



Mortgage Servicing Rights Primer

Two Harbors Investment Corp.
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Two Harbors Investment Corp. is proud to present a webinar titled: Mortgage Servicing Rights Primer. Periodic webinars from Two Harbors provide an opportunity to share more in-depth insights on various topics. We hope that these webinars help investors, analysts and the media develop a deeper understanding of Two Harbors and the residential and commercial mortgage and housing markets.

Tim Perrott, *Investor Relations, Two Harbors*

Bill Roth, *Chief Investment Officer, Two Harbors*

Bill Greenberg, *Managing Director, Two Harbors*

WELCOMING REMARKS

Thank you for joining us today. I'm Tim Perrott, Senior Director of Investor Relations for Two Harbors. We are pleased to launch the ninth segment in our webinar series titled, "Mortgage Servicing Rights Primer." Through our webinars we intend to share more in-depth insights on various topics in order to help investors develop a deeper understanding of the mortgage and housing markets, as well as Two Harbors. Joining me today are Bill Roth, our Chief Investment Officer, and Bill Greenberg, Managing Director.

The accompanying presentation is available via download on Two Harbors' website, under the "Investors" and "Webinars" tabs. Please note that this webinar is pre-recorded. We encourage you to contact Investor Relations if you have questions or would like to discuss this topic further. Contact information can be found on slide 27 of this presentation.

SAFE HARBOR

Please turn to slide 2. Before we begin, I would like to take a moment to remind you that remarks made during this webinar and the accompanying slide presentation may include forward-looking statements. Forward-looking statements reflect our views regarding future events and are typically associated with the use of words such as anticipate, target, expect, estimate, believe, or other similar words.

We caution investors not to rely unduly on forward-looking statements. They imply risks and uncertainties, and actual results may differ materially from expectations. We urge you to carefully consider the risks described in our filings with the SEC, which may be obtained on the SEC's website at www.sec.gov. We do not undertake any obligation to update or correct any forward-looking statements if later events prove them to be inaccurate.

This presentation is not investment advice and does not constitute an offer or solicitation to buy or sell any security. This presentation is not intended to be, and you should not consider anything in this presentation to be, investment, accounting, tax or legal advice, and you should consult with your own financial advisors, accountants or attorneys regarding your individual circumstances or needs.

TWO HARBORS INVESTMENT CORP. OVERVIEW

Turning to slide 4, by way of introduction, Two Harbors is a leading hybrid mortgage REIT traded on the New York Stock Exchange under the ticker symbol, "TWO," with a market capitalization of approximately \$3.0 billion as of September 30, 2016. We manage a \$17.0 billion portfolio primarily comprised of mortgage-backed securities, or MBS, mortgage servicing rights, or MSR, and commercial real estate assets. Our hybrid model and investment approach gives us the flexibility to opportunistically adjust our asset allocation based on changing market conditions in an effort to drive

long-term stockholder returns. Perhaps most importantly, we take a prudent approach to risk management, striving to protect shareholder capital while delivering attractive returns, and doing so through a multitude of rate environments. We believe this key component of our strategy is one of the reasons why we have outperformed our peer group by over 40% in total stockholder return over the last seven years since we became a public company. I'll now turn the presentation over to our Chief Investment Officer, Bill Roth.

ATTRACTIVE RETURNS WITH LOWER RISK

Thank you, Tim. Our goal at Two Harbors is to provide attractive risk-adjusted returns over the long-term through dividends and capital appreciation. As shown on slide 5, over time we have generated an attractive and comparable dividend yield, but we have done so with lower leverage, less interest rate risk and less prepayment exposure than our peers. In fact, given the manner in which our portfolio and hedging strategy are currently composed, we believe our book value and earnings power are largely insulated from changes in interest rates. As you will learn in this webinar, MSR are an integral part of our portfolio, and help us maintain a conservative risk profile and drive strong and stable returns.

