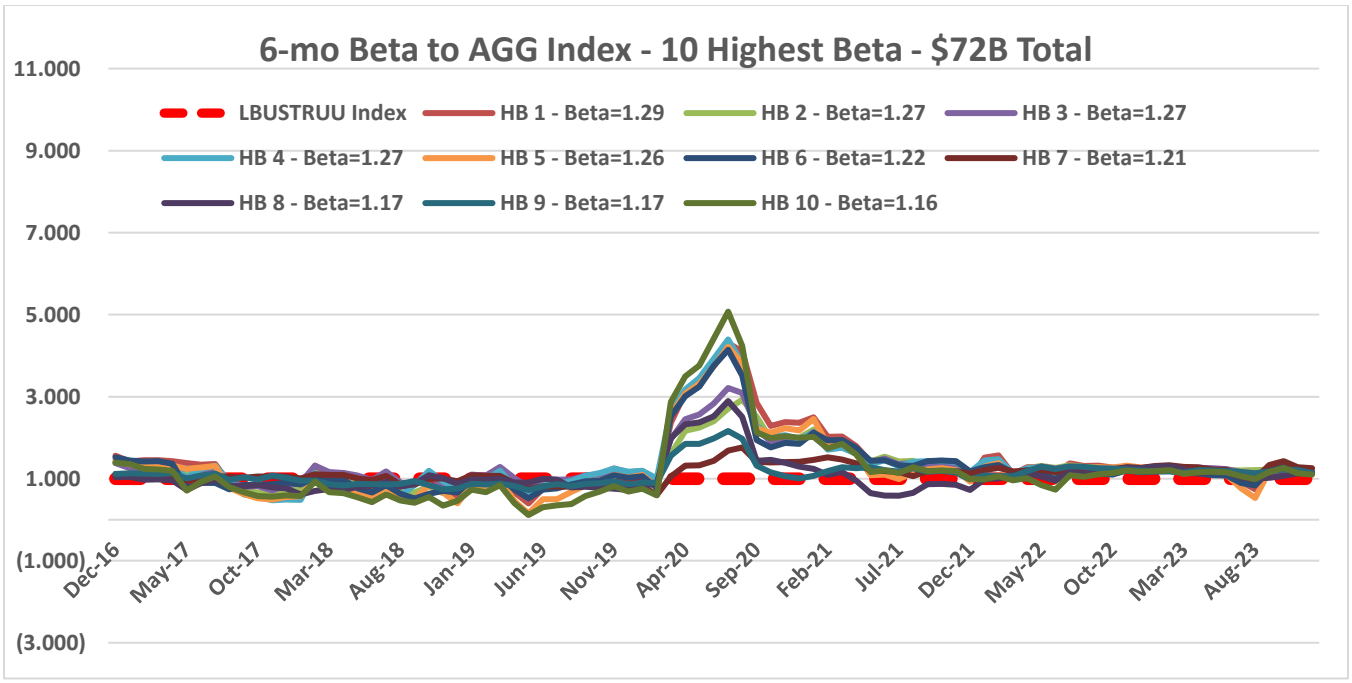


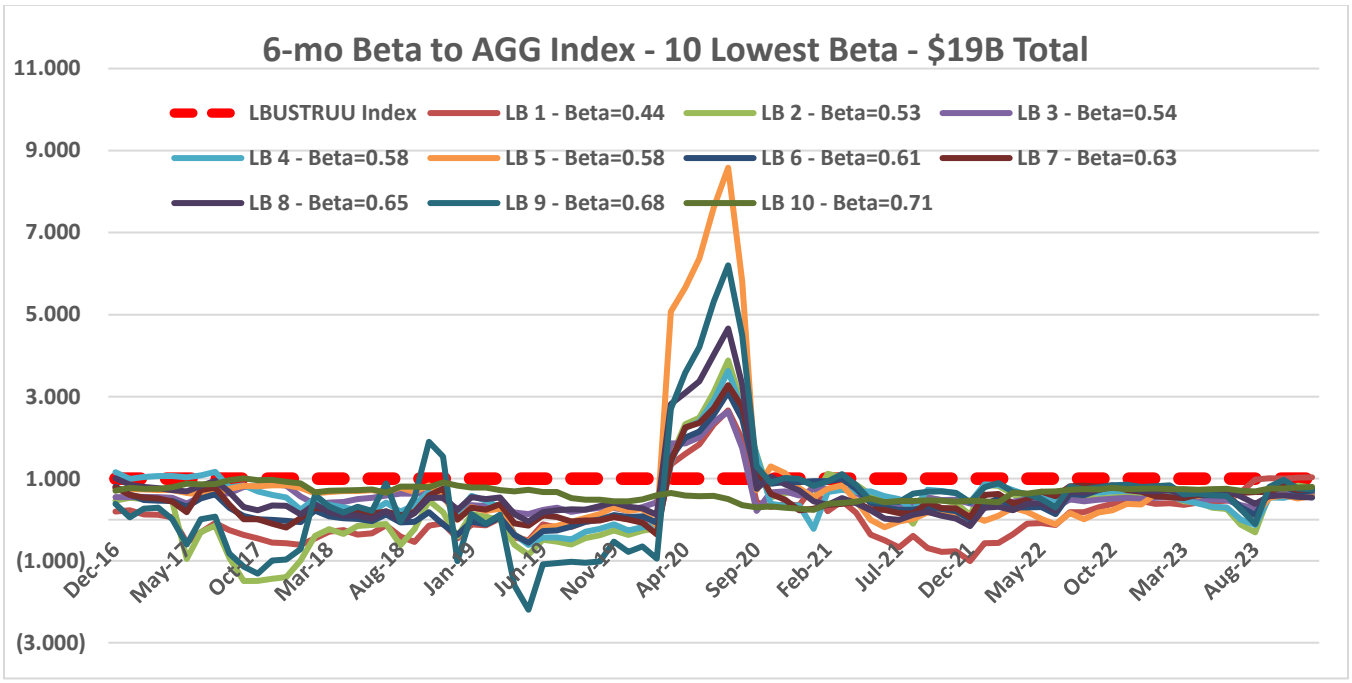
Same scale as subsequent charts:

