# *My* Favorite ROBOT

By John Rubino

As investment firms morph into tech companies, will a model of collaboration replace rivalry between humans and artificial intelligence?

These days, a visitor to CNBC's website might notice a series of articles with titles such as "Kensho Stats: When Dollar Jumps, Dump Stocks." But readers who initially (and quite understandably) assume that the source of these predictions is a Wall Street analyst or economist soon discover that Kensho is not a "who" but a "what"—an algorithm that sifts through immense amounts of data, teases out historical relationships, and generates actionable strategies. In other words, it's a machine that can do what junior security analysts have traditionally done, but much faster, more thoroughly, and at a fraction of the cost of a newly minted CFA charterholder.

Welcome, financial community, to the age of automation.

Machines have, of course, been replacing people steadily since the dawn of the Industrial Revolution. But until very recently, the resulting insecurity and turmoil was mostly confined to the realm of physical work. The printing press replaced medieval scribes; industrial robots replaced 20th century assembly line workers. But "symbol manipulators" such as doctors, lawyers, and money managers sailed on, aided rather than impaired by technological progress.

Now, however, automation is racing up the socioeconomic ladder. First to be affected was transactional work, as ATMs and online services such as PayPal replaced bank tellers and back-office clerks. Then passive investment vehicles, such as index funds and exchange-traded funds

(ETFs), began to shift money management away from active stock picking and toward mechanical portfolio construction, presumably eliminating thousands of analyst and portfolio manager positions.

But that was a gentle breeze compared with the coming gale. As big data and artificial intelligence (AI) gain prominence, huge swaths of the investment world begin to look as ripe for disruption as the factories of yesteryear.

And venture capitalists have taken notice. According to the March 2016 Citigroup report "Digital Disruption: How Fintech Is Forcing Banking to a Tipping Point," investment in fintech rose from $1.8 billion in 2010 to $19 billion in 2015. Consultancy KPMG reports that fintech funding nearly doubled year over year in 2016's first quarter.

But such transitions are inherently uneven. Financial automation will affect different niches

## Global Fintech Funding
US$ Billions
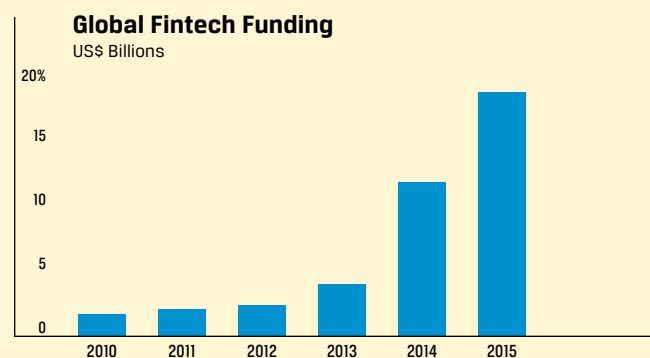


*Source:* Citigroup

in different ways during different time frames, creating and preserving some kinds of work while making other skills more rather than less valuable.

## NEXT-GENERATION PASSIVE

The trend toward passive investing is accelerating. ETFs, which offer baskets of index or sector-representative securities, have turned out to be both more convenient and (after fees) better performing than most actively managed mutual funds. As a result, they've become the favorite vehicle for financial planners who, as fiduciaries, are required to prioritize such qualities.

Meanwhile, hedge funds, which charge high fees in return for the promise of market-beating performance, have recently failed to deliver. With brand-name funds underperforming broad market averages—even flat out losing money while plain vanilla stocks and bonds keep rising—a growing number of major institutions are shifting away from such active vehicles and joining individual investors in ETFs.