TWO HARBORS' MSR PORTFOLIO COMPOSITION

Turning to slide 6, at Two Harbors we currently view MSR and Agency RMBS as pairing well together, given their attractive characteristics and as they are capable of generating better returns with lower overall risk. Our current portfolio of MSR has a fair value of \$456 million, which hedges roughly \$2.3 billion out of our total of \$12.6 billion of Agency RMBS. Given the attractive potential returns and risk profile, as we will discuss in this webinar, we expect to continue to grow our holdings of high quality, new issue, conventional MSR to pair with a larger portion our Agency RMBS. On the right-hand side of this slide are shown some of the details highlighting the quality of our MSR portfolio.

WEBINAR OVERVIEW

Turning to slide 7, today we will be focused on MSR and how we believe a portfolio constructed with a combination of MSR and Agency RMBS can provide better returns with less risk. MSR is an asset that acts like a hedge to Agency RMBS, and we will refer to MSR as being an asset and a hedge interchangeably throughout the webinar. In combination, as shown in the chart at the bottom of the slide, it is possible to construct a portfolio of RMBS and MSR that has the same or higher returns, with lower leverage and a lower sensitivity to interest rates and mortgage spread risk than a portfolio of RMBS hedged only with swaps. I will now turn the presentation over to Bill Greenberg, one of our senior portfolio managers who oversees our MSR business activities.

WHAT ARE MORTGAGE SERVICING RIGHTS?

Thank you, Bill. Please turn to slide 9 for an overview of mortgage servicing rights. First of all, it's important to mention that, unlike RMBS, MSR is not a security. Instead, MSR is a contractual right where the holder has responsibilities that must be performed in order to receive the servicing fee. These responsibilities include functions such as collecting principal and interests payments, holding

escrow funds, paying taxes and insurance payments when due, and remitting principal and interest payments, less servicing fees, to the owner of the mortgage loan. In many cases, including for Two Harbors, the owner of the MSR will subcontract these operational activities to qualified sub-servicers, who, in turn, interact with the borrower. Every loan of every type needs to be serviced and to have a servicer – residential mortgages, commercial mortgages, student loans, credit card loans and car loans, just to name a few. In this webinar, we will be focusing on residential conforming MSR, which consist of loans guaranteed by Fannie Mae or Freddie Mac. This is the type of MSR that Two Harbors holds.

Residential conforming MSR is generally lumped into one of two categories: Legacy or New Issue, as shown on the bottom left of this slide. Legacy MSR are servicing rights on loans generally originated before or during the financial crisis of 2008. The loans underlying Legacy MSR typically exhibit high rates of delinquency, are sensitive primarily to credit performance, and require high-touch servicing. Because of these characteristics, Two Harbors currently does not invest nor anticipates investing in this type of MSR. On the other hand, new issue MSR are servicing rights on loans that have been originated post-crisis and typically involve borrowers with high-quality credit, low delinquency rates and minimal credit risk. These attractive characteristics mean that these MSR cash flows are much more accessible, and Two Harbors is focused on acquiring new issue MSR.

In terms of acquiring MSR, purchases and sales of MSR can be transacted through either a bulk sale or on a flow basis. A bulk sale occurs when a seller has aggregated a substantial amount of MSR and wants to sell it all at once to a single purchaser to reduce risk or to raise capital. The benefit to the purchaser of buying a bulk MSR package is that the purchaser fully knows the characteristics of the loans underlying the MSR. However, to be a winning bidder on a bulk MSR package, one might need to also acquire MSR having certain characteristics that are less desirable. As a result, bulk packages of MSR tend to trade at a price that is higher than flow MSR. On the other hand, the sale of MSR on a flow basis is typically set up between a seller and a purchaser such that an agreed upon amount of MSR will be sold on a regular basis at a price determined based on loan characteristics. Flow agreements are beneficial to sellers because they never have too much capital tied up in the MSR asset, they provide certainty of MSR sale execution, and they can use the MSR price as an input in setting their loan rates to borrowers. Purchasers benefit by being able to better control the characteristics of the MSR it acquires through differential pricing, even though the precise loan characteristics are not initially known. Thus, the purchaser can strategically craft a portfolio based on which loan characteristics it deems most desirable. Two Harbors is focused primarily on acquiring MSR via flow purchases.

