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ARTICLE

False (and Missed) Discoveries in Financial Economics

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ABSTRACT

Multiple testing plagues many important questions in finance such as fund and factor selection. We propose a new way to calibrate both Type I and Type II errors. Next, using a double-bootstrap method, we establish a *t*-statistic hurdle that is associated with a specific false discovery rate (e.g., 5%). We also establish a hurdle that is associated with a certain acceptable ratio of misses to false discoveries (Type II error scaled by Type I error), which effectively allows for differential costs of the two types of mistakes. Evaluating current methods, we find that they lack power to detect outperforming managers.

Supporting Information

Filename	Description
jofi12951-sup-0001-InternetAppendix.pdf 325.6 KB	**Appendix S1**: Internet Appendix.
jofi12951-sup-0002-ReplicationCode.zip 16.1 KB	**Replication code**.

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REFERENCES

Andrikogiannopoulou, Angie, and Filippos Papakonstantinou, 2016, Estimating mutual fund skill: A new approch, Working paper, Swiss Finance Institute.

Google Scholar

Andrikogiannopoulou, Angie, and Filippos Papakonstantinou, 2019, Reassessing false discoveries in mutual fund performance: Skill, luck, or lack of power? *Journal of Finance* **74**, 2667–2688.

Web of Science® Google Scholar

Avramov, Doron, Robert Kosowski, Narayan Y. Naik, and Melvyn Teo, 2011, Hedge funds, managerial skill, and macroeconomic variables, *Journal of Financial Economics* **99**, 672–692.

Web of Science® | Google Scholar

Ayadi, Mohamed A., and Lawrence Kryzanowski, 2011, Fixed-income fund performance: Role of luck and ability in tail membership, *Journal of Empirical Finance* **18**, 379–392.

Web of Science® | Google Scholar

Bajgrowicz, Pierre, and Olivier Scaillet, 2012, Technical trading revisited: False discoveries, persistence tests, and transaction costs, *Journal of Financial Economics* **106**, 473–491.

Web of Science® | Google Scholar

Barras, Laurent, 2019, A large-scale approach for evaluating asset pricing models, *Journal of Financial Economics* **134**, 549–569.

Web of Science® | Google Scholar

Barras, Laurent, Olivier Scaillet, and Russ Wermers, 2010, False discoveries in mutual fund performance: Measuring luck in estimated alphas, *Journal of Finance* **65**, 179–216.

Web of Science® | Google Scholar

Barras, Laurent, Olivier Scaillet, and Russ Wermers, 2018, Reassessing false discoveries in mutual fund performance: Skill, luck, or lack of power? A reply. Working paper, McGill University.

Google Scholar

Beneish, Messod D., 1997, Detecting GAAP violation: Implications for assessing earnings management among firms with extreme financial performance, *Journal of Accounting and Public Policy, Fall* **1997**, 271–309.

Google Scholar

Beneish, Messod D., 1999, The detection of earnings manipulation, *Financial Analysts' Journal* **55**, 24–36.

Google Scholar

Benjamini, Yoav, and Yosef Hochberg, 1995, Controlling for the false discovery rate: A practical and powerful approach to multiple testing, *Journal of the Royal Statistical Society, Series B* **57**, 289–300.

Google Scholar

Benjamini, Yoav, and Daniel Yekutieli, 2001, The control of the false discovery rate in multiple testing under dependency, *Annuals of Statistics* **29**, 1165–1188.

Web of Science® | Google Scholar

Berk, Jonathan B., and Richard C. Green, 2004, Mutual fund flows and performance in rational markets, *Journal of Political Economy* **112**, 1269–1295.

Web of Science® | Google Scholar

Blake, David, Alberto Rossi, Allan Timmermann, Ian Tonks, and Russ Wermers, 2013, Decentralized investment management: Evidence from the pension fund industry, *Journal of Finance* **68**, 1133–1178.

Web of Science® | Google Scholar

Brown, S. J., W. Goetzmann, R. G. Ibbotson, and S. A. Ross, 1992, Survivorship bias in performance studies, *Review of Financial Studies* **5**, 553–580.

CAS | Web of Science® | Google Scholar

Busse, Jeffrey A., Amit Goyal, and Sunil Wahal, 2014, Investing in a global world, *Review of Finance* **18**, 561–590.

Web of Science® | Google Scholar

Carhart, Mark M., 1997, On persistence in mutual fund performance, *Journal of Finance* **52**, 57–82.

Web of Science® | Google Scholar

Carhart, M.M., J.N. Carpenter, A.W. Lynch, and D.K. Musto, 2002, Mutual fund survivorship, *Review of Financial Studies* **15**, 1439–1463.

