

United States House of Representatives
Committee on Financial Services
2129 Rayburn House Office Building
Washington, D.C. 20515

December 3, 2019

Memorandum

To: Members, Committee on Financial Services
From: FSC Majority Staff
Subject: December 6, 2019, “Robots on Wall Street: The Impact of AI on Capital Markets and Jobs in the Financial Services Industry.”

The Task Force on Artificial Intelligence of the House Financial Services Committee will hold a hearing entitled, “Robots on Wall Street: The Impact of AI on Capital Markets and Jobs in the Financial Services Industry,” on December 6 at 9:30 a.m. in Room 2128 of the Rayburn House Office Building. This single-panel hearing will have the following witnesses:

- **Dr. Charlton McIlwain**, Vice Provost for Faculty Engagement and Development and Professor of Media, Culture, and Communication at NYU
- **Dr. Marcos Lopez de Prado**, Professor of Practice, Engineering School, Cornell University and Chief Investment Officer, True Positive Technologies
- **Ms. Rebecca Fender**, CFA, Senior Director, Future of Finance, Chartered Financial Analyst Institute
- **Ms. Kirsten Wegner**, Chief Executive Officer, Modern Markets Initiative
- **Ms. Martina Rejsjö**, Head of Nasdaq Market Surveillance, Nasdaq Stock Market

Overview

Technological innovation has long affected U.S. industries and workplaces, and the financial services industry is no exception. The asset management industry, for example, uses artificial intelligence (“AI”) to aggregate data, including public company financial reports, macroeconomic data, and asset prices in related markets, and performs analyses for the purpose of making decisions about where to invest the capital it holds.¹ At the same time, the rapid development of AI and algorithmic decision-making has the potential to create computer programs that exceed human capabilities in certain manual tasks, such as quantitatively analyzing data sets and predicting outcomes based on those analyses, thus replacing the need for humans.

When further examining AI’s impact on capital markets and jobs in the financial services industry, AI potentially increases workers productivity (and thereby their labor market value) for those who perform complex, non-routine tasks. Some examples where AI helps workers perform better include: (1) reducing the time it takes to process data and organize information; (2) streamlining regulatory processes; and, (3) increasing the precision of work performed. Productivity improvements also can translate into increased labor demand if consumer demand responds sufficiently to the lower costs, better quality, or increased variety in the financial services products.

¹ See for example, Financial Industry Regulatory Authority Foundation and CFA Institute, “Uncertain Futures: 7 Myths About Millennials and Investing,” Oct. 2018, at <https://www.finrafoundation.org/files/full-report-uncertain-futures-7-myths-about-millennials-and-investing>.

Furthermore, there are concerns regarding how many jobs may be at risk due to new automation technologies in the coming years – one study estimated 30 percent of finance and insurance jobs in developed economies are at risk of automation by 2029.² Meanwhile, automation technologies can also create new employment areas, potentially creating opportunity for workers displaced from traditional financial sector jobs or newly-entering the sector.³ For example, in recent years firms like JP Morgan Chase have reportedly hired more software developers than Google or Microsoft.⁴

Below is background on how AI and automation affects investment decisions, its impact on the workforce in the financial services sector, and how AI may affect oversight, risk management and regulatory compliance by financial firms.

Investment Decisions

Investment fund managers use AI along with large data sets to enhance their investment strategies and understanding of the earnings prospects of an asset, affecting how these managers price assets (e.g., stocks, bonds, and derivatives). Hedge funds and high-frequency traders were the earliest adopters of AI decision-making within the financial services industry.⁵ Some specific applications include: (1) “robo-advisers”⁶ (2) trading and portfolio management and the data analysis and execution of trades, and (3) supervisory functions.⁷ Further, AI utilization is hoped to overcome certain irrational and emotional tendencies of human decision making, including: loss aversion (feeling greater negative emotion over losses relative to positive emotion over equivalent gains), trend-chasing (being influenced by the investment activities of others), and anchoring (being unwilling to consider new information that contradicts initial assessments).⁸

