



Causal Factor Investing

by Marcos M. López de Prado, Cambridge University Press (2023).
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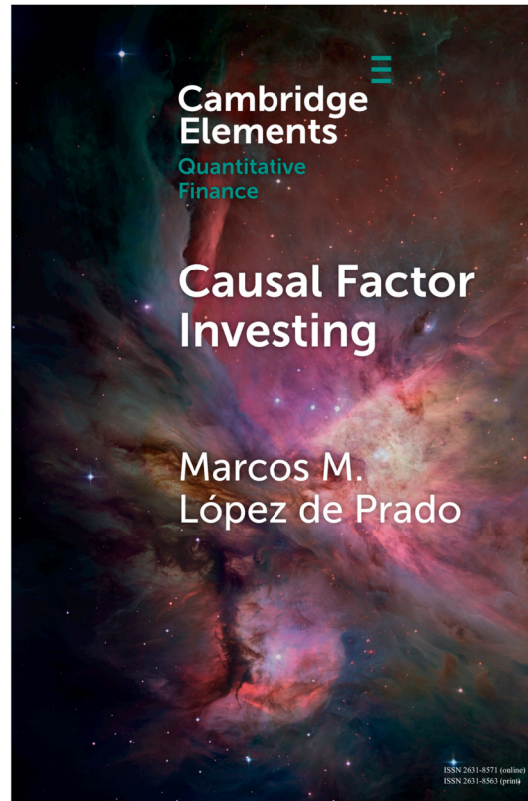


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Book review



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Quantitative Investing is approaching its 100th anniversary, whose birth one can bring back to the work of Graham and Dodd, shortly after the creation of rudimentary accounting standards and the investors act of 1933. During that voyage, the notion of what is ‘*quantitative*’ has evolved from an era before computers, where computations were done by hand, to the creation of computers in the fifties, culminating with the theories at the turn of the century, when everyone had a computer at their desk. We are at a historical moment now, with artificial intelligence and machine learning disrupting the technology landscape in a way that we will be able to ask new questions never before imagined.

This is especially relevant for finance, a discipline which is all about the future, where the past is not replicable and, although the past generates the future, it is not known which past features will be relevant in the future. Quoting Ian H. Wilson: ‘No amount of sophistication is going to allay the

fact that all of your knowledge is about the past and all your decisions are about the future’. It is in this realm that causal discovery comes into play.

Author Marcos Lopez de Prado already revolutionized finance with the first monograph on financial machine learning. He is doing it again, keeping ahead of innovation, presenting his perspective on causal discovery as an effort, a step forward from machine learning, to understand ‘*what causes what*’ (causality), away from the past focus on ‘*what happens at the same time as what*’ (association).

This book is a first.

It starts with a reflection on the differences between association and causation in the context of scientific discovery, laying the foundation for the philosophy and the science that will drive the main part of the book, the three chapters on causal inference, econometrics and factor investing, which I consider its pinnacle. In it, he describes the work of Nobel laureate Eugene Fama, a cornerstone in factor investing, and quickly moves to provide a causal perspective on the topic, away from association modelling. In fact, this book addresses, in Chapter 7, a very sharp explanation of why these models work and

what they miss, proposing the right way forward, explaining what confounding variables may have been missed, and providing numerical experiments explaining these findings.

Despite broad advancements in machine learning, human involvement through causal discovery (or Bayesian priors, or simply practitioner attention) has remained critical in investment research due to low signal-to-noise ratios, non-stationary and the competitive nature of markets. Blind reliance on statistical and machine learning techniques, without overlaying the tools and knowledge described in the book, have not led to successful quantitative investment ideas and strategies. AI is only now beginning to show some promise for pushing beyond these methods. In this direction, the techniques and philosophy described in this book will remain critical.

The book also discusses why causal discovery has been neglected in the finance community, highlighting several key factors including the relative ease of statistical analysis, challenges posed by financial data, the traditional academic and practical training, and difficulties in conducting controlled experiments in financial markets.

As with his book on financial machine learning, this one has the potential to become a standard reference. It introduces, not only the basic notions of causality, but the language without which everything is more difficult, or maybe even misleading. The book is not only a must for experts, but also for everyone curious about what causality is, and in understanding the differences from associations, even at the philosophical level.

Although the book is technical in nature, as it should be, it does address many philosophical issues which are at the fingertips of everyone with a basic college education. And although it focuses on finance, and investing in particular, many of its statements are universal, with finance playing the role of being at the same time the application focus and the didactic example.

I think this book will have a long life: as issues of high complexity, such as sustainability, for example, become active points of discussion, this book will provide a guiding path to avoid false positives and false negatives, but also a defence against charlatanism.

Prof. Luis Seco is the Director of the Mathematical Finance Program, a Professor of Mathematics at the University of Toronto and the director of Risklab, a university research laboratory established in 1996, conducting research in quantitative finance, with a special focus on asset management. Prof. Seco's current activity is focused on sustainability, including climate risk, and is simultaneously the Chair of the Centre for Sustainable Development at the Fields Institute, and an affiliate Faculty member at the Vector Institute for Research in Machine Learning; Prof. Seco's core activity is bringing artificial intelligence into today's sustainability challenges to build a new better world for future. He has authored papers in artificial intelligence and environmental scores and currently is expanding that work to analyze CO₂ emissions and carbon trades using machine learning. He was appointed ADIALab Fellow in 2022.

His expertise has been in developing University–Industry relationships, which he has done since 1996. In October 2007, he won the NSERC – Natural Sciences and Engineering Research Council of Canada–Synergy Award for Innovation for his achievements. The award was delivered by Dr. Colin Carrie, Parliamentary Secretary to the Minister of Industry, on behalf of the Honourable Jim Prentice, Minister of Industry and Minister responsible for the Natural Sciences and Engineering Research Council of Canada (NSERC), and by Dr. Suzanne Fortier, President of NSERC. In 2011 he was admitted to Caballero de la Orden del Mérito Civil (Knight of the Order of Civil Merit), an award from the Government of Spain for his application of mathematics to foresee economic cycles.

He was a co-founder and CEO of Sigma Analysis & Management Ltd., an asset management firm that invested institutional money in liquid alternative investments for 20 years.

Today, Prof. Seco's business partners include several International pension and sovereign wealth funds, the FIT Centre, RiskLab Centre Inc., Metaversitas Inc. and JUMP S.a.r.l., to address challenges and achieve an innovation agenda. His vision is to leverage the University network worldwide to promote training and research broadly in the areas where technology and innovation join finance bringing them together, including education, climate risk and sustainability.

Luis Seco's career started at Princeton University in 1985 and landed at the University of Toronto in 1992 after a short stay at the California Institute of Technology. Today, he holds adjunct appointments at Renmin University in Beijing, Florida International University, the Technical University of Munich, the University of Zurich and Kutaisi International University.

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