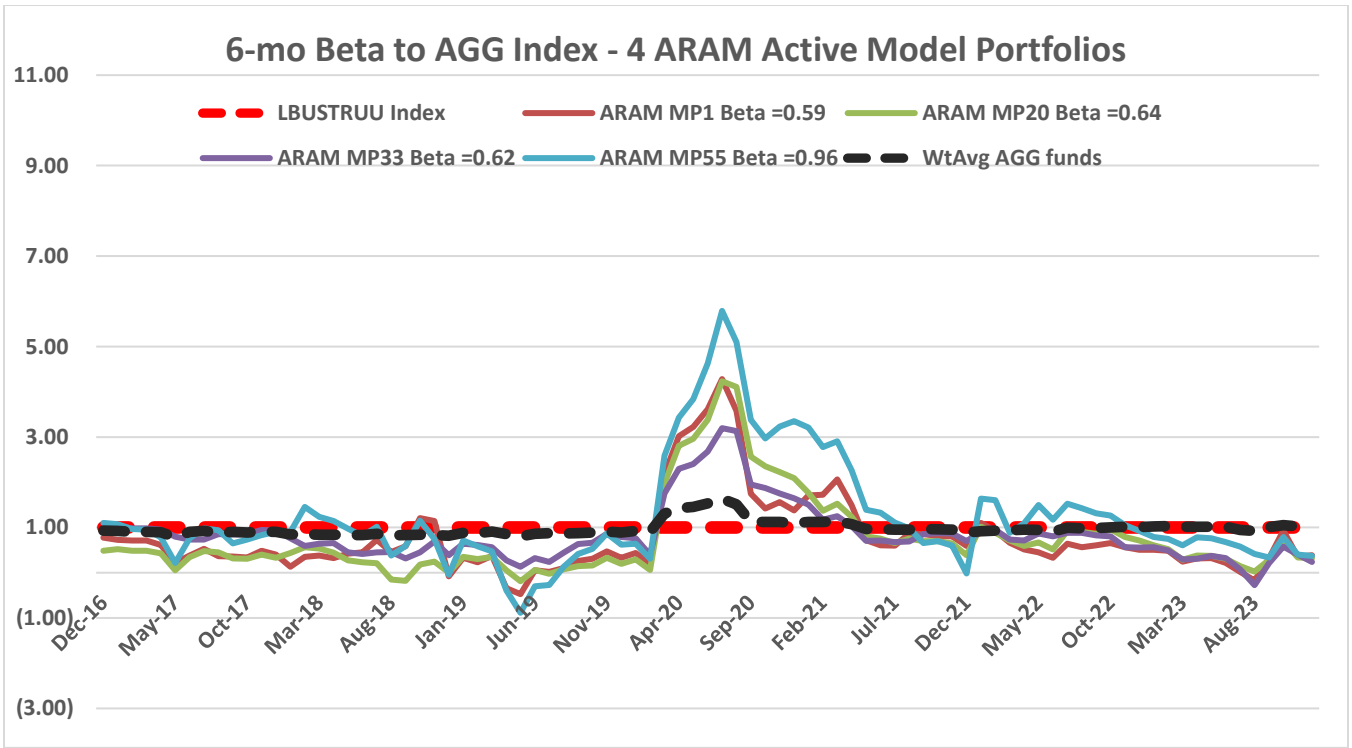




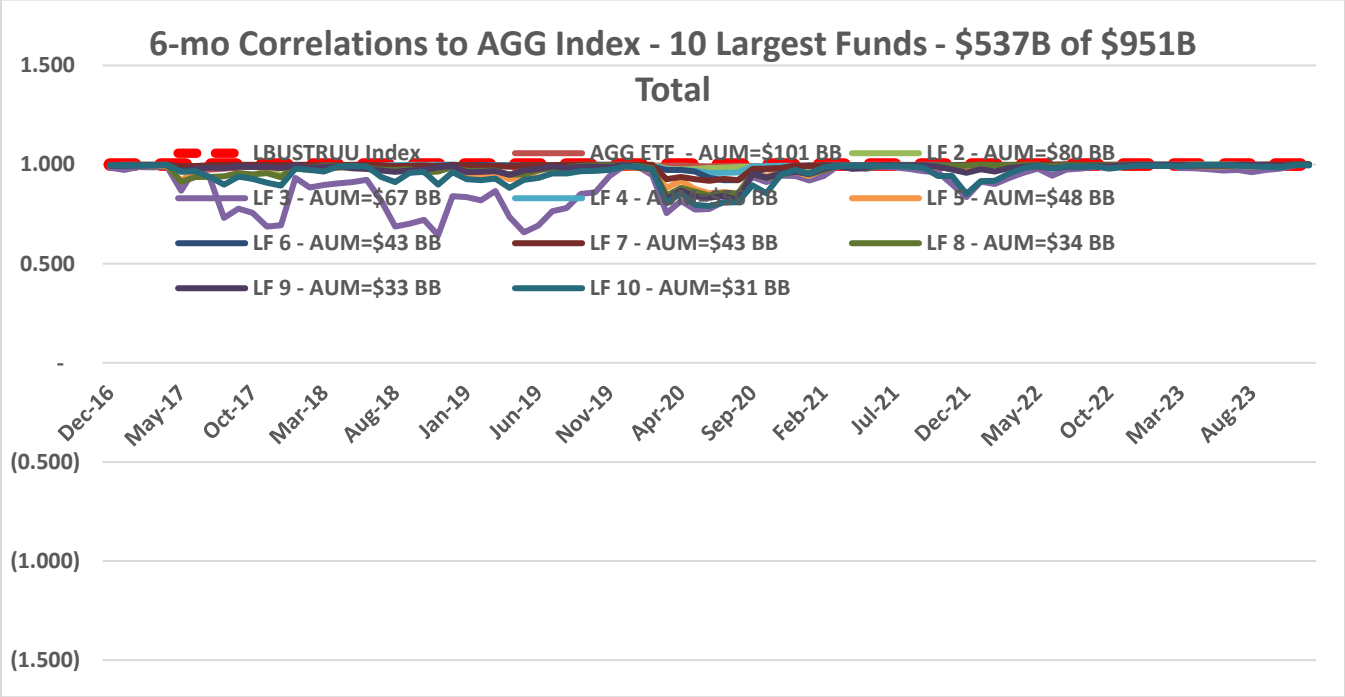

6-mo Beta to AGG Index - 10 Lowest Correlations (<0.65) - $16B Total
11.000
9.000
7.000
5.000
3.000
1.000
(1.000)
(3.000)
LBUSTRUU Index
LC 1 - Corr=0.29
LC 2 - Corr=0.41
LC 3 - Corr=0.49
LC 4 - Corr=0.49
LC 5 - Corr=0.53
LC 6 - Corr=0.58
LC 7 - Corr=0.59
LC 8 - Corr=0.62
LC 9 - Corr=0.63
LC 10 - Corr=0.63
Dec-16
May-17
Oct-17
Mar-18
Aug-18
Jan-19
Jun-19
Nov-19
Apr-20
Sep-20
Feb-21
Jul-21
Dec-21
May-22
Oct-22
Mar-23
Aug-23

