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Referee Report for the Paper
Anomalies and News

Anomalies and News, authored by *Joseph Engelberg*, *David McLean*, and *Jeffrey Pontiff*, uses 97 published stock return anomalies to test if anomaly returns change significantly on the earnings announcement days and corporate news days, which indicates that return predictability should be explained by mispricing.

The motivation of this paper is to provide empirical evidence for testing three main explanations of return predictability, i.e., risk-based theory, behavioral finance theory, and data mining theory. Based on the risk-based theory, return predictability comes from the change in discount rates. When an announcement or news released, there should be no surprises, because, as the paper says, "what happens with returns ex-post was expected by rational investors ex-ante." However, behavioral finance argues that investors have biased expectations of cash flows, so they will update their expectation when some information is released. Another explanation for return predictability is data mining, which means that, after testing numerous variables, it is not surprising to find some of the variables can predict well in-sample, but, in fact, they do poorly out-of-sample.

1. Novelty and Contribution

The novelty of this paper is that it incorporates the information of 97 anomalies from published studies into an aggregate anomaly variable, *Net*. *Net* is the difference between *Long* and *Short*. *Long* is the number of anomalies that long a stock. *Short* is the number of anomalies that short a stock. Although the way this paper incorporates information from 97 anomalies can be more sophisticated, the idea of exploiting as many variables as they can is creative and interesting. The paper contributes to financial economics in a way that it finds some evidence for mispricing in the stock market, which is a view from behavioral finance.

2. Main comments

The five main things that needs improvements or clarification are the following:

1) The concept of "cross-sectional predictability" is confusing. The main test in this paper is to test which theory explains the "cross-sectional predictability", but this term does not mean return predictability. Below is the regression model that this paper mainly uses. This paper only focuses on the betas on the cross-sectional terms, so the "cross-sectional predictability" is the explanatory power of the cross-sectional variables, not the return predictability that is commonly understood as the ability to predict the future returns.

$$R_{i,t} = \alpha_t + \beta_1 Net_{i,t} + \beta_2 Net_{i,t} \times Eday_{i,t} + \beta_3 Net_{i,t} \times Nday_{i,t} + \beta_4 Eday_{i,t} + \beta_5 Net_{i,t} + \sum_{i=1}^{10} \gamma_i LagReturn_{t-i} + \sum_{i=1}^{10} \delta_i LagReturn_{t-i}^2 + \sum_{i=1}^{10} \rho_i Volume_{t-i} + \epsilon_{i,t}$$

2) It is difficult to interpret the betas on the anomaly factors and market portfolio factor. The paper tests if the results of β_1 to β_5 are robust when adding a systematic risk factor ($factor$) that is based on a long-short anomaly portfolio or a market portfolio variable. The betas on the $factor$'s (β_6, β_7, and β_8) are commonly understood as the exposures of an asset to the systematic risk. However, the samples in this regression are the returns for almost all the stocks, instead of a single stock, from NYSE during the period 1979-2013. It is hard to interpret those betas, because they are not risk exposures of one stock but of many stocks.

$$R_{i,t} = \alpha_t + \beta_1 Net_{i,t} + \beta_2 Net_{i,t} \times Eday_{i,t} + \beta_3 Net_{i,t} \times Nday_{i,t} + \beta_4 Eday_{i,t} + \beta_5 Net_{i,t} + \beta_6 factor_t + \beta_7 factor_t \times Nday_{i,t} + \beta_8 factor_t \times Eday_{i,t} + \sum_{i=1}^{10} \gamma_i LagReturn_{t-i} + \sum_{i=1}^{10} \delta_i LagReturn_{t-i}^2 + \sum_{i=1}^{10} \rho_i Volume_{t-i} + \epsilon_{i,t}$$

3) The evidence for the relative importance of information days[1] is not sufficient. The paper argues that, because only about 30% of sample days are information days but over 80% of anomaly returns are generated on the information days, the anomaly returns do change significantly on information days, which supports the idea that mispricing explains cross-sectional return predictability. This conclusion does not base on a rigorous statistical test. I would suggest that the authors test if the average anomaly return on non-information days are significantly different from the average anomaly return on information days. If the null hypothesis is rejected, the result will be stronger evidence of the relative importance of information days.

