

Book Review: Adaptive Markets – Financial Evolution at the Speed of Thought

**Lo, A. (2017). *Adaptive Markets: Financial Evolution at the Speed of Thought*.
PRINCETON; OXFORD: Princeton University Press.**

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In *Adaptive Markets: Financial Evolution at the Speed of Thought*, Andrew W. Lo, professor at the MIT Sloan School of Management and director of the MIT Laboratory for Financial Engineering, directly challenges the Efficient Markets Hypothesis (EMH), a theory long accepted by the investment industry and most finance academics, by proposing a new way of thinking about financial markets and human behavior, called the *Adaptive Markets Hypothesis*. The term “adaptive markets” refers to the role that evolution plays in shaping human behavior as well as financial markets, and “hypothesis” is meant to relate it to the EMH.

Rather than contrasting the *Adaptive Markets Hypothesis* with the EMH, Lo offers an extension to it. The core essence of the EMH is that there is no such thing as a free lunch, especially on Wall Street. Financial market prices already fully incorporate all available information, thus trying to beat the market is not possible. Instead, investors should put all their money into passive investment funds for the long term. Lo, on the other hand, argues that finance is more like biology than physics, where financial markets behave like a population of living organisms rather than a collection of inanimate objects.

Lo takes the reader on a journey through the discoveries that ultimately led him to propose the *Adaptive Markets Hypothesis*. He begins with the exploration of irrational behavior ev-

erywhere in human decision making, as first brought forward by the behavioralists. They, unlike the theories advocated by the EMH, argue that any model of investor behavior that assumes that individuals make rational choices should be questioned. Instead, they assert that consistent irrational investment behavior can replace the wisdom of crowds, which depends on the errors of individual investors cancelling each other out via the madness of mobs. Lo directly observed this in the violation of the Random Walk Hypothesis. At the same time, Lo also distances himself from the behavioralists, repeatedly saying that “it takes a theory to beat a theory”, and anomalies, no matter how dramatic or universal, don’t constitute a theory.

He further continues by shedding light on three basic functions of the brain that are particularly relevant for financial decision making : fear, pain, and pleasure. Using a variety of examples, Lo succeeds in demonstrating that fear and greed, pleasure and pain are key drivers of financial behavior, and even if it looks irrational, it doesn’t mean it is random or unmotivated. Instead, Lo argues that there is a compelling reason behind it, which often has a biological basis. He advances that thought by guiding the reader through the principles of evolution itself. After reviewing the theories of great minds like Charles Darwin and Ernst Mayr, he concludes that, what separates us from other species, is our ability to create complex sce-

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narios, pure figments of our substantial imagination, accomplished at the speed of thought. Lastly, he brings this thought back to financial markets, arguing that finance professionals and their strategies are extremely fine-tuned to the current financial environment, and that a change in that environment would have severe consequences. In this context, Lo introduces the shark metaphor, showing how sharks, over thousands of years of evolution, have become so finely tuned to their current environment, that any change in its environment or to its anatomy would make it worse off, similar to the current financial markets. The EMH, however, has little to say about market behavior, and even less about market dynamics. Thus, Lo concludes, “we need a new narrative to make sense of the wisdom of crowds, the madness of mobs, and evolution at the speed of thought”.

This new narrative comes in the form of the *Adaptive Markets Hypothesis* which can be summarized in five key principles :

1. We are neither always rational nor irrational, instead our behavior is shaped by the forces of evolution.
2. We display behavioral biases and make apparently suboptimal decisions, but we can learn from past experiences and alter our behavior accordingly.
3. We have the capacity for abstract thinking.
4. Financial market dynamics are driven by our interactions as we behave, learn, and adapt to each other.
5. Survival is the ultimate force driving competition, innovation, and adaptation.

Lo goes on to explain that irrational behavior is a result of individuals and species adapting to their environment. If the environment changes, the heuristics in place are not suited anymore and the behavior exhibited might look “irrational”. Lo, however, refuses to label such behav-

ior “irrational”. Instead, he proposes the term “mal-adapted”, arguing that there may be a compelling reason for the behavior, but it’s not the ideal behavior for the current environment.

Until now, Lo has managed to investigate the world of behavioral biases at a never before seen level. But how do these principles relate to practice? Lo demonstrates this exact principle in Chapter 8 “Adaptive Markets in Action”, in which he directly addresses the five core beliefs and principles of the traditional investment paradigm spawned by the EMH, which are

1. The risk/reward trade-off
2. Alpha, beta, and the CAPM
3. Portfolio optimization and passive investing
4. Asset allocation
5. Stocks for the long run.

