

THE IMPACT OF AI AND NEW TECHNOLOGIES ON CORPORATE GOVERNANCE AND REGULATION

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Artificial intelligence (“AI”) and other new technologies will shape, and are already shaping, the business models, management, structures and boundaries, and governance of corporations. This article examines selected developments in this area and their potential impacts on corporate law, governance, and regulation, using both theoretical and practical perspectives. The first part discusses AI and corporate leadership, focusing in particular on management structures, liability, and autonomous algorithmic entities. The second part proceeds to theorise firms in light of three specific business-related changes or phenomena induced by AI and other technologies. Finally, this part outlines selected impacts that these changes may have on corporate governance and the regulation of AI and online platforms.

I. INTRODUCTION

In this article, I focus on selected impacts that artificial intelligence (“AI”) and other new technologies have, or will have, on corporate governance and regulation. The article proceeds in two parts. The first part explores whether, or to what extent, AI can take over corporate management.¹ Based on the assumption that AI will eventually be able to take over managerial tasks, this part then proceeds to discuss a number of potential effects on specific aspects of internal corporate governance, namely, corporate leadership structures and liability of directors and officers. This part also provides a brief look at algorithmic entities as a novel form of autonomous AI-managed business entities. The second part looks at corporations more broadly and examines how they are affected not only by AI, but also by other new technologies. It uses three distinct phenomena – perforated firm boundaries, business’ use of *reverse access* to third-party resources, and the status of online platforms between firms and markets – as a basis to consider: (a) the effects of technology-induced changes on corporate theory, that is how we conceptualise corporations in our tech-dominated environment; (b) implications with regards to the priorities for the

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¹ This part is based on Martin Petrin, “Corporate Management in the Age of AI” (2019) 2019(3) *Columbus L Rev* 965.

board of directors; and (c) selected implications concerning the regulation of AI and large online platforms in the business context.

II. INTERNAL ASPECTS: AI AND CORPORATE MANAGEMENT

Approximately a decade ago, reports began to emerge indicating that AI was taking on managerial responsibilities. For instance, a Hong Kong-based venture capital firm claimed to have appointed an AI entity as a member of its board of directors. According to this account, the AI entity was given full directorial rights, including the ability to cast votes, although it was primarily employed for the purpose of making investment decisions.² The firm even announced that its AI director had already sanctioned several investment choices. Another example involved the California software company, Salesforce. It was reported that its CEO regularly included an AI entity named Einstein in his weekly meetings with management teams.³ There was even a peculiar incident where Einstein was said to have interrupted a presentation by an employee, remarking that it did not believe that a certain executive would meet the relevant targets. Although the executive was understandably perturbed, the CEO explained that Einstein was able to identify the issue and ultimately facilitated its swift resolution.⁴ Finally, in a similar vein, a Finnish software company released a statement announcing that it had added an AI system as a full-fledged member of the management team for a newly established data-driven business unit.⁵ The company noted among others that the system, Alicia T, was equipped with a conversational interface system that makes it “possible [to] have a discussion with it and ask questions about anything.”⁶

Fast forward a few years, and we now have generative AI tools such as OpenAI’s ChatGPT at our disposal, to name just one example of emerging conversational AI chatbots that are currently rolling out. While the discussion surrounding ChatGPT’s role in corporate management still remains limited at the time of writing, some early applications are beginning to surface. For instance, an organisation named CS India has declared its decision to appoint ChatGPT as its CEO.⁷ This is accompanied by the expectation that ChatGPT will oversee day-to-day operations, steer the organisation’s growth and expansion, and analyse market trends, among other responsibilities. Another example involves an entrepreneur, João Ferrão dos Santos,

² Charles Groome, “Deep Knowledge Ventures Appoints Intelligent Investment Analysis Software VITAL as Board Member”, *Cision PRWeb* (13 May 2014) <www.prweb.com/releases/2014/05/prweb11847458.htm>.

³ David Reid, “Marc Benioff brings an A.I. machine called Einstein to his weekly staff meeting”, *CNBC* (25 January 2018) <www.cnbc.com/2018/01/25/davos-2018-ai-machine-called-einstein-attends-salesforce-meetings.html>.

⁴ *Ibid.*

⁵ Jessica Diktonius, “Tieto the first Nordic company to appoint Artificial Intelligence to the leadership team of the new data-driven businesses unit”, *Business Wire* (17 October 2016) <www.businesswire.com/news/home/20161016005092/en/>.

