

# GMO's Predictions: A Useful Guide for Investors?

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**Abstract.**

## GMO'S PREDICTIONS: A USEFUL GUIDE FOR INVESTORS?

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How successful are stock market predictions? We explore one set of easily accessible predictions by a respected firm, GMO. Specifically, we evaluate how effective GMO's predicted stock returns have been in guiding investors from June 2000 through March 2014. We find that the predictions have been useful, although based on past history investing solely in the top one or two performing indexes would have been an inferior strategy for maximizing return to investing equal amounts in the three indexes with the top predicted returns.

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How successful are stock market predictions? We explore one set of easily accessible predictions by a respected firm, GMO. Specifically, we evaluate how effective GMO's predicted stock returns have been in guiding investors from June 2000 through March 2014. We find that the predictions have been useful, although based on past history, investing solely in the top one or two performing indexes would have been an inferior strategy for maximizing return to investing equal amounts in the three indexes with the top predicted returns.

Beginning in early January 2000 GMO published predicted rates of return for various stock and bond market categories on its web site. The data are predictions as of the first of each month, and are published several weeks into the month. Initially these were predicted ten year returns. More recently they have been seven year predicted returns. Initially GMO archived these quarterly predictions. Subsequently GMO removed the early predictions from its web site, so only the more recent quarterly predictions remain. We have saved the quarterly predictions, and we test to see whether these quarterly predictions of five stock categories are useful for investors. One must register to access the web site, <http://www.gmo.com/America/>, but registration is free.

*The Economist* has evaluated GMO's predictions (Buttonwood, 2013), and Tower has written several working papers on the GMO family. This paper is yet another one in that series, (Tower 2010a, 2010b).

## **HOW HIGH ARE THE CORRELATIONS BETWEEN GMO'S LONG-RUN PREDICTED RETURNS WITH REALIZED RETURNS?**

GMO reports predicted real returns for six categories of stocks: US Large, US Small, US High Quality, Intl Large, Intl Small, and Emerging. US High Quality were added after the series was started, so we exclude them and focus on the other five indexes. To compare predicted returns with realized returns, we use five indexes, which we access from the Bloomberg terminal. These are the S&P500 index, the S&P Small Company index, MSCI EAFE index, MSCI EAFE Small Cap Index, and MSCI Emerging Market Index. The Bloomberg codes are SPXT, SPTRSMCP, NDDUEAFE, NCUDEAFE, and NDUEEGF. The Morningstar codes are S&P 500 TR, S&P SmallCap 600 TR, MSCI EAFE NR USD, EAFE Small Cap NR USD, and MSCI EM NR USD. Initially the predicted returns were ten year predicted returns. We assume GMOs predicted returns are annualized real returns. We work solely with continuously compounded returns, as they have the desirable property that the continuously compounded return over several periods is the average of the continuously compounded returns over the component periods. Thus, all returns in the paper are continuously compounded. They are also real.

Exhibit 1 shows the correlation between the continuously compounded seven or ten year predicted return and the realized seven year return. To calculate the realized real return we use the consumer price index provided by the Bureau of Labor Statistics.

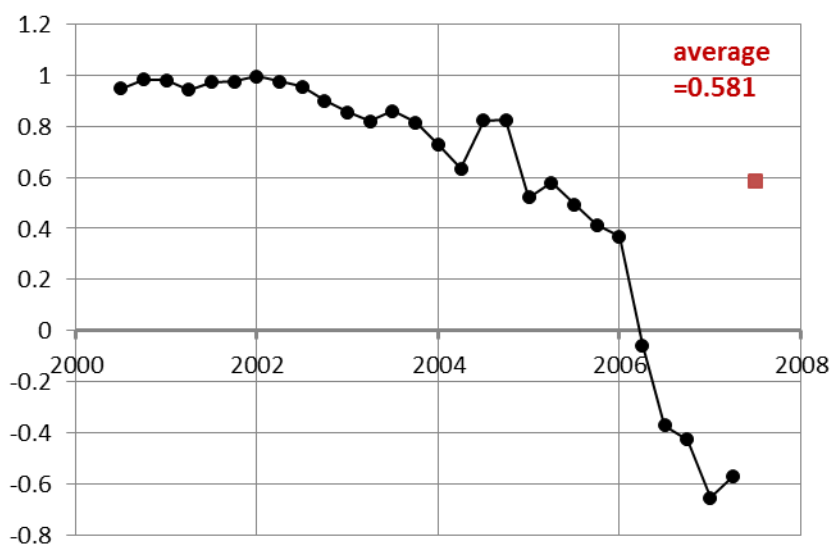
The data are the predicted and realized returns starting from the prediction at the close of the market on the last day of June 2000 through the last day of March 2007. Thus the data series for realized returns ends on the last day of March 2014.

