Using Scaling Laws For FX Trading Models – A Two-Dimensional Extension

In my previous article (February 2020), I showed how scaling laws can be used to predict the behavior of FX data. In this follow-up article, I show how scaling laws can be extended into two dimensions, volatility and price change thresholds. Now, using two-dimensional scaling laws, an even more accurate prediction of expected returns can be made.

Fractals and Scaling

The jagged coastline of Norway, an old oak tree and the EURUSD time series have at least one thing in common! They all have fractal geometries. This means they have the same form or structure when viewed at different scales. Scale can mean the altitude that a coastline is observed or the time interval (such as 5min, 1 hour, 1 day) selected for viewing a financial time series. This property is called self-similarity. If you look at a branch of a tree, it will have many smaller branches and each branch will also look like a tree, but at a smaller scale. Significantly, physical laws are independent of the scale so that the behavior of fractal systems is scale-independent. Scaling laws that represent the fractal structure of FX rate data can be used to predict the expectation value of FX parameters such as the average return of an up/down trend or the duration of a trend. This information is key to the development of financial trading models.

WHAT'S AHEAD

In the following sections, I will give a brief recap of the development of scaling laws for FX data. A more detailed description is given in the previous article and listed references. I will describe four scaling law equations and introduce volatility as a key measure of scale for two of these scaling laws. Then, I will show how extending the scaling concept into two dimensions allows the four scaling law equations to collapse into two equations. Finally, I will describe trading algorithms based on two-dimensional scaling laws and show the resultant trading model performance.