The stock market is (informationally) greater than the sum of its parts

April 22 2024, by Benjamin Kessler

Credit: Pixabay/CC0 Public Domain

Professional asset managers are assessed based on their ability to

outperform the market. In practice, outperformance is most often measured relative to industry benchmarks such as the S&P 500 (for large-cap U.S. equities), or the Bloomberg Barclays U.S. Aggregate Bond Index.

Benchmarking may help demystify asset managers' skills and talents, but it raises concerns about disincentives to acquire new information. Past research argued that as a stock becomes more benchmarked, investment professionals may become less interested in that stock, because the demand for it becomes more about hedging risk, and less asset supply is available for investors to speculate on the company's fundamentals. According to this view, benchmarking encourages the substitution of passive for active investment.

Bo Hu, an assistant professor of finance at the Donald G. Costello College of Business at George Mason University, argues that this view of benchmarking doesn't take accurate account of how asset managers learn about markets.

"Existing theory assumes asset managers only acquire information exclusively or specifically about one asset at the time, instead of a portfolio," Hu says. "This is not the reality. Asset managers' objective is to optimize their portfolio return."

His co-authored working paper in *SSRN Electronic Journal* illustrates this principle by modeling and comparing two distinct types of learning technologies. Separative learning regards every asset in isolation.

As Hu explains, "With separative learning, the overall information revealed by prices is additive. One plus one equals two." Integrative learning allows investors to process portfolio-wide signals, achieving a "cross-asset information effect" in which the market informationally exceeds the sum of its parts.

The researchers quantify the informational efficiency of markets through a novel use of information theory. Hu explains, "We use a mutual information measure that can tell you how much uncertainty about all stock payoffs can be reduced if you observe all stock prices. This is different from the standard measure of price informativeness, which relies on a regression model or can only capture linear relationships. To the best of my knowledge, we are the first to use this measure to quantify price efficiency at different levels."

As expected, the inverse relationship between the benchmarking level of an asset and its price-informativeness held firm under separative learning. But the results for integrative learning were more nuanced. As the uncertainty surrounding an asset's eventual returns increased (as might happen in the early months of a CEO's tenure, or any other impending major change at the company), it garnered more investor attention, because of the aforementioned cross-asset effects.

In a multi-asset economy, the researchers showed that benchmarking could actually improve the overall market efficiency. In other words, market efficiency can be greater than the sum of price-informativeness of all assets. This occurs under integrative learning as investors keep paying more attention to high-risk equities. However, when a risky asset's benchmarking level increased past a certain threshold, market efficiency could go down because that asset grabs too much investor attention despite its reduced supply.

The researchers also investigated the combined impact of the above effects upon prices for non-benchmarked assets. They found that under separative learning, an increase in benchmarking level for one stock always boosted the price of the other. But with integrative learning, the non-benchmarked asset's price could decrease—again, depending on whether the benchmarked asset was more or less volatile than its counterpart. The less risky asset could be relatively ignored given

investors' limited attention.

"I think you can view many things as information processing systems. The financial market is a gigantic, intricate ecosystem which constantly produces data and accumulates dispersed information from investors. Their learning technology is crucial to how their information gets incorporated into prices," Hu says. The cross-asset dynamics of integrative learning seems closer to what real-world investors desire than the additive logic of separative learning.

The introduction of new technologies such as large language models like ChatGPT may make integrative learning even more beneficial.

"Machines can help us extract useful information at a level consistent with the objective of portfolio management," Hu says. "I think integrative learning becomes more feasible nowadays and seems like the better choice."

More information: Wen Chen et al, How Does Benchmarking Affect Market Efficiency? The Role of Learning Technology, *SSRN Electronic Journal* (2022). DOI: 10.2139/ssrn.4266487

Provided by George Mason University