⁶ *Ibid.*

⁷ Bharat Sharma, “Youth Organisation Appoints ChatGPT AI Bot As Its CEO, Calls It ‘Groundbreaking’”, *India Times* (9 February 2023) <www.indiatimes.com/technology/news/organisation-appoints-chatgpt-bot-as-its-ceo-592620.html>.

who revealed that he launched a company with ChatGPT serving as the CEO.⁸ Dos Santos's approach was to allocate a budget of \$1,000 and one human hour per day, then instructing the AI to leverage these resources to create the most profitable company possible. In response, ChatGPT recommended establishing an e-commerce platform named 'AIsthetic Apparel,' specialising in AI-designed sustainable clothing. It further suggested utilising Midjourney, an AI-powered image and visual graphics tool, for designing the clothing items, and recommended securing venture capital for the business.⁹ Dos Santos regularly updated his progress on social media, expressing considerable satisfaction with ChatGPT's performance.

A. *Can AI Take Over?*

The media reports and press releases mentioned above are undeniably intriguing and provide a glimpse into the potential of AI when it comes to corporate management. We should be aware, however, that these types of stories often tend to be overstated. For example, in most jurisdictions today it would not be possible, legally speaking, to appoint a non-human entity as a director.¹⁰ Nevertheless, the criteria for who may qualify to sit on boards – and whether this is or should be restricted to humans – are not the focus of this article. Instead, the following delves into broader questions concerning the capabilities of AI to assume corporate management (broadly defined as including the board and non-directorial executives) and the resulting implications of potential future AI management for corporate law and governance.

To answer the first question, whether AI possesses the capability to take over management functions, a good starting point is to delineate the current responsibilities of directors and managers and compare them with AI's capacities. A survey conducted by McKinsey shows that directors carry out a variety of tasks. They engage in relational tasks (9% of their overall time allocation), risk management (9%), core governance and compliance (10%), investments and mergers & acquisitions (12%), organisational structure, culture, and talent management (13%), performance management (20%) and strategic tasks (27%).¹¹ Strategy and performance management thus emerge as areas on which boards spend the most effort, with survey respondents indicating that they would like to invest even more time on strategy as well as organisational matters, such as structure, culture, and talent management.¹² Another survey, by the consulting firm Accenture, examined typical tasks for managers below board level. The survey, extending to managers from 14 countries and 17 different industries, suggests that 53% of managers' time is spent on administrative coordination and control tasks, followed by problem solving and

⁸ TPN/Lusa, "Portuguese entrepreneur creates viral company", *The Portugal News* (28 April 2023) <www.theportugalnews.com/news/2023-04-28/portuguese-entrepreneur-creates-viral-company/77089>.

⁹ *Ibid.*

¹⁰ See Stephen M Bainbridge, "Corporate Directors in the United Kingdom" (2017) 59 *Wm & Mary L Rev* 65 at 67 (with reference to the US, Australia, Canada, and New Zealand).

¹¹ McKinsey & Company, "The Board Perspective: A collection of McKinsey insights focusing on boards of directors" (March 2018) <<https://perma.cc/8CJM-N223>> at 49.

¹² *Ibid.*

collaboration (30%), strategy and innovation (10%) and relational tasks (7%).¹³ Hence, based on this survey, we can conclude that administration generally appears to be the most time-consuming function among typical managerial tasks.

When considering AI's potential role, a distinction emerges between administrative tasks and judgment work. Administrative tasks – which include routine tasks such as scheduling, allocation of resources and reporting – are widely agreed to be within AI's purview.¹⁴ Based on the abovementioned percentages of their overall time that directors and managers tend to spend on tasks of an administrative nature, we can deduce that AI is already, or should soon be, capable of handling over 50% of managers' duties and approximately 20% of board tasks. Indeed, the authors of the Accenture survey found that “artificial intelligence will soon be able to do the administrative tasks that consume much of managers' time faster, better, and at a lower cost” and suggested that AI will put an end to administrative management work.¹⁵