However, AI has its own biases and deficiencies that may limit its potential to replace human workers in the investment sector.⁹ One key concern is the auditability and accountability of the machine decisions. In the context of deep learning, AI could make investment decisions on its own. Human attempts to audit,

² See, Robert Wright, “Workplace automation: how AI is coming for your job,” *Financial Times*, Sept. 29, 2019, at <https://www.ft.com/content/c4bf787a-d4a0-11e9-a0bd-ab8ec6435630>; and Jack Kelly, “Wells Fargo Predicts That Robots Will Steal 200,000 Banking Jobs Within The Next 10 Years,” *Forbes*, Oct. 8, 2019, at <https://www.forbes.com/sites/jackkelly/2019/10/08/wells-fargo-predicts-that-robots-will-steal-200000-banking-jobs-within-the-next-10-years/#3461207f68d7>.

³ Jennifer Liu, “Finance Jobs Requiring A.I. Skills Increased 60% Last Year—Here’s What They Look Like,” *CNBC*, Sept. 25, 2019, at <https://www.cnn.com/2019/09/25/finance-jobs-requiring-ai-skills-are-growing-and-here-are-examples.html>.

⁴ See, Tom Lin C. W., “Artificial Intelligence, Finance, and the Law,” Nov. 4, 2019, 88 *Fordham Law Review* 531 (2019) at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2227498

⁵ See, “Majority of Hedge Fund Pros Use AI/Machine Learning in Investment Strategies,” *HedgeWeek*, Jul. 19, 2018, at <https://www.hedgeweek.com/2018/07/19/266589/majority-hedge-fund-pros-use-aimachine-learning-investment-strategies>.

⁶ The term “robo adviser” generally refers to an automated digital investment advisory program offering asset management services to clients through online algorithmic-based platforms, for example, websites or mobile applications. See, SEC, “Investment Management Guidance Update: Robo-Advisers,” Feb. 2017, at <https://www.sec.gov/investment/im-guidance-2017-02.pdf>.

⁷ Financial Stability Board, “Artificial Intelligence and Machine Learning in Financial Services: Market Developments and Financial Stability Implications,” at pg. 14-21, Nov. 1, 2017, at <http://www.fsb.org/2017/11/artificial-intelligence-and-machine-learning-in-financial-service>.

⁸ H. Kent Baker and Victor Ricciardi, “How Biases Affect Investor Behavior,” *The European Financial Review*, Feb. 2014, at https://www.researchgate.net/profile/Victor_Ricciardi/publication/280087380_How_Biases_Affect_Investor_Behaviour/link/s/55a79fb008ae345d61db609f/How-Biases-Affect-Investor-Behaviour.pdf.

⁹ See generally, Task Force on Artificial Intelligence hearing, “Perspectives on Artificial Intelligence: Where We Are and the Next Frontier in Financial Services,” Jun. 26, 2019, at <https://financialservices.house.gov/calendar/eventsingle.aspx?EventID=403824>.

replicate, or rationalize such decisions may not succeed. As such, some question the assignment of the responsibilities for AI decisions, when things go wrong. In a recent case concerning a \$20 million AI-related investment loss, a Stanford University law professor commented, “people tend to assume that algorithms are faster and better decision-makers than human traders. That may often be true, but when it’s not, or when they quickly go astray, investors want someone to blame.”¹⁰

Robo-advising may also present opportunities for expanding customer demand by democratizing the access to financial services. If automation can reduce costs for investment firms, and those cost savings result in lower prices or lower minimum investment amounts, people who previously found asset management services too expensive could begin to place their savings with an asset manager.¹¹ In addition, some people who felt uncomfortable with or lacked the time to seek out, choose, and discuss sensitive or complex investment decisions with a human adviser may be willing to invest using a convenient computer interface.¹²