Exhibit 1, shows the predicted and realized returns to have correlations of close to unity during the early periods and lower correlations subsequently, with negative correlations in the most recent five quarters. Over the entire period the correlation averaged 0.581.

The GMO predictions at the start of each month are not published until later in the month. We ignore this lag and pretend that the investor at the beginning of each month has access to the predictions for the last day of the preceding month. This is not too much of a stretch, as the predictions are based on the ratio of stock index price to fundamentals, and the stock index price is observable at the beginning of each month and the fundamentals don't change much from month to month.

## EXHIBIT 1

The Correlation between 7 or 10 year predicted return and 7 year realized return continuously compounded, July 2000 through March 2014

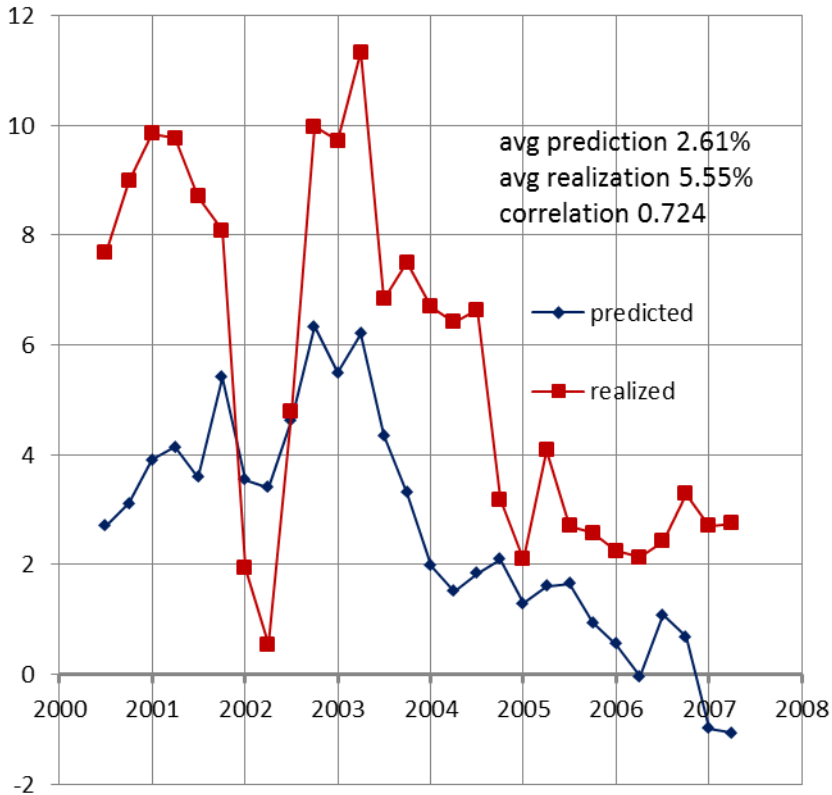


## HOW GOOD ARE GMO'S AVERAGE PREDICTIONS?

Exhibit 2 presents the average GMO predictions and the average realizations, again continuously compounded. The average GMO predictions and realizations are for the portfolio of the five stock indexes, rebalanced every quarter. On average GMO has underpredicted. The average real predicted return is 2.62%/year, and the average realized return is 5.20% per year. The correlation between the prediction and the realization is 0.708. **The average predicted return on April 30, 2014 was +.08 %/year, not as depressed as the -1.07 %/year predicted at the end of March 2007.** This may be relevant for investors who are aware of the view that the stock market is overvalued. Of course our calculation is for an average of world markets. However, the ranking is also true for US large caps, but not for US small caps.

