The MBS "Income Factor"

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The MBS "Income Factor"

Factor based investing has become commonplace in Equities, with ETFs available for many factors. More recently, numerous Fixed Income fund managers have also started using equity factors, such as "Momentum", "Value", "Size", "Quality", "Yield" etc. for bond portfolio construction and investing.

Since 1994, we have been using what would today be called an "Income Factor" to identify MBS with high returns, and have built an MBS strategy that uses this factor for portfolio construction. We use the High Income subset of the MBS Income Factor for our strategy – the "MBS High Income Factor".

Our core insight has been that MBS are not a "Fixed Income" securities, but rather are a "Variable Income" securities.

Treating MBS as Variable Income securities leads one to investigate the Income available in MBS, and to construct portfolios whose returns are dominated by High Income Returns. Such High Income portfolios exhibit some very interesting and desirable characteristics:

- **Low Betas** to most benchmarks, including Fixed Income benchmarks, over long periods
- **Low R-squareds and correlations**
- **Unstable Betas** to most benchmarks over short periods, identifying High Income MBS as a **new absolute return asset class**
- **Returns distributions with positive Skewness** – positive Income returns dominate normally distributed price returns, resulting in a positive skew to total returns
- **An ideal diversifier** for portfolio allocation strategies
- **Inherent Capital Protection**
- **Higher Income Returns than "market yields", with similar "Price Returns" as other MBS – in other words, Alpha from High Income**
- **Compounding at High Income rates through reinvestments**

Sections: **Page**

I: What is "MBS Income"?

For many market participants who have been trained to believe that all bonds are "Fixed Income", the concept of MBS as "Variable Income" bonds is foreign, to say the least. **This insight, that MBS are "Variable Income Securities", is arrived at by deconstructing the core investment concept of Total Return.**

Total Returns are typically attributed to two factors - Return from Price Change and Return from Income. For most Fixed Income bonds, such as corporate bonds or US Treasuries, the Return from Income is correctly understood to be a function of coupon interest and price, and is approximated by "Yield". Variation in returns for Fixed Income bonds usually arise from differences in Return from Price Change, and **most investors focus on Price Change**, either through active duration management, or by looking for spread compression.

MBS returns derive from many additional factors besides the returns from coupon or price change. The cashflows in MBS are not stable, either creating additional return, or offsetting return from interest, as these additional factors impact MBS cashflows dramatically, both positively and negatively.

Many investors think that prepayments and credit losses are the extent of cashflow variation in MBS, and much effort is expended in MBS Research to identify and model the loan characteristics that impact MBS prepayments or borrower credit. Examples of such characteristics are loan sizes, FICO scores, geography, type of loan, loan size, LTV, size of servicer, shelf name, shelf type (bank or third party originator), seasonality, etc.

I spent much of the early 1990s as head of the MBS Strategies group at Nomura trying to improve MBS models and explain MBS return volatility through identifying and modeling additional factors, as MBS models were not good predictors of MBS returns. As an industry, we did not (and still do not) even have consensus on the duration of our benchmark Agency MBS duration. It is during this period that I had the epiphany that MBS is not Fixed Income, and developed the framework and tools to systematically identify MBS Income.

Single factor analysis is easily understandable – for example, fast prepayments on a discount bond should result in higher returns from cashflow. Usually most single factor events get priced in by the market, and so discount MBS like POs will go up in price as interest rates decline (and prepayments are expected to speed up), and IOs will appreciate when rates rise and prepayments are expected to slow.

Unfortunately for most MBS investors who view MBS with a Fixed Income lens, **there are many other factors that distort MBS cashflows,** and thus returns from cashflows. These make MBS risky when viewed as corporate bond substitutes. **More importantly, these factors interact with each other at the return level to create unstable cashflow events and volatile returns.** Factors such as severities, call exercises, yield maintenance payments, subsequent recoveries, settlements, changes in servicing, other cashflow shortfalls (from servicer

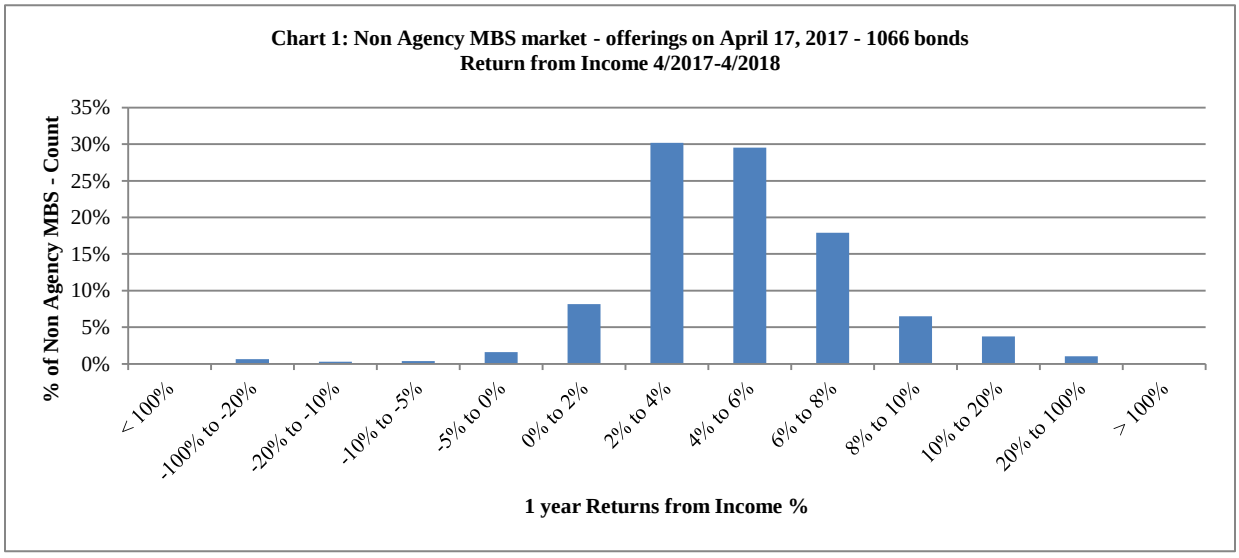
misbehavior, curtailments, rate modifications, loan forgiveness, loan extensions), etc., all change the return performance of MBS.

As an example of such interactions, there are many discount bonds that do not receive sufficient cashflow to generate much income, in spite of fast voluntary prepayments from many loans in the deal, as other loans in the same deal are defaulting with high severities at the same time, reducing the cashflow and offsetting the return from prepayments. Such interactions make bets on single factors non-durable. One could, in theory, compute the attributions of returns for each of these additional factors, not an easy task, and one that I have found is not of much use for making investment decisions.

To allow for comparison to other Fixed Income and Equity Products, we reduce this factor attribution process into the two main attributes of Total Return. There are two steps. First, we isolate the Return from Price Change from the Total Return of the bond in a given period, which is easy to do. **The remaining return is thus the Return from Income for MBS** (we previously called this "Return from Cashflow")**, and is the aggregate remaining return from the netting of the return attributions from the multiple factors that impact the MBS' cashflows during a given period, after subtracting the Return from Price**.

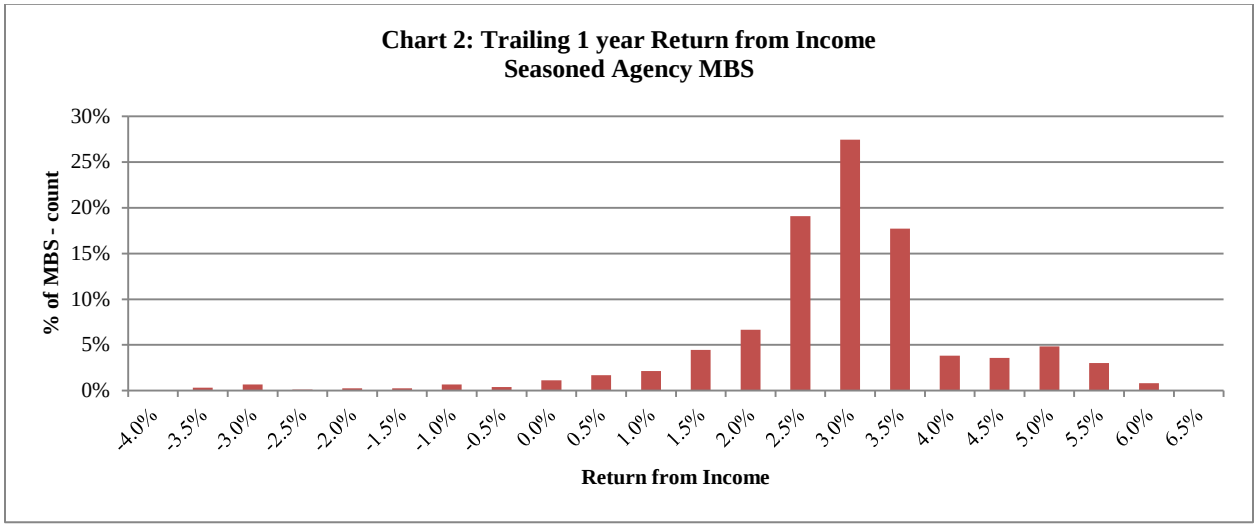
It turns out that MBS Income Returns vary in time for the same bond, and also vary between two similar bonds that markets (and models) view as substitutes, making similar bonds have very different Income returns. Below, in Case Study 1, we show some examples.

There is a very wide range of Income available in the MBS market. We have found that the resulting distribution of Income available in secondary market MBS is similar at different points in time. Chart 1 shows the realized 12 month Income returns for all Non-Agency ("NA") MBS offered on a random day in the MBS market, and is indicative of the MBS Income distribution available in the MBS market on almost any day.

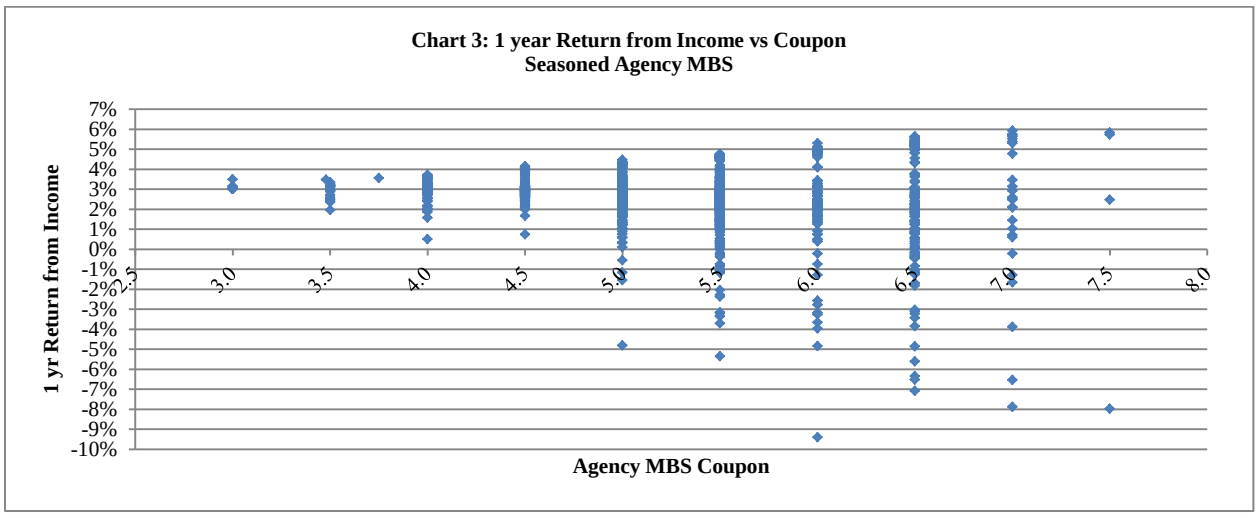


Approximately 60% of MBS generate Income similar to "market yield" of 3% to 4% - what we call "Average Income". **More importantly, there are a significant quantity – ~30% - of bonds available in the right tail of the distribution - "High Income MBS".**

The next graph shows the distribution of Income for Agency MBS. There were over 17,000 Agency MBS pools offered on 2/27/18, too many to be analyzed with our limited data Bloomberg license – we would hit our monthly data limit immediately. We arbitrarily limited our analysis to 1484 seasoned 30 year MBS pools, with maturities ("WAMs") ranging from 225 to 260 months, and prices ranging from $96.8 to $121.8. Coupons ranged from 3% to 7.5%.