Web of Science® | Google Scholar

Cao, Charles, Yong Chen, Bing Liang, and Andrew W. Lo, 2013, Can hedge funds time market liquidity? *Journal of Financial Economics* **109**, 493–516.

Web of Science® | Google Scholar

Chen, Joseph, Harrison Hong, Ming Huang, and Jeffrey D. Kubik, 2004, Does fund size erode mutual fund performance? The role of liquidity and organization, *American Economic Review* **94**, 1276–1302.

Web of Science® | Google Scholar

Chen, Yong, and Bing Liang, 2007, Do market timing hedge funds time the market? *Journal of Financial and Quantitative Analysis* **42**, 827–856.

Web of Science® | Google Scholar

Chordia, Tarun, Amit Goyal, and Alessio Saretto, 2020, Anomalies and false rejections, *Review of Financial Studies* **33**, 2134–2179.

Web of Science® | Google Scholar

D'Agostino, Antonello, Kieran McQuinn, and Karl Whelan, 2012, Are some forecasters really better than others? *Journal of Money, Credit, and Banking* **44**, 715–732.

Web of Science® | Google Scholar

De Long, J. Bradford, and Kevin Lang, 1992, Are all economic hypotheses false? *Journal of Political Economy* **100**, 1257–1272.

Web of Science® | Google Scholar

DeGroot, Morris, 1975, *Probability and Statistics* (Addison-Wesley, Reading, MA).

Google Scholar

DeGroot, Morris, and Mark J. Schervish, 2011, *Probability and Statistics*, 4th edition (Pearson Education Limited, Harlow, UK)

Google Scholar

Diane Del, Guercio,, and Paula A. Tkac, 2008, Star power: The effect of Morningstar ratings on mutual fund flow, *Journal of Financial and Quantitative Analysis* **43**, 907–936.

Web of Science® | Google Scholar

Elton, Edwin J., Martin J. Gruber, and Christopher R. Blake, 1996, Survivor bias and mutual fund performance, *Review of Financial Studies* **9**, 1097–1120.

Web of Science® | Google Scholar

Elton, Edwin J., Martin J. Gruber, and Christopher R. Blake, 2001, A first look at the accuracy of the CRSP mutual fund database and a comparison of the CRSP and Morningstar mutual fund database, *Journal of Finance* **56**, 2415–2430.

Web of Science® | Google Scholar

Fama, Eugene F., and Kenneth R. French, 1993, Common risk factors in the returns on stocks and bonds, *Journal of Financial Economics* **33**, 3–56.

Web of Science® | Google Scholar

Fama, Eugene F., and Kenneth R. French, 2010, Luck versus skill in the cross-section of mutual fund returns, *Journal of Finance* **65**, 1915–1947.

Web of Science® | Google Scholar

Fawcett, T., 2006, An introduction to ROC analysis, *Pattern Recognition Letters* **27**, 861–874.

Web of Science® | Google Scholar

Ferson, Wayne, and Yong Chen, 2017, Working paper, University of Southern California.

Google Scholar

Genovese, Christopher, and Larry Wasserman, 2002, Operating charateristics and extensions of the false discovery rate procedure, *Journal of the Royal Statistical Society, Series B* **64**, 499–517.

Web of Science® | Google Scholar

Giglio, Stefano, Yuan Liao, and Dacheng Xiu, 2018, Thousands of alpha tests, Working paper, University of Chicago.

Google Scholar

Hastie, T., Robert Tibshirani, and Jerome Friedman, 2009, *The Elements of Statistical Learning: Data Mining, Inference, and Prediction* (Springer Science & Business Media) New York, New York.

Google Scholar

Harvey, Campbell R., 2017, Presidential address: The scientific outlook in financial economics, *Journal of Finance* **72**, 1399–1440.

Web of Science® | Google Scholar

Harvey, Campbell R., and Yan Liu, 2013, Multiple testing in economics, Working paper, Duke University.

Google Scholar

Harvey, Campbell R., Yan Liu, and Heqing Zhu, 2016, … and the cross-section of expected returns, *Review of Financial Studies* **29**, 5–72.

Web of Science® | Google Scholar

Harvey, Campbell R., and Yan Liu, 2017, Luck vs. skill and factor selection, in John Cochrane and Tobias J. Moskowitz, eds.: *The Fama Portfolio* (University of Chicago Press, Chicago, IL).

Google Scholar

Harvey, Campbell R., and Yan Liu, 2018, Detecting repeatable performance, *Review of Financial Studies* **31**, 2499–2552.

Web of Science® | Google Scholar

Harvey, Campbell R., and Yan Liu, 2019, Lucky factors, Working paper, Duke University.

