Value Added
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Rebalancing II

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In the previous issue of *Value Added*, we addressed portfolio rebalancing as a way of keeping the portfolio in-line with the policy asset mix. In this issue, we will explain the mechanics of a proposed alternative to the current rebalancing program.

The Dilemma – Tracking Error vs. Transaction Cost

The key to designing a successful rebalancing program is in properly recognizing the trade-off between tracking error and transaction costs. The ideal situation would be for the portfolio to be in-balance each day. This would allow the portfolio to track the performance of the benchmark very closely. However, into the ideal world we have to introduce the fact that it costs real dollars to execute the trades associated with rebalancing. If there were a way to keep the portfolio in line with the benchmark without incurring transaction costs, we would have the best of both worlds. This is why the use of futures in connection with rebalancing makes sense for a portfolio such as ours. Futures are attractive because they track the performance of a specific benchmark closely and can be traded with very low transaction costs. The rebalancing program NISA Investment Advisors has designed for us would use futures in combination with the securities markets to reduce transaction costs and expected tracking error.

Under the current program, when a "rebalance trigger" is reached for one of the asset classes, (+/- 10 percent of the targeted allocation weight), we sell assets in the overperforming class and buy assets in the underperforming classes. For example, domestic equity has a 47.5 percent allocation and a trigger of +/-4.75 percent. Using our actual historical trading cost as a guide, we have estimated the transaction costs required to rebalance the portfolio using the current program has been about 6.0 basis points per year. The tracking error associated with the current program is estimated to have averaged 64.0 basis points per year. If we can reduce the transaction costs and maintain the same level of tracking error, the System will be advantaged. The 6.0 basis points of transaction costs represent about $3 million in cost on a $5 billion portfolio. The 64 basis points in tracking error represent $32 million on the same portfolio. The obvious question is, "Why not go after the $32 million instead of the $3 million?" The answer is that transaction costs are a true cost and always have a negative impact on performance. The tracking error is the return difference between the portfolio and the benchmark attributable to the rebalancing program (this can be positive or negative). In some years we will outperform the benchmark and in other years not do as well as the benchmark. With that in mind, it seems to make more sense to focus on guaranteed savings in transaction costs rather than possible savings from tracking error reductions.

NISA reviewed our policy asset mix and developed a rebalancing plan that initially uses futures to rebalance. Market volatility causes frequent imbalances and allocation reversals (the whipsaw effect) that are most effectively corrected using futures, which are less costly to trade than cash market securities. The whipsaw effect is the wasted transaction costs of buying securities one month and then selling them soon thereafter. The proposed program eventually performs a securities rebalancing if the performance continues in the same direction and otherwise would cause the futures position to become inefficiently large. NISA projects that the program would reduce transaction costs to about 3.0 basis points per year, for about $1.5 million annual savings. In connection with their proposed methods, they also believe the tracking error would be reduced to approximately 50 basis points.

Through the extensive work and analysis done for us by NISA on this subject, we are firmly convinced that we can reduce transaction costs and tracking error by altering our rebalancing triggers and making limited judicious use of exchange traded futures contracts. Since that is the bottom line, we were tempted to stop here with the discussion. However, for any of you who may be interested in the mechanics of the process, we thought it might be useful to provide numeric illustrations. Accordingly, we prepared the balance of this newsletter with that in mind.

Mechanics

While some of the intricacies of the program are still being developed, and likely will continue to be refined well beyond any initial implementation, the following provides a general illustration of how the proposed program would work. The example uses only two asset classes; domestic equity and domestic fixed income. Together, these two classes represent 77.5 percent of the MOSERS' policy asset mix. We are looking for instruments that will substitute for the actual holdings, but have similar performance. S&P 500 futures do the best job of achieving this goal for the domestic equity portfolio. The S&P 500 futures are heavily traded and priced efficiently because of trading volume. Futures on United States government bonds are best suited for replicating our fixed income portfolio. Even though our portfolio is benchmarked to the Lehman Aggregate, the government bond futures do a good job because duration is the main driver of fixed income returns. Bond futures would allow us to match our target duration very closely by using a combination of futures on five-, ten-, and thirty-year bonds.

The guidelines of the proposed program call for us to do nothing until an asset class has moved one half of one percent (.5%) away from the target allocation. For this example, we will assume that domestic equities continue their "Bull Run" and therefore cause the rebalancing program to be triggered. At the end of month one, equities are 48.1 percent (see the table below) and fixed income represents 29.4 percent of the portfolio. We would sell (i.e., short) S&P 500 futures in an amount that represents 0.1 percent and buy (i.e., go long) bond futures that represent 0.1 percent of the portfolio. For practical purposes, we now have total portfolio exposure (securities plus futures) that should perform as if it is 48.0 percent equity and 29.5 percent fixed income. At the end of month two, equities have continued to outperform fixed income and now equity securities represent 49.1 percent of the portfolio while fixed income securities represents 28.4 percent. To bring the equity exposure back to 48.0 percent we would sell 1.1 percent of S&P 500 futures and buy 1.1 percent of bond futures.