High Income can be found in Agency MBS too! The next graph shows that there is no consistency of Income by coupon in Agency MBS. If anything, Income risk (and the opportunity) increases as coupons go up and durations shorten.



We focus on the Non-Agency MBS markets as we are seeking the highest Income possible. Non-Agency MBS have the widest distribution of Income within the various MBS sub-sectors.

Relationships between MBS Income and Credit Factors

In corporate bonds, higher yields and coupons are usually associated with higher credit risk and lower ratings. This is not the case in MBS. **With secondary market NA MBS, we find no stable relationships between high Returns from Income and factors such as Ratings, Coupon or Credit Scores (ie collateral type – Prime, Alt-A or Subprime).**

Chart 5: Return from Income vs NA RMBS Rating (Moodys)
(limited to +10%)

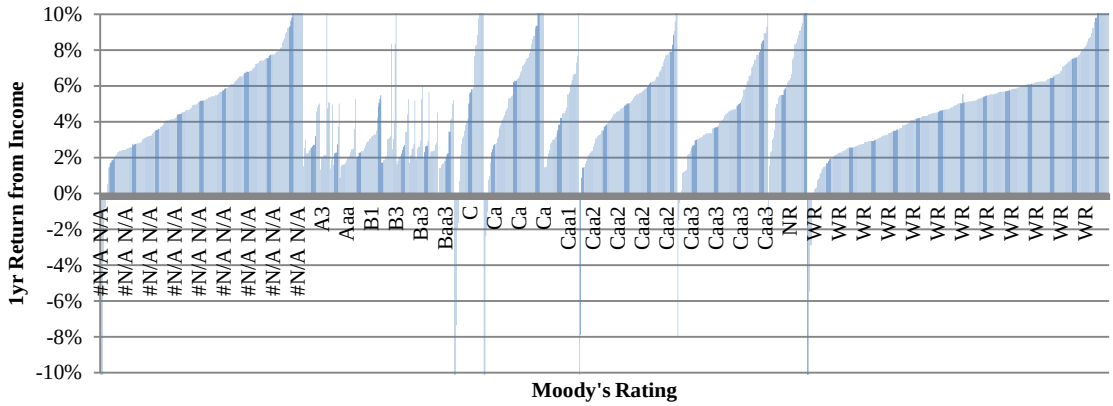
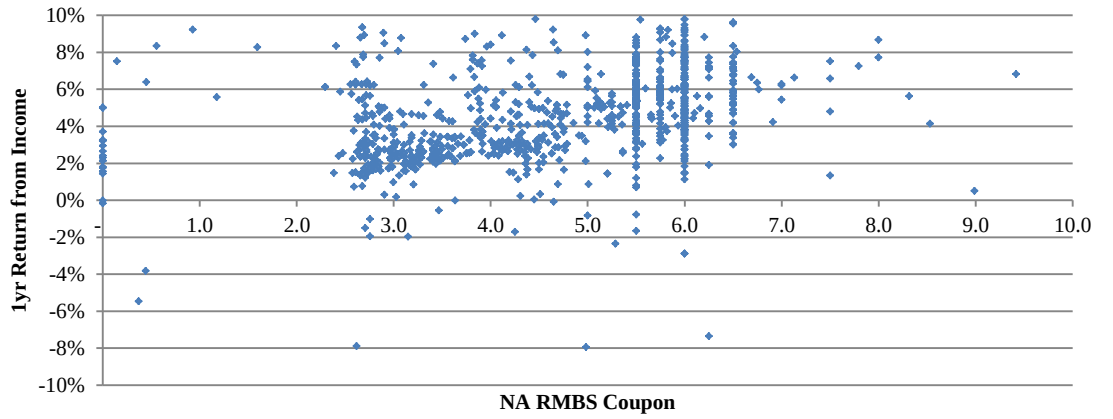
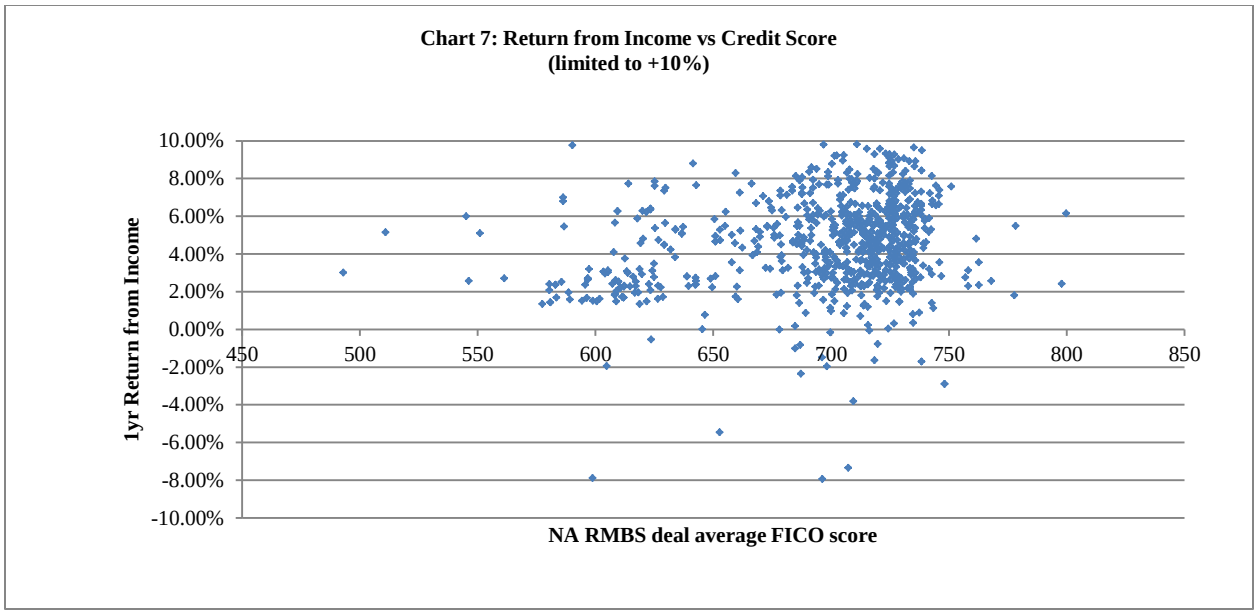


Chart 6: Return from Income by Coupon
(limited to +10%)





II: MBS Income Case Studies – Competitor Funds and Specific MBS examples

We believe that most MBS investors are not aware of the wide Income distribution in MBS, and end up owning MBS portfolios with an Income distribution that resembles the market's Income distribution – ie not significantly different than random purchasing of bonds. The following graph is from our March 2019 newsletter, where we performed an analysis and deconstruction of the MBS Income profile of the MBS holdings of five different MBS or Income funds with high MBS percentages, ranging in size from $700mm to $118b.

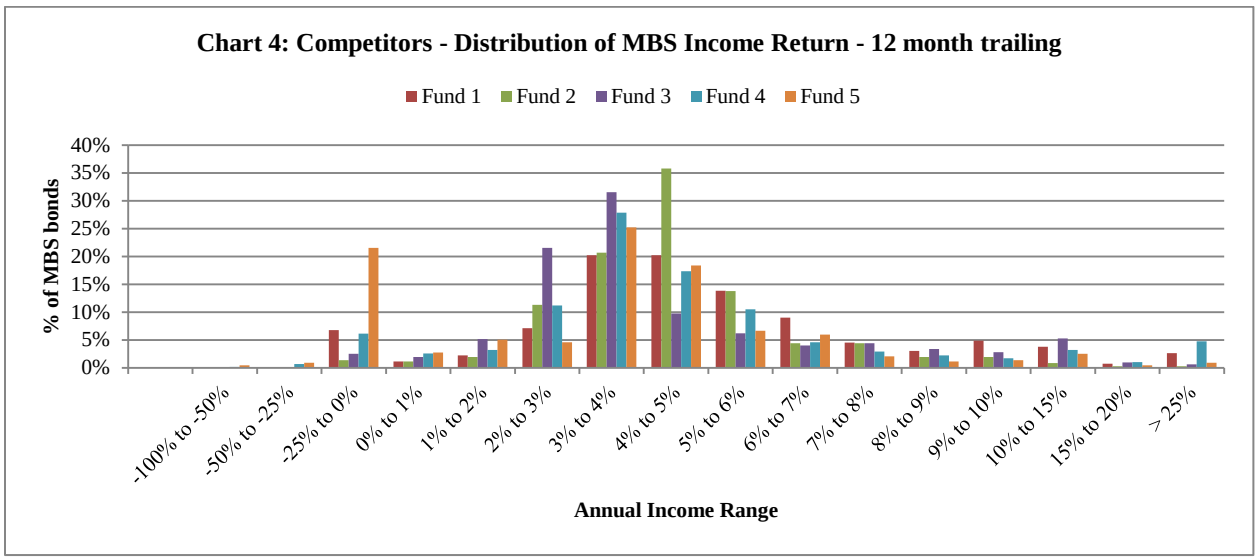


Table 1 shows the extent of Credit-levered MBS used by the various funds to generate Income, and the average Income and Coupon of each fund.

Table 1: Income, Coupon and levered Credit exposure

	Avg. MBS Income	Avg. Coupon	% Mezz	% Subs
MBSM	**10.1%**	**4.9%**	**0.0%**	**0.8%**
Fund 1	5.6%	5.7%	21.0%	34.8%
Fund 2	4.3%	4.4%	23.1%	35.8%
Fund 3	4.3%	3.9%	12.0%	1.2%
Fund 4	3.4%	4.0%	50.1%	15.1%
Fund 5	2.1%	3.7%	85.5%	9.5%

In our opinion, none of the five portfolios analyzed are based on the Income Factor, and four of the five "chase" income and yield through significant bets on Credit leverage. This is also evidenced in the Income distribution above – **the quantity of bonds in the negative Income buckets reflects credit losses**.