Google Scholar

Harvey, Campbell R., and Yan Liu, 2020, Revisiting luck vs. skill in mutual fund evaluation, Working paper, Duke University.

Google Scholar

Harvey, Campbell R., Yan Liu, Nicholas G. Polson, and Jianeng Xu, 2019, Re-evaluating semi-strong market efficiency, Working paper, Duke University.

Google Scholar

Hau, Harald, and Sandy Lai, 2013, Real effects of stock underpricing, *Journal of Financial Economics* **108**, 392–408.

Web of Science® Google Scholar

Horowitz, Joel L., 2001, *The Bootstrap, Handbook of Econometrics 5* (Elsevier, Amsterdam, The Netherlands).

Google Scholar

Hou, Kewei, Chen Xue, and Lu Zhang, 2020, Replicating anomalies, *Review of Financial Studies* **33**, 2019–2133.

Web of Science® Google Scholar

Ioannidis, John P. A., 2005, Why most published research findings are false? *PLoS Medicine* **2**, e124.

PubMed Web of Science® Google Scholar

Ioannidis, John P. A., and Chris H. Doucouliagos, 2013, What's to know about the credibility of empirical economics, *Journal of Economic Surveys* **27**, 997–1004.

Web of Science® Google Scholar

Ioannidis, John P. A., Tom D. Stanley, and Hristos Doucouliagos, 2017, The power of bias in economics research, *Economic Journal* **127**, 236–265.

Web of Science® Google Scholar

Jiang, George J., Tong Yao, and Tong Yu, 2007, Do mutual funds time the market? Evidence from portfolio holdings, *Journal of Financial Economics* **86**, 724–758.

Web of Science® Google Scholar

Jones, Christopher S. and Jay Shanken, 2005, Mutual fund performance with learning across funds, *Journal of Financial Economics* **78**, 507–552.

Web of Science® | Google Scholar

Kandel, Shmuel, and Robert F. Stambaugh, 1996, On the predictability of stock returns: An asset-allocation perspective, *Journal of Finance* **51**, 385–424.

Web of Science® | Google Scholar

Kosowski, Robert, Allan Timmermann, Russ Wermers, and Hal White, 2006, Can mutual fund "stars" really pick stocks? New evidence from a bootstrap analysis, *Journal of Finance* **61**, 2551–2595.

Web of Science® | Google Scholar

Leamer, Edward E., 1983, Let's take the con out of econometrics, *American Economic Review* **73**, 31–43.

Web of Science® | Google Scholar

Linnainmaa, Juhani T., 2013, Reverse survivorship bias, *Journal of Finance* **68**, 789–813.

Web of Science® | Google Scholar

Nanda, Vikram, Z. Jay Wang, and Lu Zheng, 2004, Family values and the star phenomenon: Strategies of mutual fund families, *Review of Financial Studies* **17**, 667–698.

Web of Science® | Google Scholar

Romano, Joseph P., Azeem M. Shaikh, and Michael Wolf, 2008, Control of the false discovery rate under dependence using the bootstrap and subsampling, *TEST* **17**, 417–442.

Web of Science® | Google Scholar

Romano, Joseph P., and Michael Wolf, 2005, Stepwise multiple testing as formalized data snooping, *Econometrica* **73**, 1237–1282.

Web of Science® | Google Scholar

Sarkar, Sanat K., 2006, False discovery and false nondiscovery rates in single-step multiple testing procedures, *Annuals of Statistics* **34**, 394–415.

Web of Science® | Google Scholar

Sastry, Ravi, 2013, The cross-section of investing skill, Working paper, University of Melbourne.

Google Scholar

Scott, James G., and James O. Berger, 2006, An exploration of aspects of Bayesian multiple testing, *Journal of Statistical Planning and Inference* **136**, 2144–2162.

Web of Science® | Google Scholar

Storey, John D., 2002, A direct approach to false discovery rates, *Journal of the Royal Statistical Society, Series B* **64**, 479–498.

Web of Science® | Google Scholar

Storey, John D., 2003, The positive false discovery rate: A Bayesian interpretation and the q-value, *Annals of Statistics* **31**, 2013–2035.

Web of Science® | Google Scholar

Yan, Xuemin, and Lingling Zheng, 2017, Fundamental analysis and the cross-section of stocks returns: A data-mining approach, *Review of Financial Studies* **30**, 1382–1423.

Web of Science® | Google Scholar

Ziliak, Stephen T., and Deirdre N. McCloskey, 2004, Size matters: The standard error of regressions in the *American Economic Review* **33**, 527–546.

Google Scholar

Citing Literature