Gérard Hertig
October 2021

(FRS) FUTURE RESILIENT SYSTEMS

# The Political Economy of AI-Driven Financial Supervision

#5

Table of Content

# 1 Abstract

AI-reliance is expected to improve risk management across the financial services industry, reinforcing the dominant of private ordering in ‘normal times’.

From a supervisory perspective, the use of AI can be expected to decrease regulatory enforcement costs while providing technology-advanced players with opportunities to game the regulatory system.

More fundamentally, AI-reliance is unlikely to either significantly improve the prompt and effective handling of systemic incidents or to increase systemic risk. However, the use of AI may go hand-in-hand with significant job losses.

Overall, the use of AI can be expected to have an impact on the respective roles of private ordering and state regulation. The former will become (rapidly) dominant in normal times while the latter will (slowly but increasingly) target systemic issues.

*Key Words: Artificial intelligence, compliance, courts, financial supervision, investor protection, systemic risk.*

## 2 The Increasing Role of AI

The authorities in charge of financial supervision still rely upon human judgement for oversight purposes.[i] At the same time, they are starting to **trust artificial intelligence** (AI). There is an awareness of AI-driven analysis being risky due to data quality, transparency and understandability issues; however, AI advances provide supervisory authorities with an opportunity to focus upon domains where humans (still) have an advantage over machines.

1. These developments generate **social benefits and costs**. On the up side, AI-use is expected to increase labor productivity by up to 40%—in particular, by taking over tedious tasks that contribute to friction within large organizations like government agencies.[ii] It follows that lawmaking and enforcement costs should decline,[iii] especially when it comes to predicting bank distress,[iv] detecting fraud[v] and minimizing money laundering.[vi]

On the down side, financial authorities are likely to face **AI models** they cannot fully comprehend. More importantly, large financial intermediaries may benefit from AI-driven supervision at the expense of their smaller brethren.[vii]

2. Given this environment, one does not expect financial authorities to adopt a **wait-and-see** approach. To begin with, it would open them to 'obsolete technology' blame should scandals or market failures occur. In addition, AI-driven supervision is likely to prove popular with taxpayers due to its (perceived) cost-savings potential. Finally and most importantly, financial authorities cannot afford to lag behind AI-reliant private players if they want to remain effective and credible.

[i] Larry D. Wall, *Some Financial Regulatory Implications of Artificial Intelligence,* 100 Journal of Economics and Business 55 (2018).

[ii] Daylyn Brooke Gilbert, *Implementation of AI into Federal Agencies, Keeping an Eye on the Federal Workforce* (2021), availabe at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3891943.

[iii] Adrian Zuckerman, *Artificial Intelligence, Implications for the Legal Profession, Adversarial Process and Rule of Law*, 136 Law Quarterly Review 427 (2020); Sangchul Park and Ko Haksoo, *Machine Learning and Law and Economics: A Preliminary Overview*, 11 Asian Journal of Law and Economics 25 (2020).

[iv] Joel Suss and Henry Treitel, *Predicting Bank Distress in the UK with Machine Learning*, Bank of England Staff Working Paper 831 (2019).

[v] Doaa Abu-Elyounes, *Computer Says No!": The Impact of Automation on the Discretionary Power of Public Officers*, 23 Vanderbilt Journal of Entertainment & Technology Law 451 (2021).

[vi] Astrid Bertrand, Winston Maxwell and Xavier Vampires, *Do AI-based Anti-money Laundering Systems Violate European Fundamental Rights?* 11 International Data Privacy Law 276 (2021).

[vii] Markus Behn, Rainer F. H. Haselmann and Vikrant Vig, *The Limits of Model-Based Regulation*, forthcoming in Journal of Finance..

This does not mean that financial authorities are wholeheartedly embracing AI-driven supervision; they are aware of AI-reliance raising **complex issues** from an ethical, legal, political and economic perspective.[viii] Hence, the *European Commission* (EC) is emphasizing the need for a common AI approach to avoid single market fragmentation and foster legal certainty,[ix] whereas the European Central Bank (ECB) follows a cautious approach to using AI for supervisory purposes.[x] Similarly, the US government sees its AI regulation role as a limited one,[xi] the idea being that uncertainty about AI-related risks is likely to decrease over time.[xii]

3. AI-reliance also has **behavioral implications**. Human beliefs generally depend on recalled personal experiences such as stock market crashes, and not merely on statistical information. In addition, there is a mystifying diversity of human biases; in particular, people tend to over-estimate the frequecy of events that are unlikelyxiii or can be broken down in constituent parts.[xiv]

By contrast, the use of AI can be expected to result in **more complete** and unbiased decision-making. Programming or data bank deficiencies may initally offset some of the benefits of reduced human intervention, but they should vanish over time. The downside is that AI decision-making may run counter to the (subjective) preferences of voters; here, the hope is that their inclinations can be addressed via legislative amendments and the resulting coding adjustments.