By contrast, we believe plenty of MBS Income is available in the secondary markets in senior bonds, and we feel no need to take on additional Credit leverage. Using the High Income Factor allows us to have less than 1% of our portfolio is in Credit levered securities.

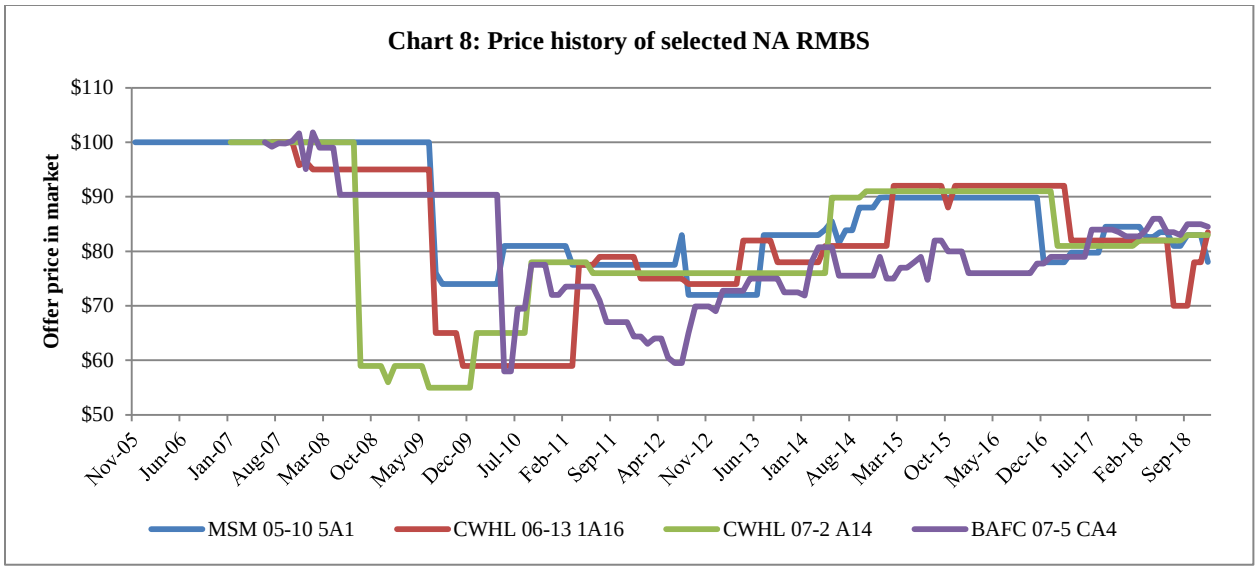
Case Study 1 - similar bonds with different Income Return results

We have selected four Alt-A bonds from our 4/17/2017 Non Agency market run that appear similar, with similar prices.**The graphs and tables show that each bond's Income Return varies in time and is also different from the other bonds.**

Table 2: Parameters and returns for similar MBS

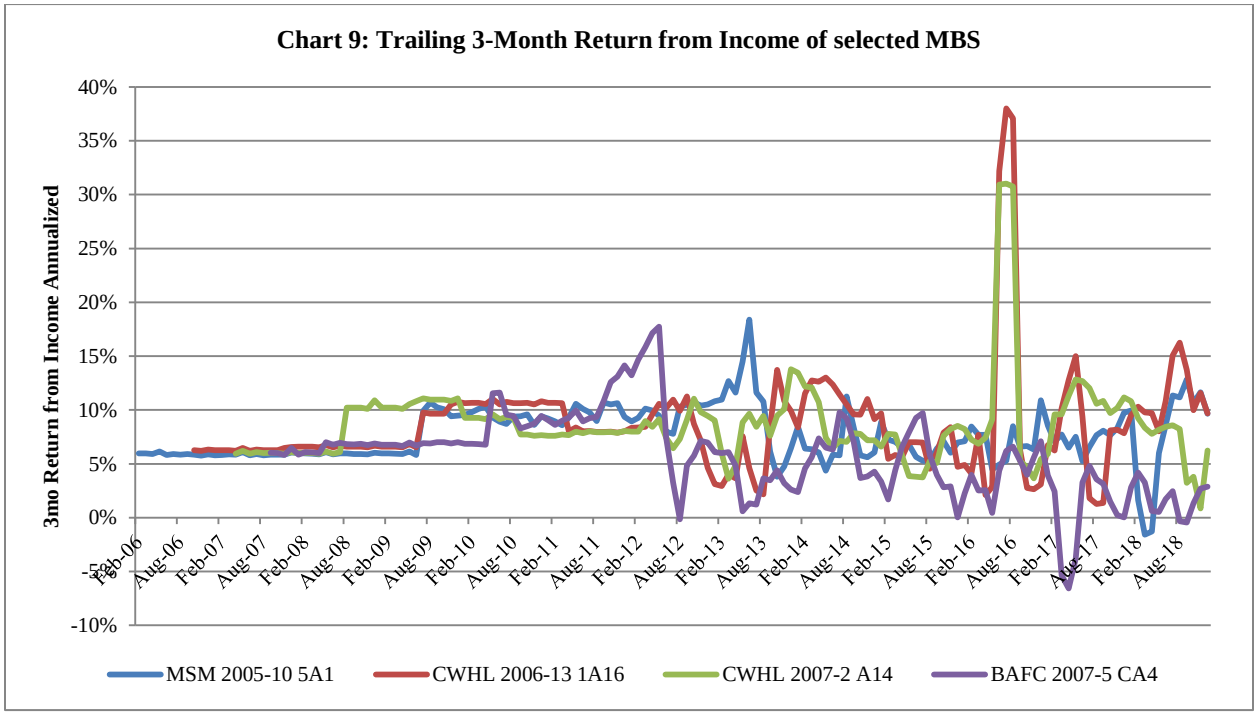
Name	MSM 05-10 5A1	CWHL 06-13 1A16	CWHL 07-2 A14*	BAFC 07-5 CA4
Coupon	**6.00%**	**6.25%**	**6.00%**	**6.00%**
Collateral Credit Score 12/2018	**700**	**746**	**739**	**696**
Rating 12/2018	NR/WR	WD/Caa3	WR/NR/NR	WD/NR/WR
Structure	Fixed Senior	Fixed Senior	Fixed Senior	Fixed Senior
Price on 4/14/17	**$79.75**	**$82.00**	**$81.00**	**$79.00**
Income Return 4/17 - 4/18	**5.9%**	**6.6%**	**9.5%**	**2.9%**
Issue Date	11/28/2005	7/27/2006	1/30/2007	6/29/2007
Total Return - Issue to 4/14/17	38.4%	39.3%	35.2%	18.7%
Annualized Total Return	**2.9%**	**3.1%**	**2.8%**	**1.5%**
Last Price 2018	$78.06	$83.50	$84.50	$84.50
Total Return - 4/15/17 to 12/31/18	11.3%	14.2%	16.3%	10.8%
Annualized Total Return	**6.4%**	**7.9%**	**9.1%**	**6.1%**
Annualized Price Change Return	**0.9%**	**0.7%**	**1.8%**	**3.1%**
Annualized Income Return	**7.3%**	**7.1%**	**7.3%**	**3.0%**

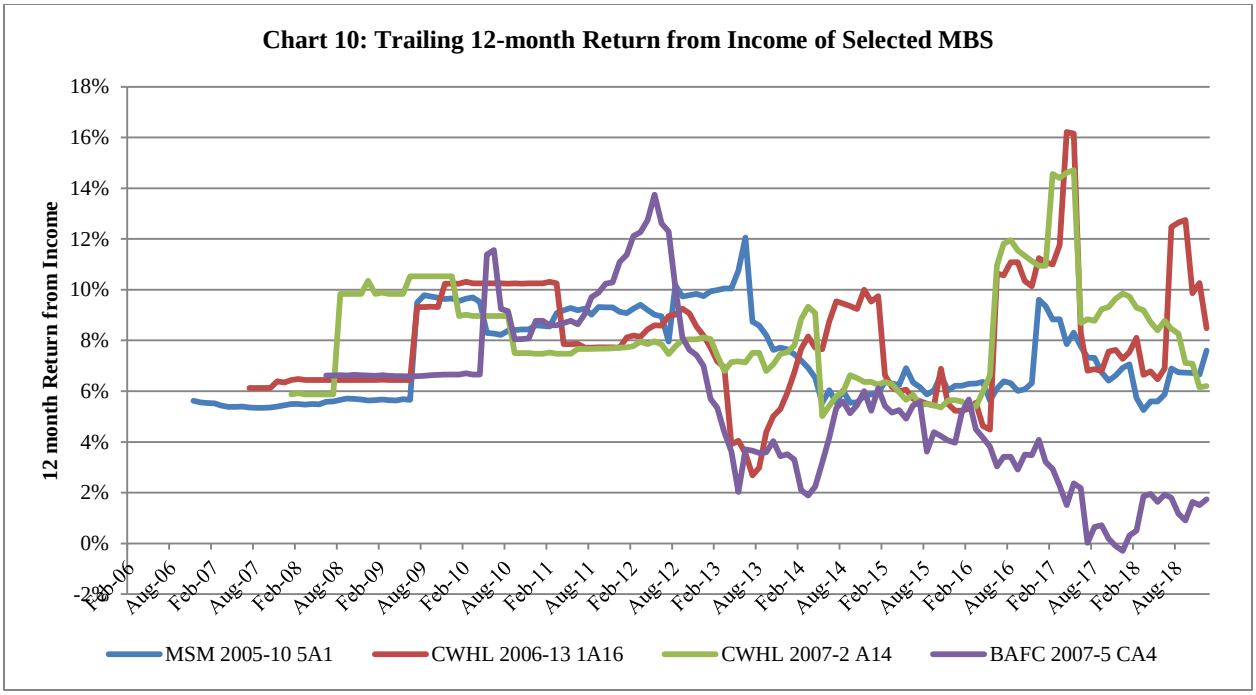
***Note: We own other parallel bonds from the CWHL 2007-2 deal with identical cashflows to the A14 tranche used here**
All returns computations assume a 0% reinvestment rate – over long periods this underestimates return
Prices should be viewed as indications - bonds trade in wide price bands with trades rarely occurring at the "marks"



The prices of these similar bonds have mostly moved in tandem, especially over the longer period since the Crisis, and is similar for the first three bonds even over shorter periods.

Unlike other fixed rate bonds, Income Returns from MBS can vary over time, with a significant range, and differ from each other. The next charts show the 3-month and 12-month Income Returns for these otherwise-similar MBS.





We selected Alt-A bonds that are similar, to demonstrate that Income Returns differ between even similar MBS at different points in time, and to show evidence that RMBS bonds go through periods of high and low income.

Differences that are even more dramatic can be seen when comparing these with other types of bonds, such as Subprime bonds, or subordinated/mezzanine credit-levered bonds.

Case Study 2 – demonstrating the interaction of Factors behind variable Income Returns

The example used is a 2006 vintage bond we have owned since 12/2016, and have purchased numerous times – we have chosen not to identify it, as it is still available in the market in size, and we keep reinvesting into it.