Finally, it is important to note that there are very high barriers to entry to becoming an owner of MSR. These include operational, legal and financial considerations. In this webinar, we will focus purely on the financial aspects of owning MSR.

MSR PROVIDE DIFFERENT THINGS TO DIFFERENT PARTICIPANTS

Let's look at the types of market participants that generally invest in MSR, as shown on slide 10. Broadly speaking, there are three categories of investors for MSR: banks, mortgage companies, and financial investors. Each type of participant is active in different parts of the MSR market for distinctly different reasons. For banks, new issue servicing acts as a hedge to their origination business: when interest rates rise, MSR values rise, but origination fees on newly originated mortgages decrease – and vice versa. Many independent mortgage companies utilize MSR based on legacy, credit sensitive loans to extract the fees attached to refinance and modification opportunities. Financial investors, like Two Harbors,

invest in new issue, high quality MSR to provide a financial hedge to other securities held in their portfolios.

CURRENT MARKET OVERVIEW

The MSR market is quite large and rapidly evolving, as shown on slide 11. The left-hand side of this slide illustrates that over the last three years, nearly a trillion dollars of notional MSR has been transferred between parties. This includes both bulk and flow-sale MSR transactions. The right-hand side of this slide shows that the largest concentration of servicing rights is held by three top banks – Wells Fargo, Chase and Bank of America. However, in recent years, non-bank participation in the MSR market has grown significantly, with non-banks now representing 4 of the largest 8 servicers. Matrix Financial Services Corporation, Two Harbors' wholly owned MSR subsidiary, is ranked number 18 in terms of UPB volume.

HOW ARE MSR MADE?

Turning to slide 12, let's deconstruct MSR a little bit and walk through a simple example of how MSR is created. Recall that MSR is a contractual right to service a mortgage loan in exchange for a servicing fee. The Gross Servicing Fee is a fixed portion of the interest that a borrower pays on their loan, which is retained by the servicer to cover certain costs of servicing a loan. The Net Servicing Fee is that amount of the Gross Servicing Fee that is left after the fee paid to a government agency to guarantee the mortgage. Additionally, in many cases, the holder of the MSR has the right to receive float income on bank balances related to principal and interest, taxes, insurance, late fees and ancillary income, before payments are remitted to the GSEs. Let's walk through a high level example of this.

Suppose that a borrower pays an interest rate of 3.75% on a 30-year fixed-rate mortgage. After originating the mortgage, the bank will typically then turn around and sell this 3.75% coupon loan to Fannie or Freddie, simultaneously buying back an RMBS. It is at this point that the MSR is created. The GSEs charge around 50 basis points today to guarantee the principal and interest payments to the investor in the security, leaving 3.25% remaining. At this point, the originator can either hold onto the MSR, as discussed on slide 10, or they can sell the MSR. In either case, the MSR owner is typically required to hold at least 25 basis points of the coupon. Going back to our example, if we subtract the servicing fee of 25 basis points from the remaining 3.25%, we are left with a 3% coupon for the Agency RMBS. Finally, the MSR owner can either choose to service the loan itself or contract with a sub-servicer to manage the day-to-day servicing of the loan. The latter is what we do at Two Harbors. Typically, the cost to hire a subservicer is around 5 basis points, leaving the MSR owner with an MSR income stream consisting of approximately 20 basis points of the original coupon.

MSR ARE MORE THAN JUST INTEREST-ONLY

While the 20 basis points of coupon is by far the biggest component of value of MSR, it is not the only part, as seen on slide 13.