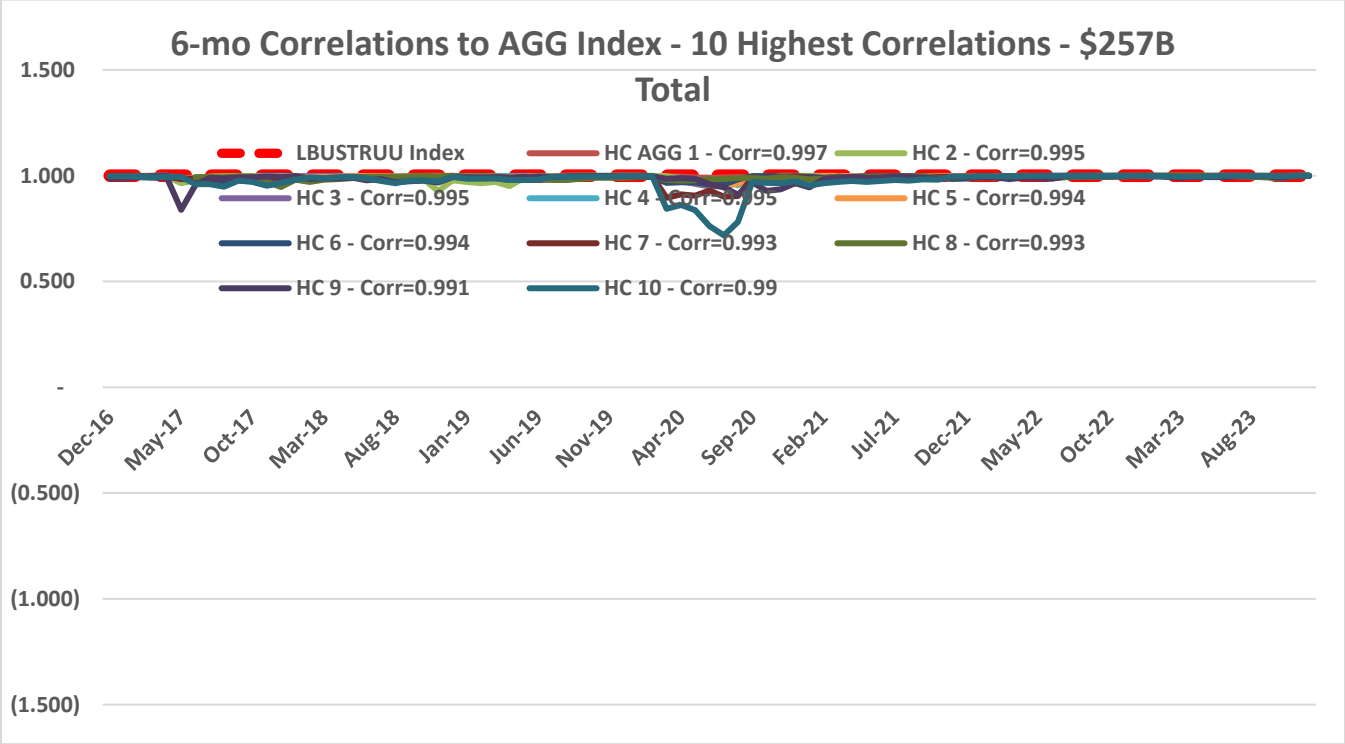

6-mo Beta to AGG Index - 10 Highest Beta - $72B Total
11.000
9.000
7.000
5.000
3.000
1.000
(1.000)
(3.000)
LBUSTRUU Index
HB 1 - Beta=1.29
HB 2 - Beta=1.27
HB 3 - Beta=1.27
HB 4 - Beta=1.27
HB 5 - Beta=1.26
HB 6 - Beta=1.22
HB 7 - Beta=1.21
HB 8 - Beta=1.17
HB 9 - Beta=1.17
HB 10 - Beta=1.16
Dec-16
May-17
Oct-17
Mar-18
Aug-18
Jan-19
Jun-19
Nov-19
Apr-20
Sep-20
Feb-21
Jul-21
Dec-21
May-22
Oct-22
Mar-23
Aug-23

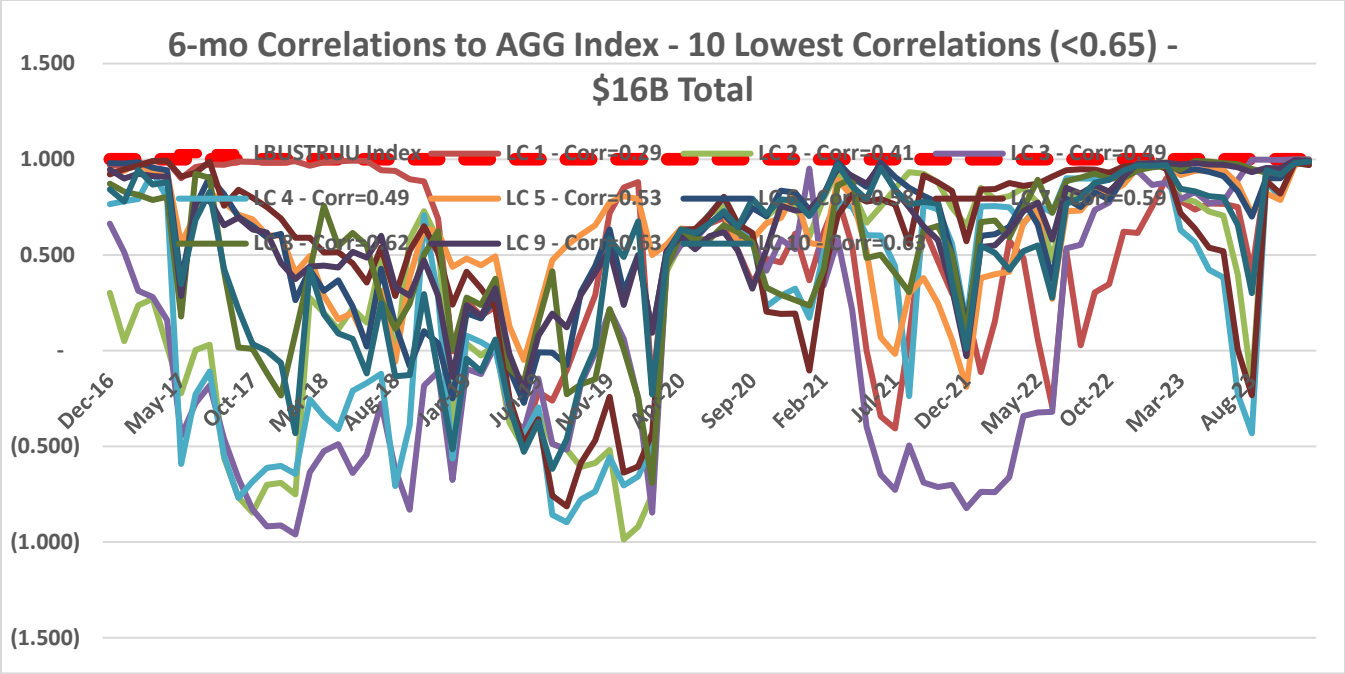

6-mo Beta to AGG Index - 10 Lowest Beta - $19B Total
LBUSTRUU Index
LB 1 - Beta=0.44
LB 2 - Beta=0.53
LB 3 - Beta=0.54
LB 4 - Beta=0.58
LB 5 - Beta=0.58
LB 6 - Beta=0.61
LB 7 - Beta=0.63
LB 8 - Beta=0.65
LB 9 - Beta=0.68
LB 10 - Beta=0.71
11.000
9.000
7.000
5.000
3.000
1.000
(1.000)
(3.000)
Dec-16
May-17
Oct-17
Mar-18
Aug-18
Jan-19
Jun-19
Nov-19
Apr-20
Sep-20
Feb-21
Jul-21
Dec-21
May-22
Oct-22
Mar-23
Aug-23