Chart 11 shows the price history of the selected MBS and the LTVs of the underlying mortgage loan collateral. The price has been in a range in spite of credit curing after 2012, even as housing recovered and LTVs (Loan to Values) started declining in 2012.

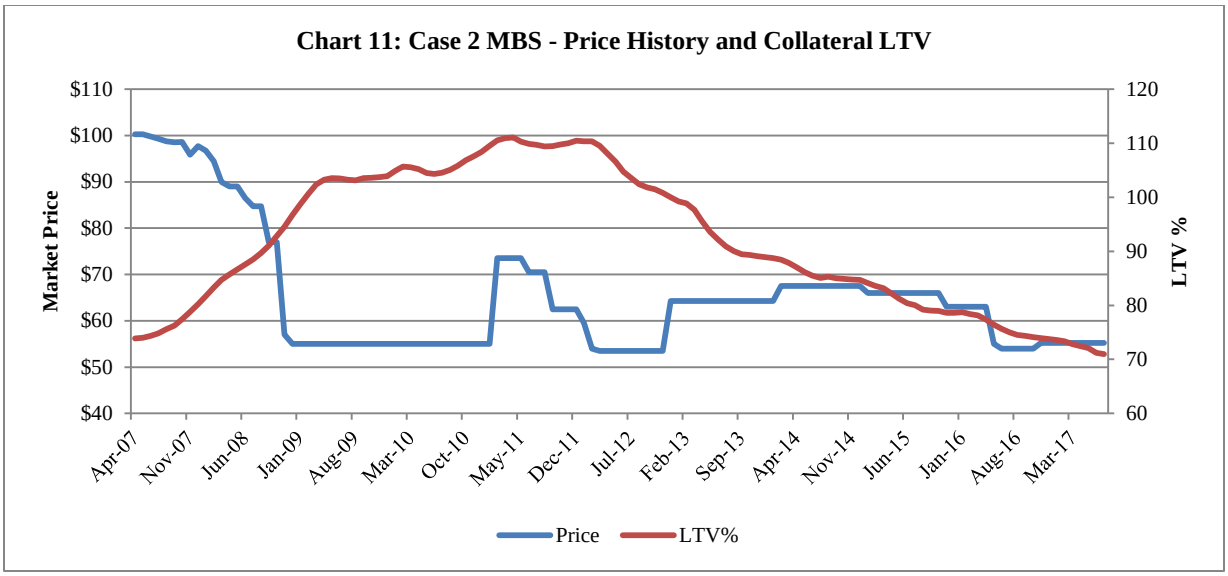
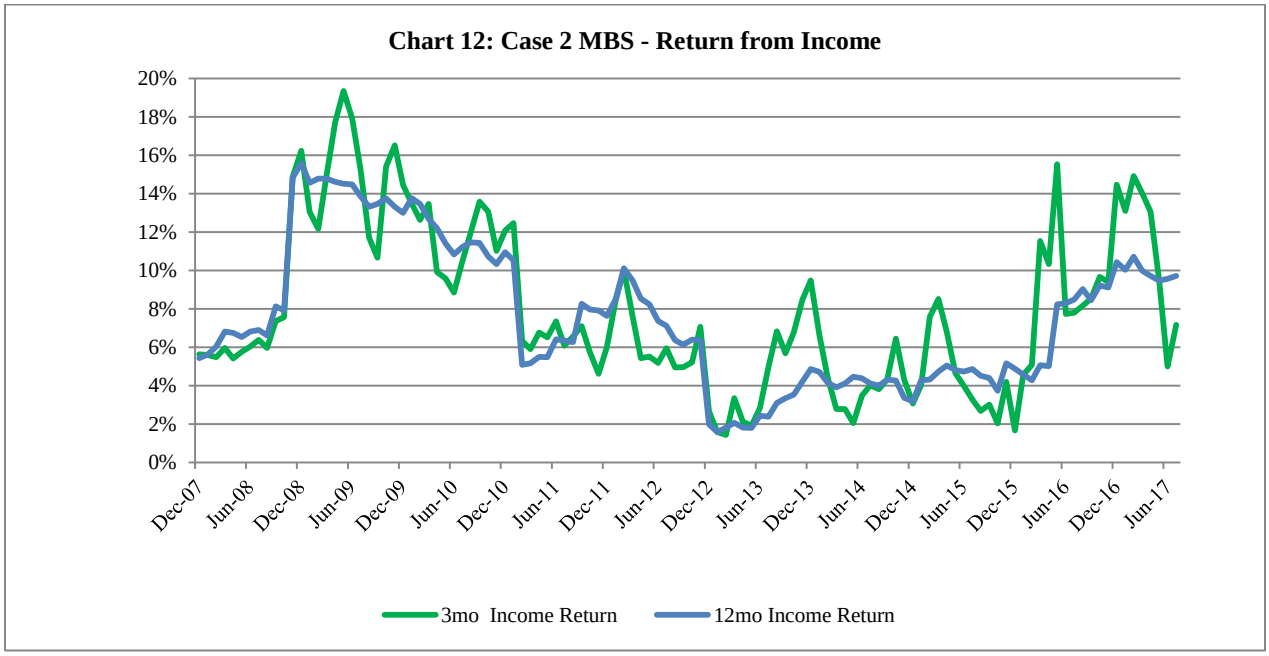


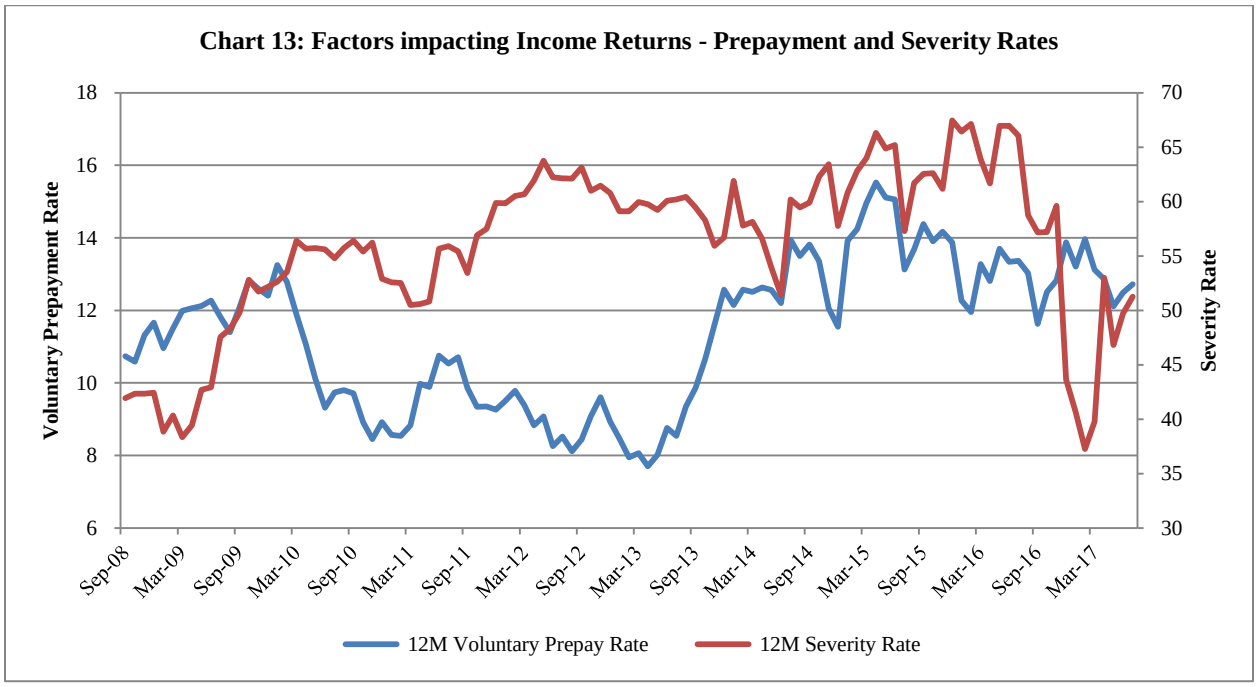
Chart 12 shows the Return from Income of this bond over time. Income picked up in 2008 when the price declined, but then started declining as LTVs went up between 2009 and 2012 in spite of stable prices. **Surprisingly, Income remained low between 2012 and 2015**, in spite of credit curing that started in 2012 that resulted in declining LTVs. **Income finally recovered in 2016, and the bond switched to a High Income state (**Income > 6%).

MBS income varies over time.



A closer look at some of the underlying factors explains why Returns from Income remained low after 2012, and why they picked up in 2016.

The chart below shows that Prepayments (blue line) spiked in 2013 as the markets recovered and LTVs declined, as would have been expected. With the bond price ranging between $50 and $70, and prepayment rates between 12 cpr and 15 cpr, one would have expected Income to have gone up in 2013.



The rise in loan Severities (red line) in 2009 explains why Income declined between 2009 and 2012. However, in spite of LTVs starting to decline in 2012, Severities on delinquent loans remained high till 2016, as the pipeline of loans in the foreclosure process had not cleared. (Numerous other factors culminate in Severities). The losses from severities offset the positive return benefits of prepayments. It was not until severities finally declined in 2016 that Income spiked to over 10%, and both factors started working together! This also explains why a single factor bet on prepayments from housing recovery placed in 2013 would not have worked for 3+ years, with significant opportunity cost, as average income remained below 5% till 2016.

MBS are complicated instruments, with many variables and factors impacting cashflows simultaneously. It is the interaction of multiple factors – in this case Prepayments and Severities – that primarily determines the Return from Income realized for MBS at a given point in time.

III: Exploiting the MBS Income Factor – building portfolios of High Income MBS

We do not believe that other MBS and Fixed Income managers have discovered the MBS Income Factor, as their MBS portfolios and returns do not exhibit the High Income, low Betas, and positive Skewness that characterize MBS High Income portfolios. For this reason, we use MBS Mantra's High Income Strategy's process and portfolio returns to illustrate the potential benefits of this factor.

At MBS Mantra, we use a systematic process to identify the current state of MBS Income of all the MBS offerings in the market – High (>6%), Average (3% to 5%), or Low (<3%).

We further screen each High Income MBS by identifying the primary drivers of its Income status, (which is sometimes the absence of a driver that is adversely impacting other MBS), and identify bonds with stable High Income trends – **The "High Income Factor"**. **By tracking trends in Income Returns, and identifying the factors behind changes in Income Returns, it is possible to build portfolios of High Income MBS that defy "market yields"**.

Through sizing and diversification, we create portfolios with stable High Income. The majority (88% in Dec 2018) of our aggregated portfolio has Income over 6%, averaging 8% to 10% annualized in any given month, even though the monthly and quarterly income of each bond varies significantly over time.

We systematically cull Low Income MBS from our portfolios (when Income declines), while reaping High Income from the remaining portfolio. We reinvest both cashflows from MBS as well as cash from sales into more High Income MBS, at reinvestment rates that are significantly greater than "market yields" – **we compound at High Income rates**! The combination of High Income and continuous reinvestment and compounding automatically makes such an MBS portfolio defensive, with low Betas to other bonds and sectors, and also protects capital.