Workforce Disruption

There have been some initial studies that attempt to assess how the labor market in the economy, as well as the financial sector, will be affected by AI and related advanced technologies. According to one recent study, AI and related technologies will eliminate 200,000 jobs in the banking industry in the next decade.¹³ More broadly, a recent Federal Reserve paper found that the portion of national income that goes to workers, known as the labor share, has fallen substantially over the past 20 years, and that automation and artificial intelligence has been an important driving factor.¹⁴

Still, it is worth noting that while AI has reduced and eliminated many jobs in financial services, the technology also, produces new jobs that require different skill sets that potentially may require retaining or reassignment of workers tasks. While some express concerns about the potential job impact automation is and will continue to have, some experts contend that AI should be viewed as an ally to humans, not an adversary.¹⁵

Lastly, it is important to note the nuances between AI and automation when discussing how either will impact the future of the financial services work force. AI, which tends to be more complex than automation, is a science and engineering process whereby humans create machines or software to copy or

¹⁰ Thomas Beardsworth and Nishant Kumar, “Who to Sue When a Robot Loses Your Fortune,” Bloomberg, May 5, 2019, at https://www.bloomberglaw.com/document/XA51N7GO000000?bna_news_filter=banking-law&jcsearch=BNA%25200000016a8ce4d6bfadfb9cee2ed10000#jcite; see also, Darla Mercado, “Here’s Why Robo-advisors Won’t Replace Human Financial Advisors,” CNBC, Jun. 6, 2019, at <https://www.cnbc.com/2018/06/06/heres-why-robo-advisors-wont-replace-human-financial-advisors.html>.

¹¹ Lisa Beilfuss, “Banks Are Paying Peanuts on Deposits. Robo Advisers Are Offering Higher Rates,” *The Wall Street Journal*, March 1, 2019, at <https://www.wsj.com/articles/banks-are-paying-peanuts-on-deposits-robo-advisers-are-offering-higher-rates-11551452400>.

¹² Facundo Abraham, Sergio Schmukler, and Jose Tessada, *Robo-advisors: Investing Through Machines*, The World Bank Group, February 2019, <http://documents.worldbank.org/curated/en/275041551196836758/pdf/Robo-Advisors-Investing-through-Machines.pdf>.

¹³ See, Kelly at *supra* 3.

¹⁴ Sylvain Leduc and Zheng Liu, “Are Workers Losing to Robots?,” Federal Reserve Bank of San Francisco, Sep. 30, 2019, at <https://www.frbsf.org/economic-research/publications/economic-letter/2019/september/are-workers-losing-to-robots/>.

¹⁵ See, Lin, *supra* 3 at 548

supersede human behaviors and intelligence;¹⁶ automation is refers to developing hardware or software that can complete tasks without human intervention or involvement and can involve certain types of AI technologies, like machine learning.¹⁷ To illustrate the differences, a financial analyst whose work involves identification of new areas of investment, bridging compromise in complex negotiations, or responding to rapidly changing consumer environments can use AI technologies to perform better, but her work cannot necessarily be automated by a machine or software. Compared to a financial analyst whose role largely consists of downloading data, creating fixed set of statistics, and compiling reports of statistical data. These tasks can be automated by statistical analysis or reporting software.

AI Impact on Oversight, Risk Management, and Regulatory Compliance

Risk management and compliance processes at financial institutions currently rely on data to predict whether and how wrong-doing or bad outcomes are occurring or could potentially occur. For example, in anti-money laundering (“AML”) compliance, financial firms are required to file suspicious activity reports (“SARs”) with the Treasury’s Financial Crimes Enforcement Network (“FinCEN”) when transactions by a customer appear as if they might potentially be linked to crime, fraud, money laundering, terrorist financing or other transgressions.¹⁸ In connection with the SARs and other AML requirements, financial institutions maintain an AML compliance program, which may involve training employees to recognize what constitutes suspicious activity and when they are required to file a report.¹⁹

