January 18, 2006

Portfolio Analysis

Short-Extension Portfolios: An Exploration of the 120/20 Concept

Short extensions such as “120/20” strategies offer increased flexibility for active equity management. The expanded footings provide a wider range of alpha-seeking opportunities for both traditional and quantitative management.

Short extension strategies can be designed to fit within a sponsor’s existing allocation space for active US equity management. With proper risk control, a short extension may entail tracking error that is only moderately greater than that of a comparable long-only fund.

Short extensions open the door to a fresh set of actively chosen underweight positions. With long only funds, significantly sized underweights are limited to stocks with very large market capitalizations, with the remaining underweights being scattered (sometimes with less attention) across a broad range of stocks.

A carefully implemented short extension can expand relationships with existing managers. A sponsor may wish to draw upon those active managers that have already been vetted in terms of their alpha-seeking skills, organization infrastructure, and risk-control procedures.

Short extensions can facilitate and sharpen a number of standard active management techniques, for example, more specific relative value trades, selective weight enhancement, industry and sector positioning, etc.

The special challenge and costs involved in the shorting process should not be underestimated. Many long-only managers are initially daunted by shorting’s costs and need for significantly different approaches to valuation, execution, monitoring, and risk control.

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Short-Extension Portfolios: An Exploration of the 120/20 Concept

Summary & Conclusions

There has been a recent series of papers describing how active equity management can be enhanced through relaxation of the constraints typically imposed on long-only funds [1-18]. In particular, the greatest attention has been focused on a moderate loosening in the long-only constraint, allowing up to 20% of the fund to be shorted. In general, these “120/20” techniques use this shorting facility to extend the universe of active management opportunities, rather than acting as a leveraging mechanism for taking more concentrated long positions. For this reason, the term “short extension” seems like a more reasonable expression to capture the key distinguishing feature of the 120/20 concept and its variants.

At the outset, it should be noted that shorting differs significantly from long-only management in a number of important ways, including transaction and maintenance costs, the available level and continuity of liquidity, the more intensive monitoring and risk control requirements, etc.

A key feature of the “120/20” strategy is that it maintains the basic risk characteristics of benchmark-centric long-only funds: 1) the 20% short is offset by a beta-equivalent 20% long position so as to preserve the beta posture, and 2) the overweight and underweight positions are structured so as to keep the tracking error within reasonable bounds. Within these risk constraints, the “20% short extension” opens up a broader range of active alpha opportunities, with the objective of improving the ratio of active return relative to the associated tracking error.

In Portfolio Notes published over the past year, we have pointed out that the “total beta” accounts for over 90% of the total volatility of most U.S. pension funds, foundations, and endowments [19-28]. Moreover, this total beta dominance occurs even with very highly diversified allocations having as little as 15-20% weightings in US bonds and equities. Given this central role for the beta factor, the function of each asset class within a policy allocation can be analyzed in terms of its implicit or explicit beta value, beta variability, passive and/or active alpha variability, and other associated “dragon risks” [29]. By maintaining a general congruence along these risk dimensions, short-extension portfolios can be viewed as a modest variant of traditional equity as an asset class.

Thus, unlike shorting vehicles that tend to have beta values that are either untargeted or deliberately varied, a short extension’s well-defined beta value allows it to basically occupy the same allocation space as long-only equity funds.

The recent studies of the 120/20 portfolio have drawn upon new developments in the theory of active management [30]. These academic studies generally employ an elegant, but somewhat complex, approach to address the broad sweep of problems associated with multiple portfolio constraints. The purpose of this Note is to focus more narrowly on the opportunity enhancement feature of the 120/20 strategies, using a simple alpha-ranking model to characterize the active management process. This model is applied to a basic short-extension example that was chosen primarily for illustrative purposes, and should not be construed as being representative of any specific extension strategy. Although this approach represents an admittedly less comprehensive treatment than the referenced studies, it does capture the fundamental appeal of short extension strategies for sponsors and for both traditional active and quantitative equity managers.

For sponsors, the 120/20 concept is a relatively modest move toward expanding the opportunities for an active manager that the sponsor already believes has the skill set to generate positive alphas. Moreover, this potential alpha enhancement can be pursued within a disciplined framework that retains absolute and relative risk controls that are comparable to those provided by the sponsor’s existing long-only managers.

