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**Andrew W. Lo, *Adaptive Markets: Financial Evolution at the Speed of Thought*, Princeton University Press, 2017, 462 pp. \$25 Hardcover**

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**Abstract.** In 1973, Burton Malkiel published *A Random Walk Down Wall Street*, unquestionably the best-selling book in financial economics written for the popular press. Prior to its publication, it was common among the general public and financial market practitioners to advocate trading strategies that generated super-normal returns for various asset classes. Malkiel synthesized the prevailing academic research that indicated stock returns followed a random-walk, a statistical process that indicates information and events are random, and it is random information announcements behind stock return variation.

**Keywords.** Financial economics, Adaptive markets, Stock market.

JEL. B26, C58, D53, G00, G12.

### Book Review

In 1973, Burton Malkiel published *A Random Walk Down Wall Street*, unquestionably the best-selling book in financial economics written for the popular press. Prior to its publication, it was common among the general public and financial market practitioners to advocate trading strategies that generated super-normal returns for various asset classes. Malkiel synthesized the prevailing academic research that indicated stock returns followed a random-walk, a statistical process that indicates information and events are random, and it is random information announcements behind stock return variation. This Efficient Market Hypothesis went on to become among the most tested and controversial theories in economics, and its robust conclusion that supports a passive investment strategy became the prevailing investment wisdom among academic economists. The Efficient Markets Hypothesis was also integrated into capital budgeting and public policy making decisions. The theory's success seemed overwhelming, and its conclusions on investment strategies gave birth to a new industry that grew into the trillion dollar index mutual fund industry.

Even more ubiquitous than the Efficient Market Hypothesis is the neo-classical microeconomic theory that economic agents systematically behave in their own self-interest, not making systematic errors in judgement and

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behave with computer-like precision. This demand theory was developed by William Jevons and Herman Heinrich Gossens and developed into the equal marginal principle. Given the assumption that economic agents maximize utility subject to a budget constraint, the conclusion that follows is that agents allocate resources to their highest valued use, where the marginal utilities per dollar are equal across all goods. The theory is the starting point for various follow-up studies used in labor, financial, and industrial economics. Given rigid assumptions on information and utility, it is a short step in macroeconomics to rational expectations, where market participants use all available information when formulating their responses to government economic stabilization policies. During much of the 1980s and 1990s, these three theories of microeconomic rationality, the Efficient Market Hypothesis, and rational expectations formed the basis of microeconomics, financial markets, and macroeconomics.

Nonetheless, hold-outs to the Efficient Market Hypothesis persisted, and by 1993 Jagadeesh and Titman published their study that contradicted the theory and reported that returns exhibit autocorrelation, momentum, and reversals. Studies challenging the Efficient Market Hypothesis followed, and the 2008 housing market debacle were serious blows to prevailing wisdom. After all, if markets efficiently reflect and assimilate information into prices, participants acting rationally certainly price pending volatility into returns, making the 2008 debacle unlikely. The result is that a generation of researchers studying financial markets has now been exposed to a literature that supports market inefficiency, where markets do not efficiently assimilate information into prices, and profitable trading strategies may exist.

Applied to financial markets, a primary conclusion from the Efficient Market Hypothesis is that the average investor cannot construct portfolios that consistently beat the return on a portfolio of randomly selected financial assets, especially after accounting for commissions and transaction costs. The conclusion was profound because the Efficient Markets Hypothesis upended traditional wisdom that skilled fund managers consistently constructed portfolios that beat a value-weighted market index. However, the academic research of Paul Samuelson, Eugene Fama, and others soon illustrated that such profitable trading strategies were unlikely for the average investor. Jack Bogle founded the Vanguard Group based on the belief that buying and holding a well-diversified portfolio created superior returns for the average investor relative to hiring a professional manager who tried to time the market, and transaction costs of hiring over-priced fund managers eroded the returns an investor earned.

The Massachusetts Institute of Technology's Andrew Lo was among the first finance professors who publicly dismissed the seemingly ironclad Efficient Market Hypothesis. However, rather than a response from self-interested financial market participants, Lo led the counter-revolution and brought econometrics to bear against the Efficient Markets Hypothesis. In his book, *Adaptive Markets: Evolution at the Speed of Thought*, Lo indicates

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that markets are not efficient but adaptive, invoking a biological metaphor of survival of the fittest, and rejecting the physicist's approach to economic rationality, market efficiency, and rational expectations. While the Efficient Market Hypothesis is a special case of the Adaptive Markets Hypothesis, the Adaptive Market Hypothesis holds that markets are evolutionary, more nimble, and quickly adjust to financial market innovations. Neuroscience illustrates that much of decision making goes beyond rational decision-making processes, and investors are governed more by fear and exuberance than a rigid adherence to perfectly informed rational decisions.

Nevertheless, a key question for adaptive markets and its adherents is whether the average investor can systematically outperform a market portfolio of randomly collected stocks. Considerable attention in the book is devoted to hedge fund managers and extreme-event investors who have managed—for at least a time—to consistently outperform the market. Strategies, such as Fisher Black's dynamic hedging, are presented as though the average investor spends the time and resources to learn modern finance and earn super normal returns above holding a well-diversified market portfolio. However, compelling evidence is not presented that the average investor systematically beats the market by following adaptive markets after accounting for transaction costs. Criticisms against rational choice economics is not well-defined, and no evidence is offered that because random highlights in the brain in functional MRIs are illustrating that traditional neo-classical microeconomics is invalid or incapable of explaining micro-level human behavior compared to other modes of modeling human behavior. Alternatively, considerable time is devoted to creating a caricature of neoclassical microeconomic theory that is used to criticize neoclassical economics and market efficiency. Lo is also unable to identify when markets act efficiently versus when they act adaptively. The Efficient Market Hypothesis is about how markets assimilate information into prices, not the thought processes associated with trading in financial markets. So, adaptive markets is insufficient to supplant the existing Efficient Market Hypothesis, rational choice, and rational expectations hypotheses.

In 1973, Burton Malkiel wrote *A Random Walk Down Wall Street*, a text that summarized a generation of scholars' work that supports market efficiency that information is assimilated into prices, and strategies that consistently beat the market are uncommon. All hypotheses are necessarily false by construction, but that does not eliminate their usefulness. Andrew Lo has written a well-informed challenge to *A Random Walk Down Wall Street* from a behaviorist perspective. However, the value-added of its contribution is less compelling than the original book it challenges. Nonetheless, the interested reader in financial economics is well-served to read the book, as much for the context of the discussion and questions it proposes to answer as to the conclusions it draws.

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