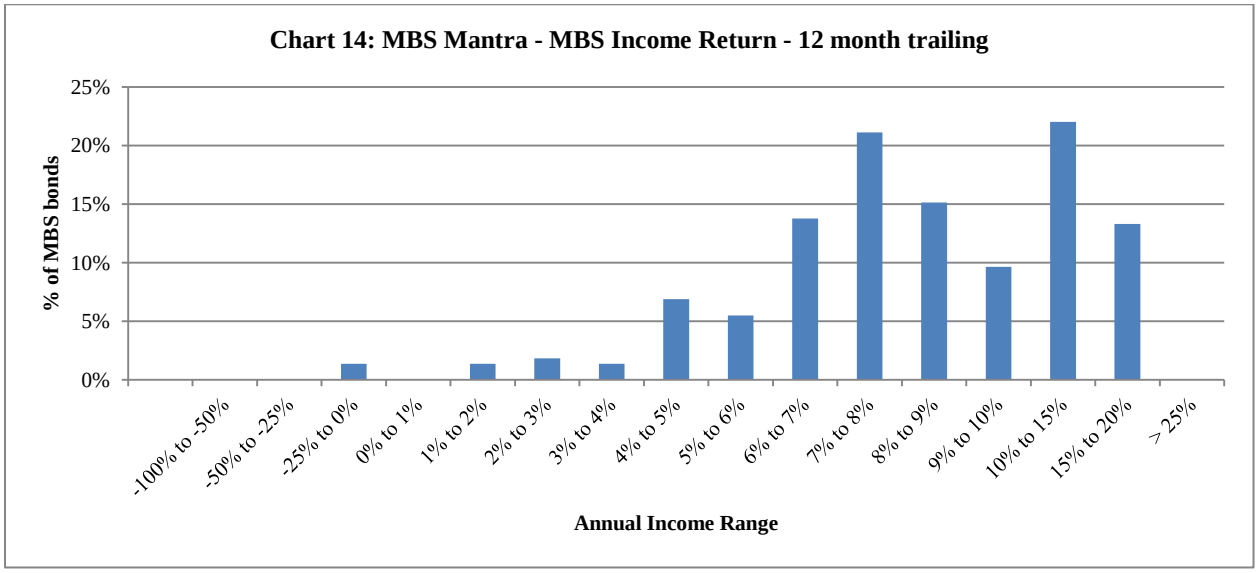
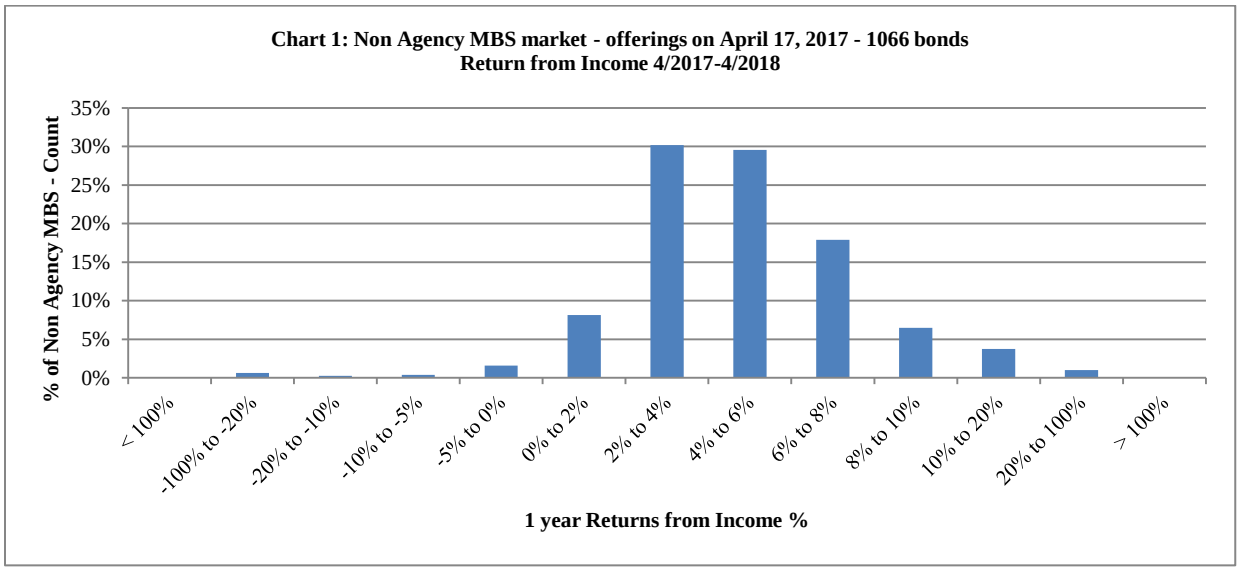


Chart 14 above shows the resulting distribution of 12 month Income for MBS Mantra's portfolio – we harvest the right tail of the market MBS Income distribution (Chart 1 repeated below), with only a very small percentage of the portfolio in the 'left tail'.



Our process and strategy was initially identified in 1994 as a secondary market "arbitrage finder", when I realized that models could not capture MBS returns or identify return risk, and excess returns were available to be found in the secondary MBS market.

The most common drivers of durable MBS High Income are:

(a) **secondary market reverse "CMO arbitrage"** – where the prices (and value) of all the bonds in a deal do not add up to the market price/value of the collateral, usually where an incorrect - too high for the risk - discount rate is used to price an individual bond due to (c) below. This is usually due to the lack of a "natural buyer" for the mispriced MBS.
(b) **"document arbitrage"** – where prospectus reading will result in the use of different inputs and scenarios than typically used to model returns and identify risk
(c) **incorrect evaluation of projected cashflows** resulting in lower "yield" estimates

All three types of arbitrage are represented in our portfolios, partially explaining our low turnover – we let such bonds "run" and usually mature. An arbitrage identified is 1994 is still active, and is a part of our portfolios.

I would recommend reading ***NBER working paper 5167, 'The Limits of Arbitrage', Shleifer and Vishny, July 1995,*** for some insights into why arbitrages persist in markets with limited participants, such as MBS.

It is for this reason that we have dubbed the MBS sector as "Variable Income Securities", and believe it to be a separate asset class from 'Fixed Income Securities'. The statistics and analysis in the next section will demonstrate this.

IV: MBS High Income Strategy Betas to Benchmarks

In this section we compute Betas of the MBS High Income strategy, and compare them to the Betas of some other MBS and Income funds. This strategy should fit the need of most allocators for "uncorrelated alpha generating strategies", as **it creates both a portfolio diversifier and risk reducer, but is also a standalone absolute return strategy.**

Table 3 below shows the Beta, and strength of the relationship, of MBS Mantra's monthly Gross returns ("MBSM") to four benchmark indices. Computations use regressions on monthly returns from 11/2014 to 9/2019.

The four Benchmark Indices used are:

- "Barclays AGG": Bloomberg Barclays US Agg Total Return Value Unhedged USD Index
- "Barclays MBS": Bloomberg Barclays US Securitized: MBS/ABS/CMBS and Covered Total Return Unhedged USB Index
- "Barclays HY": Bloomberg Barclays US Corporate High Yield Total Return Value Unhedged USD Index
- "S&P 500": S&P 500 Index

Table 3: MBSM Long Term Betas to Benchmarks

MBSM Gross Monthly Returns vs	Barclays AGG	Barclays MBS	Barclays HY	S&P 500
Beta	0.39	0.39	0.06	(0.02)
Alpha (monthly)	0.6%	0.6%	0.7%	0.7%
R-Squared	0.12	0.06	0.01	0.00
Correlation	35%	24%	10%	7%

Charts 15-18 below allow one to visualize these relationships. The slope of the 'fitted line' of the scatterplots is the "Beta" of the relationship, and the intercept to the vertical axis is the "Alpha". **The scatterplots emphasize the low R-Squareds of these relationships, suggesting that the Beta's are almost meaningless.** (We are not addressing Alpha in this analysis, but will simply note that is positive versus all the benchmarks.)

What should stand out is that, while the data on X-axis (benchmark) in each graph is more-or-less normally distributed, the data on the vertical Y-axis (MBSM) are heavily skewed to positive returns (above the X-axis), and that there are few MBSM returns in the lower left quadrants of each chart.

The positive Skewness and low Betas of the MBSM distribution are a direct consequence of the usage of the MBS High Income Factor.

Academic research has shown that prices are normally distributed. Most market returns and strategies depend on Returns from Price Change for the majority of their Total Returns, resulting in the expected normal distributions of returns for most benchmarks.

High Income MBS, on the other hand, offset and buffer negative Returns from Price downturns, and are additive to positive Returns from Price during rallies, resulting in the skew towards positive returns (along with lower drawdowns, when drawdowns occur). (Skewness is computed in the next section.)