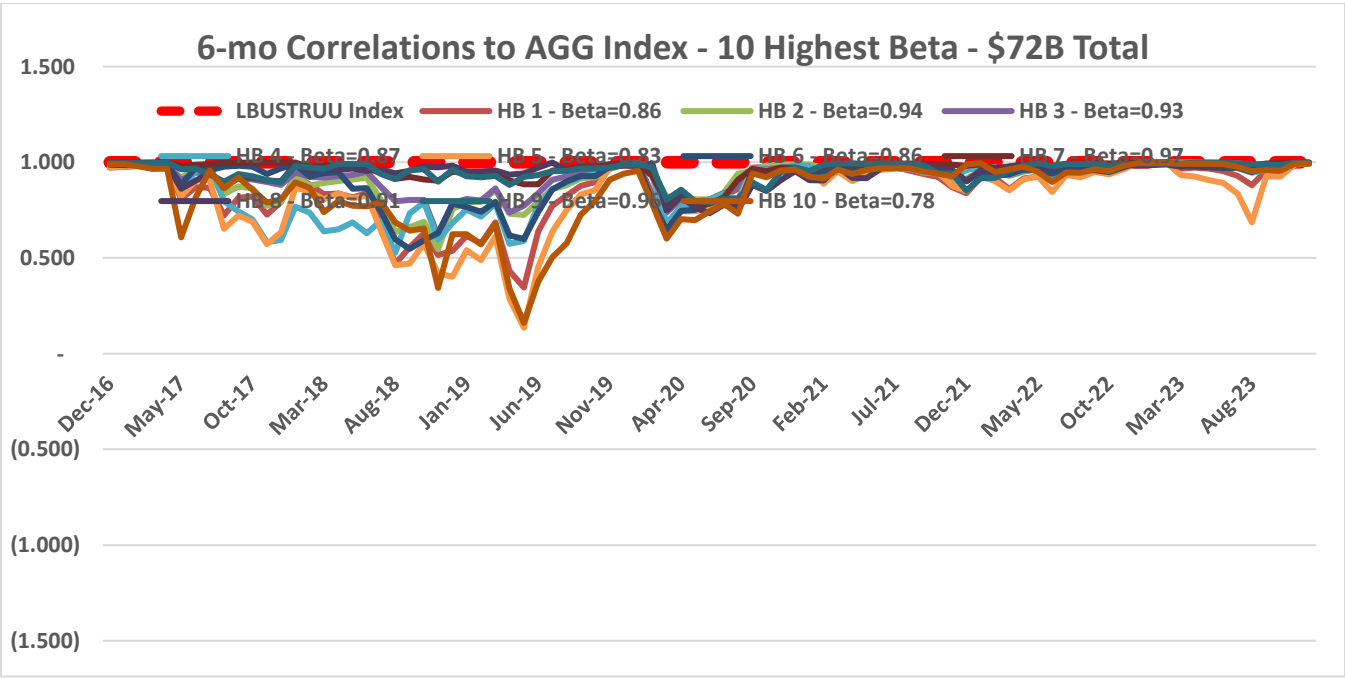

6-mo Beta to AGG Index - 4 ARAM Active Model Portfolios
LBUSTRUU Index
ARAM MP1 Beta =0.59
ARAM MP20 Beta =0.64
ARAM MP33 Beta =0.62
ARAM MP55 Beta =0.96
WtAvg AGG funds
11.00
9.00
7.00
5.00
3.00
1.00
(1.00)
(3.00)
Dec-16
May-17
Oct-17
Mar-18
Aug-18
Jan-19
Jun-19
Nov-19
Apr-20
Sep-20
Feb-21
Jul-21
Dec-21
May-22
Oct-22
Mar-23
Aug-23