In contrast to administrative tasks, where AI's dominance seems inevitable, the outlook on AI's capabilities in judgment work remains uncertain and disputed. Judgment work refers to tasks that require creative, analytical, strategic, and interpersonal skills.¹⁶ For managers, again based on the abovementioned surveys, this category comprises less than 50% of their time, whereas for directors, judgment work seems to take up over 70% of their time and workload.¹⁷ On the pivotal question concerning AI's capabilities and role in the area of judgment work, experts diverge into two camps: the sceptics and the believers. Sceptics argue that AI will assist and augment human judgment work but lacks the proficiency to make independent decisions.¹⁸ Even though these commentators may agree that judgment can be partially replicated, they fundamentally believe that humans are irreplaceable. Conversely, believers argue that it is possible for AI to replicate human judgment, and thus for AI or *machines* to fully take over judgment work and act autonomously. Examples in this regard include academic and professional views that “technology will probably soon offer the possibility of artificial intelligence not only supporting directors, but even replacing them,”¹⁹ or, more generally, that machines will in the

¹³ The survey and its results are mentioned in Vegard Kolbjørnsrud, Richard Amico & Robert J. Thomas, “How Artificial Intelligence Will Redefine Management”, *Harvard Business Review* (2 November 2016) <<https://hbr.org/2016/11/how-artificial-intelligence-will-redefine-management>>.

¹⁴ *Ibid.*

¹⁵ *Ibid.*

¹⁶ *Ibid.*

¹⁷ McKinsey & Company, *supra* note 11 at 49. We assume that tasks pertaining to strategy, organisational structure, culture, talent management, and shareholder and stakeholder management consist of judgment work. We further assume that at least half of performance management, investments and M&A, core governance and compliance, and risk management tasks are judgment work as well. This suggests that judgment work makes up approximately 72% of overall board tasks.

¹⁸ See, for example, Kolbjørnsrud, Amico & Thomas, *supra* note 13; Megan Beck & Barry Libert, “The Rise of AI Makes Emotional Intelligence More Important” *Harvard Business Review* (15 February 2017) <<https://hbr.org/2017/02/the-rise-of-ai-makes-emotional-intelligence-more-important>>; Ajay Agrawal, Joshua S. Gans & Avi Goldfarb, “What to Expect from Artificial Intelligence”, *MIT Sloan Management Review* (7 February 2017) at 24–27.

¹⁹ Florian Möslin, “Robots in the Boardroom: Artificial Intelligence and Corporate Law” in Woodrow Barfield & Ugo Pagallo, eds. *Research Handbook on the Law of Artificial Intelligence* (Cheltenham: Edward Elgar Publishing, 2018) at 649.

long run replace human professionals altogether.²⁰ Some commentators expect the advent of general AI or artificial general intelligence – which will at least match human intelligence in all areas, not just for specific fields or tasks – or even predict a future with superintelligent AI that will far exceed human intelligence.²¹ Both would be capable of assuming judgment work, or any other task, and thus fully replace management.

The perspectives outlined above were articulated before the advent of generative AI, the textual output-focused AI systems – currently developed by the likes of OpenAI, Google, Tencent, or Meta – that are based on Large Language Models (“LLM”).²² Notably, ChatGPT has already demonstrated its proficiency in various professional tasks ranging from taking professional tests and university-level exams to generating legal and other advice. This raises the question of generative AI’s future impact on judgment work in business management.

Early indications suggest that generative AI tools have considerable potential in this area. In one experiment, two management consultants and academics specialising in business strategy prompted ChatGPT to generate some disruptive business ideas for a large European transport provider.²³ In response, the AI chatbot suggested a personalised planning app, a ride-sharing service, a hyperloop transportation system, and a smart-luggage delivery service. Interestingly, these suggestions were closely aligned with those conceived as part of a workshop by a group of human executives working on the same question. Still, the authors of the experiment are reluctant to declare victory for the AI. Writing in the MIT Sloan Management Review, they suggested that while generative AI can be useful in supporting specific steps of strategising, it still takes experienced human strategy experts to fully benefit from AI support. Based on their findings, the authors concluded that AI will not replace humans and the “cultivation of strategic minds.”²⁴

Conversely, there are those that are more optimistic about generative AI’s potential role for business-related judgment work. A recent study led by a US-based professor assessed ChatGPT’s creative abilities for business by using the Torrance Tests of Creative Thinking (“TTCT”), “a well-known tool used for decades to assess human creativity.”²⁵ Responses generated by the latest iteration of ChatGPT, GPT-4, were submitted to a third-party testing service, along with answers from a control group of business students. The resulting scores were compared with 2,700 college

²⁰ Richard Susskind & Daniel Susskind, *The Future of the Professions: How Technology Will Transform the Work of Human Experts* (Oxford: Oxford University Press, 2015) at 279–281.