Chart 15: MBSM vs Barc. AGG Index

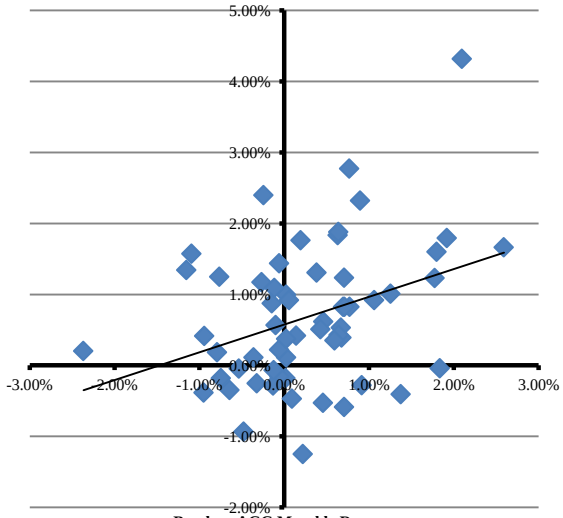


Chart 16: MBSM vs Barc. MBS Index

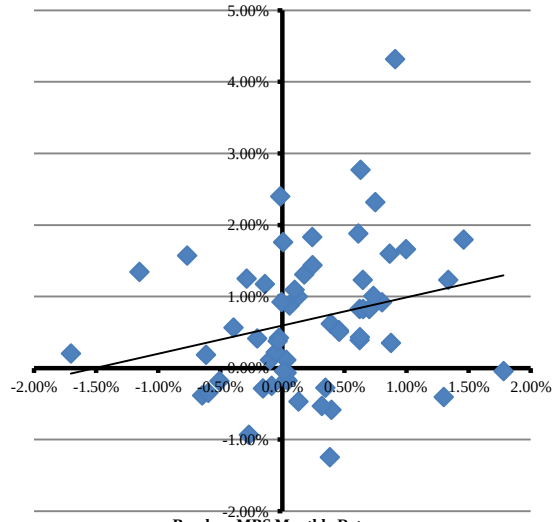


Chart 17: MBSM vs Barc. HY Index

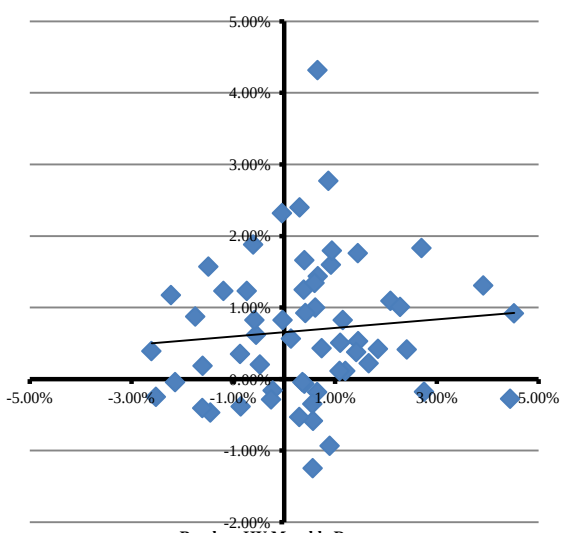
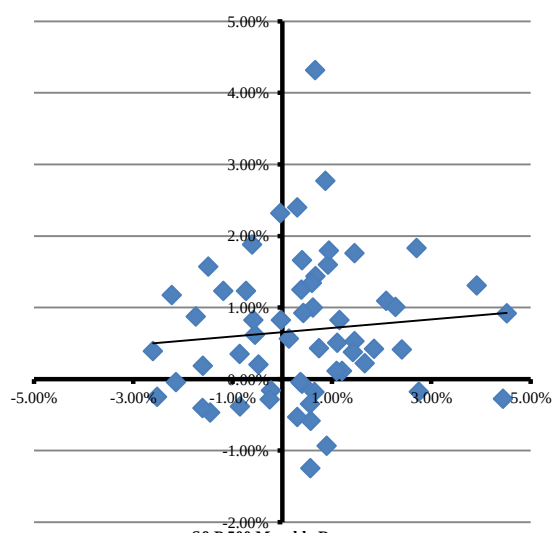
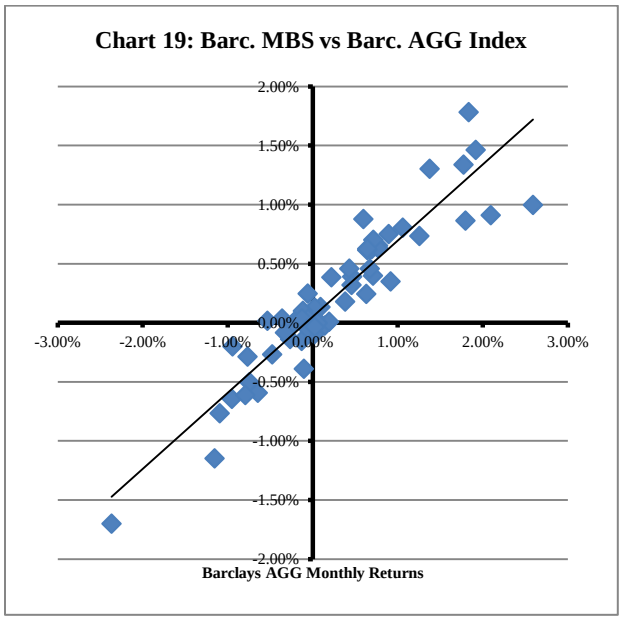
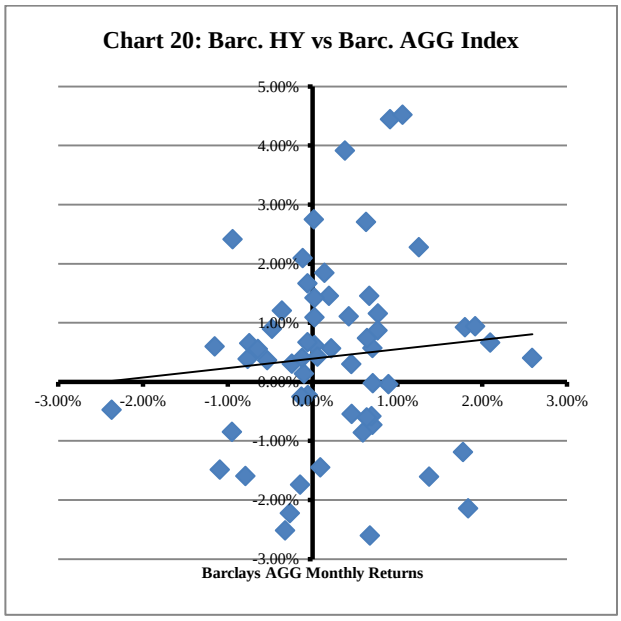


Chart 18: MBSM vs S&P 500



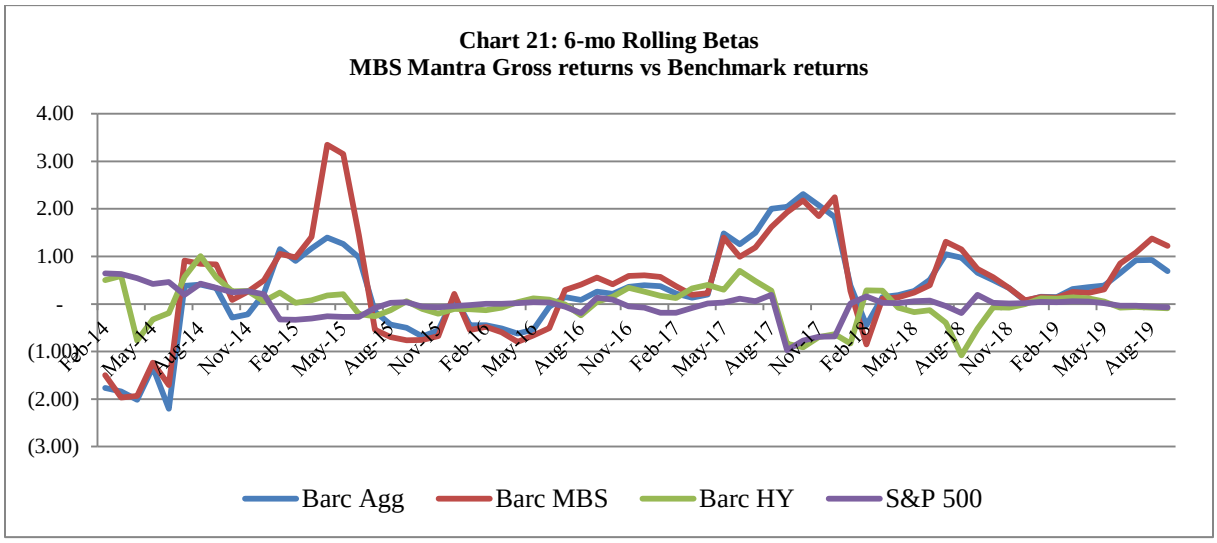
Charts 19 and 20 show the returns of the MBS Index (high Beta) and the HY Index (low Beta) vs the AGG as examples of relationships and return distributions that are more 'normal' in both axes, as returns for both benchmarks are dominated by Return from Price.





Rolling Betas

Table 3 on page 14 shows long term Betas of MBS Mantra's returns to various benchmarks. Chart 21 below shows that the Beta's are not stable over shorter periods, even to fixed income benchmarks.



The implication of this Beta volatility is that portfolios built using the MBS High Income Factor are not inherently hedgable by any benchmark financial instrument, including

other MBS. This can only be viewed as either a new asset class or as an Absolute Return strategy.

MBS High Income portfolios inherently solve for the investment problems of 'Too Little Income' and 'Too Much Beta'!

V. A New Absolute Return Strategy?

The rolling Beta's graph shows periods in which MBSM's returns exhibit offsetting Betas to the High Yield/S&P pair and the AGG/MBS pair, suggesting a "credit exposure" to the returns. This led us to investigate if our strategy and portfolio could be replicated by (and thus hedged with) an AGG/S&P portfolio, an AGG/HY/S&P portfolio, or a AGG/HY portfolio.

The results of three regressions indicate that the MBS Mantra High Income Strategy has some limited exposure to rates (AGG), and is different from High Yield and Equity credit exposure.

This supports **our thesis that an MBS High Income portfolio can be viewed as a new diversifying asset class that can complement the typical bond+equity portfolio allocation**. Even if you view MBS as Fixed Income (which we do not), at the very least, this is the investment strategy within the MBS market that captures Alpha in MBS.

Regression 1: MBSM vs Barc Agg/Barc HY/S&P500

	Coefficients	T-Stats	Regression Statistics
Intercept (Alpha)	**0.58%**	4.3	
Barc Agg Beta	**0.35**	2.4	
Barc HY Beta	**0.10**	0.8	
S&P500 Beta	**-0.04**	-0.7	
R-Square			**0.14**
Adjusted R-Sq			**0.09**
Correlation			**36.9%**

Regression 2: MBSM vs Barc Agg/S&P500

	Coefficients	T-Stats	Regression Statistics
Intercept (Alpha)	**0.58%**	4.3	
Barc Agg Beta	**0.39**	2.8	
S&P500 Beta	**0.00**	-0.1	
R-Square			**0.12**
Adjusted R-Sq			**0.09**
Correlation			**35.3%**

Regression 3: MBSM vs Barc Agg/Barc HY

	Coefficients	T-Stats	Regression Statistics
Intercept (Alpha)	**0.56%**	4.3	
Barc Agg Beta	**0.38**	2.8	
Barc HY Beta	**0.04**	0.5	
R-Square			**0.13**
Adjusted R-Sq			**0.10**
Correlation			**35.8%**

VI: Do other Managers use the MBS High Income Factor?

This section aims to answer two questions:

- **Do any other MBS managers invest using the MBS High Income Factor?**
- **If you are already invested in an MBS or an Income fund with a manager, do you have exposure to the MBS High Income Factor?**

Chart 4 and Table 1 above summarize our March 2019 analysis of the MBS Income of 5 different "Income" funds, and found that their Income from MBS ranged from 2.1% to 5.6%, **half or less than MBS Mantra's MBS Income**.

Here, we conduct Beta analysis of a broad selection of MBS, Total Return and Income funds that existed before 11/2014. In addition, we compute statistics that summarize the shape of their returns' distribution.

We use public data – we do not have returns for private MBS Hedge funds. However, many of these managers also have Hedge Funds. As they are all fiduciaries and have to "allocate fairly", I doubt that their hedge funds will have significantly different results except due to the usage of leverage.