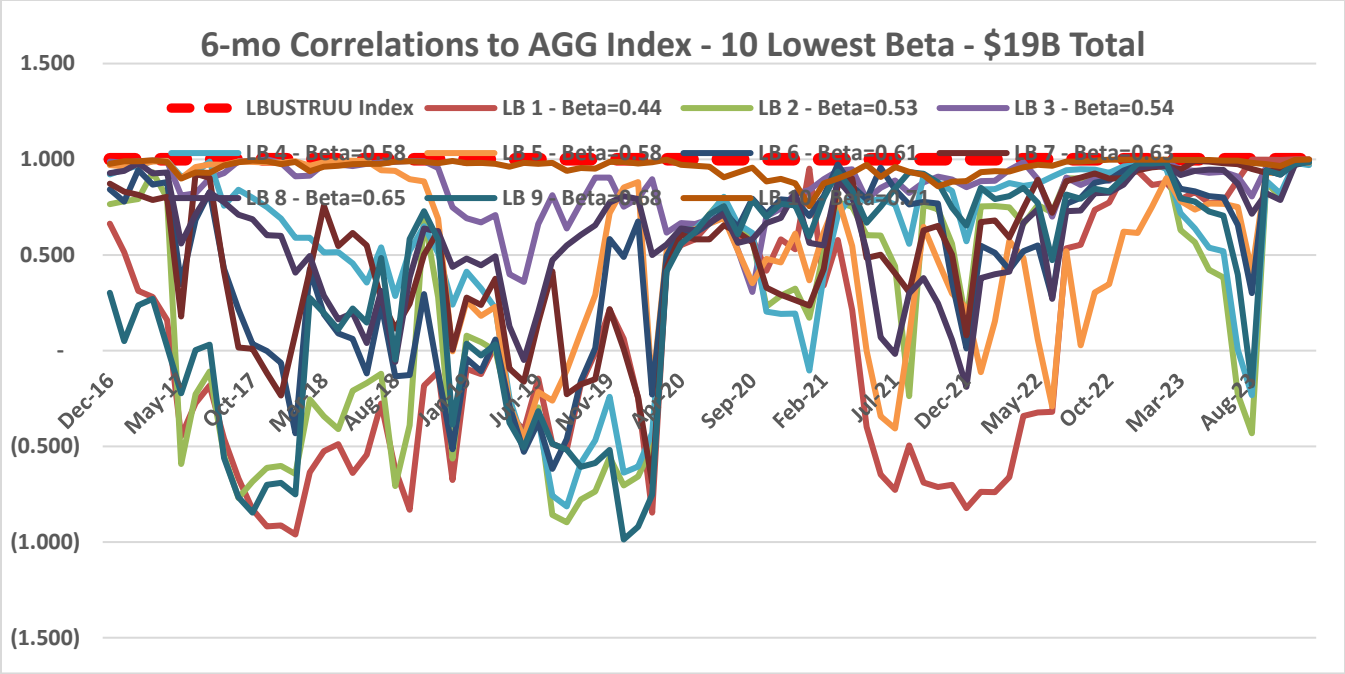
6-month Correlation Comparisons

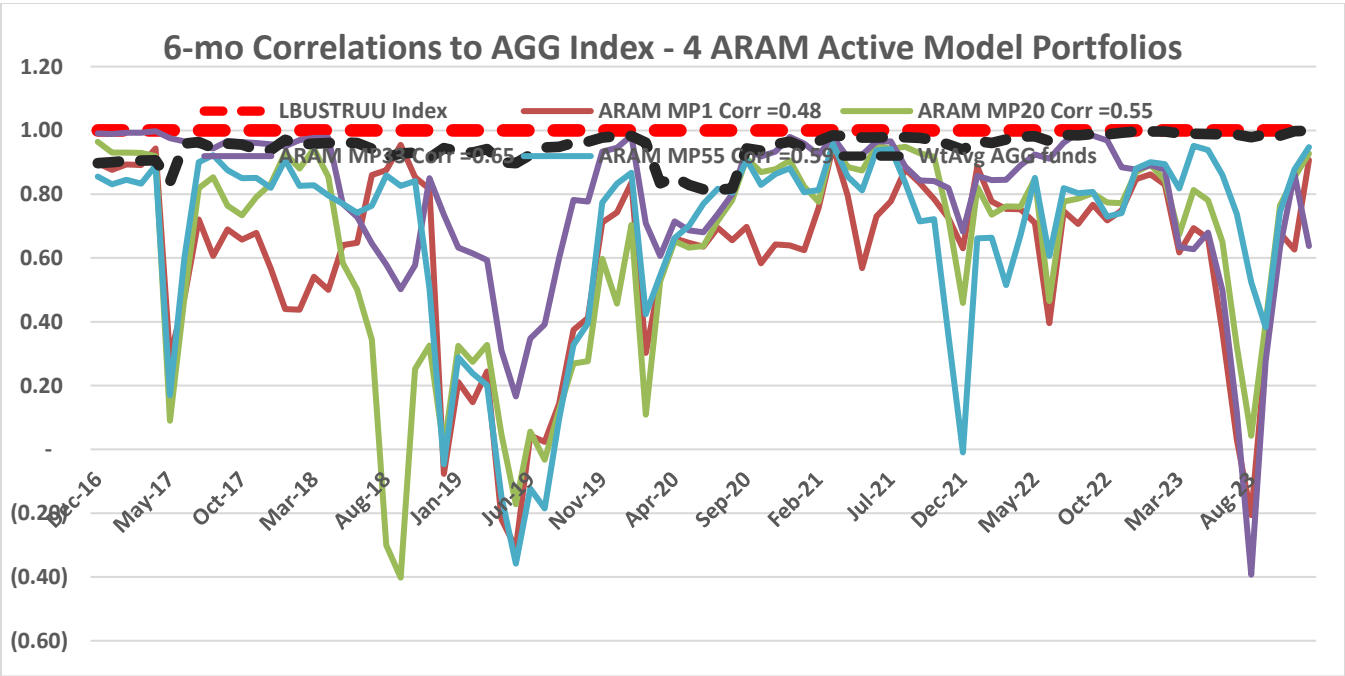




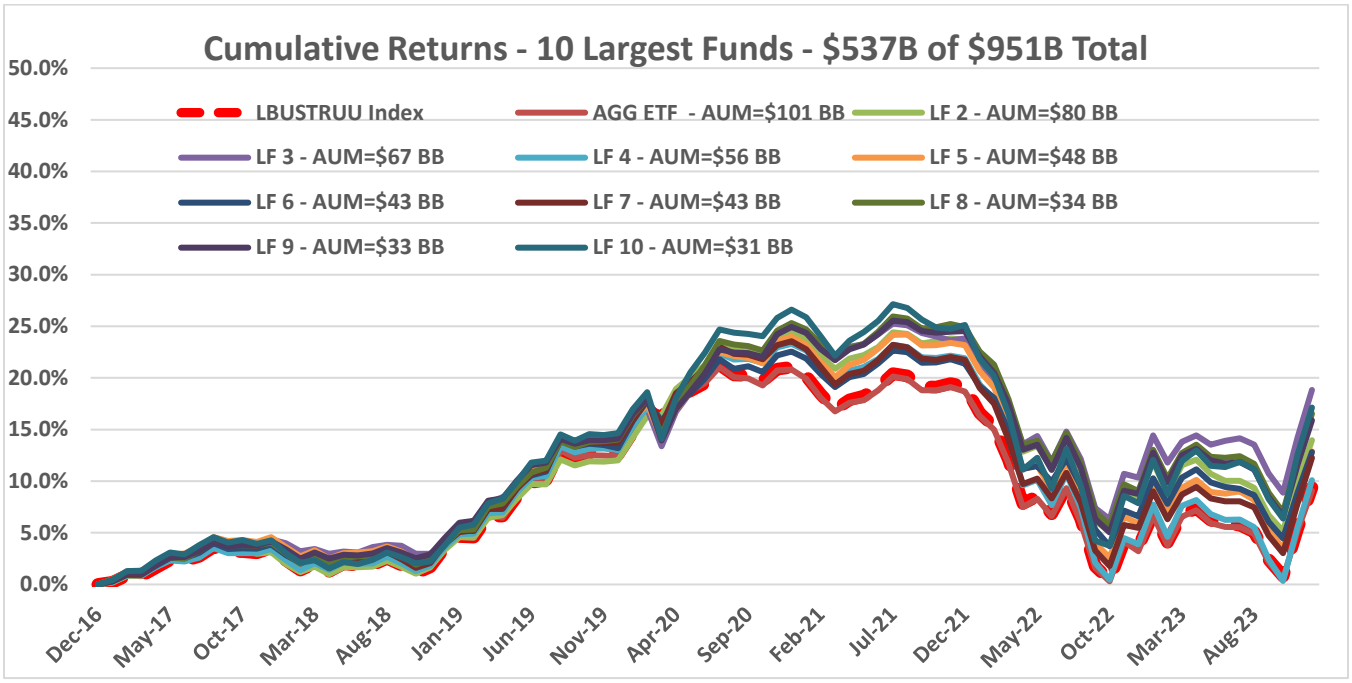

6-mo Correlations to AGG Index - 10 Lowest Correlations (<0.65) - $16B Total
1.500
1.000
0.500
-
(0.500)
(1.000)
(1.500)
LBUSTRUU Index
LC 1 - Corr=0.39
LC 2 - Corr=0.41
LC 3 - Corr=0.49
LC 4 - Corr=0.49
LC 5 - Corr=0.53
LC 9 - Corr=0.53
Dec-16
May-17
Oct-17
Mar-18
Aug-18
Jan-19
Jun-19
Nov-19
Apr-20
Sep-20
Feb-21
Jul-21
Dec-21
May-22
Oct-22
Mar-23
Aug-23