### ETF/ETN Assets Under Managaement Worldwide
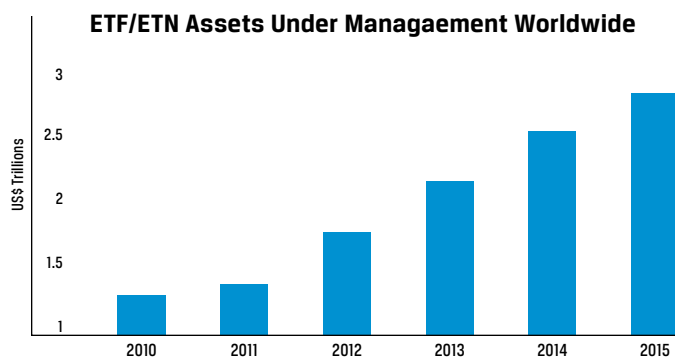


*Source:* ETFGI

The growth of passive/automated asset allocation is now being turbocharged by online services known as robo-advisers, which acquire client data and build appropriate portfolios of ETFs at very low cost.

This trend has long legs for three reasons: First, it streamlines the asset allocation process in ways that help both financial planners and their clients, thus generating little resistance from the former. "Robo-advisers are a tool to make planners' practices more efficient and better serve clients. Planners get this," says Jon Stein, CFA, CEO of New York–based robo-adviser Betterment. (For more, see the feature interview with Stein in the March 2016 issue.)

Second, robo-advisers appeal to tech-savvy millennials who have grown up with the idea that every problem has an online solution. As this generation acquires a bigger share of investable wealth, robo-investing will grow commensurately.

Third, robo-advisers do much more than build cookie-cutter portfolios. "We personalize portfolios, manage customer behavior, and minimize taxes," says Stein. He notes that besides allocating ETFs according to their tax impact—high-dividend stocks in IRAs and municipal bonds in taxable accounts, for

instance—"with every transaction, we use the proceeds to rebalance. We harvest losses [by replacing underwater assets] with secondary and tertiary tickers. We show you before you make a transaction what your taxes are likely to be."

The upshot: Passive vehicles will continue to take market share from actively managed mutual funds and hedge funds, in effect replacing analysts and money managers with websites, servers, and computer programmers.

## AI AND BIG DATA

Robo-advisers, though impressive, are fairly straightforward. But the other fintech trend is straight out of science fiction. Let's begin with its two main concepts: big data and artificial intelligence.

**Big Data.** Potentially actionable information is already pouring out of satellites, social media, and point-of-sale terminals. With the advent of "the internet of things," networked sensors are being embedded in cars, kitchen appliances, autonomous drones, and wearable electronics that track their owners' vital signs, location, and behavior. Virtual reality, meanwhile, is spawning massive artificial environments in which every action, word, and decision is recorded and stored. It will, in short, soon be possible to monitor and/or measure nearly everything in real time.

**Artificial Intelligence.** Much of this data is "unstructured" (i.e., not in a spreadsheet or other standard format). The complexity of correlating, say, satellite imagery with Twitter posts and bio-measurements from wearable sensors in order to extract meaningful trends in real time is daunting. But next-generation AIs will be up to the task.

These entities (for lack of a better term) are not programmed; they are trained. Scientists build a massively parallel computer network structured like an organic brain. And rather than breaking down problems into pre-coded steps, they feed the network information and allow it to learn by doing. The mildly disturbing part is the way AI rewrites its own code to the point that its creators can no longer tell *how* it's doing what it does. The result will be AIs that can both manage big data far better than the typical human analyst and learn from their own experience, in effect guiding their own evolution.

Such trends have many potential effects on money management, but the most immediate, transformative impact is that investment firms will become tech companies. Tapping into available AI and/or building such capabilities in-house will no longer be optional. The institutions that make this transition successfully will be those that "treat the money management firm as a tech company. If they aren't integrating these processes, they'll lose out as innovators come in," says Efrem Hoffman, CEO of Toronto fintech firm Running Alpha.

Size and capital will confer a first-mover advantage. "The bigger shops with access to more PhDs and data scientists will obviously have a head start," says Hoffman.

For example, Goldman Sachs is both a customer and part-owner of Kensho.

Two-way transparency will also become increasingly important. "Right now, money managers are judged based on performance relative to target indices. That obscures a lot of important nuance," says Hoffman. Next-generation AI "will be able to not only compare fund performance with peers but track the underlying reasons for the performance so it's more aligned with the client."

The same technologies will offer better insight into exactly who customers are and what they need. "Every new client defines their risk tolerance and other preferences upfront, but that information has a short shelf life and is potentially inaccurate," says Hoffman. "Most people don't know what their risk tolerance is. And a PM managing 400 accounts can't track their subsequent behavior in response to volatility episodes."