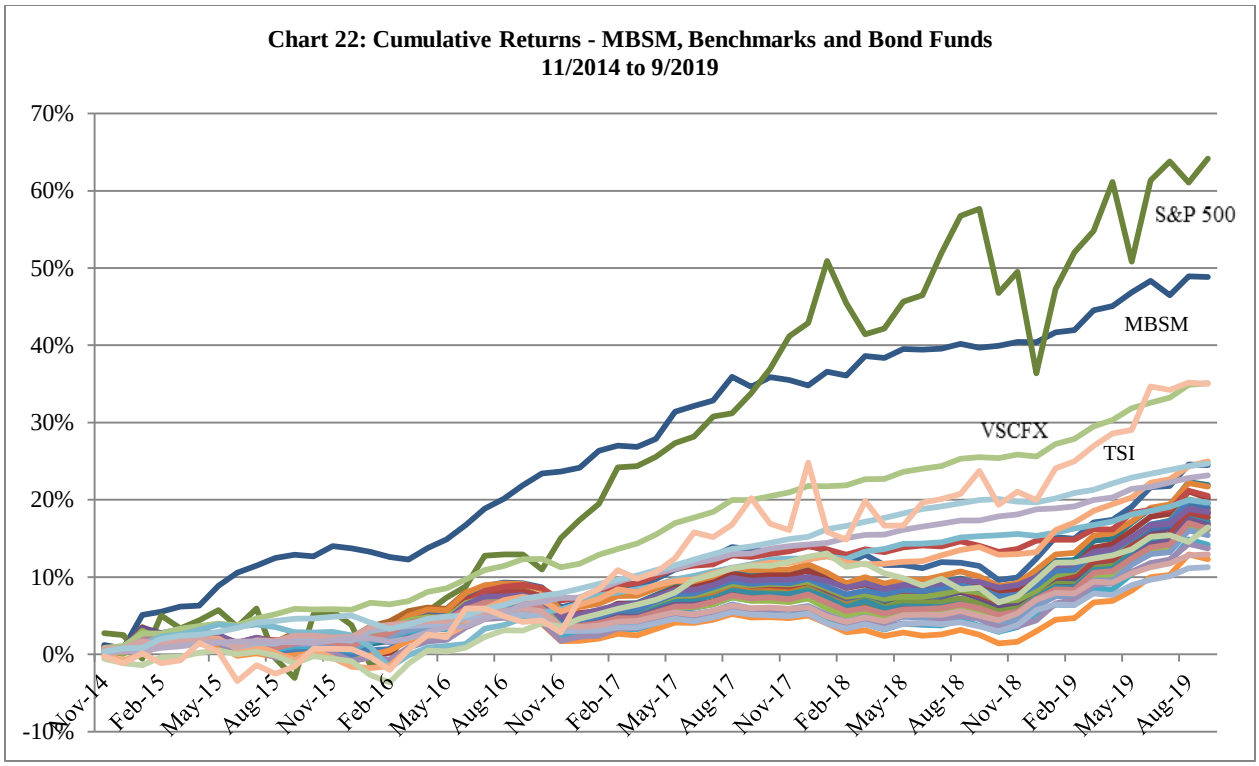
The data below is sorted by Beta to MBSM. **The highest fund Beta to MBSM is 0.40, and highest Skewness is 0.31**. **This suggests that these managers have not discovered the MBS Income Factor. Most of the funds exhibit high Betas to the AGG, with similar average returns.** While most of the funds exhibit Skewness between 0.2 and -0.2, suggesting normal distributions to their returns, a few have negative Skewness of less than -1.0

Table 4: High Income MBS (MBSM) compared to Benchmarks and other Fixed Income Funds

Name	Ticker	Beta to MBSM	Beta to AGG	R-Sq to MBSM	RSq to AGG	Avg Mthly Return	Avg Annual Return	Std Dev	Skew-ness
MBSM		**1.00**	**0.39**	**1.00**	**0.12**	**0.68%**	**8.49%**	**0.99%**	**0.92**
Barclays AGG		**0.32**	**1.00**	**0.12**	**1.00**	**0.27%**	**3.28%**	**0.89%**	**0.12**
S&P 500		**(0.24)**	**(0.57)**	**0.00**	**0.02**	**0.90%**	**11.39%**	**3.46%**	**(0.45)**
PIMCO Total Return Fund	PTTRX	0.40	0.93	0.19	0.82	0.29%	3.52%	0.92%	0.14

PGIM Total Return Bond Fund	PDBAX	0.39	1.08	0.14	0.92	0.34%	4.17%	1.00%	(0.12)
DFA Investment Grade Portfolio	DFAPX	0.39	1.09	0.15	0.96	0.30%	3.62%	0.99%	0.17
Western Asset Core Plus Bond F	WACPX	0.37	1.01	0.13	0.78	0.38%	4.62%	1.02%	(0.03)
USAA Income Fund	USAIX	0.36	0.97	0.14	0.85	0.32%	3.87%	0.94%	(0.06)
SIMT Core Fixed Income Fund	TRLVX	0.35	0.98	0.15	0.98	0.28%	3.42%	0.89%	0.10
BlackRock Total Return Fund	MAHQX	0.35	0.95	0.15	0.95	0.29%	3.52%	0.87%	0.21
Russell Strategic Bond Fund	RFCTX	0.35	1.03	0.13	0.96	0.27%	3.34%	0.94%	(0.11)
SIIT Core Fixed Income Fund	SCOAX	0.34	0.98	0.14	0.98	0.30%	3.62%	0.88%	0.02
Baird Aggregate Bond Fund	BAGIX	0.34	0.99	0.13	0.99	0.30%	3.66%	0.89%	0.13
Sanford C Bernstein Fund Inc -	SNIDX	0.33	0.95	0.14	0.96	0.28%	3.43%	0.87%	0.04
John Hancock Bond Fund	JHNBX	0.32	0.86	0.14	0.83	0.31%	3.74%	0.84%	0.08
BlackRock Core Bond Portfolio	BFMCX	0.32	0.96	0.13	0.98	0.27%	3.24%	0.86%	0.26
T Rowe Price New Income Fund I	PRCIX	0.32	0.96	0.13	0.97	0.26%	3.13%	0.87%	0.04
Western Asset Core Bond Fund	WATFX	0.32	0.96	0.12	0.92	0.34%	4.13%	0.90%	(0.14)
Hartford Total Return Bond HLS	HIABX	0.32	0.88	0.13	0.85	0.31%	3.75%	0.85%	(0.06)
Guggenheim- Total Return Bond	GIBAX	0.31	0.65	0.21	0.75	0.32%	3.90%	0.67%	0.27
TIAA-Cref Bond Index Fund	TBIIX	0.31	1.02	0.11	0.99	0.26%	3.14%	0.91%	0.10
DoubleLine Core Fixed Income F	DBLFX	0.30	0.77	0.17	0.88	0.29%	3.53%	0.73%	(0.12)
TCW Core Fixed Income Fund	TGFNX	0.31	0.94	0.12	0.99	0.23%	2.78%	0.84%	0.31
MFS Total Return Bond Fund	MRBBX	0.30	0.92	0.12	0.93	0.20%	2.43%	0.85%	0.14
Metropolitan West Total Return	MWTRX	0.30	0.92	0.12	0.99	0.25%	3.00%	0.83%	0.19
BNY Mellon Bond Fund	MPBFX	0.29	0.91	0.12	0.97	0.26%	3.15%	0.83%	0.02
Voya Securitized Credit Fund	VSCFX	0.28	0.41	0.32	0.56	0.51%	6.33%	0.49%	(0.18)
Franklin Total Return Fund	FBDAX	0.27	0.80	0.10	0.74	0.22%	2.69%	0.83%	(0.19)
Angel Oak Multi-Strategy Incom	ANGLX	0.25	0.03	0.15	0.00	0.31%	3.74%	0.64%	(1.73)
JPMorgan Income Fund	JGIAX	0.16	0.47	0.04	0.25	0.38%	4.68%	0.84%	0.09
HC Capital Trust - The US Mort	HCASX	0.15	0.62	0.05	0.84	0.18%	2.22%	0.60%	(0.16)
Vanguard Mortgage-Backed Secur	VMBS	0.14	0.63	0.05	0.85	0.21%	2.53%	0.61%	(0.42)
Western Asset Total Return Unc	WAARX	0.12	0.17	0.02	0.03	0.26%	3.20%	0.93%	(0.07)
GMO Opportunistic Income Fund	GMODX	0.08	0.02	0.07	0.00	0.35%	4.33%	0.30%	0.23
Semper MBS Total Return Fund	SEMMX	0.08	(0.08)	0.06	0.05	0.38%	4.60%	0.33%	(1.51)
TCW Strategic Income Fund Inc	TSI	0.01	1.04	0.00	0.16	0.54%	6.63%	2.31%	(0.13)

Chart 22 shows the cumulative returns for each fund and benchmark over the period. The lines that stand out from the crowd are: S&P500, MBSM, VSCFX and, more recently, TSI. Once again, this highlights the limited relationship between the MBS High Income Factor and traditional Fixed Income or MBS.



In conclusion, we do not believe that other Fixed Income or MBS managers have discovered the MBS Income Factor, and do not appear to invest using an MBS High Income framework.

Having an investment in an MBS fund is not the same as having the MBS High Income Factor as part of your portfolio's exposure.

VII: Capital Protection

- Returns from Price changes are static, while **Returns from Income are Cumulative**.
- **High Income from MBS adds up over time**, and reduces the "Breakeven Price" (the price at which Total Return is 0%) of each MBS holding over time.
- **Such cumulative High Income dominates Return from Price Change and protects capital in a relatively short holding period** (about a year, sometimes shorter).
- **Longer holding periods imply greater capital protection from price risk.**

To illustrate these points, the following analysis was performed on the MBS holdings in MBS Mantra's portfolios in December 2018 (using our 2016-2018 purchases only, to keep the charts legible), and was shared in our December 2018 newsletter.

Chart 23 shows that as MBS Income from cashflow is realized over time, a bond can absorb greater negative price change before the position realizes a negative total return. In

the graph, we show the Cumulative Periodic (ie non-Annualized) Income for each bond, and the computed percentage Breakeven Price % change that the Income implies. The Breakeven Price is the price where the TRR would be 0% upon immediate sale. The following graph was truncated at ±100% for legibility. (A breakeven price change less than -100% implies that full repayment of the invested principal has already been realized.)