4) The test of data mining is not convincing. The paper uses a *Pseudo Net Portfolio* variable to test if the data mining problem exists in this regression. The construction of the *Pseudo Net Portfolio* variable is confusing. First, the paper constructs a *Net portfolio* variable of one stock. The paper says, "The *Net portfolio* variable is equal to 1 if the stock is in the top quintile of a sort based on *Net*, -1 if the stocks in the bottom quintile, and zero otherwise". Second, it constructs a *Pseudo Net Portfolio* variable, which, in each month, selects a stock that has the same return with the stock in the *Net Portfolio*, but this stock does not have the same *Net Portfolio* value as the stock in the *Net Portfolio*. Although I understand that the paper tries to do out-of-sample test, this test is too puzzling to understand how this will work.

5) The choice of earnings announcement day may not be accurate. The paper states that they can only find the days that earnings are announced but not the exact time. Some earnings announcements are released after the market is closed, so the information will affect the anomaly returns on the following day instead of the same day that the earnings are announced. A solution that the paper proposes is checking the trading volume on day t-1, day t and day t+1 (t is the day when an earnings announcement is released), and the day with the largest trading volume is defined as the earnings announcement days. Although

[1] Information days: the days that are earnings announcement days or news days

it is a good way to find the day that an earnings announcement takes effect, I do not think checking the trading volume on day t-1 is reasonable, since the earnings announcements should not affect the trading volume before the day it is released, unless there happens to be information leakage. Thus, the inclusion of day t and day t+1 is sufficient.

3. Minor points

The paper made some typos, a number mismatch, and it needs reorganize its structure.

1) On page 7, the paper says its sample has 40,165,651 observations, but in the Table 1, the total number of observations is 40,220,437.
2) From page 8 to page 9, the introduction of the variables in the regression model is slightly messy. I suggest change the order of the variables that are introduced. For example, introduce *Long* and *Short* first, *Net* second, and *Eday* and *Nday* last.
3) On page 10, the reference to Table 1 has to be replaced with Table 2.
4) On page 24, the reference to Table 9 has to be replaced with Table 8.

4. Remaining questions

There are two parts that were not made clear to me, and I have a question towards the conclusion of this paper.

1) The paper does not state how many stocks are in the sample. Although the paper has said it has over 40 million observations, the number of stocks is also critical information for readers, but it is not mentioned in the paper.
2) The paper needs more clarification on stock selection for the *Pseudo Net Portfolio* variable. I come up with some situations that might cause trouble. For example, which stock will a *Pseudo Net Portfolio* choose if more than two stocks satisfy the criteria of a pseudo net portfolio in a month t? What if no stock satisfying the criteria? The paper does not state how they deal with these situations.
3) I doubt if we can confidently reject the risk-based theory based on the results of this paper. When an announcement or news is released, an asset's exposure to risk factors,

i.e., β, could change. When an industry news or even a macroeconomic news is released, the risk premium of factors may also change. This paper does not seem to control the risk premium when it conducts its tests, so I am not confident about its conclusion.

5. Direction for future research

1) The authors should consider reconstructing their dataset. The *Net* variable, although is daily data, is constructed monthly. The paper says, "the anomaly portfolios are measured at the beginning of each month……the value of *Net* that we use in our regressions remains the same throughout a month". Therefore, the *Net* variable is static within each month. However, the daily returns and some other independent variables, such as binary variables for earnings announcement days and new days, changes daily. Since the *Net* variable is more like a monthly variable rather than a daily variable, which does not match other variables that changes daily, I suggest that the authors convert the daily returns to monthly returns and convert other independent variables that are daily time series to monthly time series.
2) Another direction that the authors can work on is investigating if there are asymmetric results between positive information or negative information. According to Ludger Hentschel (1992), the market volatility reacts differently to positive or negative news, so it is worth trying to categorize the information days, and test if asymmetry exists in return predictability using news.

6. Conclusion

In my opinion, this paper should be revised and resubmitted.

References

Campbell, John Y., and Ludger Hentschel. "No news is good news: An asymmetric model of changing volatility in stock returns." Journal of financial Economics 31.3 (1992): 281-318.