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Outliers and Predictability in Monthly Stock Market Index Returns

The predictability of stock market returns, of either individual stocks or indices, is an old research topic. The observed short term autocorrelation of some return series is a well established fact, but whether this observed autocorrelation can be used for profitable prediction of future returns is a more controversial question. The usual conclusion in the extensive literature on the topic seems to be negative. There is, however, a somewhat neglected aspect to this question, namely whether the results could be biased because of infrequent outliers in the data. Outliers are here defined as isolated large deviations from the majority of the observations, which can be detected as large residuals in an estimated autoregressive model. If such outliers do occur in the data, they are likely to also influence the predictions that are made.

Three simple statistical models are used in this article for predicting stock market index returns. A random walk model is used as a benchmark, which any other model should be able to improve on. A basic autoregressive (AR) model is then compared with an AR-outlier model, where dummy variables are added for detected outliers. It is assumed that if such outliers are taken into account in the model, the predictions should become better compared to the basic AR model, in which any potential outliers are ignored.

The data used in the article consists of monthly stock market indices from fifteen OECD countries. The first observation about the data set is that only ten of the series have statistically significant autocorrelation. For the other five series the AR models are therefore not actually quite valid. Nevertheless, the same models are used for all series, although the results are examined separately for autocorrelated and non-autocorrelated return series. Predictions are made at several points in time for the next month, and the one after that (i.e. one and two steps ahead). Four criteria are used to evaluate the predictions. Three compare the average accuracy of the predictions, and one how often the prediction about the future direction in which the index moves (higher or lower prices) is correct.

The results indicate that for the autocorrelated series, taking outliers into account in making predictions will indeed improve the one step ahead predictions. On the other hand, when the predicted series does not have statistically significant autocorrelation, taking outliers into account will not improve the predictions. The results for the two step ahead predictions are also less promising. It was to be expected that it is more difficult to predict further into the future, whether outliers are taken into account or not.

Some statistical tests are also computed to see whether the results are statistically significant. Since both the number of time series in the data set and the number of observations in each series are rather small, the differences

are not always statistically significant. Never-
theless, there is at least some evidence in the
findings to support the claim that taking outliers
into account will improve the predictions. ■