## EXHIBIT 2

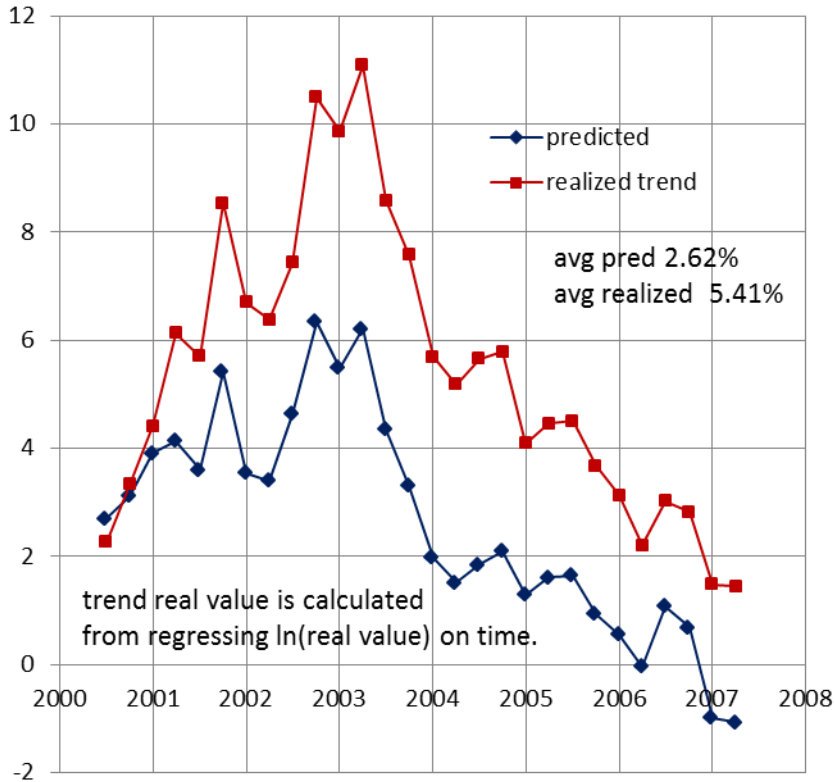
Predicted and realized average 7 year real rates of return, continuously compounded. Correlation is 0.724.  
Predictions from 7/2000-3/2007



The 2008 stock crash could not have been predicted 7 years earlier. Exhibit 3 replicates Exhibit 2, but instead of calculating realized returns using closing real value from investing in the basket of indexes, we use trend real value. This mitigates the impact of failure to predict the 2008 crash. Trend value is calculated by regressing the  $\ln$  of index portfolio real value on time. The average predicted is the same as before, and the average realized rises to 5.41%. The correlation rises markedly to 0.894.

## EXHIBIT 3

Portfolio real return, %/year: GMO Predicted 7 or 10 year vs 7 year realized using trend real value at redemption. Five stock portfolio is equally weighted and rebalanced quarterly. Correlation is 0.894.



## REAL RETURNS FROM ALTERNATIVE STRATEGIES

Exhibit 4 presents the real returns, cumulative real returns and standard deviations of return from alternative strategies.

- Simulation I assumes all funds are invested in the index predicted to return the highest.
- Simulation II, like the other simulations uses Microsoft Excel solver to maximize an objective function subject to constraints. It assumes that the investor invests only in the top two highest predicted indexes, rebalanced quarterly, with the share of funds in the highest predicted index at least as high as that of the second best predicted index. The simulation finds that the return-maximizing strategy is equal weights in the two indexes.
- Simulations III, IV, and V are the same as simulation II, except that the top three, top four, or all five predicted indexes are used. In each case we tell Microsoft Excel to invest

at least as much in any index as in any index with lower expectations. In each case Excel tells us that the optimum weights on the indexes for maximizing return are identical.

- Simulations 2 through 5 show the results for investing in just a single index.