For financial investors like Two Harbors, it turns out that the pure interest-only portion of the MSR cash flow – the part attributed to the Net Servicing Fee and cost to service – typically contributes about 80-

90% to the value of the MSR, depending on the interest rate environment. The other 10-20% of the MSR value comes from these ancillary cash flows. Let's take a minute to describe these cash flows.

The table on this slide shows the various components of value for a typical MSR. The Net Servicing Fee is the Gross Servicing Fee less the guarantee fee paid to the GSEs. The cost to service can be the roughly 5 basis points paid to a sub-servicer, as outlined on the previous slide for financial investors like us, or it can represent the cost spent by the servicer in people, systems, and infrastructure. In today's rate environment, the pure interest-only components correspond to approximately 90% of the value of the servicing. The float income on balances related to taxes and insurance is another important component, currently contributing roughly 10% of value to the total MSR asset, which typically the owner is eligible to receive. The other components, the Unscheduled P&I Float, Scheduled P&I Float, and Compensating Interest are all small and net to something close to zero in today's interest rate environment. I'll omit talking about them here, but if you are interested in more detail, please feel free to contact us or to look at the publication that is mentioned in the footnote at the bottom of the slide. The second column of the table shows the interest rate sensitivity of the components of MSR. The important thing to take away from these numbers is that the pure interest-only portion of the MSR cash flow is associated with only roughly 40% of the duration sensitivity of the entire asset; again, the T&I float component is responsible for the lion's share of the remainder.

ILLUSTRATIVE TREASURY CASH FLOW SCENARIOS

We hope that this introductory section was useful to you as an introduction to MSRs.

In the next section, we will examine the cash flows of several financial instruments: a fixed US Treasury note, a fixed rate RMBS and mortgage servicing rights. Our goal is for listeners to understand how these instruments change in value in different interest rate environments, and how changing cash flows in particular have an effect on the values of RMBS and MSR.

Before turning to slide 15, I want to acknowledge this section may be unfamiliar to some listeners. The key takeaway of the next four slides will be that in higher interest rate scenarios, treasury prices decrease, RMBS prices decrease and MSR prices increase, and in lower rate scenarios, the opposite is true.

Turning to slide 15, we have laid out a simple example of cash flows in different interest rate environments for a 5-year, 1% coupon treasury security. We examine this as a potential hedge for an RMBS portfolio, as being short treasuries could offset the interest rate risk of owning RMBS. Please note that in this section I use the terms "present value" and "price" interchangeably.

Let us begin with the middle chart with the red box around it. Here, we have shown a graph where the cash flow amount is shown as a function of time. There is a small amount of interest paid in each of the first 4 years, and then in year 5, there is additionally the big principal repayment. The total cash flow is 105% of the face amount of the security. Although the market changes every day, at the time of writing this presentation, the yield of a 5-year Treasury was approximately 1.25%. Taking the present value of these cash flows, discounted at a 1.25% yield, the price is 98.79%.

Now, what happens to the cash flows when interest rates change? The answer is – for a Treasury security – nothing. So the Total Cash flow is still 105% and the present value of the cash flows

discounted at 1.25% is still 98.79. However, if interest rates rise 100 basis points, as shown on the left-hand side of this slide, using the initial yield of 1.25% is no longer appropriate. In that higher rate scenario, the price must go down so that the security yields a market yield. If, instead, a yield or discount rate of 2.25% is used, then the price declines to 94.12%.

Conversely, in a rate scenario that is, say, 100 basis points lower, it would be more appropriate to use a yield or a discount rate that is 0.25% instead of 1.25%. In this case, the present value of this example cash flow stream is 103.72%, as shown on the right-hand side of this slide.

This example is a manifestation of the old Wall Street Journal quote and truism for bonds, “prices move inversely to yields.”