4. Overall, the **benefits** of AI-driven financial supervision can be considered highest for financial centers. In line with this hypothesis, Singapore and Swiss financial authorities are among the most advanced AI users. French and German supervisory authorities are not far behind, whereas

[viii] See https://www.coe.int/en/web/artificial-intelligence/secretary-general-marija-pejcinovic-buric.

[ix] COM (2020) 65 final, https://ec.europa.eu/info/sites/default/files/commission-white-paper-artificial-intelligence-feb2020_en.pdf. See also the proposed *Regulation on Artificial Intelligence* (COM/2021/206 final) and the *Communication on Fostering a European approach to Artificial Intelligence* (COM/2021/205 final) published by the European Commission on April 21, 2021.

[x] See ECB, Bringing Artificial Intelligence to Banking Supervision, November 13, 2019, available at https://www.bankingsupervision.europa.eu/press/publications/newsletter/2019/html

[xi] See Executive Order 13859, *Maintaining American Leadership in Artificial Intelligence*, 84 Federal Regulation 3967 (February 11, 2019), available at https://www.govinfo.gov/app/details/DCPD-201900073; Office of Management and Budget, *Guidance for Regulation of Artificial Intelligence Applications* (November 17, 2020), available at https://www.whitehouse.gov/wp-content/uploads/2020/11/M-21-06.pdf.

On the involvement of the AI-industry in policy-making and regulation, see Corinne Cath, Sandra Wachter, Brent Mittelstadt, Mariarosaria Taddeo, and Luciano Floridi, *Artificial Intelligence and the Good Society: The US, EU, and UK Approach*, 24 Science and Engineering Ethics 505 (2018).

[xii] See Itai Agur, *Politically Robust Financial Regulation*, 2021 IMF Working Paper 01.

[xiii] Sarah Lichtenstein, Paul Slovic, Baruch Fischhoff and Mark Layman, *Judged Frequency of Lethal Events*, 4 Journal of Experimental Psychology Human Learning and Memory 551 (1978).

[xiv] Baruch Fischoff Paul Slovic, Sarah Lichtenstein, Stephen Read and Barbara Combs, *How Safe is Safe Enough? A Psychometric Study of attitudes Towards Technological Risks and Benefits*, 9 Policy Sciences 127 (1978)

Japan significantly relies on AI to detect market manipulation and fraudulent money transfers.[xv]

On the other hand, supervisory use of AI remains **unimpressive** in most other European juridictions and the US. This deficit is a source of concern, especially given China's attempts to export its state control approach to data governance and AI use.

5. These concerns are adressed by the 2020 European Commission (EC) **White Paper** on Artificial Intelligence.[xvi] The basic aim is to propose a regulatory framework that inspires confidence, given that many market actors consider AI as untrustworthy in view of the privacy, data collection and intended use issues it raises.

The EC identified seven (partly overlapping) requirements that should contribute to **'trusted' AI**: 1) ultimate human control; 2) technical robustness and safety; 3) privacy and data governance; 4) transparency; 5) diversity, non-discrimination and fairness; 6) societal and environmental wellbeing; and 7) accountability.

In addition, the EC submitted a draft **Artificial Intelligence Act** (AIA) to the European Parliament.[xvii] The aim is to maintain EU leadership while preserving EU values and fundamental rights. In particular, AI systems posing significant health, safety or fundamental rights risks will have to comply with a set of horizontal requirements. These systems will also be subject to conformity assessment procedures.[xviii]

6. The draft AIA is viewed as a **watershed**. It also provides a good opportunity for the EU to engage a regulatory dialogue with the US, which has displayed restraint in regulating AI.xix For example, the draft Algorithmic Accountability Act,[xx] which aimed at striking a balance between promoting AI and safe, responsible and democratic development, died in Congress

[xv] See https://www.jpx.co.jp/english/corporate/news/news-releases/0060/20180319-01.html.

[xvi] COM(2020) 65 final.

[xvii] COM/2021/206 final.

[xviii] Emre Kazim, Charles Kerrigan and Adriano Koshiyama, *EU Proposed AI Legal Framework* (May 18, 2021), available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3846898.

[xix] Meredith Broadbent, *AI Regulation: Europe's Latest Proposal is a Wake-Up Call for the United States* (May 18, 2021), available at https://www.csis.org/analysis/ai-regulation-europes-latest-proposal-wake-call-united-states.