For active managers that would like to organically expand their alpha-seeking process, the short-extension technique offers the prospect of a differentiated, higher value-added service.

The Capitalization Structure of the Equity Market

It is well known that virtually every equity market is highly concentrated, with a small number of very large-“cap” names, a moderate number of reasonably large-cap names, and a very large number of lesser capitalization companies. Taking the S&P 500 index as an example, Exhibit 1 presents, in descending order, the capitalization for each stock as a percentage of the total S&P 500, i.e., the first stock, Exxon Mobil, has a market capitalization of 3.2%, the second-largest stock, GE, 3.1%, etc.
Capitalization rank has broad implications for a stock’s performance characteristics, although some key variables exhibit surprisingly modest sensitivity to the capitalization level. For example, Exhibit 2 displays the ex ante Barra betas for each stock across the capitalization structure. As one can see from the scattergram, these betas are indeed all over the place, but with only a moderate trend toward higher betas at the lower capitalizations.

Similarly, if we look at the Barra estimates of total volatility, the scattergram in Exhibit 3 shows that, in contrast to what might have been expected, overall volatility increases only moderately as one moves toward smaller capitalization.

Exhibit 4 shows the “alpha volatility” — the residual volatility after extracting the stock’s beta-based co-movement with the market as a whole. Here again, there is a modest increase in alpha volatility with smaller capitalization. However, it is interesting to see that even the large-capitalization stocks seem to have a surprising amount of this idiosyncratic volatility relative to their Barra beta.

Similarly, if we look at the Barra estimates of total volatility, the scattergram in Exhibit 3 shows that, in contrast to what might have been expected, overall volatility increases only moderately as one moves toward smaller capitalization.

**An Alpha Opportunity Model**
To explore the potential advantages of the short extension, it is helpful to have a model for active management opportunities as a function of capitalization structure. Even though one could argue with the specific details of any such
model, the broad outlines can serve to illustrate the key points involved in short extension.

By showing the number of analysts’ earnings estimates, Exhibit 5 provides a rough gauge of the level of research coverage across the capitalization structure. Research coverage does appear to have a discernible trend, with the larger names being more intensely covered. This scattergram may understate the level of research intensity in that, for a given number of estimates, the larger companies may be subject to more intense and more comprehensive analyses.

In the following discussion, we shall assume that there is no distinction between the coverage on the long or the short side, even though many would argue that the dominance of long-only asset managers leads to a far more intense focus on buy versus sell opportunities.

Exhibit 5
Research Coverage vs. Capitalization Rank

One often hears the argument that the very largest caps offer less opportunity for truly fresh insights, implying that there may be more alpha potential in the lower-caps. However, at some point, with ever lower capitalizations, the issue of liquidity will arise. Liquidity is a function of trading volume that, in turn, tends to be related to market capitalization. Of course, the need for liquidity is very dependent upon the nature and size of the fund in question, e.g., larger funds with shorter horizons require more liquidity, smaller funds with longer horizons may require less. Exhibit 6 makes the point that the better active opportunities are likely to be found in that swath of the capitalization spectrum where the liquidity is ample but the research coverage is not too intense.

Benchmark-centric active managers tend to have limits in terms of both their minimum and their maximum position size. The maximum size serves as one form of risk control, while the minimum helps keep the monitoring span within reasonable bounds. Under these fairly standard sizing conditions, the long-only mandate allows for positive overweights across the entire capitalization spectrum. However, negative views can only be expressed by underweight positions that are limited in size by a stock’s benchmark weight. Thus, underweight opportunities are restricted to very large-cap stocks. As schematically illustrated in Exhibit 7, the market’s cap structure means that long-only funds are foreclosed from a wide range of potential underweights.
One of the benefits of the flexibility to take short positions is that it opens the door to this region of potentially opportunity-rich underweights. To gauge the benefits of this flexibility, a framework is needed that is descriptive of the active management process.

**An Active Management Model**

In contrast to the more theoretical analyses with “score-based” variable weights, we will use a more basic model with a fixed weight of 2% for all active positions, whether underweights or overweights. In practice, most funds have a standard weight for their active positions. Indeed, in those cases where they have smaller positions, they may act as a first step in the direction of a deeper analysis and a firmer conviction that might ultimately lead to the full standard position size.

