Lecture 7a

Odds & Ends on Cross-Sectional Returns: Factor Zoos, Data Mining, and Spurious/Non-robust Findings

Factor Zoos

Researchers have discovered hundreds of anomalies: a “factor zoo,” as some call it.

Recent evidence suggests that many of these (a) cannot be replicated, or (b) do not work out-of-sample, or (c) are results of data mining.

We go through a few well known studies, not only for the results/conclusion, but also for the approach/methodology.

- Out-of-sample tests
- Adjusting statistical thresholds of tests
- Watch out for very small stocks and outliers

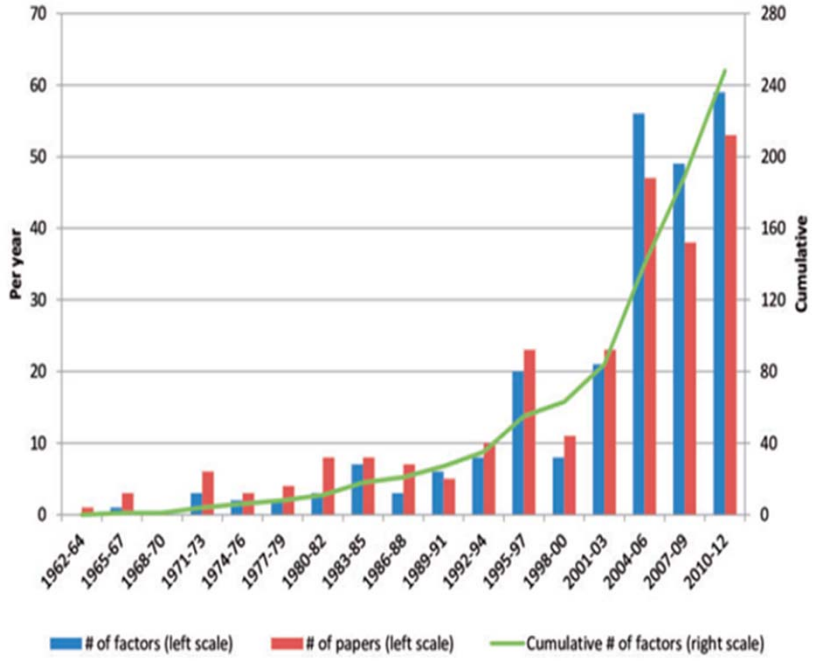

Figure 2
Factors and publications.

Evidence that disappears

Do excess returns disappear after publication?

- The part that properly compensates for risk would stay.
- The part about mispricing would disappear.
- If the strategy is costly to implement, then it would decay but not disappear.
- If the original alpha is the result of statistical bias, it would decay or disappear.

The authors look at 97 published anomalies and check how the alpha decays out of sample.

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Does Academic Research Destroy Stock Return Predictability?

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ABSTRACT

We study the out-of-sample and post-publication return predictability of 97 variables shown to predict cross-sectional stock returns. Portfolio returns are 26% lower out-of-sample and 58% lower post-publication. The out-of-sample decline is an upper bound estimate of data mining effects. We estimate a 32% (58%–26%) lower return from publication-informed trading. Post-publication declines are greater for predictors with higher in-sample returns, and returns are higher for portfolios concentrated in stocks with high idiosyncratic risk and low liquidity. Predictor portfolios exhibit post-publication increases in correlations with other published-predictor portfolios. Our findings suggest that investors learn about mispricing from academic publications.

Evidence that disappears

Evidence

Many effects do disappear or get smaller for period after the sample in which it was discovered or after the evidence was published

Conclusion

Up to ¼ of anomaly returns they examine reflect pure statistical bias

Post-publication, sophisticated investors trade on the anomalies and reduce mispricing by about 1/3.

Regression of Predictor Portfolio Returns on Post-Sample and Post-Publication Indicators

The regressions test for changes in returns relative to the predictor's sample-end and publication dates. The dependent variable is the monthly return to a long-short portfolio that is based on the extreme quintiles of each predictor. *Post-Sample (S)* is equal to one if the month is after the sample period used in the original study and zero otherwise. *Post-Publication (P)* is equal to one if the month is after the official publication date and zero otherwise.

Variables	(1)
Post-Sample (S)	−0.150***
	(0.077)
Post-Publication (P)	−0.337***
	(0.090)

Statistical Adjustments

Study by Harvey, Liu and Zhu [*Review of Financial Studies* (2015)] suggests we raise the statistical standards to address the well known "multiple testing" problem.

If you test 20 hypotheses simultaneously, and each has a probability of 0.95 of having no significant result, then the probability of having at least one significant result (at 5% level) is

$$1 - 0.95^{20} \approx 0.64$$

If one sorts portfolios in many ways, some of the sorts would "work" in sample, just by chance. Statisticians have known this problem for decades.

Hence, the usual statistical standard **for judging the significance of the excess returns** should be raised.

Adjusting the p-value:

1. Bonferroni approach $p_i^{bonferroni} = \min(M \times p_i, 1)$, where M is the # of tests.
2. Holm and Benjamini-Hochberg-Yekutieli (BHY) adjustment approach involves ranking the p-values

Watch out for Outliers, Tiny Stocks, and Weighting Schemes

Hou, Xue, and Zhang [*Review of Financial Studies* (2018)] study >400 anomalies and most of them fail to replicate when they use NYSE breakpoints and value-weighted portfolio returns.

Microcaps (stocks smaller than the 20th percentile of NYSE stocks) tend to generate larger anomalies, but not easy to invest in.

Microcaps could be outliers, causing problems in traditional regressions (which implicitly equal weight)

They argue that microcaps are too small to be important for investment management (although important for the economy such as employment).

[Caveat: their methodology and factor construction are not always identical to the original study]

Lessons learned from this type of evidence

Think critically about claimed excess returns:

- Are they robust out-of-sample?
- Are they robust to outliers?
- Can the strategies be implemented with liquid stocks at low costs?

If the answers are yes, ask:

- How risky are these strategies?
- Do they have a sound economic rationale for making excess returns?
- Why are the excess returns not arbitraged away?
- Can the strategies be implemented with liquid stocks at low costs?

This work is not easy and it is fraught with peril, but the rewards can be high!

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