The return maximizing strategy was to invest all in the index predicted to be third best, and the risk minimizing strategy was to invest in the fourth best predicted index. Of the diversified strategies, the highest return came from investing in the top three predicted funds, and the minimum risk came from investing equal amounts in all five. **Vis a vis the benchmark of equal amounts in all five indexes, equal amounts in the top three predicted indexes returns 0.96 % per year higher costing a standard deviation of return 0.96% per quarter higher.**

We assume rebalancing every quarter. But rebalancing transactions occur less frequently than that. For example, to maintain equal amounts in the top three predicted indexes simply required swapping a third of the portfolio five times from 30 June 2000 through 31 March 2014.

Next in Exhibit 4 are four simulations that are discussed in the next two sections.

Next are the returns and standard deviations of the five indexes. The S&P500 and the EAFE both have lower returns than even the indexes predicted to be fourth or fifth best.

The final simulation, the normal diversified portfolio, is close to what a financial advisor might recommend. It assumes 60 % of the portfolio invested in US stocks, divided up with 48% in the S&P500 index, and 12% in small caps. The remaining 40% is international, with 24% in the EAFE and 8 % each in international small caps and emerging markets. Its standard deviation of return is lower than any other except for investment in the S&P500 index. The cost of this low standard deviation is that this portfolio's return is lower than any of the equal-weight investments strategies, I-V.

## EXHIBIT 4

### Real Returns Continuously Compounded from Alternative Strategies

| simulation    | rule  | real return<br>6/2000-3/2014,<br>inclusive.<br>%/year | cumulative<br>real return<br>6/2000-3/2014,<br>inclusive. % | standard<br>deviation of<br>real return.<br>%/quarter |
|---------------|---|---|---|---|
| I             | All in top predicted index                          | 4.44  | 80  | 13.02   |
| II            | Equal amounts in top two predicted indexes          | 4.97  | 93  | 11.50   |
| <b>III</b>    | <b>Equal amounts in top three predicted indexes</b> | <b>5.51</b>   | 107   | <b>11.05</b>  |
| IV            | Equal amounts in top four predicted indexes         | 4.83  | 90  | 10.40   |
| <b>V</b>      | <b>Equal amounts in all five indexes</b>            | <b>4.55</b>   | 83  | <b>10.09</b>  |
| 2             | All in index predicted to be second best            | 5.15  | 98  | 10.59   |
| 3             | All in index predicted to be third best             | 6.28  | 130   | 10.84   |
| 4             | All in index predicted to be fourth best            | 2.34  | 36  | 9.45  |
| 5             | All in index predicted to be fifth best             | 2.99  | 49  | 10.00   |
| RS            | Maximize return shorts ok                           | 6.03  | 122   | 15.26   |
| SDS           | Minimize standard deviation of return shorts ok     | 4.55  | 83  | 10.09   |
| RL            | Maximize return long only                           | 5.43  | 105   | 11.93   |
| SDL           | Minimize standard deviation of return long only     | 2.92  | 47  | 9.61  |
| Small Cap 600 | US small cap only                                   | 7.19  | 159   | 10.34   |
| Emerging      | Emerging market only                                | 5.90  | 119   | 13.09   |
| MSCI Small    | International small only                            | 5.44  | 106   | 11.13   |
| S&P500        | S&P500 only   | 1.49  | 22  | 8.89  |
| EAFE          | International EAFE only                             | 1.18  | 17  | 10.31   |
| <b>NDP</b>    | <b>Normal Diversified Portfolio</b>                 | <b>2.99</b>   | 49  | <b>9.44</b>   |

### MAKING THE INVESTMENT SHARE A FUNCTION OF PREDICTED RETURN. SHORTS PERMITTED

Exhibit 5 makes the investment share in each index equal to a constant that is the same for all five indexes plus a sensitivity parameter times the difference between the predicted return for that index and the average predicted return for all five indexes. Some of the portfolio weights are negative, meaning that holding indexes short is assumed to be possible, something that is impossible to do without additional costs. When we maximize return, the return of 6.03 % per year is higher than simulation III in Exhibit 4 (equal amounts in the top three predicted funds), with a much higher standard deviation of real return, 15.26 %/quarter.