²¹ See, for example, Nick Bostrom, *Superintelligence: Paths, Dangers, Strategies* (Oxford: Oxford University Press, 2017); Michio Kaku, *The Future of Humanity: Terraforming Mars, Interstellar Travel, Immortality, and our Destiny Beyond Earth* (Toronto: Doubleday, 2018).

²² These models typically scrape data from the internet, develop contextual understanding, and provide answers by predicting likely next words or ‘tokens’ based on user inputs. See Visual Storytelling Team & Madhumita Murgia, “Generative AI exists because of the transformer. This is how it works”, *Financial Times* (12 September 2023) <<https://ft.com/generative-ai>>.

²³ Christian Stadler & Martin Reeves, “Three Lessons From Chatting About Strategy With ChatGPT”, *MIT Sloan Management Review* (30 May 2023) <<https://sloanreview.mit.edu/article/three-lessons-from-chatting-about-strategy-with-chatgpt>>.

²⁴ *Ibid.*

²⁵ Cary Shimek, “UM Research: AI Tests Into Top 1% For Original Creative Thinking”, *University of Montana News Service* (5 July 2023) <www.umt.edu/news/2023/07/070523test.php>.

students nationally who had previously taken the TTCT. The results revealed that ChatGPT placed in the top 1% not only for its ability to generate a large volume of ideas, which could have been expected, but also for originality, that is the ability to come up with new business ideas.²⁶ The researchers' conclusion drawn from this study was that AI will be a crucial tool and significant driver for business innovation going forward.

B. Corporate Governance Consequences of AI Management

Although my research leans towards the convictions of the AI believers – and thus the ability of AI to fully replace human managers – it must be acknowledged that the trajectory of AI's future development remains uncertain. For the purposes of this section, however, I invite the reader to entertain the assumption that AI will indeed master judgment work and assume the mantle of corporate management. Based on this assumption, the following will delve into the implications that such *management by machine* may have for corporate law and governance.

The first and perhaps most fundamental anticipated AI-induced change concerns the structure of corporate boards and management – or corporate leadership more generally. Presently, boards typically function as collective bodies, often comprising a substantial number of (exclusively human) directors. The emphasis on independent directors and, more recently, diversity within this group is a notable hallmark of contemporary board governance.²⁷ In addition, many jurisdictions adhere to a two-tiered corporate leadership structure, consisting of boards of directors at the top that oversees senior management. This hierarchical structure serves to mitigate agency costs by minimising harm from self-interested managerial actions.

In a future dominated by AI, the collective, hierarchical structure of corporate leadership will evolve. Boards are poised to shrink as AI takes over an increasing number of tasks. Eventually, the system of collective decision-making by human directors will be replicated by a singular entity, an AI system, which will be coded to replicate the outcomes and benefits derived by the diverse and independent inputs of today's teams of individual directors.²⁸ The traditional division between boards and management will also disappear as AI assumes both sets of responsibilities, directorial and managerial. Given that AI can have the ability to be unencumbered by conflicts of interest that often afflict human managers, the main *raison d'être* for boards – to curb agency costs – will be dramatically reduced or vanish,²⁹ as will the

²⁶ *Ibid.*

²⁷ See generally Jeffrey N. Gordon, "The Rise of Independent Directors in the United States, 1950-2005: Of Shareholder Value and Stock Market Prices" (2007) 59 *Stan L Rev* 1465; Marc Moore & Martin Petrin, *Corporate Governance: Law, Regulation, and Theory* (London: Macmillan International, 2017) at 189.

²⁸ This AI board/system could still be selected or "appointed" by shareholders, with an option to switch to another system, or perhaps different algorithmic risk-taking and business preferences.

²⁹ See John Armour, Luca Enriques, Ariel Ezrachi & John Vella, "Putting technology to good use for society: the role of corporate, competition and tax law" (2018) 6(1) *Journal of the British Academy* 285 at 298, suggesting that the deployment of AI may lead to significant reductions in agency costs within firms. But *cf* Luca Enriques & Dirk A. Zetsche, "Corporate Technologies and the Technologies and

need for collective or team governance to alleviate workload issues. Ultimately, this will lead to the disappearance of the conventional two-tiered corporate leadership structure. Instead, a unified and fused management unit, the AI system, will by itself take centre stage in corporate management. The currently prevalent mandatory exclusive use of natural persons as directors is largely incompatible with the idea of the AI-controlled board,³⁰ which, however, will presumably in due course steer policymakers towards legal reforms that remove these hurdles.