ILLUSTRATIVE RMBS CASH FLOW SCENARIOS

Now let’s see what happens to RMBS cash flows in different interest rate scenarios, depicted on slide 16. Let’s again focus first on the middle section with the red box.

In this example, we have considered a brand new, 30-year RMBS with a 3% coupon, and each graph shows cash flows as a function of time. The dark blue represents interest cash flows and the light blue represents principal cash flows.

In the base case scenario, total principal and interest is 119% of the face amount, and the weighted average life is 6.4 years, based on an expected prepayment rate of 12 CPR. At the time of writing, the market value of such a security was around 104.24% which corresponded to a 2.25% yield at that speed.

Now let’s take a look at what happens when interest rates change. If interest rates were to rise by 100 basis points, we expect prepayments to slow, in this case, to around 6 CPR. Indeed, looking at the graph on the left-hand side of the slide, we see the cash flows have a lower peak when compared to the base case but they extend out in time so that the total cash flow is more than in the base case, about 130% of face value. If these cash flows are present valued at the same initial yield of 2.25%, the price would be higher, 106.32%, because the cash flows last for longer. But again, as we discussed on the previous slide, when interest rates rise, a higher yield is required for a given set of cash flows. Assuming a discount rate a hundred basis points higher than the base case, at 3.25%, the present value is 98.04%.

Now let’s look at the graph on the right-hand side of the slide and consider the opposite case, when interest rates fall. If interest rates decline, we expect prepayments to increase, due to increased refinancing activity, in this case to around 24 CPR. The total cash flow is less than in our base case, only 110% of the face value. Again, if we use a discount rate at the same yield as in the base case, the price would be lower, 102.4%, reflecting less total cash flow. But in a low interest rate environment, the yield required by investors can be lower also, and a lower discount rate can be used. If a yield of 1.25% is used, the present value would increase to 105.72%.

In sum, like Treasury securities, RMBS prices rise when interest rates fall, and fall when rates rise. And this is true even though there are roughly 10% more cash flows in higher rate scenarios and 10% less cash flows in lower rate scenarios.

ILLUSTRATIVE MSR CASH FLOW SCENARIOS

Moving to slide 17, let's now take a look at what happens to MSR cash flows in these same interest rate scenarios.

In these cash flow graphs, the light blue corresponds to the Net Servicing Fee cash flows, the dark blue corresponds to the Cost to Service, and the green cash flows correspond to all the other cash flow components described earlier.

In our base case, highlighted in the middle of this slide, the MSR has a weighted average life of 5.9 years at 12 CPR, and a total cash flow of 1.4% of the face amount. At a yield of 8%, the MSR has a present value of 0.94%.

In a higher rate environment, prepayments slow, float income increases and the total cash flows go up to 2.2%, as shown on the left-hand side of this slide. So far, this sounds very similar to the case of RMBS in a higher rate environment. But upon closer analysis, something very different is happening. Of course, if the base-case discount rate of 8% is used, the price increases to 1.31%, simply reflecting the increase in total cash flow. However, if the discounting rate increases in this scenario, to reflect the higher yields, then we find that the present value goes down but not enough to offset the increase coming from the additional cash flow. In fact, even if we increase the yield by 200 basis points instead of 100 basis points like we did in the RMBS example, the price increases from the 0.94% in the base case, to 1.18%.

And the opposite happens in a low rate scenario, as shown on the right-hand side of this slide. The total cash flow is diminished, now only 0.7% of face amount, as the cash flows are peaked lower and last for a shorter period of time. The base-case discount rate of 8%, combined with a higher prepayment rate of 24 CPR, results in a present value of 0.54%. Using the same logic as before, that the required yield in a low rate environment is lower than in the base case, the price increases a little, but does not get back to where it started in the base case. Using a yield of 6%, 200 basis points lower than in the base case, the present value is still only 0.57%.