[xx] Bill H.R. 2231, introduced on October 4, 2019.

without receiving a vote. However, change may be in the making, as evidenced by the more aggressive approach pursued by the draft Algorithmic Justice and Online Platform Transparency Act.[xxi]

The differences in **EU and US approaches** may be due to US players favoring voluntary standards. For example, the NASDAQ stock exchange has used AI to detect irregular activities since 2017,[xxii] and for market surveillance since 2019;[xxiii] nowadays, its systems review more than 750,000 alerts (unusual price movements, trading errors and potential manipulation) a year.[xxiv]

## 3 Private Ordering vs State Regulation

In this evolving environment, one **fundamental policy question** arises: will the use of AI have an impact on the respective importance of private ordering (via personal and collective norms) and state regulation? The easy answer is 'definitely'; it is harder to predict in which circumstances and to what extent.

1. Overall, private ordering will remain dominant in **'normal times'**. Many executives expect the advent of AI to improve financial institutions' risk management.[xxv] There is a simple assumption behind this anticipation: AI being easier to buy than (equivalent) talent, its use has to increase the robustness of financial intermediaries.

It follows that financial authorities are likely to spend fewer resources monitoring market conduct. Instead of investigating compliance with the principle of precaution, they will devote significant attention to the **overall robustness** of AI-driven systems.

In other words, **structural review** will pre-empt behavioral analysis.

2. In this context, dealing with **systemic risk** takes a new meaning. The generalized use of AI should facilitate the private uncovering and management of systemic incidents. In theory, market participants will identify

[xxi] Bill S. 1896, introduced on May 27, 2021.

[xxii] See https://www.nasdaq.com/articless/for-the-first-time-nasdaq-is-using-artificial-intelligence-to-surveil-u.s.-stock-market.

[xxiii] See https://www.finextra.com/pressarticle/80533/nasdaq-uses-ai-for-surveillance-patterns.

[xxiv] Shanny Basar, *Nasdaq to Expand AI for Surveillance with Transfer Learning* (November 19, 2019), available at https://www.marketsmedia.com/nasdaq-to-expand-use-of-ai-with-transfer-learning.

[xxv] See https://www.sqlpower.ca/artificial-intelligence-financial-regulation.

and execute the required measures (margin calls, stop loss, firewalls, etc.) in real time. In practice, however, circuit breakers could hamper their timely execution or, as evidenced by past crises, even shut down transaction systems altogether.

More fundamentally, one must be aware that most of the **available data** is from normal times. It is not easy to link this data to the determinants of large losses that could threaten overall stability.[xxvi] In fact, history shows that financial crises generally get market participants flatfooted.

Overall, technological improvements is likely to make financial systems **more resilient**. In particular, one can expect AI-driven supervision to complement the private use of AI, with significant contributions to systemic risk management.

3. In terms of state intervention, this by-and-large positive impact of AI may not prove as decisive as its impact on **workforce** size and composition.

There is evidence of financial services firms increasingly using AI for risk management (56%) and new products and processes generation (52%) purposes.[xxvii] This evolution will generate significant efficiency gains;[xxviii] hence, US banks expect AI-use to generate a $70 billion reduction in middle-office costs by 2025.[xxix] However, AI-use will also go hand-in-hand with **workforce reductions** or reallocations; for example, AI-use is projected to cut or transform 23% of banking jobs in China by 2027, while increasing the output of the remaining 77%.[xxx]

Given these forecasts, policy-makers as well as industry representative can be expected to adopt measures to minimize their **social impact**. An obvious strategy is to rely on automation primarily for routine tasks while beefing-up jobs that require human judgment and expertise. For example, the UK Serious Fraud Office uses AI to review privileged document, thus

[xxvi] Larry D. Wall, *Some Financial Regulatory Implications of Artificial Intelligence*, 100 Journal of Economics and Business 55 (2018).

[xxvii] Cambridge Centre for Alternative Finance and World Economic Forum, *Transforming Paradigms A Global AI in Financial Services Survey* (January 2020), available at https://www3.weforum.org/docs/WEF_AI_in_Financial_Services_survey.pdf.

[xxviii] See AIM Expert Network, *Artificial Intelligence And Its Impact On Financial Services Landscape* (March 17, 2020), available at https://analyticsindiamag.com/artificial-intelligence-and-its-impact-on-financial-services-landscape.

[xxix] Aradhana Khanna, *AI in Financial Industry in 2021: A Harbinger of Faster, Smoother, and More Reliable Business Processes* (July 29, 2021), available at https: www,magicfinserv.com/ai-in-financial-industry-in-2021 .