Another facet of transformation lies in managerial liability. The existing paradigm is to a large extent built upon personal fiduciary duties that directors and officers owe to the corporation and, secondarily, its shareholders.³¹ Breaches of these duties are typically redressed through shareholders' derivative actions. Managerial misconduct may also lead to securities litigation, tort-based claims, regulatory actions, or even criminal enforcement. In essence, the current system of managerial liability is geared towards limiting personal transgressions. As a counterweight to managerial power, shareholder fiduciary duty litigation in particular is meant to serve the goals of *ex ante* deterrence and *ex post* compensation.³² From a broader corporate governance perspective, enabling shareholders to initiate derivative actions can also be viewed as a mitigation device against (managerial) agency costs.³³

This landscape is poised to change as AI assumes control over corporate management. Assuming, as we do in this section, that AI will replace human managers, three potential scenarios emerge. First, with no human managers left to be held personally accountable, the notion of managerial liability might be altogether abolished. Successful actions against managers are already infrequent and difficult in many jurisdictions, rendering this option a plausible path forward. Second, a new system with AI entities as defendants could be developed. As such, claims could be directed at *AI managers* or AI systems. This approach is more difficult to implement as the current absence of legal personality in AI entities poses a challenge,³⁴ although it is also possible that AI entities would operate in the form of existing

the Tech Nirvana Fallacy" (2020) 72 Hastings LJ 55 (arguing that technology may aggravate agency problems).

³⁰ For an insightful broader discussion of impediments to the use of AI on boards and in corporate governance, see Christopher M. Bruner, "Distributed Ledgers, Artificial Intelligence and the Purpose of the Corporation" (2020) 79 Cambridge LJ 431 and "Artificially intelligent boards and the future of Delaware corporate law" (2022) 22(2) Journal of Corporate Law Studies 783.

³¹ For the US, see for example, R. Franklin Balotti & Jesse A. Finkelstein, *The Delaware Law of Corporations and Business Organizations* (Philadelphia: Wolters Kluwer, 2018) vol 1.

³² American Law Institute, *Principles of Corporate Governance: Analysis and Recommendations* (Washington, D.C.: American Law Institute, 1994) Part VII, Introductory Note, Reporter's Note 2; John C. Coffee, Jr. & Donald E. Schwartz, "The Survival of the Derivative Suit: An Evaluation and a Proposal for Legislative Reform" (1981) 81 Colum L Rev 261 at 302–304.

³³ David Kershaw, *Company Law in Context: Text and Materials* (Oxford: Oxford University Press, 2012) at 506.

³⁴ The idea of creating a legal status for artificial persons has been repeatedly discussed in the past. See Matthew U. Scherer, "Of Wild Beasts and Digital Analogues: The Legal Status of Autonomous Systems" (2018) 19 Nevada Law Journal 259; Robert van den Hoven van Genderen, "Legal personhood in the age of artificially intelligent robots" in Barfield & Pagallo, *supra* note 19; Möslein, *supra* note 19 at 667; Lawrence B. Solum, "Legal Personhood for Artificial Intelligences" (1992) 70 NCL Rev 1231. See also, specifically on personality and consciousness of AI in connection with corporate boards, Sergio Alberto Gramitto Ricci, "Artificial Agents in Boardrooms" (2020) 105 Cornell L Rev 869.

types of legal entities, such as a corporation or LLC, offering management services. Additionally, holding AI entities financially accountable for damages would be pointless as long as they do not hold funds themselves, which means that their capitalisation would have to be ensured. The third option is a model akin to products liability.³⁵ Under this option, liability would be directed at those responsible for designing, programming, or selling AI management software. These claims would focus on whether an AI management system was *deficient* or deviated from certain, *ex ante* defined, standards applicable to such systems.

C. Algorithmic Entities

The final frontier in this part's discussion centres on the emergence of algorithmic entities ("AE").³⁶ Unlike entities managed by AI with human involvement, AE exhibit a distinctive feature: they operate autonomously without any ongoing human input or ownership whatsoever. In essence, these entities, powered by algorithms, utilise organisations that possess legal personality to engage in revenue-generating business activities. Examples mentioned in the literature range from simple tasks such as renting out cloud storage space to online gambling operations or services akin to Uber or Airbnb.³⁷ Funds generated through these activities are at the disposal of the AE, which may use them according to its discretion.