The main point regarding MSR, then, is the following: In both higher rate and lower rate scenarios, the effect on the value of changing cash flows due to changing prepayments completely dominates the effect of changing yields or discount rates. So, the value of the MSR goes up as rates rise and prepayment speeds slow, and goes down as rates decrease and prepayment speeds increase. This is completely opposite from the behavior of RMBS or Treasury securities.

The main reason this is the case is because of the IO nature of MSR. In the example of RMBS, the total principal returned is the same in a higher rate scenario as it is in a lower rate scenario and it is large compared to the interest received. As a result, the change in total cash flows goes from 130% to 110% from a high rate environment to a low rate environment, in this example. That's a change of only 20 percent from low to high. Compare that with the change in MSR cash flows in similar cases. The total cash flow goes from 2.2% to 0.7% for a change of more than 200%. Treasuries have no cash flow variability, RMBS have moderate cash flow variability and MSR have large cash flow variability.

IMPACT OF INTEREST RATES

Let's summarize what we have just highlighted on the past three slides, on slide 18. In higher rate scenarios, treasury prices decrease, RMBS prices decrease and MSR prices increase. The opposite effect is true in lower rate scenarios. So, now, it is possible to imagine being able to construct a portfolio of RMBS and MSR, or RMBS and short treasuries, where they naturally hedge each other in different rate scenarios. In practice, it is often more convenient to pay fixed on interest rate swaps rather than to short Treasury securities that we don't own. Notwithstanding the potentially volatile swap spread moves like what we experienced earlier in 2016, selling Treasuries short and paying fixed on swaps are economically very similar. At this point in the presentation we are going to switch our vocabulary from selling short treasuries to paying fixed on interest rate swaps.

PORTFOLIO OF MSR HAS HIGHER YIELD POTENTIAL

In the first part of this webinar, we have talked about the background of MSR, and in the second part we have talked qualitatively about how the cash flows and prices of MSR and RMBS react to changes in interest rates, and how RMBS and MSR are similar and how they are different. In this section, we will bring this all together and take a look at how we can use MSR in a portfolio context with Agency RMBS.

Moving to slide 20, let's look at how a zero duration portfolio of MSR and RMBS can yield more than a zero duration portfolio of RMBS hedged only with interest rate swaps. We consider two illustrative portfolios each with \$100 of capital. In the left-hand table, we have added some leverage to the initial capital amount to buy \$900 of Agency pools. Against this we have borrowed in the repo market and entered into payer swaps to hedge to a duration neutral position – these activities are summed up in the "Agency Repo" and "5-year swaps" lines. In the columns on the far right we have calculated the duration and the dollar change per 1 basis point change in rates. This portfolio, with a neutral duration position, yields a 9% return on equity.

On the right-hand side of this slide, we have a portfolio of MSR and RMBS. In this example we have chosen to use approximately the same leverage on the RMBS portion of the portfolio as the example portfolio on the left-hand side of the slide. Furthermore, we have chosen to hedge the interest rate risk of the RMBS with MSR instead of swaps. Note that the MSR has a large negative duration, in this case, minus 25, compared with the 5-year duration for the 5-year swap. This is consistent with what we concluded on Slide 18 about the MSR having a much larger percentage price move for a given change in interest rates. We have also applied some leverage to the MSR using indicative market terms. These assumptions create a portfolio resulting in \$47 of capital allocated to RMBS and \$53 to MSR. Again, this portfolio is duration neutral, but yields a greater return on equity than the sample portfolio on the left, at 13%.

HIGHER YIELD OF MSR PORTFOLIO IS NOT FREE

And that sounds pretty good, doesn't it? Well, it is! The extra yield generated by the RMBS and MSR portfolio is attractive, but it doesn't come for free.

We have already talked about the high barriers to entry of the MSR business, which include operational costs and ongoing responsibilities. In addition, though, a portfolio of RMBS and MSR, while having

higher yield, comes with increased negative convexity compared to an RMBS portfolio hedged only with swaps.