Consider an imaginary scenario: Two clients both claim moderate risk tolerance, but a sharp market correction elicits a "sell everything" call from one and a "buy the dip" from the other. Future AIs will be able to track these responses and "put clients with managers who align with their behavior," says Hoffman, who proposes a new performance metric called "anxiety-adjusted return" to gauge this relationship.

## WINNERS AND LOSERS

For humans, the coming transition is a mix of good and bad news. Beginning with the latter, traditional junior analyst chores, such as forecasting the effects of financial events or monitoring industry trends, can now be done by AI in real time for zero marginal cost. As a result, "the legacy financial analyst who spends all of his or her time reading SEC filings or press releases or company presentations is already disappearing," says David Kedmey, CEO of New York–based fintech firm EidoSearch.

Meanwhile, "there's a gap forming between funds that stress transparency and customer service and those that focus solely on performance," says Amanda Tepper, CEO of Connecticut money management consultancy Chestnut Advisory Group. Tepper believes the transparency–service model will win out. In her view, the performance business model (which she describes as "two guys and a Bloomberg machine who just want to run money and will only show you their numbers") won't succeed in the future.

In this environment, certain types of skills and knowledge are likely to become more valuable, and five in particular will be key: data science, niche expertise, statistics, "hand-holding," and high-level judgment and initiative.

DATA SCIENCE. Kensho's May 2016 "Careers" page gives a concise picture of money management's future:

> We are looking for highly trained individuals who are interested in applying advanced software methods to global financial markets. You would be joining a group of roughly fifty people, many of whom have PhDs in scientific disciplines. We have a spectrum of opportunities for individuals with the right scientific and computing skills.

That's right. The hottest fintech startup doesn't include finance or economics in its ideal skill set. Data scientists—the people who devise the algorithms that animate current and future AIs—are the new kings of both Silicon Valley and Wall Street, and the coming big data/AI world will hire them in droves.

NICHE EXPERTISE. "Having data scientists who might not understand finance or specific industries throw inappropriate data at an AI won't accomplish much," says Hoffman. "The data has to be in the right structure and format, and the only way to do that is to employ domain experts who understand the subject matter." The firms where these two groups work together as equals will, he says, have the best chance of surviving.

As AI improves institutions' ability to calculate where alpha is coming from, "you'll see a rising number of sector-specific and/or geographically focused portfolios," says Kedmey. "Not just, say, Western Europe equities, but West European pharma or Swiss fixed income." So where a premium for broad knowledge once prevailed, there will soon be myriad niches for narrowly focused specialists. Did you earn an undergraduate degree in fisheries management before acquiring that MBA? You might fit nicely into a hedge fund's aquaculture portfolio. Are you an expert in Brazilian bankruptcy law? A Latin American distressed debt fund may have a spot for you.

STATISTICS. With a near-infinite selection of data streams coming online, the ability to make statistical sense of them will also become more valuable. "As an analyst or PM, you're there to interpret that data and make a decision," says Kedmey. "To be proficient at judging statistical conclusions, the more you understand about how statistics work, the better off you'll be. Probabilistic thinking should be in your blood and in your practice, not just a dusty course you took in business school and forgot about."

HAND-HOLDING. "Our research shows that for institutional investors, performance doesn't really matter," says Tepper. "What drives decisions to hire asset managers is an understanding of what they're doing with your money and why they're doing it. Style drift is thus much more negative than underperformance." So, paradoxically, "the more quantitative and automated your strategy is, the harder it's going to be to raise capital, because investors are skeptical. They're not going to buy a performance record that you can't explain," she says.

As a result, "the industry is bifurcating between nuclear physicists and hand-holders," says Tepper. "A CFA charterholder might be able to do both, but generally, you'll have someone running the money and other, more empathetic and articulate people working with investors on an ongoing basis. This cannot be automated."

# Early Entrants in the Race to Automate Finance

Fintech is nothing if not multi-faceted.

