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## The Long-Only Constraint

Avoiding the surprisingly large impact of long-only constraint can lead to a significant improvement in efficiency.

The long-only constraint is so automatic in investment management that, often, we don't even think about it. Yet this pervasive constraint can dramatically reduce efficiency and induce small stock biases – and these negative impacts increase with active risk. In fact, the advantage of long-short products is the avoidance of the long-only constraint.

Imagine that we have analyzed a group of stocks and ranked them as “strong buy,” “buy,” “hold,” “sell” or “strong sell.” The long-only constraint will keep us from using some of that ranking information. For example, the “strong sell” information will probably go to waste, because we can't underweight stocks very much in a long-only portfolio.

But how much information will we waste? Will we lose just the “strong sell” information? Or will we lose “sell” information as well? What determines how much we lose?

Two factors are important. We lose more information as we increase the fund's active risk because we are increasing the overweights and underweights. As underweights increase, they soon hit the long-only barrier.

We also lose more information if our benchmark contains more stocks. A 60-stock benchmark holds an average 1.67 per cent of each stock. A 300-stock benchmark holds an average 0.33 per cent per stock. As the number of stocks increases, the average cushion before hitting the constraint decreases.

To analyze the long-only constraint in more detail, we numerically simulated results for a variety of active risk levels. For each active risk, we ran 900 simulations. Each simulation generated a set of alphas and built an optimal portfolio.

These results clearly demonstrated that for long-only products, expected return does not increase linearly with active risk. Instead, each unit of additional risk generates less and less expected return. Viewed another way, long-only information ratios – the ratios of expected active return to active risk – decrease with increasing active risk.

To capture this, we define efficiency as the ratio of the long-only information ratio to the information ratio achievable in a long-short product. Loosely speaking, this efficiency measures the fraction of a manager's ideas fully expressed in the portfolio.

This decrease in efficiency can be significant. A long-only product with 4.5 per cent active risk loses half its information ratio (efficiency = 49 per cent) relative to a long-short product using the same information (same alphas).<sup>1</sup> The impact is less severe at low risk levels. A risk-controlled product with only two per cent active risk has an efficiency of 71 per cent.

Improved efficiency doesn't guarantee performance. It is good in that it allows the portfolio to fully reflect manager views. It doesn't guarantee that these views are correct. You select active managers because you believe in their views, so you should desire maximum efficiency.

Our analysis also demonstrates a bias toward small stocks. This arises because the long-only constraint mainly impacts the smaller capitalization stocks that have less weight in the benchmark. Once again, the bias increases with portfolio risk level. For a product with 4.5 per cent active risk, this bias in the U.S. would have generated a loss of 2.35 per cent over the 10-year period ending September 1998 (when large stocks outperformed small stocks).

Long-short investing can offer an advantage over long-only investing. Avoiding the long-only constraint leads to improved efficiency and an avoidance of an incidental small stock bias. Among long only products, risk-controlled products offer better efficiency and less size bias than traditional, higher-risk products. ■

<sup>1</sup> For these simulations, we assume 500 assets in the benchmark.