Let's take a look at the charts on slide 21. All three of the charts on this slide show the change in portfolio equity on the y-axis as a function of instantaneous change in interest rates. We assume that the yield curve moves in parallel and that mortgage rates move uniformly with all other rates.

The top left graph depicts a portfolio of Agency RMBS hedged with swaps. The dotted line is how the RMBS behaves when rates change, and the dashed line, which depicts the swap, does the opposite. The solid blue line is the net of the RMBS and swap positions. It is relatively flat, indicating that the hedged portfolio of RMBS and swaps neither makes nor loses a significant amount of money for instantaneous parallel changes in rates.

The lower left graph depicts the same analysis, but RMBS is hedged with MSR instead. The combined position, in solid green, shows the net return of the RMBS and MSR portfolio for parallel and instantaneous changes.

If both of these combined positions are placed on the same scale, as shown on the larger chart on the right-hand side of the page it can be seen that the portfolio of RMBS and MSR, which is represented in green, is more negatively convex than the RMBS and swaps portfolio shown in blue. When rates go down or up a lot instantaneously, an investor loses more money in that instant with the MSR and RMBS position than with the RMBS and swaps position. So while the base case yield is higher, the potential outcomes in extreme rate moves are worse...which raises the question, is hedging with MSR really better?

MSR PORTFOLIO GENERATES MORE REVENUE

The answer is "yes," we think MSR is a better hedge, and for a number of reasons. Let's start on slide 22. Here we show a similar analysis as shown on slide 21, but taking into account the effects of the positive income and positive yield of both portfolios over a period of time. Specifically, this analysis shows the change in the equity value of each portfolio as a result of shocking interest rates, in parallel, and then waiting for one year, and earning whatever expected income is due to each portfolio while also accounting for prepayments. The result, shown in the large graph on the right-hand side of the slide, shows that the effect of the higher yield of the RMBS and MSR portfolio is so significant that that portfolio would be expected to outperform the RMBS and swaps portfolio in almost every scenario, except for very severe downward interest rate shocks.

There are different ways to think about that "tail risk" of the severe downward rate shock. One way is to assert that rates are low and the next move in interest rates is expected to be up and not down, and therefore not to worry about that potential outcome. Another way is to continuously monitor the portfolio and rebalance our hedges as the market moves in order to manage the additional convexity like we always strive to do at Two Harbors. Yet another way is to buy some protection in the form of interest rate or mortgage options.

ENHANCED MSR PORTFOLIO OUTPERFORMS

Let's take a look at how the additional revenue from the extra yield attributed to MSR can be spent buying swaptions, which provide a right but not an obligation to engage in swap transactions. The results of this are shown on slide 23. Swaptions are options on interest rates that cost a little bit of money up front, but can pay off in a big way if rates move in a certain direction and by a certain amount. In this sample portfolio, we added options to protect against a severe decline in interest rates. The calculations and assumptions used here are identical to those on slide 22 – they reflect a parallel shock in interest rates and with the portfolio held constant for one year. The curve representing the RMBS and MSR portfolio on this slide is shifted down a little compared to the prior slide – reflecting the option premium paid - but now the portfolio including MSR outperforms in every scenario. While the assumptions used in this example are simplified, and these results are not predictions or forecasts of expected returns, they illustrate the main reason why Two Harbors invests in MSR as a pair with RMBS – a portfolio of MSR and RMBS provides a natural hedge to RMBS with higher return potential.

MSR PORTFOLIO HAS LESS BASIS RISK

This sounds great so far, but that's not all! Moving to slide 24, I want to talk about an additional benefit of hedging an RMBS portfolio with MSR, which is the ability to neutralize value changes with respect to changes in the mortgage basis. The mortgage basis is the difference between mortgage rates and swap rates. In all of the rate shock scenarios considered in the previous slides, it was assumed that current and future mortgage rates moved in tandem with swap rates, so that in all of those scenarios, the mortgage basis was unchanged. MSR values are heavily influenced by prepayment speeds, which depend on the rate available to borrowers - the mortgage rate - and not the swap rate. So, what happens if mortgage rates and swap rates don't move together?

