

## Statistics 434: Homework No. 7

### Exploration of Style Momentum

In the language of mutual funds, “style” has come to refer to the nine boxes into which Morningstar jams all funds. These styles are given by the cross table of (small, medium, large) capitalizations and (value, blend, growth) investment temperaments. All serious mutual fund and ETF families create funds to fill all of the boxes. Here we’ll focus on two iShares ETFs: IWZ (Growth) and IWW (Value). These are both “blend” funds but you should not be surprised if they track large cap cousins more closely than the small cap cousins.

Conventional thinking (and some academic research) suggest that there is momentum in the relative performance of “value” and “growth.” That is, there are blocks of time where Value wins and blocks of time where Growth wins and the lengths of these blocks are not consistent with tossing coins. You get to explore this and see what you think the evidence tells you. The suggestions below will get you going, but you should explore this theme in anyway that interests you.

#### Suggestions for Exploration

1. There is more chance for signal in weekly returns than in daily returns. After getting the daily returns from CRSP, convert these to a sequence of 5-day returns. You don’t need to actually get calendar weeks — just sequences of 5-day returns. You can also just approximate the “weekly” return as the sum of five days of running returns.
2. First for fun, plot the wealth sequence corresponding to an investment in IWZ, IWW and  $\text{Max}(\text{IWZ}, \text{IWW})$ . The third series is the wealth process of a person who every week guesses the best of the two ETFs to hold. No one can do this, but it gives us an upper bound on our dreams of avarice.
3. Consider the time series of your weekly returns for IWZ minus the weekly returns for IWW. This is a good approximation to what you would get by being long IWZ and short IWW each week in equal dollar amounts. Call this series NET. If there is the kind of momentum that people hope for in style, then you should be able to say something statistically significant about the NET series.
4. What does Ljung-Box tells us about NET? Is there hope for signal? Explore AR(1), AR(2), and AR(3) fits to NET. What do they tell you?
5. So far we have just tried to use weekly returns to predict weekly returns. Now let’s bring time series regression into the game. Let  $NET_t$  be this weeks return on NET. Let  $A_t$  be the return on NET last week, that is we set  $A_t = NET_{t-1}$  and  $B_t = NET_{t-2} + NET_{t-3} + NET_{t-4} + NET_{t-5}$  so  $B_t$  is (approximately) the return on NET in the month before last week. Do the time series regression. Interpret your regression. If you had to use just the information in  $A_t$  or just the information in  $B_t$  which would you use? Can you suggest an investment strategy based on  $A_t$  and  $B_t$ .

### **This Gets the Ball Rolling**

You know the theme: Can one make a good guess that next week Growth will out perform Value? Keep in mind that you don't have to win them all. If you can win 55% of the time, you have a very interesting guessing machine.

You have a good set of tools to explore this theme. You can also make progress by pure logic and honest EDA. Your insights here have real value, and they may even form the basis of a career — whatever it is that you discover and document.

### **How to Write It Up**

As always, you want to have a one page executive summary that “spills the beans” — we don't want any budding mystery novelists here. You can then follow up with the details that support your conclusions, with an emphasis on well designed tables and informative graphs — all nicely presented.