[xxx] David He and Venessa Guo, Boston Consulting Group, *4 Ways AI will Impact the Financial Job Market* (September 14, 2018), available at www.weforum.org.

reducing independent counsel review by 80%.[xxxi] Similarly, augmented demand for protecting the integrity of data collection, processing and storing is likely to have positive workforce effects. A good example of the drivers of data integrity concerns is the US Governmental Accounting Office (GAO) pointing out that cybersecurity incidents have increased by more than 1,000% from 2006 to 2015.[xxxii]

4. AI is also changing the way financial institutions interact with financial supervisors.

For example, financial supervisors have started using AI to identify **misbehaving** financial advisers and suspicious trading activity. Applications range from mis-selling detection in the mortgage loan and consumer credit contracts area[xxxiii] to the generalized detection of financial irregularities.[xxxiv]

This new approach is contingent upon the parties **trusting** each other. This is especially true for operational risks, given the autonomous adaptability of AI-based models and the complexity of the techniques employed.[xxxv]

5. More specifically, the increasing use of AI raises various **practical issues**. One is whether AI-driven supervision is biased in that it focuses on those areas where data is available or risks are easier to measure. Another issue is that AI performance is less impressive when the past is unlike the future, i.e. when standards are superior to rules.[xxxvi] A third issue is that the use of AI generates data authenticity, provenance, ownership and privacy issues,[xxxvii] as well as data and concept drift problems.

[xxxi] Emeline Denis , *How can AI Enhance Market Supervision and Integrity?*, OECD Business and Finance Outlook 2021 (September 6, 2021), available at https://oecdonthelevel.com/2021/09/06/how-can-ai-enhance-market-supervision-and-integrity.

[xxxii] Gregory C. Wilshusen, Director, Information Security Issues, Testimony before the Subcommittee on Research and Technology Oversight, Committee on Science, Space, and Technology, House of Representatives, 7 (July 8, 2015), *available at* http://www.gao.gov/assets/680/670935.pdf.

[xxxiii] Financial Stability Board, *The Use of Supervisory and Regulatory Technology by Authorities and Regulated Institutions* (October 9, 2020), available at https://www.fsb.org/wp-content/uploads/P091020.pdf..

[xxxiv] *SFO Expected to Promote Ravn's Crime-Solving AI Robot*, Financial Times (February 13, 2017, online edition); Stefan Hunt, *From Maps to Apps: the Power of Machine Learning and Artificial Intelligence for Regulators* (October 19, 2017), speech available at https://www.fca.org.uk/publication/documents/from-maps-to-apps.pdf.

[xxxv] Iota Nassr, *Artificial intelligence in Finance: Is Machine Learning going to Dominate the Markets?* (July 12, 2021), available at https://oecdonthelevel.com/2021/07/12/artificial-intelligence-in-finance-is-machine-learning-going-to-dominate-the-markets.

[xxxvi] Frank Fagan and Saul Levmore, *The Impact of Artificial Intelligence on Rules, Standards, and Judicial Discretion*, 93 Southern California Law Review 1 (2019).

[xxxvii] Bank of England and Financial Conduct Authority, Minutes of the Artificial Intelligence Public-Private Forum First Meeting (October 12, 2020), 2019-2020 FCA Annual Report at 42.

In the US, the Securities and Exchange Commission (SEC) is dealing with such issues by using unsupervised algorithms to **detect data patterns and anomalies**, and supervised learning algorithms to inject SEC knowledge into the process. These successive algorithms can then be applied to new data, for example those generated by recent SEC filings. However, in a possibly self-interested move, SEC representatives have emphasized that it would be premature to think of AI as the next market regulatorxxxviii— a view shared by the Financial Stability Board (FSB), which has highlighted the need to keep a human touch within the supervisory process.[xxxix]

Still another issue is that financial intermediaries have been **slow in translati**ng regulatory expectations into effective internal governance and practices. This has led financial supervisors to clarify their position. For example, the SEC has ruled that AI-use must be disclosed to investors;[xl] it is also ramping-up its enforcement actions, as evidenced by Charles Schwab having to set aside $200 million following an investigation about fraudulent charges for robot advising.[xli]

## 4 The Politics of AI-driven Supervision

The move from human to AI-driven financial supervision will result in **gains and losses** for financial supervisors as well as for financial intermediaries and investors.

### 4.1 Increasing Supervisory Independence

This new technology world is likely to make financial supervisors **more independent** from lawmakers

1. To begin with, decision-making relies on codes, which are harder to assess than human-generated decisions. This barrier to understanding is

[xxxviii] See Scott W. Bauguess, *The Role of Big Data, Machine Learning, and AI in Assessing Risks: a Regulatory Perspective* (June 21, 2017), available at www.nscai.gov.

[xxxix] Financial Stability Board, supra note 33.

[xl] SEC vs Blue Crest Capital Management Ltd, Administrative Proceeding File No. 3-20162, failure to disclose the reallocation of capital to a semi-systematic trading system, which essentially was a replication algorithm (December 8, 2020).

[xli] https://www.bloomberg.com/news/articles/2021-07-02/schwab-to-take-200-million-charge-on-sec-investigation. See also SEC Staff, Guidance Update and Investor Bulletin on Robo-Advisers 2017-52, Washington D.C. (February 23, 2017), recognizing 'investor adviser' status to robo-advisers.

compounded by the use of AI allowing for **more differentiated outcomes**, due to the taking into account of a larger number of variables.

