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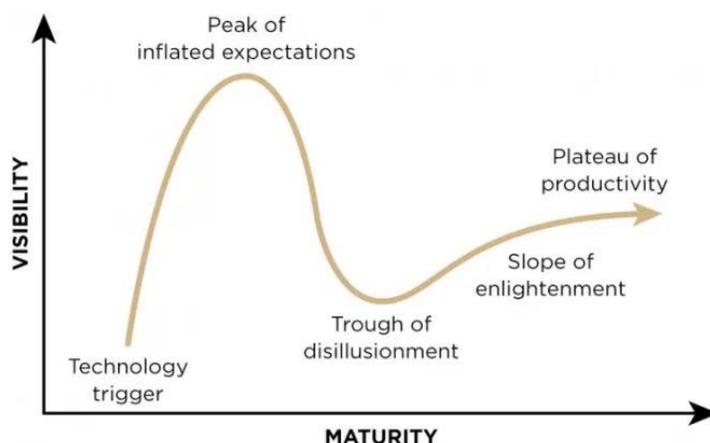## Artificial Intelligence and Stock Picking – the Future is NOT Here

There is quite a bit of enthusiasm surrounding Artificial Intelligence (AI) and its potential to replace traditional stock picking. But, enthusiasm and hype of a new concept is common in market history. Humans love forecasting extremes – bland forecasts are boring and not worth talking about. Historically, market players fall prey to hype and assume adoption and acceptance of a new initiative will occur much more rapidly than it actually does.

At the current level of development, AI technology is primarily a categorization tool. It is capable of classifying observations – but it requires a mountain of data. AI works best at definable, repeatable tasks where you have enormous amounts of data, with no need for creative or bespoke thinking. Today's AI technology relies on a very large data set; millions or billions of examples in order for it to "learn." However, that level of detailed data does not exist in financial markets, individual stocks or the many phases of market cycles and interest rate movements.

One of the best sources for data at this point is Global Financial Data (GFD). The company claims that it provides daily stock prices further back than any other company. It provides daily close prices on stocks listed on major U.S. exchanges and over-the-counter markets dating back to the mid 1970's, and monthly data back to 1815. GFD also provides fundamental data for current and delisted stocks for the last 20 years on just 75 data points and 10 years of income statements, balance sheets and cash flow statements. While this level seems robust, the truth is that it still isn't near the level required to turn the decision-making over to AI.

Experts seem to agree that this lack of data acts as a deterrent to AI. Pierre Ferragu, Senior Analyst at Sanford C. Bernstein & Co., has written several reports on the topic and states, "financial markets cannot offer enough data for deep learning algorithms to learn stock picking" and "existing historical data is not enough to teach algorithms even taking a view on a stock for a week or a day."[i] Yet there still seems to be extreme expectations surrounding AI.

As new and exciting trends emerge over time, a cycle seems to develop. The Gartner Hype Cycle graph (below) outlines extreme peaks and troughs that can occur with new technology trends.[ii] Some may reach expected highs, but others never come close. The paperless office is an excellent example of an extreme forecast that has never reached the high expectations initially established. A 1975 Business Week article predicted that paperless offices would be achieved by 1990. Today, 42 years later, global paper and cardboard sales continue to rise. Wired magazine recently wrote, "Have we achieved the paperless office? Not by a long shot. The dirty little secret rarely discussed is that most organizations will never be totally paperless anytime soon."[iii] Gartner, the fact-based IT consulting business known for its hype-cycle research stated that the annual growth rate of the amount of paper produced by the average company is 25% and the amount of paper documents in U.S. is growing at a rate of 22%[iv]. Further, production volume of paper and cardboard worldwide has risen every year since 2006 (excluding 2008 and 2009).

Another telling example of market hype is e-commerce. In 2000, e-commerce was expected to rapidly dominate retail sales (recall Grocery Gateway). Today, 17 years later, e-commerce represents just 8.5% of total retail sales. A recent Bain & Company report suggests e-commerce will top out below 30 percent of total sales around 2030.

AI may be the latest trend, but it has actually been around for quite some time. AI research originated in 1956 at Dartmouth College, and the hype surrounding it grew quickly. By 1965, Herbert Simon, one of the founders of AI, predicted, "Machines will be capable, within 20 years, of doing any work a man can do." As we know, that didn't materialize. The challenge with AI is that innovations can eventually get capped out by technological limits and stall advancement until the technology itself progresses. The current AI revival has come from the relatively new ability to access and teach algorithms using enormous available data sets. As it has in the past, its limit will likely be tested and enthusiasm may slow until the next leg in technological capability emerges. Stock picking and asset mix AI is unlikely to occur for quite some time as we wait for large relevant data sets to become available for collection and analysis.

Money, corporations and markets were all invented by humans and reflect our emotional psyche. This can impact the market as collective human optimism and pessimism leads to market volatility and fluctuating prices, which is discomforting to most investors. Andrew Lo of MIT recently wrote of another aspect of human nature that can impact investing – our desire for order and certainty. In his paper, *Warning: Physics Envy may be Hazardous to Your Wealth*, Lo states, "Physics envy has created a false sense of mathematical precision and accuracy in finance."[v] AI creates an irresistible hope that it may be possible to build models of economic systems and financial markets that are as rigorous, mathematical and precise as those in physics – but how will AI account for the unpredictable human element of the market?

In his paper, *Models Behaving Badly,* Professor Emanuel Derman warns of the dangers of relying only on numerical models in investing. Economics is a social science, the study of human society and social relationships, which is more descriptive than experimental science demonstrated by repeatable results. AI currently works best as an experimental science applying enormous data sets in order to solve known and defined problems. It assumes the past is a prologue and that history will repeat itself. Derman warns that models often provide humans with false confidence.

We have already seen model-based investing strategies experience significant failures. Long-Term Capital Management (LTCM) was a hedge fund that used an AI application trading algorithm and executed trading strategies based on Efficient Market Hypothesis arbitrage models. It employed high leverage (25 to 1) to magnify small gains. It had four successful years until questionable bets in a three-month period on Russia and Japan wiped out its assets. One year later, LTCM's founder, John Meriwether, formed JWM Partners; its hedge fund was based on the same models but with less leverage. The company went under in 2009. More recently, Bernstein Research collected a sample of 21 AI funds with total assets of approximately US$1billion, and discovered that these funds underperformed the S&P 500 by 30 percent over the last five years.[vi]

Investors have always sought an edge using whatever tools may be available to them. Once a technique is found to be useful and makes excess profits, others seek to follow. As more players play the same game, the returns diminish to a point where it is difficult to earn excess profits in the long term. AI could very well fall into this trap – the game and edge will keep changing and any excess returns may get melted away.

We believe AI will be best utilized in the hands of active managers as a tool to assist with the speed of analysis as well as with cost efficiencies. We continue to believe that a combination of both quantitative and qualitative factors are necessary to succeed in asset management, which requires a healthy understanding of messy social science to consistently win with less risk.

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[iv] Milliken, Greg. Wired Magazine. *The Paperless Office: 30-Year Old Pipe-Dream?* https://www.wired.com/insights/2014/01/paperless-office-30-year-old-pipe-dream/
[v] Lo, Andrew W. *Warning: Physics Envy may be Hazardous to Your Wealth!* https://pdfs.semanticscholar.org/eeba/95d8505fd79db7c2df2cbcc673c29d6f14df.pdf
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