To minimize standard deviation, using same functional form and constraining the sensitivity parameter to be non-negative, the best sensitivity parameter is zero, so the best portfolio is the simple equal weighted portfolio of simulation V

## EXHIBIT 5

**Portfolios that are a Function of Return Differentials 7/2000-3/2014 inclusive.  
Shorts permitted.**

| Simulation | Objective                             | S=share sensitivity | avg real return. %/year | std dev of retn.%/quarter |
|------------|---------------------------------------|---------------------|-------------------------|---------------------------|
| RS         | Maximize real return                  | 0.234               | 6.03                    | 15.26                     |
| SDS        | Minimize std deviation of real return | 0.000               | 4.55                    | 10.09                     |

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Portfolio share in the  $i^{\text{th}}$  index in the  $t^{\text{th}}$  quarter =  $a + S[\text{predicted real return for the } i^{\text{th}} \text{ index in the } t^{\text{th}} \text{ quarter minus average of predicted real returns for all indexes in the } t^{\text{th}} \text{ quarter}]$ . A share sensitivity of 0.234 means that each one percentage point increase in [expected return minus average expected return] raises the share in the index by a fraction: 0.234. That is almost a quarter of one percentage point. The portfolio shares always add up to one. S is constrained to be positive. Simulation SDS has an optimum S of zero, so the simulation turns out to be the same as that for equal weight.

## MAKING THE INVESTMENT SHARE A FUNCTION OF PREDICTED RETURN. LONG ONLY

Exhibit 6 is similar to Exhibit 5, except that shorts are prohibited. The share invested in the  $i^{\text{th}}$  fund depends on its predicted return minus the average of the predicted returns in that same quarter, with the constraint that the share cannot be negative. This is a more relevant simulation than those in Exhibit 5. Again portfolios are rebalanced quarterly. The return maximizing simulation has a slightly lower return than that in Exhibit 5, with considerably lower standard deviation of return. The slightly lower return reflects the fact that by excluding shorts we have reduced degrees of freedom.

The simulation that minimizes standard deviation of return has a slightly lower return and a lower standard deviation than that in Exhibit 5. **Vis a vis the benchmark of equal amounts in all five funds it returns 1.63 percentage points per year lower, shrinking the standard deviation of return 0.48 percentage points.**



## EXHIBIT 6

Portfolios that are a function of return differentials. 7/200-3 2014 Inclusive.  
Longs Only.

| Simulation | Objective                                | avg real return.<br>%/year | std dev of return.<br>%/quarter |
|------------|--|----------------------------|---------------------------------|
| RL         | Maximize real return                     | 5.43                       | 11.93                           |
| SDL        | Minimize std deviation<br>of real return | 2.92                       | 9.61                            |