At the same time, managerial failures could be harder to prove in an AI-driven world, unless there is some programming or data gathering deficiency. This situation will not necessarily generate **supervisory laxity**; however, the latter is more likely to occur when leniency beneficiaries outnumber their opponents.

2. The early 2000s **house-price "bubble"** provides a good laxity example. Its occurence was facilitated by supervisors allowing lenders to engage in excessive risk-taking;xlii fundamentally, however, the bubble is attributable to its beneficiaries ("subprime" buyers and home owners) outnumbering its opponents (affluent buyers and renters).[xliii]

The 2010s introduction of lending platforms offers another laxity example. Due to banks being cautious in the wake of the 2008 credit crisis, retail investors engaged in unsupervised peer-to-peer **(P2P) lending**.[xliv] At the time, supervisory authorities tolerated the practice even though it spread transaction risks among non-professional players.xlv This approach is now under review:[xlvi] P2P lending proves to be more complex than expected[xlvii] due to the market getting dominated by institutional lenders.[xlviii]

---

## 4.2 "Private" Interests as a Key Driver

Investor protection and systemic risk management are the **core goals** of financial regulation. Hence, AI-driven financial supervision is likely to be

[xlii] Ben S. Bernanke, *Monetary Policy and the Housing Bubble* (January 3, 2010), available at www.federalreserve.gov/newsevents/speech/bernanke20100103a.

[xliii] Igor Livshits and Youngmin Park, *On the Political Economy of Financial Regulation,* Society for Economic Dynamics Meeting Paper 1465 (2019).

[xliv] Hua Cheng, Hua and Rui Guo, *Risk Preference of the Investors and the Risk of Peer-to-Peer Lending Platform*, 56 Emerging Markets Finance and Trade 1520 (2020).

[xlv] Rainer Lenz, *Peer-to-Peer Lending: Opportunities and Risks*, 4 European Journal of Risk Regulation 688 (2016).

[xlvi] Zhi-hong Song, Yu-xin Tian, Dong-mei Lee, and Jin-xia Qin, *Analysis on the Risk and Supervision of P2P Online Financing Platforms in China*, 5 International Journal of Emerging Trends in Social Sciences16 (2019).

[xlvii] Moran Ofir and Ido Saleh, *A Revolution in Progress: Regulating P2P Lending Platforms*, 16 New York University Journal of Law and Business 683 (2020).

[xlviii] Tetyana Balyuk and Sergei Davydenko, *Reintermediation in FinTech: Evidence from Online Lending* (2019), revise & resubmit at Journal of Financial and Quantitative Analysis, available at ssrn.com; Tania Ziegler et al., *The Global Alternative Finance Benchmarking Report, Cambridge Centre for Alternative Finance* (2020).

constrained by (the perception of) its usefulness for small investors and its value in terms of crisis prevention.

1. The extent to which AI-use improves the situation of **small investors** is debatable. In theory, it should be easy to develop algorithms designed to protect their interests. In practice, this is difficult due to small investors often investing via pension funds and other asset managers. Nowadays, AI's potential contribution to small investor interests seems essentially limited to small claims cases,[xlix] a situation where AI allows for affordable litigation avenues and facilitates class action settlement.[l]

2. AI-reliance may prove more effective when it comes to financial crisis prevention. However, it would be naïve to expect AI-use to eradicate **systemic deficiencies**, especially when it comes to time-inconsistencies and opportunistic behavior.

For example, **financial crises** can be prompted by investors preferring long-term returns while expecting banks to remain well capitalized in the short-term.[li] Clearly, AI-driven financial regulation will not fundamentally constrain investor preferences or thwart their natural outcome. Or, to take another example, AI-driven financial regulation cannot take care of policy-makers' tendency to deem government bonds resilient to sovereign default.[lii] Nevertheless, AI-driven financial supervision can contribute to the early detection or, at least, the **proper management** of macro-prudential events. It follows that AI-driven financial supervision will, at worse, prove neutral in terms of systemic risks and, at best, contribute to their reduction.

3. In practice, the interests of financial intermediaries and supervisory authorities are the **key drivers** of AI-driven financial supervision.

[xlix] Tania Sourdin, *Judge v. Robot? Artificial Intelligence and Judicial Decision-Making*, 41 University of New South Wales Law Journal 1114 (2018); Anthony J. Casey and Anthony Niblett, *Will Robot Judges Change Litigation and Settlement Outcomes? A First Look at the Algorithmic Replication of Prior Cases*, MIT Computational Law Report (2020), available at https://law.mit.edu/pub/willrobotjudgeschangelitigationandset.

[l] Mark Findlay, *Future Lawyers or Robots with Big Data?, in Globalisation, Populism, Pandemics and the Law* 128–147 (Edward Elgar 2021); Jessica Erickson, *Automating Securities Class Action Settlements*, 72 Vanderbild Law Review 101 (2019).