While the concept may sound futuristic, the creation of AE is already feasible today. For example, as one scholar has explained, Delaware law appears amenable to the establishment of AE.³⁸ Accordingly, a human member could form a Delaware LLC, designate a specific algorithm as the entity's manager through the LLC's operating agreement, and subsequently withdraw. Delaware law does not mandate ongoing human membership, which means this setup would result in a legal entity controlled solely by an algorithm. An individual incorporator could also establish two Delaware corporations that are both controlled by the same algorithm. These corporations would be established without (a) shareholders, which are not required under Delaware law, or (b) a board of directors, which is also not required if instead there is a legal entity designated for managing a corporation. Thus, to meet the latter requirement, the two corporations can agree to manage each other, resulting in a pair of self-sufficient (independent from human input) and autonomous AE.

The implications of AE present a mixed bag. On the positive side, AE could support charitable causes through their actions or financial contributions. However, the more likely scenario involves negative impacts. AE may well find that their comparative advantage is useful in undesirable activities, such as harassment or undue

³⁵ An additional option could be based on veil piercing with shareholder liability. On this, see John Armour & Horst Eidenmüller, "Self-Driving Corporations?" (2019) 10 Harvard Business Law Review 87 at 112. Note, however, the considerable challenges and general resistance towards such forms of liability.

³⁶ The leading contribution on AE is Lynn M. LoPucki, "Algorithmic Entities" (2018) 95 Washington University Law Review 887. See also Shawn Bayern, "The Implications of Modern Business-Entity Law for the Regulation of Autonomous Systems" (2015) 19 Stan Tech L Rev 93.

³⁷ LoPucki, *supra* note 36 at 891.

³⁸ *Ibid* (detailing the mechanics for using LLCs and Corporations as AE).

political influence, or even outright illegal activities including financial crimes or terrorism. Compounding the issue is the difficulty in deterring, locating, and punishing AE. Against this background, one scholar has warned that the rise of AE is “inevitable” – indeed, they may already exist – and underscored the urgency for swift and drastic regulatory measures to avert them becoming a major threat to humanity.³⁹ This echoes concerns previously already expressed by figures like Elon Musk or the late Stephen Hawking regarding the broader negative implications of AI technologies.

III. EXTERNAL ASPECTS: CORPORATE THEORY, GOVERNANCE, AND REGULATION

This part shifts the focus of the discussion to the broader impacts of AI and other newer technologies. Moving beyond internal management considerations, it examines how these advancements affect external aspects of corporations. Specifically, it delves into three phenomena: perforated boundaries, reverse access and the status of online or digital platforms between firms and markets. The following sections will briefly outline these phenomena and discuss selected implications that they hold for corporate theory, governance and regulation.

A. *Three Phenomena*

1. *Perforated Boundaries*

Management scholars have long observed that outsourcing, network structures and novel contractual arrangement – along with digitalisation – have made it more difficult to define firm boundaries.⁴⁰ Firms are said to have increasingly *blurred* or *porous* boundaries. Today’s new technologies are pushing these developments further and in new directions, adding further complexity to the discussion concerning firm structures and boundaries.⁴¹ An emerging, qualitatively far-reaching type of blurring is based on third-party AI applications or services. Indeed, it seems more appropriate in this context to adopt one commentator’s use of the stronger term “perforation” of boundaries instead of mere blurring.⁴²

The perforation of firm boundaries arises from the adoption of AI by businesses. Instead of developing or purchasing AI directly, companies typically access it through third-party, cloud-based services based on subscriptions, often referred to as “AI-as-a-Service” (“AIaaS”). Providers like OpenAI, Google, IBM, Tencent,

³⁹ *Ibid* at 951–953.

⁴⁰ Filipe M. Santos & Kathleen M. Eisenhardt, “Organizational Boundaries and Theories of Organization” (2005) 16(5) *Organization Science* 491.

⁴¹ See, for example, Markus Menz *et al*, “Corporate Strategy and the Theory of the Firm in the Digital Age” (2021) 58 *Journal of Management Studies* 1695 at 1703–1704.