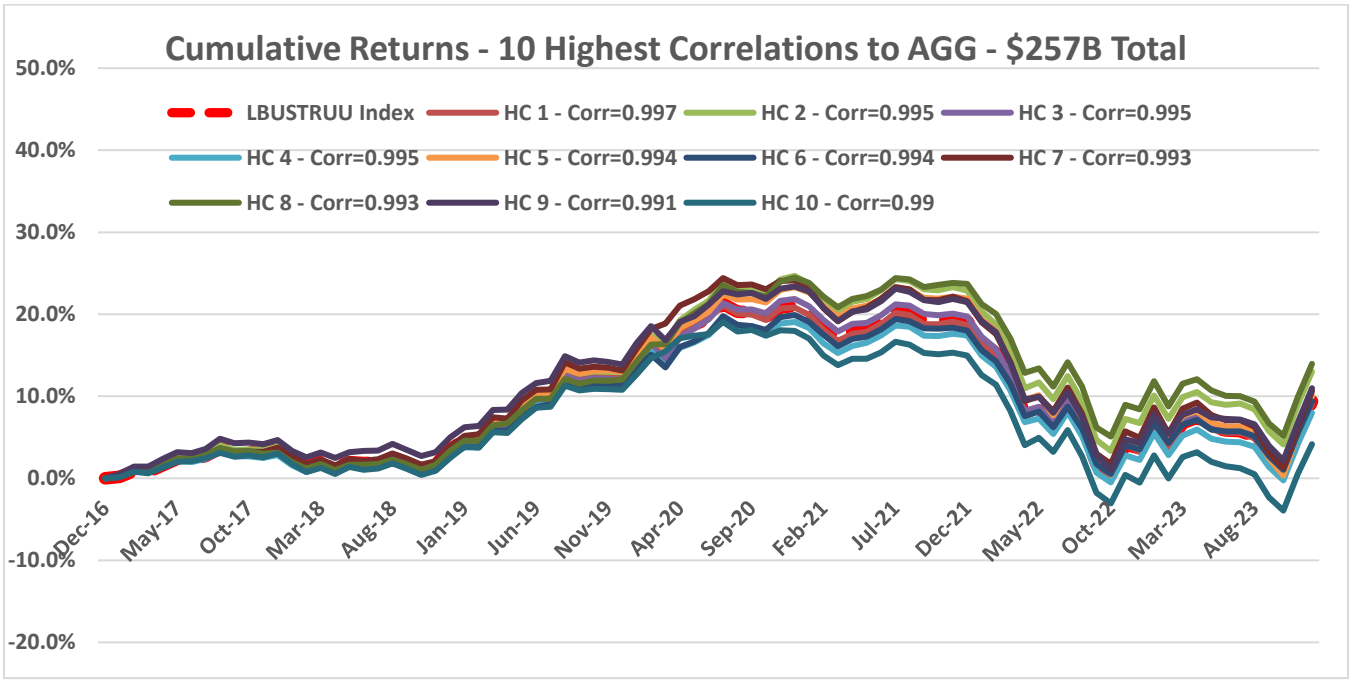

6-mo Correlations to AGG Index - 10 Highest Beta - $72B Total
1.500
1.000
0.500
-
(0.500)
(1.000)
(1.500)
LBUSTRUU Index
HB 1 - Beta=0.86
HB 2 - Beta=0.94
HB 3 - Beta=0.93
HB 10 - Beta=0.78
Dec-16
May-17
Oct-17
Mar-18
Aug-18
Jan-19
Jun-19
Nov-19
Apr-20
Sep-20
Feb-21
Jul-21
Dec-21
May-22
Oct-22
Mar-23
Aug-23

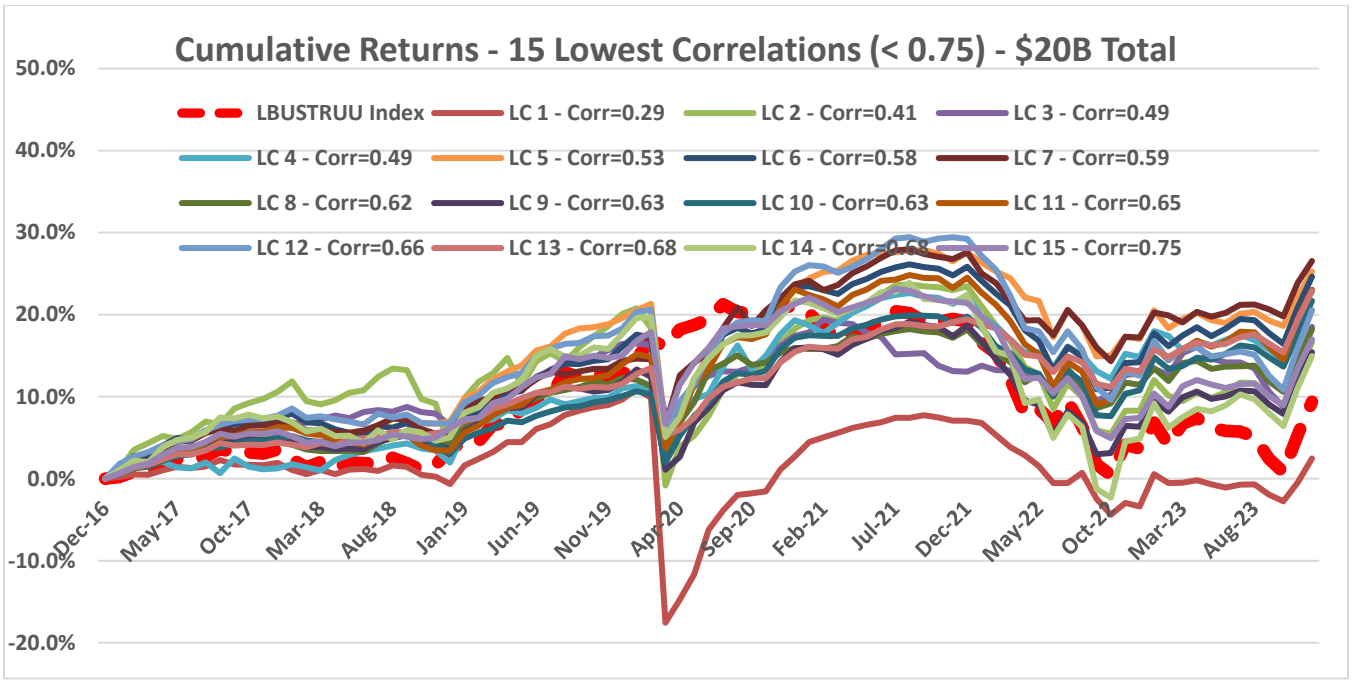

6-mo Correlations to AGG Index - 10 Lowest Beta - $19B Total
LBUSTRUU Index
LB 1 - Beta=0.44
LB 2 - Beta=0.53
LB 3 - Beta=0.54
LB 8 - Beta=0.65
1.500
1.000
0.500
-
(0.500)
(1.000)
(1.500)
Dec-16
May-17
Oct-17
Mar-18
Aug-18
Jan-19
Jun-19
Nov-19
Apr-20
Sep-20
Feb-21
Jul-21
Dec-21
May-22
Oct-22
Mar-23
Aug-23