[li] Sandro Brusco and Fabio Castiglionesi, *Liquidity Coinsurance, Moral Hazard, and Financial Contagion*, 65 Journal of Finance 2275 (2007).

[lii] Varadarajan V. Chari, and Patrick J. Kehoe, *Time Inconsistency and Free-riding in a Monetary Union*, 40 Journal of Money, Credit and Banking 1329 (2008); Pablo D'Erasmo, Igor Livshits and Koen Schoors, *Banking Regulation with Risk of Sovereign Default*, 2019 Federal Reserve Bank of Philadelphia Working Papers 15.

**Financial intermediaries** can be expected to support or, at least, not to object to the use of AI for supervisory purposes. This can be attributed to they themsleves increasingly using AI for management, operational and compliance purposes. For example, a 2019 survey by the Bank of England and the Financial Conduct Authority shows that 57% of respondents were relying upon AI applications for risk management and compliance purposes.[liii] AI is also more and more used for disclosure and advice purposes[liv] as well as for fraud detection.

**Financial supervisors** are in a similar position. They already rely on AI to identify financial advisers with higher risk of misconduct as well as suspicious trading activity. Other applications range from uncovering miselling in the mortgage loan and consumer credit contracts area[lv] to the generalized detection of financial irregularities. Financial supervisors can be expected to expand AI-use across-the-board, if only to match growing AI-reliance by financial intermediaries.

---

## 4.3 Macro-Economic Impact

At this stage, AI-related **job losses** seem modest and limited to clerical workers.[lvi] However, even small increases in job losses can result in public pressure driving regulatory policy off track across-the-board. For example, workers may perceive AI-driven financial supervision as a first step towards generalized use of AI in the financial industry.

1. One way to insulate AI use from labour-related constraints is to provide adequate **public information**.[lvii] To be effective, communication officers must cut through the technical jargon and present the issues in simple, accessible and credible terms.[lviii] This could prove problematic, for two

[liii] See James Proudman, *Managing Machines: The Governance of Artificial Intelligence*, available at https://www.bankofengland.co.uk/speech/2019.

[liv] Sean Hanno Williams, *AI Advice: The Irony of Big Data Disclosures and the New Advice Paradigm*, 2020 University of Texas Public Law Research Paper No. 718.

[lv] Financial Stability Board, supra note 33.

[lvi] Karen Levy, Kyla E. Chasalow, and Sarah Riley, *Algorithms and Decision-Making in the Public Sector*, 17 Annual Review of Law and Social Science (forthcoming 2021).

[lvii] Roger B. Myerson, *Rethinking the Principles of Bank Regulation: A Review of Admati and Hellwig's The Bankers' New Clothes*, 52 *Journal of Economic Literature* 197 (2014).

[lviii] Anat Admati and Martin Hellwig, *The Banker's New Clothes: What's Wrong with Banking and What to Do about It,* Princeton University Press (2014).

reasons. To begin with, the parties directly benefiting from AI-reliance (financial intermediaries) have limited market credibility. In addition, the civil servants in charge of financial supervision may not have the expertise and, more importantly, the autonomy needed to generate market confidence.

At this point, the best way to deal with **voter pressure** could be to combine the disclosure of private information about the labor impact of AI-use with credible commitments of state intervention should AI-driven financial supervision have significant employment consequences.

2. AI-driven financial supervision may also result in a *de facto* **reallocation of powers** between lawmakers and financial supervisors.

It is relatively easy to spot competence issues in a non-AI environment. By contrast, abuse of supervisory powers can be **hard to detect** in an AI-driven world—especially when they favor well-established incumbents. Consequently, it may go unnoticed that the financial industry has become less competitive, with a negative impact on capital accumulation and income distribution. Pushed to its limits, AI-driven supervision may increase the severity of economic and social crises[lix] by prompting (ultimately inefficient) State interventions.

3. The **COVID-19** environment provides good case studies. At the national level, many financial policymakers favoured the deferring of loan loss recognition to shield banks from the impact of the pandemic and give them time to 'resurrect'.[lx] At the global level, the implementation timeline for outstanding Basel III standards got delayed to buttress banks' Covid resilience.[lxi]

While the circumstances clearly warranted these interventions, efficiency requires them to be limited to countering market dysfunctionalities— e.g.

[lix] Bilin Neyapti, *Income Distribution and Economic Crises*, 21 International Finance 273 (2018).

[lx] From a macro-economic perspective, see Kristalina Georgieva, *Confronting the Crisis: Priorities for the Global Economy*, April 9, 2020 (the IMF is putting $1 trillion at the service of its membership), available at https://www.imf.org/en/News/Articles/2020/04/07/sp040920-SMs2020-Curtain-Raiser; *How the World Bank Group is helping countries address COVID-19*, February 11, 2020, available at https://www.worldbank.org/en/news/factsheet/2020/02/11/how-the-world-bank-group-is-helping-countries-with-covid-19-coronavirus.