Lo explains that these five principles have become the foundation of the investment management industry, influencing virtually everything, and that many people have greatly benefited from them. But principles do not have the same durability as physical laws, such as the law of gravity. Indeed, these principles depend upon a number of unspoken key technical assumptions, all of which depend in turn on the stationarity of the environment. Even though the environment might fluctuate it will do so with the same statistical laws over time. The question here then isn’t whether these assumptions are literally true, but if their approximation errors are small enough to ignore. This is where Lo uses the narrative he has built up until then to conclude that these errors used to be small, but have grown significantly over the past years.

Thus, Lo reconsiders these traditional investment principles from an *Adaptive Markets Hypothesis* standpoint and proposes the following points instead:

1. Investment risk is subject to extreme fi-

- nancial threats.
2. The CAPM and other linear factor models are poor approximations in certain market environments.
 3. Portfolio optimization tools are only useful if the assumptions of stationarity and rationalization are good approximations to reality.
 4. The boundaries between asset classes are becoming blurred and managing risk through asset allocation is no longer effective.
 5. Stocks for the long run assumes an unrealistic time horizon so investors need to be more proactive about managing their risk.

Lo begins his explanations of how he derived these new investment principles by referring to the Great Modulation, which was a time period from the mid-1930s to the mid-2000s, during which the financial markets and regulations were relatively stable. In this environment, stationarity and rationality seem reasonable approximations, and it is easy to understand why buy-and-hold strategies, asset allocation heuristics, and passive index funds were popular. In the last two decades, however, the environment has changed significantly, and so have errors due to following the old investment principles. One indicator that we are now living in a very different environment is volatility. Today's equity markets are larger, faster, more diverse and stranger than at any other time in modern history. One of the biggest implications of this new environment is that the first principle may no longer hold. According to the Adaptive Markets Hypothesis, risk isn't always rewarded, instead it depends on the environment. Long time horizons can hide many important features of the financial landscape, and the risk/reward trade-off can actually be on vacation at times.

Concluding his book, Lo provides a systematic framework for identifying the root causes of

financial pathologies and possible remedies. He acknowledges the fact that the financial system is more like an ecosystem which needs to be managed accordingly, which can be done via so-called feedback loops to prevent the system from getting too close to the point of no return. What is needed is a framework in which regulators are a part of the ecosystem, which can be achieved through adaptive regulation that isn't prone to the same human behavioral biases as human regulators. One example of such an adaptive regulation are dynamic margin requirements, which is currently used by the Chicago Mercantile Exchange (CME) to determine how much money a market participant must keep on account to protect both the exchange and market participants from default due to extreme losses. In order for adaptive financial regulation to really show its effects however, it needs to be implemented to the entire financial system, not just to one or two of its organs.

But what do Lo's discoveries mean for other disciplines? Some areas of marketing have long adapted methods that are based on the EMH, such as the event study method. The event study method is a tool which involves the analysis of share prices around the time of an announcement or event. If the EMH holds, then any public announcement made by a company holds value for the investors and captures the market's reaction towards a management decision by measuring the abnormal returns which are associated with the announcement. This method has recently seen a surge in popularity because accountability for marketing decisions has become increasingly important. Its application has found wide acceptance in various marketing areas, amongst others in the Sport Marketing literature by examining sponsorship announcements. If Lo's *Adaptive Markets Hypothesis* holds, then marketing practitioners need to exercise caution when adopting this method. The event study assumes market efficiency, which, according to Lo isn't an all or

nothing condition, but rather a continuum. Market efficiency depends on the relative proportion of market participants who are making rational investment decisions to those that are making more intuitive decisions, such as fight-or-flight. Furthermore, market efficiency is also related to the degree market participants have adopted to the environment in which the market has developed. Even though a relatively new market is most likely less efficient than a long-established market, inefficiencies can still arise if either the environment shifts or the population of investors changes considerably. Thus, when employing the event study, practitioners need to be aware of changes in the environment that could

influence its application.

Lastly, Lo managed to convince his readers that the Adaptive Markets Hypothesis is a new framework that synthesizes the traditional paradigm of market efficiency with its behavioral opponents. But although Lo tried to write a book for a broader audience that goes beyond the academic community this book might only be fully understood and appreciated for what it is by exactly his academic colleagues and their students.

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