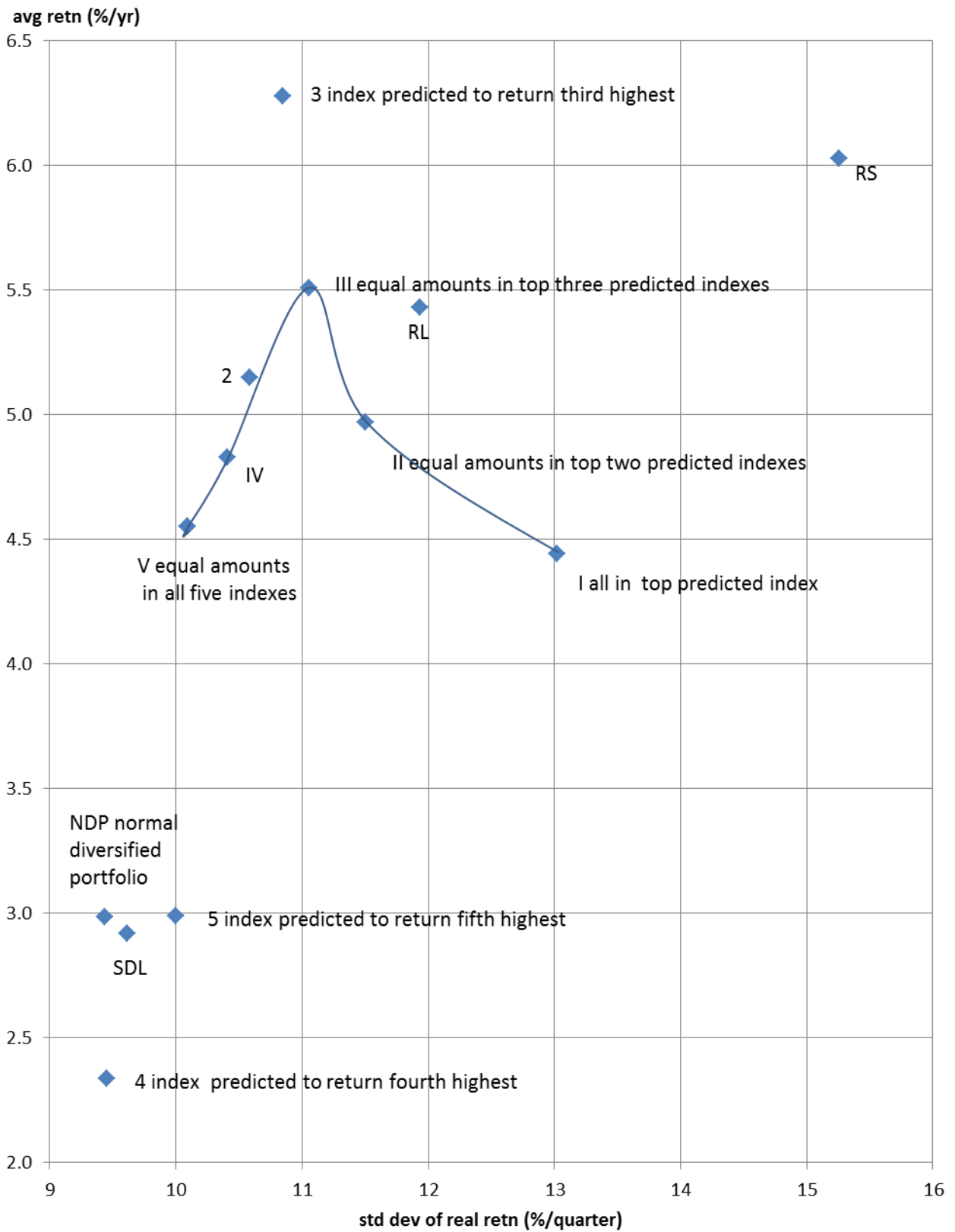
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Portfolio share in the  $i^{\text{th}}$  index in the  $t^{\text{th}}$  quarter =  $w_{it} / \sum w_{it}$ ,  
where  $w_{it}$  is  $\max\{0, a + S [\text{predicted real return for the } i^{\text{th}} \text{ index in the } t^{\text{th}} \text{ quarter minus average of predicted returns for all indexes in the } t^{\text{th}} \text{ quarter}]\}$ .  
The portfolio shares always add up to one.

Exhibit 7 presents the results of all the simulations in a chart. Perhaps the most practical result is that investing equal amounts in the top three predicted indexes raises return over investing equal amounts in all five, but also imposes higher standard deviation of return. The hump in Exhibit 7 illustrates that investing equal amounts in the top three predicted funds has a higher return than investing equal amounts in the top 1, 2, 4, or 5 funds.

# EXHIBIT 7

## Risk vs Return



## CONCLUSION

- The GMO predictions provide useful information, but plunging into the single index with the highest predicted return produced a lower return with a higher standard deviation than investing equal amounts in all five funds.
- As one would expect there is a tradeoff between risk and return.
- More broadly, we find the GMO predictions do provide useful guidance for investors, which should be tempered with recognition of the importance of diversification. We are grateful to GMO for publishing their predictions and hope that more advisers will do the same.
- One commenter on the paper suggested that measuring a value oriented shop from June 2000 is probably a generous way to do it, since this was near the peak of the tech bubble, a remark that is borne out by the low recent correlations between 7 year predictions and realizations in Exhibit 1.

## ACKNOWLEDGEMENTS

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