[lxi] To insure for adequate effectiveness, the action was taken within the Bank for International Settlements' (BIS), by the Group of Central Bank Governors and Heads of Supervision. See https://www.bis.org/press/p201130.htm.

restricted to the period during which asset values fell below historic costs.[lxii] However, extreme event are also an opportunity for **industry lobbies** to get overly lenient supervisory treatment.[lxiii] The COVID 19 crisis was no exception; actually, it exemplifies how to achieve such outcome—i.e. by exploiting the regulatory forbearance vs liquidity shortage trade-off.[lxiv]

4. One must also take into account that AI technology and financial resources remain concentrated in the hands of a few firms and nations.[lxv] This goes hand-in-hand with an increasing **digital gap** at both the firm and country levels.[lxvi]

At the **firm level**, there is evidence of some enterprises being better at continually improving their performance,[lxvii] an outcome at least partly attributable to variance in technology and knowledge diffusion.[lxviii]

At the **country level**, the digital gap is most visible between rich industrialized countries and the global south. However, this gap can also be observed within OECD countries: according to the Digital Government Index (DGI), the average score across OECD member countries was 0,5, with 15 out of 29 countries surpassing this threshold.[lxix] Interestingly, Korea, the UK and Columbia were among the best performers whereas Greece, Iceland and Sweden scored the lowest.

5. Digital gaps could hamper **market access** for several reasons. First, home supervisory authorities may deem some financial intermediaries to have such an AI advantage that they cannot properly supervise them. Second, host supervisory authorities may constrain market access for financial intermediaries whose home supervisors they consider as lacking AI-savviness. Third, political considerations may generate barriers to entry

[lxii] Franklin Allen and Elena Carletti, *The Role of Liquidity in Financial Crises*, Jackson Hole Economic Policy Symposium, available at https://repository.upenn.edu/fnce_papers/48.

[lxiii] Deniz Igan and Thomas Lambert, *Bank Lobbying: Regulatory Capture and Beyond*, IMF Working Paper 2019/171; Sumit Agarwal, David Lucca, Amit Seru and Francesco Trebbi, *Inconsistent Regulators, Evidence from Banking*, 129 Quarterly Journal of Economics 889 ((2014).

[lxiv] Andrei Shleifer and Robert W. Vishny, *Unstable Banking*, 97 Journal of Financial Economics 306 (2010).

[lxv] Conference Summary, Machines, Smart Policies, OECD Digital Economy Paper N°270 (2018).

[lxvi] OECD, *Strengthening Economic Resilience Following the Covid-19 Crisis*, 2020.

[lxvii] Dan Andrews, Chiara Criscuolo and Peter N. Gal, *The Best Versus the Rest: The Global Productivity Slowdown, Divergence Across Firms and the Role of Public Policy*, OECD Productivity Working Papers 5/2016.

[lxviii] Giuseppe Berlingieri, Sara Calligarisi, Chiara Criscuoloi and Rudy Verlhac, *Laggard Firms, Technology Diffusion and its Structural and Policy Determinants*, OECD Science, Technology and Industry Policy Papers, N° 86 (2020).

[lxix] OECD, *Government at a Glance* (2021).

for foreign financial intermediaries deemed to be AI-savvier than their domestic counterparts.

These **barriers to entry** could prove short-lived. AI is already facilitating the emergence of new entities that, due to their size or organization, should be less prone to submit to supervisory moral suasion.[lxx] At the other end of the financial spectrum, robot-advisor algorithms allow individual investors to shape their financial portfolios themselves.[lxxi]

6. Finally and most importantly, **supervision effectiveness** requires financial regulators to build predictive simulations and other technical capabilities, while limiting bias and risk amplification.[lxxii] There is evidence of measures taken in that direction. For example, the US SEC has developed algorithms that are five times better than random testing at detecting whether it should investigate investment adviser filings;[lxxiii] more fundamentally, the ECB is considering using AI for banking supervision at large.[lxxiv]

Clearly, it may **take time** for these developments to transform market dynamics. Most financial authorities still use descriptive and diagnostic analytics: recent data shows that less than 10% rely on more advanced predictive and prescriptive analytics.[lxxv]

This 'interim' situation is costly. On the one hand, it hampers AI-use by financial intermediaries to the extent they need regulatory guidance given operational and other risks.[lxxvi] On the other hand, technology-advanced

[lxx] Compare Denis Beau, *Future Challenges for Oversight*, in Daniela Russo (Ed.), 2021 *Payments and Market Infrastructure Two Decades after the Start of the European Central Bank* 318.