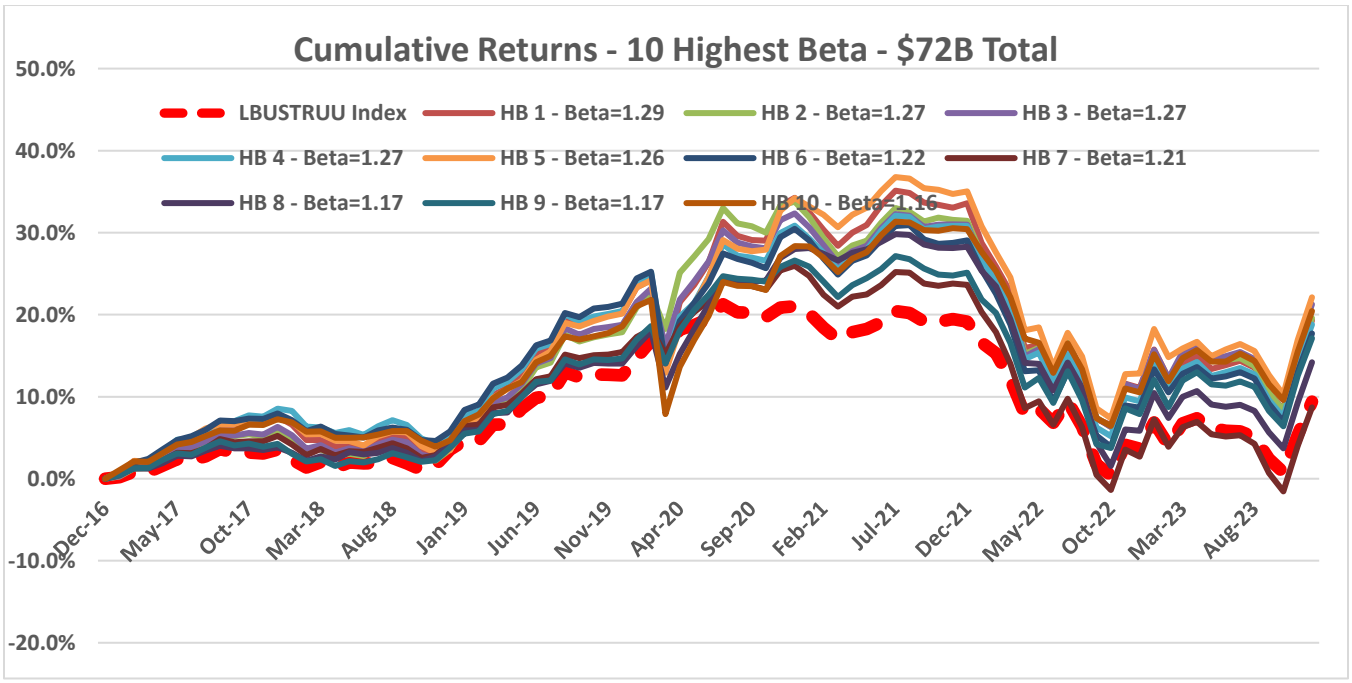

6-mo Correlations to AGG Index - 4 ARAM Active Model Portfolios
LBUSTRUU Index
ARAM MP1 Corr =0.48
ARAM MP20 Corr =0.55
WtAvg AGG Funds
1.20
1.00
0.80
0.60
0.40
0.20
-
(0.40)
(0.60)
Dec-16
May-17
Oct-17
Mar-18
Aug-18
Jan-19
Jun-19
Nov-19
Apr-20
Sep-20
Feb-21
Jul-21
Dec-21
May-22
Oct-22
Mar-23
Aug-23