This can be looked at in one of two ways – either a scenario where the mortgage rate is unchanged and swap rates move, or a scenario where swap rates are unchanged and mortgage rates move. Either point of view is acceptable and will lead to the same the result if done carefully. For ease of discussion, we will consider the representation where swap rates are unchanged and mortgage rates move.

First let's consider the portfolio of RMBS hedged with swaps. In a case where swap rates don't move, the swap portion of the portfolio can be basically ignored. And slide 16 showed that when mortgage rates rise, the prices of RMBS fall, and when mortgage rates fall, the prices of RMBS rise. In this sense, a portfolio of RMBS hedged with swaps is totally unhedged with respect to changes in the mortgage basis. These results are depicted in the graph in the upper left of slide 24. Here the x-axis no longer refers to instantaneous parallel changes in all interest rates but only to instantaneous changes in the mortgage rate by the indicated amount, while leaving all other rates unchanged. As mortgage spreads widen, which is represented by increasing x-values, the changes in the portfolio equity value become more negative.

But a portfolio of RMBS hedged with MSR is different. MSR cash flows depend on the mortgage rate in a different way than RMBS. As slide 17 showed, when mortgage rates go up, prepayments slow and MSR becomes more valuable, not less like RMBS. Furthermore, if swap rates and all other rates are kept unchanged, the yield or discount rate is also unchanged. This is the result depicted in the lower left graph.

This is very important. While it sounds almost the same as what we discussed in previous slides, it is actually a quite different. An RMBS portfolio hedged with MSR is not only hedged with respect to interest rates – when all rates move together – but it is also much more effectively hedged with respect to changes in the mortgage basis – that is, when mortgage rates move but swap rates do not or vice versa. The large graph on the right-hand side summarizes this discussion. The green line depicts the return profile of the portfolio with MSR and the blue line that without. Clearly, the RMBS and MSR combination has far more stable outcomes as it related to mortgage spread risk.

PORTFOLIO WITH MSR HAS LOWER LEVERAGE

But, wait, there is even more! On slide 25, the tables from slide 20 have been replicated and we have included the swaptions mentioned on slide 23. The result on the right-hand side of this slide is essentially similar to slide 20, but now I want to emphasize something slightly different. Namely, while not only does the RMBS and MSR portfolio have the potential to earn a higher return, it also employs substantially lower overall leverage. As I described earlier, the RMBS portfolios of each example portfolio have roughly the same leverage, but owing to the portfolio on the right-hand side having approximately half its capital only levered a small amount rather than 8 times, the overall leverage of the portfolio is much, much lower. To the extent that margin calls and excessive leverage have typically been the cause of historical market stress events, a portfolio that has less leverage is clearly preferable, all else equal, to one with higher leverage.

CONCLUSION

Wrapping things up, I ask you to turn to slide 26. In this webinar, we have discussed the background for MSR, its creation, and the market. We have discussed how the cash flows of RMBS and MSR are different, how they are similar, and how they react to changes in the interest rate environment. Finally, I showed you why we believe MSR and MBS can be combined in a portfolio to create higher return potential, lower mortgage basis risk, and lower leverage than a portfolio of Agency RMBS and swaps.

In closing, we are very excited about the MSR opportunities before us, and to be able to share our strategy for superior portfolio construction with our investors. And with that, I'll turn it back over to Tim.

CONTACT INFORMATION

Thank you for joining us for today's webinar. To view other webinars that are a part of our webinar series, please visit the investor relations page and click on the Webinars tab. If you have any questions, please do not hesitate to reach out to the Investor Relations contact listed on slide 27.

Investor Relations
Two Harbors Investment Corp.
612.629.2500
investors@twoharborsinvestment.com