Kensho, for example, is the finance analog of Google's search engine. A user enters a natural language question with a "what happens if..." theme and clicks the "Generate Study" button. The AI then searches a vast store of historical data to tease out relevant relationships and presents an overview of the subject followed by a series of predictions for various investments based on their past behavior. Daniel Nadler, Kensho's founder and CEO, recently claimed to *The New York Times* that such a piece of research would previously "have taken days, probably 40 man-hours, from people who were making an average of $350,000 to $500,000 a year."

EidoSearch applies pattern recognition algorithms to both off-the-shelf data streams and clients' in-house data. "We're a tech vendor," says CEO David Kedmey. "Our clients [primarily hedge funds and other money managers] have a number of datasets that they're sourcing from various vendors or gathering themselves. We supply the machine intelligence to mine and analyze those sources to pick out recurrent patterns and then draw conclusions." The EidoSearch AI assigns probabilities to a range of possible outcomes, which, says Kedmey, "allows you to verify the forecasting skill of the machine. ... The junior analysts who used to do this, it's time for them to focus on something else."

Ask any distressed debt analyst about the hardest part of their job and they'll likely cite monitoring and interpreting the legal events that dominate the world of busted bonds. Court documents are opaque but occasionally harbor nuggets of gold, and until recently there was no alternative to tracking them down and slogging through them. Reorg Research has partially automated the process. "Our servers parse and categorize [court documents] and use machine learning algorithms to strip out superfluous info that doesn't affect security prices," says CEO Kent Collier. "The result is much less noise for our customers. For, let's say, a very large bankruptcy filing, not only do we provide our subscribers real-time access to that document, we're also first to provide a summary. We've automated a process that took an hour into a few seconds. The goal is to reduce the opportunity cost of following these situations to effectively zero."

A casual user of social media might notice when a given company is generating more than the usual crosstalk on Facebook or Twitter, but they can't necessarily quantify or analyze such a vast and diffuse field of data. Enter the Sprott BUZZ Social Media Insights ETF, a joint venture of Toronto firms Sprott Asset Management and BUZZ Indexes that uses an algorithm to convert social media chatter into a stock portfolio. "The deeper the level of conversation, the more [people and more] diverse people talking about the stock, the greater the likelihood that what they're saying will reflect their intentions and, by implication, the stock price," says BUZZ Index's creator, Jamie Wise, CFA. "We identify the 100 most talked-about stocks, and the algorithm analyzes the tone of conversation. Is it bullish, bearish, or neutral? Who's initiating the conversation? How well-followed are they? What kind of influence do they have? And how accurate are they in their forecasting?" The algorithm then identifies the 25 companies with the most positive buzz and updates the fund's portfolio accordingly. "This goes way beyond keyword analysis. We're training the machine to understand the context of the paragraph or the conversation," claims Wise.

**HIGH-LEVEL JUDGMENT AND INITIATIVE.** Another area that can't be automated is the kind of judgment (perhaps better called "intuition") that, for example, led Warren Buffett to conclude in 1987 that Coca-Cola would be a dominant brand for the next 30 years, or the combination of prescience and audacity that led George Soros to break the Bank of England by shorting the pound sterling in 1992.

The same is true of venture capital and private equity. As Henry Kravis, founder of iconic private equity firm KKR, explained to *Bloomberg* in June 2016:

> *We like to think of ourselves as industrialists.... We buy a company and look at what we can do to make it better. How can we improve operations? Maybe it's fixing the pricing or the supply chain, or putting the proper metrics in place so we can better measure what the company is doing. Maybe we have to change some of the company's management.*

## NEAR FUTURE: THE HYBRID MODEL

In the long run, "I don't think there's a limit to what kinds of intelligence we can automate," says Kedmey. But in the next 5 to 10 years, the best model for money management's evolution might be the world of chess. When IBM's Deep Blue beat reigning chess champion Garry Kasparov in 1996, it looked like the end of human dominance of that game. But today, the strongest players are not AIs but human/AI partnerships in which each member contributes unique insights. That's where finance is going, says Kent Collier, CEO of New York legal documentation fintech firm Reorg Research: "A hybrid model will evolve. Humans will remain the more powerful stock pickers. But [services based on AI and big data] will give financial analysts better tools to make them better analysts."

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