With funds that are strictly long-only (i.e., without access to futures or other derivatives), the overweight positions must be balanced against the complementary underweights that serve both as funding sources and as mechanisms for beta control. As such, the underweights are generally not equivalent in active content to the overweights. There may be a wide dispersion in the size of these nominal underweights, but it would be misleading to view all of them as truly active positions. For many reasons, the basic orientation of most active portfolio managers is a focus on the selection of the overweight positions.

One of the motivations behind the 120/20 short extension is to enable the portfolio manager to exploit a broader range of potentially attractive underweight positions. Suppose a fund is granted the freedom to short up to 20% of its assets, subject to maintaining a high level of beta control and a limited tracking error. The portfolio construction can then deploy 20% of its asset size in newly available underweights, and then use the additional 20% funds generated for a comparable set of additional overweights. At the 2% position size that we have assumed, this translates into 10 new active underweights and 10 new active overweights.

**The Alpha Ranking Model**

To evaluate the benefits of this portfolio “extension,” assume that the best overweight offered an expected alpha of 5%, and that the remaining positions could be arrayed in sequence of decreasing alpha. Exhibit 8 displays such orderings, with the decline in alpha proceeding in two phases.
In terms of tracking error, if the positions have statistically independent tracking error (assumed to be 23%), then the well-known square root of N rule applies, leading to the portfolio tracking error shown in Exhibit 10.

Combining the portfolio alpha from Exhibit 9 together with the tracking error from Exhibit 10 leads to Exhibit 11, which plots the portfolio alpha as a function of the tracking error for varying numbers of positions.

At this point, we make a further assumption that the portfolio manager will have a maximum number of positions that he can thoughtfully establish and monitor. Indeed, one characteristic of an active manager’s style is this maximum number of active positions and the percentage of the portfolio that they comprise. Our base-case example consists of a long-only manager having 25 overweight positions each with a 2% weight. The remaining 50% of the assets serve as non-specific underweights configured so as to maintain the unit-beta posture.

A Short Extension Model
The preceding alpha ranking model can be adapted to a fund having a limited flexibility to take short positions. Assume that the manager now achieves the right to short up to 20% of the fund’s asset size. With the position size kept constant at the 2% level, this 20% shorting option allows for 10 new underweights. The added fractional costs involved in the short side can be modeled by assuming that the best short position has an alpha somewhat lower than the best long position. If we take a 0.50% decrement for this effect, then the best new underweight will have an alpha of 4.50%. For simplicity, the subsequent underweight position can then be viewed as subject to the same percentage erosion as applied to the overweights (Exhibit 12). These 10 new underweight positions now represent a fresh source of high-quality alpha that could contribute 0.81% to the total portfolio alpha. In essence, these new underweights are picking off the early cream of the alpha ranking curve.
It well might be argued that the alpha quality ranking of the short positions, since they are generally underpursued, should be higher than the ranking curve used for overweights. However, there are serious pragmatic infrastructural and risk-control problems associated with the short side, quite apart from all the behavioral biases and limited shorting experience of long-only managers. Managers who have moved into shorting stocks for the first time frequently point out that the process proves far more difficult than they anticipated. (Indeed, the recent trend of long/short hedge funds to launch long-only funds has been frequently ascribed to the difficulties in finding “good” shorts.)

After frictional costs, the proceeds from these shorts could be deployed to establish 10 new long positions. Since the 25 best overweight positions have already been taken, these additional 10 would have to represent lesser ranked opportunities. In other words, these new (short-funded) overweights would consist of alpha returns from the 26th to 35th ranked positions in Exhibit 8. The 35-position overweights would now provide cumulative alpha of 2.44% (Exhibit 9).

The question might be raised at this point as to why not simply increase the sizing of the more attractive overweight positions. Quite apart from how this greater concentration might lead to increased tracking error, the pragmatic fact is that most traditional managers are limited to a certain maximum position size.

The net portfolio effect from the 20% short extension is a move from 25 long overweights to 35 long overweights and 10 fresh short underweights, i.e., a total position count of 45. As summarized in Exhibit 13, this extension in position count, together with the mining of a rich set of underweight opportunities, leads to a portfolio alpha of 3.25%, a significant increase from the 1.96% of the original long-only portfolio. At the same time, the tracking error increases to 3.09%, versus 2.30% for the long-only case. The active return/risk ratio rises to 1.05, compared with 0.85 for the long-only case.