[lxxi] Paul J. Yakoboski, Annamaria Lusardi and Andrea Hasler, *The 2020 TIAA Institute-GFLEC Personal Finance Index Many Do Not Know What They Do and Do Not Know,* available at https://gflec.org/wp-content/uploads/2020/04/TIAA-Institute-GFLEC_2020-P-Fin-Index_April-2020.pdf?x63881.

This development could prove problematic considering investor (decreasing?) tendency to over-estimate their financial knowledge.

[lxxii] Andrés Alonso and José Manuel Carbó, *Machine Learning in Credit Risk: Measuring the Dilemma between Prediction and Supervisory Costs*, Bank of Spain Working Paper 2032 (2020).

[lxxiii] See e.g. Scott W, *Bauguess, The Role of Big Data, Machine Learning, and AI in Assessing Risks: a Regulatory Perspective*, Keynote Address at the 19th Annual Operational Risk North America Conference (June 21, 2017).

[lxxiv] Pierre Guerineau, *Artificial Intelligence and Banking Supervision, Preserving the Human Touch*, available at https://home.kpmg/xx/en/home/insights/2020/01/ artificial-intelligence-and-banking-supervision-preserving-the-human-touch.html.

[lxxv] Financial Stability Board, *The Use of Supervisory and Regulatory Technology by Authorities and Regulated Institutions, Market Developments and Financial Stability Implications* at 24 (October 8, 2020), available at https://www.fsb.org/wp-content/uploads/P091020.pdf. See also Simone di Castri, Stefan Hohl, Arend Kulenkampff and Jermy Prenio, *The Suptech Generations*, FSI Insights on Policy Implementation No 19 (October 2019).

[lxxvi] Laurent Dupont, Olivier Fliche and Su Yang (2020) *Governance of Artificial Intelligence in Finance*, available at https://acpr.banque-france.fr/sites/default/files/medias/documents/20200612_ai_governance_finance.pdf.

intermediaries may see this state-of-affairs as an **opportunity to game** the regulatory system,[lxxvii] which could be the source of economic and social harms.[lxxviii]

7. This state of affairs is a source of **supervisory concern**. AI and, more generally information technology developments make it increasingly difficult to continue to discriminate among investors, in particular when this results in systemic differentiations.[lxxix]

Going forward, **two approaches** seem possible.

One is to use a **step-by-step** approach, under which AI-driven supervision is first introduced in areas where supervision is already or can more easily be digitalized, such as trading or retail banking. AI-driven supervision would thereafter be extended to more complex areas, such as investment banking or private banking.

The other approach is to select a small **set of representative banks,** for which AI-driven supervision is introduced across the board. This is a bolder approach and it would require the parallel continuation of the existing supervision mechanisms.

Both approaches raise significant **conceptual and methodological issues**. The latter approach has the advantage to be a voluntary one, but raises adverse selection issues. The former has the advantage of being inclusive, but may prove much harder to implement.

## 5 A Long Way to Go for AI-Driven Supervision

Major financial services market players and supervisory authorities increasingly rely on **AI for internal purposes.**

[lxxvii] Adrian Whelan, *Regulating Robots: Will the SEC Hold Algorithms to the Same Standards as RIAs?* (June 2, 2021), *available at* *https://www.bbh.com/us/en/insights/blog/on-the-regs/regulating-robots--will-the-sec-hold-algorithms-to-the-same-stan.html*

[lxxviii] Daron Acemoglu, *Harms of AI*, NBER Working Paper No. 29247 (September 2021).

[lxxix] Monetary Authority of Singapore, *Principles to Promote Fairness, Ethics, Accountability and Transparency in the Use of Artificial Intelligence and Data Analytics* at 7.

On the other hand, private and supervisory use of AI seem to be diverging when it comes to **financial market operations**,. Financial intermediaries' transactions are increasingly AI-driven, whereas financial supervisors use of AI seems confined to detecting illegal market practices.

More importantly, AI-driven supervision is still in its **infancy** when it comes to systemic (as opposed to transactional) applications. This is an environment where one should not rush to adjust to technological development. Regardless of peer or political pressures, the best course of action is to adopt a step-by-step AI approach. Otherwise, AI-driven systemic supervision may well increase the severity of economic and social crises[lxxx] by prompting inadequate and ultimately inefficient State interventions.

It follows that there still is and should be a long way to go until financial supervision is **comprehensively** AI-driven.

Acknowledgment

This work is an outcome of the Future Resilient Systems project at the Singapore-ETH Centre (SEC) supported by the National Research Foundation, Prime Minister's Office, Singapore under its Campus for Research Excellence and Technological Enterprise (CREATE) programme.

**Contact**

Singapore-ETH Centre
Future Resilient Systems
1 Create Way, #06-01 CREATE Tower
138602 Singapore

www.frs.ethz.ch

Publisher: Singapore-ETH Centre



[lxxx] Bilin Neyapti, *Income Distribution and Economic Crises*, 21 International Finance 273 (2018).