AI has the potential to make compliance activities, like as AML compliance, more accurate and efficient. Commentators refer to this process as “regtech,” which refers broadly to the adoption of new technologies to assist with regulatory compliance. A key component in the risk management and compliance process for financial institutions is identifying patterns in data and predicting outcomes. These processes include identity validation for clients, and real-time monitoring, particularly for AML and anti-fraud purposes. They also could include risk modeling, economic forecasting and internally monitoring employees, such as, for example, monitoring whether excessively risky trades are harming the bank’s own capital or liquidity positions.²⁰

Moreover, the Financial Industry Regulatory Authority (“FINRA”) has begun to use such tools to surveil the securities market.²¹ FINRA predicts that these technologies will help with AML processes, FinCEN’s “know your customer” requirements, surveilling employees’ trades on behalf of consumers or the firm, managing customer data privacy, preventing security risks, and centralizing supervisory control systems

¹⁶ See generally, Mark Muro, Jacob Whiton, and Robert Maxim, “What Jobs Are Affected by AI,” Brookings, Nov. 2019, at https://www.brookings.edu/wp-content/uploads/2019/11/2019.11.20_BrookingsMetro_What-jobs-are-affected-by-AI_Report_Muro-Whiton-Maxim.pdf.

¹⁷ See, Task Force on Artificial Intelligence at *supra* 11.

¹⁸ See, Rena S. Miller and Liana W. Rosen, “Anti-Money Laundering: An Overview for Congress,” Mar. 1, 2017 at <https://www.crs.gov/Reports/R44776>

¹⁹ Millions of such reports are filed with FinCEN every year. The agency decides which SARs merit additional attention, an exercise that involves sifting through large data sets to identify patterns that could indicate wrongdoing in financial transactions.

²⁰ See, American Bankers Association, “Understanding Regtech,” at <https://www.aba.com/Tools/Function/Technology/Documents/Understanding-RegTech.pdf>.

²¹ FINRA is the the self-regulatory organization that monitors securities broker-dealers. See further, FINRA, “Technology Based Innovations for Regulatory Compliance (“Regtech”) in the Securities Industry, (Sept. 2018), at http://www.finra.org/sites/default/files/2018_RegTech_Report.pdf.

for additional risk management. Reports suggest many financial institutions are eager to adopt new technologies to reduce the costs of regulatory compliance and other back-office functions.²²

In cases in which an employee's job is largely occupied with performing routine risk and compliance checks, automation might be able to replace those jobs.²³ However, in many cases these tasks are just a part of what an employee does while performing activities in support of the employer's main line of business. For example, staff at a bank branch provide services to numerous clients making regular bank transactions and may only devote a small portion of their time filing SARs after infrequent occurrences of suspicious activity. An automated AI program that flags activities for SAR filings would not perform the numerous customer service functions that make up the bulk of bank staff's job responsibilities, and thus an AI program would not necessarily replace any of those employees. Instead, the banking industry has characterized AI-enabled compliance as designed to augment employees' abilities, not replace them.²⁴

²² See, Douglas W. Arner, Janos Barberis, and Ross P. Buckley, "Fintech, Regtech and the Reconceptualization of Financial Regulation," at pg. 2, Oct. 2016 at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2847806. See also, Institute of International Finance, Regtech in Financial Services: Technology Solutions for Compliance and Reporting, at pg. 5-8, Mar. 2016 at https://www.iif.com/Portals/0/Files/private/iif-regtech_in_financial_services_-_solutions_for_compliance_and_reporting.pdf?ver=2019-01-04-142943-690.

²³ See, Adam Gilbert, "Artificial Intelligence and Bank Performance", The Clearinghouse and the Bank Policy Institute, Banking Perspectives blog, Winter 2018, at <https://www.theclearinghouse.org/banking-perspectives/2018/2018-q1-banking-perspectives/articles/ai-bank-performance>.

²⁴ See generally, David H. Autor, "Why Are There Still So Many Jobs? The History and Future of Workplace Automation," Harvard Journal of Economic Perspectives, Vol. 29, No. 3 at 23, Summer 2015, at <https://www.aeaweb.org/articles?id=10.1257/jep.29.3.3>