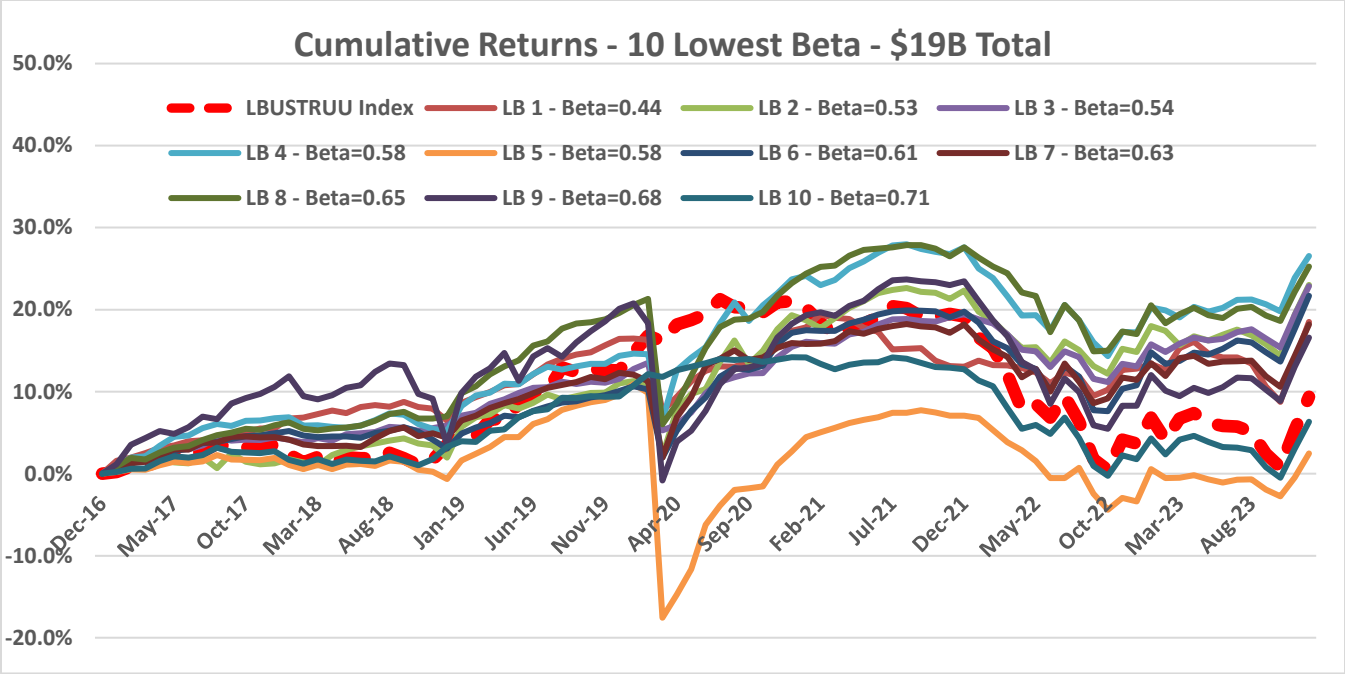
Cumulative Returns Comparisons

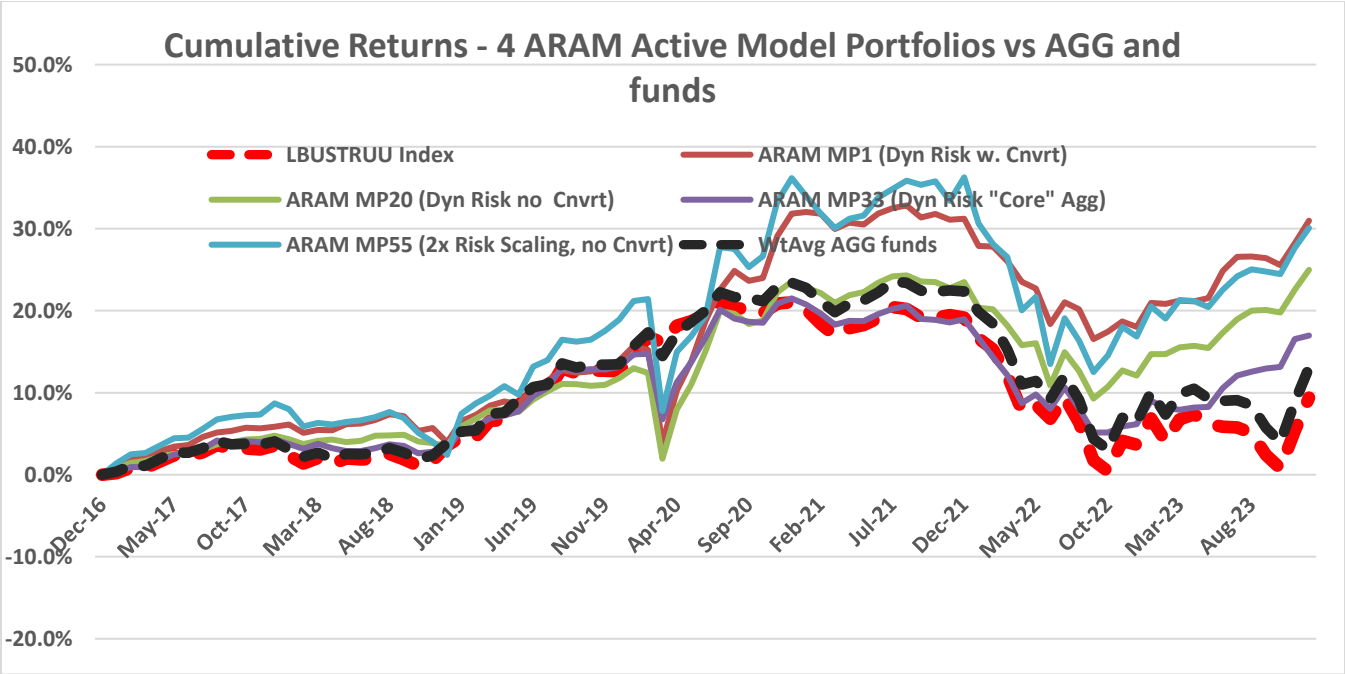





Cumulative Returns - 15 Lowest Correlations (< 0.75) - $20B Total
LBUSTRUU Index
LC 1 - Corr=0.29
LC 2 - Corr=0.41
LC 3 - Corr=0.49
LC 4 - Corr=0.49
LC 5 - Corr=0.53
LC 6 - Corr=0.58
LC 7 - Corr=0.59
LC 8 - Corr=0.62
LC 9 - Corr=0.63
LC 10 - Corr=0.63
LC 11 - Corr=0.65
LC 12 - Corr=0.66
LC 13 - Corr=0.68
LC 14 - Corr=0.68
LC 15 - Corr=0.75
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
-10.0%
-20.0%
Dec-16
May-17
Oct-17
Mar-18
Aug-18
Jan-19
Jun-19
Nov-19
Apr-20
Sep-20
Feb-21
Jul-21
Dec-21
May-22
Oct-22
Mar-23
Aug-23


Cumulative Returns - 10 Highest Beta - $72B Total
LBUSTRUU Index
HB 1 - Beta=1.29
HB 2 - Beta=1.27
HB 3 - Beta=1.27
HB 4 - Beta=1.27
HB 5 - Beta=1.26
HB 6 - Beta=1.22
HB 7 - Beta=1.21
HB 8 - Beta=1.17
HB 9 - Beta=1.17
HB 10 - Beta=1.16
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
-10.0%
-20.0%
Dec-16
May-17
Oct-17
Mar-18
Aug-18
Jan-19
Jun-19
Nov-19
Apr-20
Sep-20
Feb-21
Jul-21
Dec-21
May-22
Oct-22
Mar-23
Aug-23


Cumulative Returns - 10 Lowest Beta - $19B Total
LBUSTRUU Index
LB 1 - Beta=0.44
LB 2 - Beta=0.53
LB 3 - Beta=0.54
LB 4 - Beta=0.58
LB 5 - Beta=0.58
LB 6 - Beta=0.61
LB 7 - Beta=0.63
LB 8 - Beta=0.65
LB 9 - Beta=0.68
LB 10 - Beta=0.71
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
-10.0%
-20.0%
Dec-16
May-17
Oct-17
Mar-18
Aug-18
Jan-19
Jun-19
Nov-19
Apr-20
Sep-20
Feb-21
Jul-21
Dec-21
May-22
Oct-22
Mar-23
Aug-23


Cumulative Returns - 4 ARAM Active Model Portfolios vs AGG and funds
LBUSTRUU Index
ARAM MP1 (Dyn Risk w. Cnvrt)
ARAM MP20 (Dyn Risk no Cnvrt)
ARAM MP33 (Dyn Risk "Core" Agg)
ARAM MP55 (2x Risk Scaling, no Cnvrt)
WtAvg AGG funds
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
-10.0%
-20.0%
Dec-16
May-17
Oct-17
Mar-18
Aug-18
Jan-19
Jun-19
Nov-19
Apr-20
Sep-20
Feb-21
Jul-21
Dec-21
May-22
Oct-22
Mar-23
Aug-23

Appendix

Screening and Categorization of Active Fixed Income funds

'Active' Funds were identified using the Bloomberg FSRC (Fund Screener) tool. A number of sectors were eliminated through the screen. Inception date of 12/31/2019 and earlier was initially selected to provide sufficient returns data for statistical analysis. A minimum fund asset size of $100mm was chosen. An attempt was also made to eliminate duplicate 'retail' versions of funds with high loads and fees.

441,977 funds are globally identified as 'Active'. Of these, 8992 are US Fixed Income Funds. After using additional screening criteria, 563 Funds remained.

Currency conversion not selected

	Selected Screening Criteria	Matches
	Universe Criteria	1211329
11)	Market Status: Active	441977
12)	Fund Asset Class Focus: Fixed Income	108116
13)	Country/Territory of Domicile: United States	8992
14)	Currency: USD	8465
15)	Geographic Focus (Holdings Based): United States	5739
16)	Fund Strategy: -Municipals,-Bank Loans,-Preferred,-Convertible,-Inflation Protected	3204
17)	Fund Actively Managed = Yes	2570
18)	Inception Date <= 12/1/2019	2060
	Analytic Criteria	2060
19)	Fund Total Assets (mil) >= 100M	1802
20)	Front Load <= 0	1441
21)	Back Load <= 0	1206
22)	12b-1 Fee <= 0	862
23)	Early Withdraw Fee <= 0	563

To these, we added Fixed Income ETFs that are identified as 'Active' through a similar screening process.

Further manual screening was then done to remove additional retail funds, remove newer funds to roll back the inception date to 12/31/15 or older, closed funds, levered funds, money market funds, funds that primarily invest in other sectors such as EM and foreign bonds, and, with more fine tuning after reading fund descriptions and checking self-identified benchmarks, and Bloomberg's Holdings based fund focus, maturity, and durations, we are left with ~319 funds to analyze, including 5 passive ETFs that are generally considered Benchmarks. The total AUM is $1.65T.

More than half the funds seem to use their own unique Benchmark Index as well, some not available on Bloomberg, creating opaqueness (intentional?) about a given fund's relative performance vis-à-vis its benchmark.

For example, the funds initially selected specified 110 different indices! 118 of these specify the Lehman Agg index, LBUSTRUU. Even within the Aggregate category of 240 initial funds, there are a

total of 57 different indices. Of these funds, only half use 'LBUSTRUU' as their benchmark, and the majority of the indices have only 1 fund using it.

However, most of the indices are highly correlated, albeit with Beta differences, with High Yield having low correlation to the indices that are rates driven. We reduced the number of Benchmark Indices to 7 using statistical analysis, and have assigned a benchmark to each of the funds used in our study, that we believe best represents each fund's strategy, based on holdings, fund descriptions and high correlations, which might be different from the benchmark identified by Bloomberg (presumably from the Fund's documents).

Samir Shah

President and CIO
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Alpha Research and Consulting, LLC

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