Homework 4

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When funds are trying to design dollar-neutral strategies, they often try to make sure that the long and short positions are both "neutralized" or "balanced" in terms of certain characteristics. If this is not done, we may find that the portfolios we have built are picking up on some characteristic that we did not intend.

For example, it is very common to balance the portfolios in terms of market capitalization. That is, we try to make sure that the long and short portfolios each hold roughly equal numbers of large-cap and small-cap stocks. Otherwise, we may find that the characteristic we were trying to exploit is correlated with market capitalization, and this causes our long and short portfolios to have firms of very different size.

This assignment explores why this is important. We will revisit the example we did at the end of class on Thursday. An investor currently holds a market index fund, and is thinking about also allocating to a dollar-neutral strategy that takes a long position in value stocks and a short position in growth stocks.

(As in class, we define value stocks and growth stocks in terms of their book-to-market ratios.)

Download the spreadsheet titled "Homework 4 data.xlsx" which has the data you will need:

- Columns B, C, and D list the data from 1971-2000 that we used in class: excess returns on the market portfolio, on a "value" stock portfolio, and on a "growth" stock portfolio.
- Columns E and F list excess returns on a small-cap stock portfolio and a large-cap stock portfolio.
- Finally, Columns G and H list excess returns on a value portfolio and a growth portfolio that are both designed to be "balanced" by having equal numbers of small- and large-cap stocks.
    - We will discuss the details of how this is done during class next week. You don't need to study that now, but you can look ahead at next week's material on Canvas if you are interested.
- **Please note that all columns are excess returns.**

1. Show that the value portfolio from our in-class example has a lower alpha, but a higher information ratio, than the dollar-neutral strategy that we looked at. Based on these patterns, would an index investor be more interested in the dollar-neutral strategy or a simpler, long-only value strategy?

2. Show that a strategy of short-selling growth stocks had an alpha of close to zero. Why does that help explain what you found in #1?

3. Calculate the correlation of the excess returns on the growth portfolio, and the large-cap portfolio. Why is it not surprising that this number is extremely high? (Think about what defines a growth stock, and what defines a large-cap stock.)

4. Show that a strategy of short-selling large-cap stocks had slightly negative alpha. Based on this, and the other evidence so far, why might it be worth looking into a dollar-neutral value-minus-growth strategy that tries to "balance" the long and short portfolios by market cap?

5. Now look at the size-balanced portfolio returns in Columns G and H. Show that there was positive alpha to short-selling the size-balanced growth portfolio. Show that the alpha and information ratio of the size-balanced dollar-neutral strategy are *both* higher than the alpha and information ratio of the size-balanced value strategy alone, and also higher than either of the values we found in #1. From all this evidence, what do we learn about the best way to implement a dollar-neutral value strategy in practice?