This monthly rebalancing (using futures) would continue if the asset classes remained in a range between 0.5 percent and 2.5 percent outside the target allocation. If the imbalance in assets moves below 0.5 percent, the futures position would be eliminated. Once the maximum futures position for an asset class of two percent is reached, then the securities position would have to move outside the target allocation by 5.5 percent before additional adjustments are made. Specifically, if this happened, an outright sale of securities would take place until the securities position is lowered to 4.5 percent—thus creating a net exposure (securities plus short futures) of 2.5 percent. (Remember, there is a two percent limit on futures and that transaction costs on securities are higher than they are on futures, so the rebalancing boundaries are wider for the securities positions.)

As you can see from the table below, at month-end "6a",

equities and fixed income securities moved a total of 5.5 percent away from the policy mix (although the net exposure was much less) and we would have only sold 1.0 percent of each class in the securities markets. Under our current program, we would have sold much more in the securities markets as the equities rose and would have repurchased some of these same assets as the equities fell later in months 7 and 8, thus incurring extra transaction costs as a result of the whipsaw effect.

Month-end "6b" is after the rebalancing using the securities market. At this point we have sold 1.0 percent of equities in the securities portfolio and bought 1.0 percent of bonds in the fixed income portfolio. This rebalancing would include all domestic equity and fixed income managers. Since the active managers do not track the index, some managers would be more than 1.0 percent out of line and others would be less.

Month End	Equity Return	Equity Securities	Equity Futures Position	Net Equity Exposure	Fixed Income Securities	Fixed Income Futures	Net Fixed Income Exposure
1	+.6%	48.1%	-0.1%	48.0%	29.4%	+0.1%	29.5%
2	+1.0%	49.1%	-1.1%	48.0%	28.4%	+1.1%	29.5%
3	+1.0%	50.1%	-2.0%	48.1%	27.4%	+2.0%	29.4%
4	-0.2%	49.9%	-1.8%	48.1%	27.6%	+1.8%	29.4%
5	+1.5%	51.4%	-2.0%	49.4%	26.1%	+2.0%	28.1%
6a	+1.6%	53.0%	-2.0%	51.0%	24.5%	+2.0%	26.5%
6b	N/A	52.0%	-2.0%	50.0%	25.5%	+2.0%	27.5%
7	-2.0%	50.0%	-2.0%	48.0%	27.5%	+2.0%	29.5%
8	-2.5%	47.5%	0.0%	47.5%	30.0%	0.0%	30.0%

Rebalancing utilizing futures would be accomplished through a separate account that would hold only futures and the relatively small amount of cash needed to support the daily mark-to-market on the futures. We would also need to identify securities to post for collateral. It is likely that we would pledge securities that are not attractive for securities lending purposes so the lending program is not disadvantaged.

U.S. Stocks and Bonds – What about International Stocks?

Rebalancing in this manner when you only hold two asset classes is straightforward. When international equity is introduced into the program, more questions arise. The problem in the international markets is the lack of a single futures contract that is highly correlated to our international portfolio. There are country futures, when aggregated in the proper weights, do a decent job of replicating the developed international markets. However, there are no futures which perform like the emerging markets. We believe that there are two possible solutions to the international problem. The first possibility is to use S&P 500 futures to represent the international component. This is not perfect, but we are comfortable that the correlations between S&P 500 futures and international equities are high enough that tracking will be within reason. Since we are limiting the cumulative futures position for any asset class to a maximum of 2.0 percent, the fact that they are both equities should keep the tracking error to acceptable levels. The second choice is to use the country futures of the major international markets to represent the international portfolio. The markets of Japan, United Kingdom, Germany, and France have liquid futures available and these futures represent a majority of the EAFE index. Since the emerging markets allocation is only about 15 percent of the international allocation, we would be comfortable with the developed country futures representing the emerging markets exposure for this purpose.

In Conclusion

We would like to implement this process and initially have NISA handle management of the program. They would develop the systems to identify when a transaction should occur and how much of each asset class is needed. NISA has the necessary experience to handle this program with relative ease. In addition, they have agreed to train internal staff in the operation of the program. If it is determined that this program is something we wish to move in-house, NISA would provide the custom software and training required to make the transition.

The benefits of the proposed program are expected savings to the system of $1.5 million per year on average and while working in conjunction with NISA, being provided valuable experience in the use of futures. It is expected that as our experience in the use of futures grows, we would start to use them as an efficient means to securitize the excess cash in our internal portfolios and at the total fund level. By converting excess cash into futures that replicate an index, the tracking error created by this excess cash can be minimized, which will allow us to track the index we are trying to match more closely.

By definition, futures are derivatives and therefore might be thought of by some of you as being risky. We hope this newsletter has been useful in helping you understand how this program would use futures in a positive, risk-reducing (hedging) role with the added benefit of cost savings and reduced tracking error.

This newsletter will be produced and distributed three to four weeks in advance of each scheduled board meeting with the objective of educating the Trustees regarding investment issues facing the pension fund. If you have questions or would like additional information on any topic contained herein, please contact the investment staff.

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