### Exhibit 13

**Short Extension Model**

<table>
<thead>
<tr>
<th></th>
<th>Total Number of Positions</th>
<th>Alpha</th>
<th>Tracking Error</th>
<th>Alpha/TE Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long Only Funds</td>
<td>25</td>
<td>1.96</td>
<td>2.30</td>
<td>0.85</td>
</tr>
<tr>
<td>Long Only Funds + next 10 2% Positions</td>
<td>35</td>
<td>2.44</td>
<td>2.72</td>
<td>0.90</td>
</tr>
<tr>
<td>Top New Short Positions</td>
<td>+10</td>
<td>+0.81</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Short Extension Portfolio of 45 2% Positions</td>
<td>45</td>
<td>3.25</td>
<td>3.09</td>
<td>1.05</td>
</tr>
</tbody>
</table>

Source: Morgan Stanley Research

It should also be noted that the total positions increase from 25 to 45 represents an 80% change, i.e., far greater than the 20% amount shorted. This greater position count derives from the assumption that the 20% shorts and the new overweights will only be taken against explicit alpha opportunities, whereas the original 100% fund had only 50% of its assets devoted to truly active positions.

Exhibits 14 and 15 compare the alphas for the long-only and the short-extension portfolios as a function of position count and tracking error, respectively.
Finally, Exhibit 16 moves beyond the 120/20 case to depict the ratio of portfolio alpha to tracking error as a function of various extension levels. This curve rises rather rapidly as one moves from the original long-only portfolio to the 20% extension and then starts to bend over as it moves toward larger short-extension levels, with the lower incremental alphas on both the long and the short side.

Other Applications
In addition to the position expansion described above, the short extension can facilitate and sharpen a number of standard management techniques. Thus, relative value trades on two or more specific securities can be more precisely shaped. Moreover, the augmented proceeds can enable priority positions to be better-sized, even within the initial bounds on maximum position size.

In addition, the additional footings, both on the long and the short side, can be deployed in a mix of active/generic modes. This flexibility could be useful in a wide variety of applications, e.g., more refined relative value trades both within and among different industry and sector groups. Moreover, even for a prescribed set of initial long-only positions, the broader footings could provide the needed flexibility to achieve better beta control and tighter benchmark tracking. Thus, in such an application, a short extension may actually (and somewhat ironically) result in a lower tracking error for a prescribed initial set of long-only positions.

Caveats and Generalizations
As noted at the outset, our numerical example was chosen primarily for purposes of simplicity and clarity. There are many additional factors and myriad complications that would come to bear in any actual portfolio context. At the same time, the issues that differentiate short positions from long positions should not be underestimated. In particular, there are multiple formats for implementing the shorting process, with considerable variation in transaction costs and other frictions, e.g., the fraction of short proceeds that become available for reinvestment.
Our analytical model was deliberately based on a highly restrictive set of assumptions — a fixed position size, a common tracking error, redeployment of short proceeds into the long ‘tail,’ comparable long/short ranking models, etc. The alpha ranking model can be extended to overcome many of these limitations. For example, the weighting could be scaled to each position’s prospective return/risk ratio, while the portfolio tracking error could be optimized relative to a specific parameter for risk tolerance or to some general utility function. It would also certainly be desirable to have a more refined treatment of the differences between long and short positions. However, in this Note, we have tilted towards simplicity in addressing the challenge of capturing the key elements of the concept without overburdening the exposition.

In summary, a short extension, reasonably sized and properly risk-controlled, can occupy the same allocation space as traditional long-only equity funds while providing significant additional flexibility for alpha-seeking active management.

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<table>
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<th>Stock Rating Category</th>
<th>Coverage Universe Count</th>
<th>Coverage Universe % of Total</th>
<th>Investment Banking Clients (IBC) Count</th>
<th>% of Total</th>
<th>% of Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overweight/Buy</td>
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<td>36%</td>
<td>272</td>
<td>40%</td>
<td>36%</td>
</tr>
<tr>
<td>Equal-weight/Hold</td>
<td>943</td>
<td>45%</td>
<td>320</td>
<td>47%</td>
<td>34%</td>
</tr>
<tr>
<td>Underweight/Sell</td>
<td>382</td>
<td>18%</td>
<td>88</td>
<td>13%</td>
<td>23%</td>
</tr>
<tr>
<td>Total</td>
<td>2,078</td>
<td>680</td>
<td></td>
<td></td>
<td></td>
</tr>
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