ANOTHER LOOK AT FIBONACCI STATISTICS

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Batchelor and Ramyar (2005)[2] looked for prevalence of Fibonacci retracements and projections in the stock market and rejected the idea that they occur more often than expected by random chance. A closer look at their results suggests a different picture.

The authors present their Fibonacci results in Table 6. Each result shows the percentile of the number of occurrences of retracements or projections corresponding to a chosen Fibonacci ratio, measured against a bootstrap distribution. The following analysis assumes that the results for each ratio are approximately independent of each other. The assumption is logical because the number of occurrences of a particular Fibonacci ratio within a price distribution includes only those retracements or projections that fall within a small 2.5% band around that ratio. This number should therefore have a very small effect on the number of occurrences of other Fibonacci ratios.

For Fibonacci ratios less than 1, "bullish" and "bearish" retracements measured on log scale produced ratios of 0.786, 0.618 and 0.382 more often than would be expected on average in a random environment (hereafter called "positive outcome"). Two of them are significant at the 1% level and one at the 5% level. So half of these six Fibonacci occurrence rates are significant, despite limited data, and all six have positive outcomes. Finding positive outcomes six out of six times itself is statistically significant at a level of 1.6%. Finding significant outcomes three out of six times is also statistically significant, at the 2% level. Projections also produced positive outcomes in five out of six tests, a result that is significant at the 11% level. So, price trends on log scale produced positive outcomes in 11 out of 12 tests for Fibonacci ratios less than 1. This amount is highly statistically significant ($p = 0.003$). For Fibonacci ratios greater than 1, price trends on log scale produced positive outcomes in 10 out of 16 tests ($p = 0.2$). In all, price trends on log scale produced positive outcomes in 21 out of 28 independent tests, which is a highly significant result ($p = 0.006$). Price trends on arithmetic scale produced positive outcomes in 18 out of 27 independent tests,[3] a result significant at the 6% level. Time lengths and percentage price moves also produced positive outcomes in more than half the tests: 16 times out of 28 and 16 times out of 27, respectively.

On the whole, 71 out of 110 Fibonacci occurrence rates exceed the 50th percentile, a number greater than the 55 expected by random chance. Similarly, 22 out of 112, more than the 11 expected, achieve the 90th percentile; 19 out of 112, more than the 6 expected, achieve the 95th percentile; and fully 16 out of 112, many more than the 1 expected, achieve the 99th percentile. If these results could be assumed independent, the observed amounts would be highly significant for each of these percentiles: 50th ($p = 0.001$), 90th ($p = 0.003$), 95th ($p = 10^{-5}$) and 99th ($p = 10^{-11}$). Figure 1 summarizes these results.

Thus, either Batchelor and Ramyar's null distribution constructed from block bootstrap is unreliable, or Fibonacci ratios do occur more often in the stock market than would be expected in a random environment. As a check against a flawed bootstrap distribution, one could measure the occurrence rates of randomly chosen numbers and compare those against the occurrence rates of Fibonacci numbers.

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Footnotes

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[2] Batchelor, Roy and Richard Ramyar, "Magic Numbers in the Dow" (2005), http://www.cass.city.ac.uk/magicnumbers. Presented at the 25th International Symposium on Forecasting, San Antonio, Texas (2005).

[3] I disregard the 28th result, which lies exactly at the 50th percentile.

Figure 1: According to Batchelor and Ramyar's (2005) data, retracements on log scale show Fibonacci ratios smaller than 1 more often than expected by chance. Higher than expected occurrences of Fibonacci ratios also show up in all other measurements. Solid lines show the actual occurrence rates and dashed lines show the expected occurrence rates. The results are highly statistically significant.