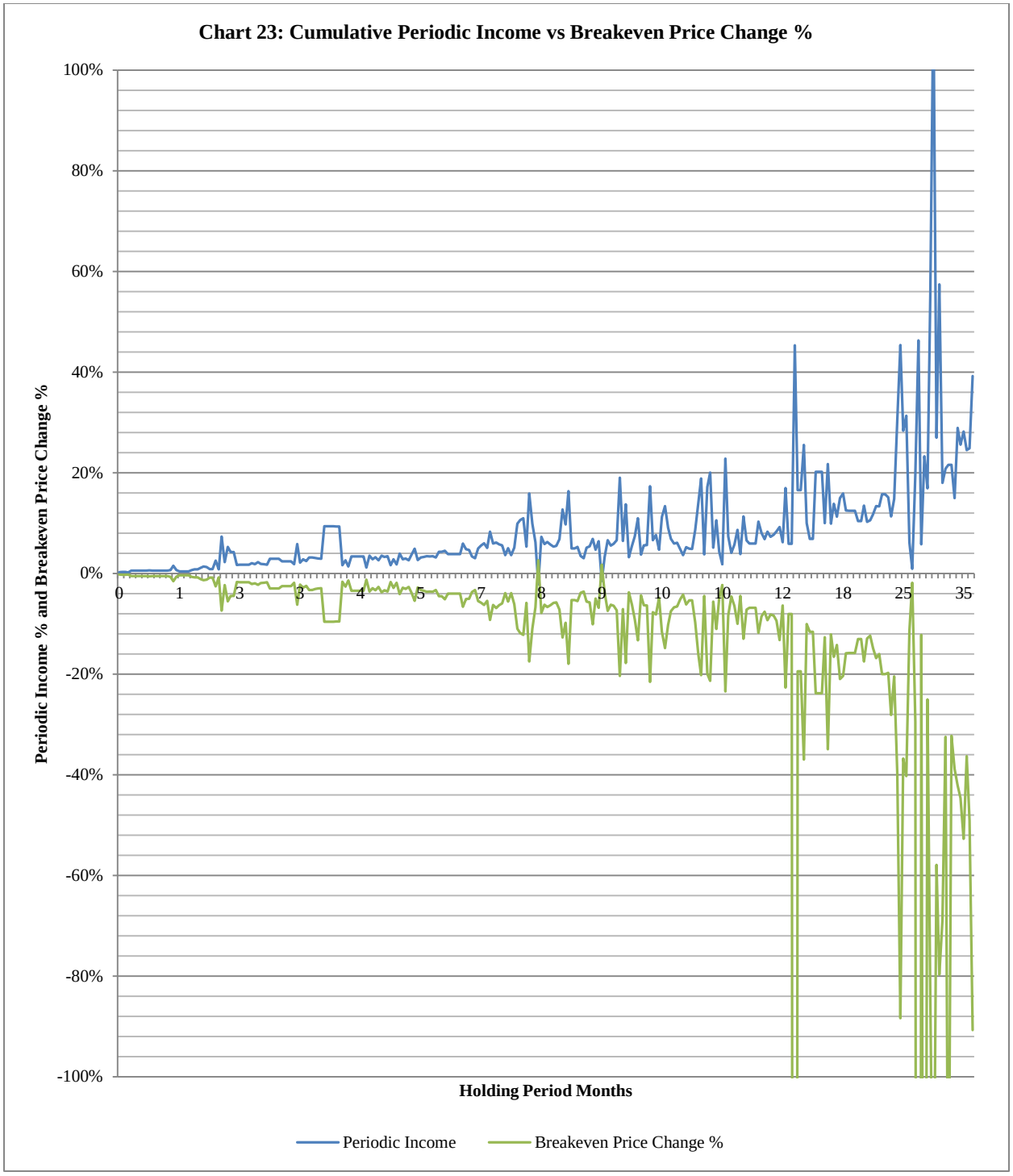


Chart 24 shows that most of our portfolio was marked down relative to cost by the pricing service (in October 2018 in response to market volatility) - most of the Returns from Price Change for MBSM's MBS holdings (2016-2018 purchases) were negative as of 12/31/18, irrespective of holding period.

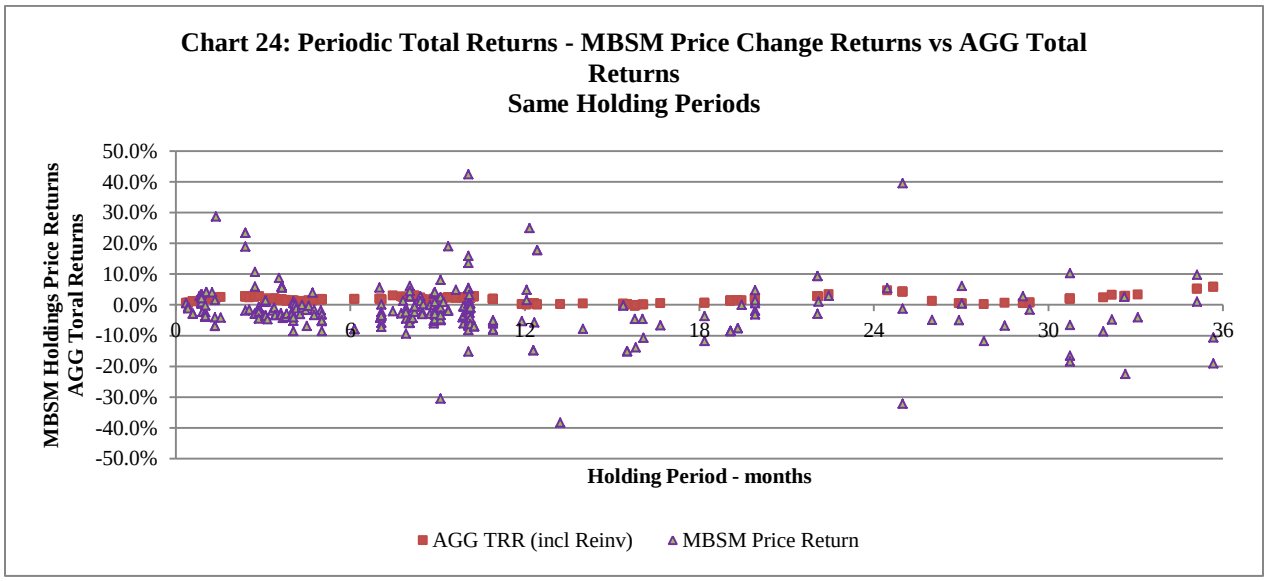


Chart 25 shows that for our High Income MBS owned for greater than one year, the Total Return (blue) has outperformed the AGG's total return (Red), as the realized Income Return (green) has continued growing and dominated the negative Return from Price Change show in Chart 24. For short holding periods, namely 2018 purchases, a number of our holdings have underperformed the AGG due to the negative Return from Price Change. **However, it can be seen that the Return from Income grows with time, offsetting this.**

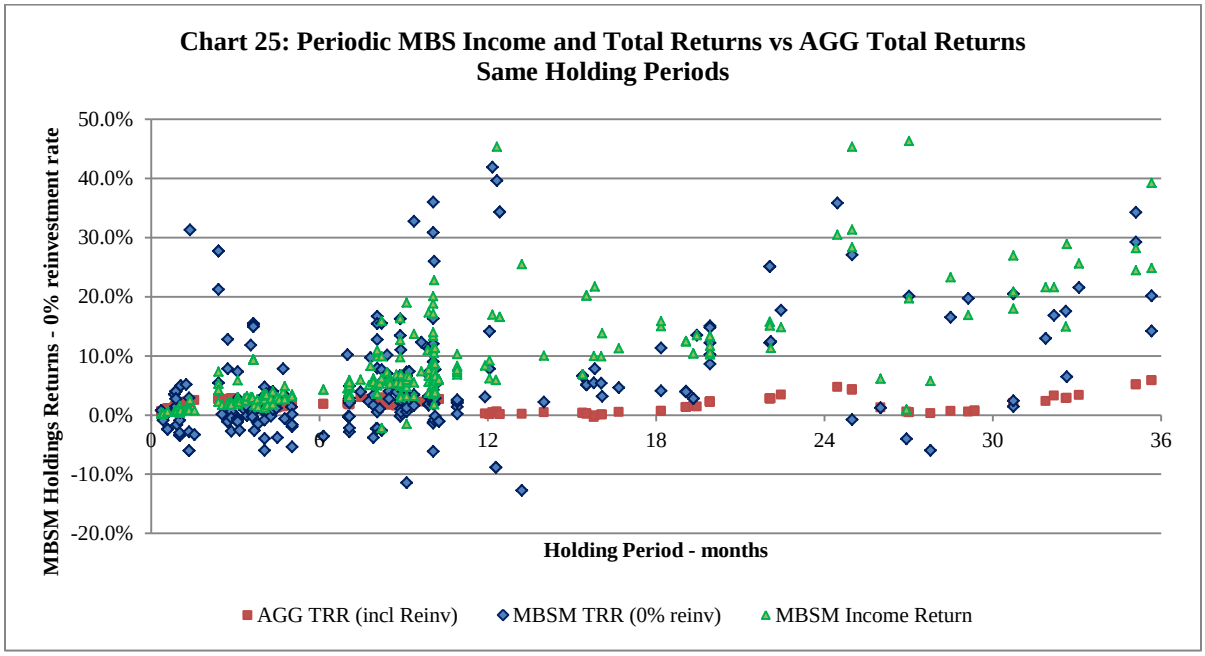


Table 5 below summarizes the data from the 3 charts above. This table shows the Income and Price Return attributions, and summarizes our performance relative to various ETF benchmarks.

Table 5: Weighted Returns of MBSM's holdings (2016-2018 purchases only) as of 12/31/18

	MBS Mantra Periodic Returns (non Annualized)			Comparable Period Benchmark Returns			
	MBS Mantra TRR	**MBSM Income Return**	**MBSM Price Return**	**AGG TRR**	**MBB TRR**	**HYG TRR**	**SPY TRR**
2016-2018 purchases	**4.7%**	**8.3%**	**-3.6%**	**1.9%**	2.1%	-0.3%	-1.6%
2016 purchases	**17.2%**	**24.1%**	**-6.9%**	**3.4%**	2.8%	11.6%	27.0%
2017 purchases	**8.1%**	**13.2%**	**-5.2%**	**1.0%**	1.3%	-0.7%	4.4%
2018 purchases	**1.5%**	**4.1%**	**-2.6%**	**1.9%**	2.2%	-2.4%	-8.3%

Weighted by the invested size of every MBS Mantra MBS holding; 0% reinvestment rate for MBS Mantra returns; Price return assumes IDC pricing; Returns for Benchmarks are reinvested in the ETF stock.

MBS High Income Returns grow with time and dampen the volatility of Price Returns, protecting capital from loss.

Conclusion

The MBS High Income Factor is a new way to invest in the MBS market. High Income MBS can be viewed as a distinct Absolute Return asset class. Having an investment in an MBS fund does not mean that you have a concentrated exposure to the MBS High Income Factor.

Most managers are aware that adding MBS to their portfolios can allow them to outperform the AGG, and many fixed income funds have high exposures to MBS as a result. However, it appears that most market participants treat MBS as a Fixed Income Asset class and do not explicitly identify the Income state of their MBS holdings, resulting in Income distributions that resemble Income distribution of the market, as seen in Chart 4. Most MBS managers (and their funds) likely own some High Income MBS but are probably not aware of it, as their Low Income MBS diffuse the benefits of their High Income MBS, giving them market-like Income and returns.

High Income MBS offer many benefits for portfolio construction, diversification, asset allocation, as their Beta to other asset classes is low. High Income MBS can generate positive Skewness to a returns distribution. A High Income portfolio can also protect capital better than a Low Income or generic Fixed Income strategy that is dependent on positive price change for positive Total Returns.

In MBS, Alpha is typically found through trading prowess. However, Alpha can also be found through Investing using the MBS High Income Factor.

We welcome your questions and comments.

Regards, Samir

October 25, 2019

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Footnote - if you do not have a statistics background, you mind find this link useful

https://www.investopedia.com/ask/answers/012615/whats-difference-between-rsquared-and-correlation.asp

To understand the 'Skewness' measure, this link and excerpt explain it quite well:

From https://brownmath.com/stat/shape.htm

If skewness is positive, the data are positively skewed or skewed right, meaning that the right tail of the distribution is longer than the left. If skewness is negative, the data are negatively skewed or skewed left, meaning that the left tail is longer.

*If skewness = 0, the data are perfectly symmetrical. But a skewness of exactly zero is quite unlikely for real-world data, so **how can you interpret the skewness number**? Bulmer (1979) — a classic — suggests this rule of thumb:*

- *If skewness is less than −1 or greater than +1, the distribution is **highly skewed**.*
- *If skewness is between −1 and −½ or between +½ and +1, the distribution is **moderately skewed**.*
- *If skewness is between −½ and +½, the distribution is **approximately symmetric**.*

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