⁴² Dirk Nicolas Wagner, “The nature of the Artificially Intelligent Firm: An economic investigation into changes that AI brings to the firm” (2020) 44(6) *Telecommunications Policy* 101954 at 5.

Amazon and others offer these AI solutions. From a corporate governance perspective, the AIaaS approach has unique implications. Once a business employs third-party AI services, which are becoming increasingly common for almost any aspect of a business, it starts to share authority with the AI provider. The business has little to no control over the AI system's algorithms, which are in the hands of the provider, even though the system may influence important aspects of the firm's operations. Additional challenges arise in the case of customised AI tools that are trained on a business's own data and user inputs. The resulting "AI knowledge gains" – that is, the machine learning-induced improvements to the provider's AI system based on exposure to large new datasets – may be transferred away from the business to the provider, at almost no cost. The provider and the user business may agree for data to be "ring-fenced" and avoid such transfers. Yet, many businesses will lack the bargaining power to negotiate meaningful protections in this manner.

2. Reverse Access

The occurrence and importance of access, in various shapes and forms, is already a familiar feature in business. In the business-to-business context, for instance, companies prefer to lease physical capital over owning it or tend to minimise ownership by resorting to practices such as franchising, outsourcing or just-in-time manufacturing.⁴³ In the business-to-consumer context, consumers increasingly also forgo ownership. Instead, they tend to opt for access-based models that offer flexibility and ease of use, as evidenced by the sharing economy and the popularity of cloud-based streaming services for movies, music and software, car leasing and subscriptions, on-demand use of household items, co-working spaces, the use of timeshare models for vacation real estate, *etc.*⁴⁴

A more recent development is access in the consumer-to-business relationship. Here, access is "reversed" because the traditional roles are flipped: instead of business providing access to goods or services to consumers, it is consumers that provide access to business. Such access, enabled by technology, enables companies to minimise ownership and employment, as exemplified by Uber and Airbnb. Uber does not own the cars and (as they claim) does not employ its drivers, but rather accesses them "on demand" through its app. Airbnb does not own the properties that are at the heart of its business. Instead, it leverages privately held real estate by acting as a gatekeeper to access using its online platform. Reverse access is therefore about a firm's ability to utilise assets or resources provided by "regular" consumers or individuals when and for as long as it deems useful to do so to extract rents for its own benefit. Businesses may "reverse access" time, labour, goods and indirect control over physical and intellectual property. Access does not need to concern a specific asset since it suffices to have a pool of assets that is generally available to a business. This development is novel in terms of the scale on which access takes place as well as the vital importance of the resulting access for a company's

⁴³ Jeremy Rifkin, *The Age of Access: How the Shift from Ownership to Access Is Transforming Modern Life* (New York: Penguin, 2000) at 33–64.

⁴⁴ Shelly Kreiczer-Levy, *Destabilized Property* (Cambridge: Cambridge University Press, 2019).

core business. The phenomenon is most common in online platforms that monetise resources situated beyond what would traditionally be viewed as their boundaries.⁴⁵ As a consequence, firms can achieve “scale without mass”, that is, they can grow quickly without increasing investment in tangible assets or taking on employees at the same rate of growth.⁴⁶

3. Status of Online Platforms

Platform models – driven by technologies such as online and mobile connectivity, cloud computing, and increasingly AI – underpin household-name businesses such as Amazon, Airbnb, Alibaba, Tencent, or Uber. While as consumers we tend to be at least superficially familiar with how platforms work, it turns out to be challenging to properly define them using traditional economic categories. One approach is to distinguish between three different views or characterisations that have crystallised in the literature.⁴⁷ According to what we may call the “market maker view”, online platforms are simply facilitators that lower transaction costs for parties that engage in exchanges on the platforms. In contrast, the “market view” contends that these platforms blur the line between firm and market. This view suggests that rather than representing mere intermediaries or facilitators, online platforms are the market itself. Finally, a third perspective, the “hybrid view”, characterises online platforms as structures that embody elements of both firms and markets.

Platforms themselves prefer to be characterised as pure intermediaries and passive operators of digital marketplaces.⁴⁸ The market maker narrative is again well illustrated by Uber, which argues that its sole function is to connect riders with drivers as independent contractors.⁴⁹ Uber claims that it creates the market but is not the market. However, some online platforms, including Uber, go beyond this role. Technology allows them to erode or even eliminate the distinction between the firm and the market. This is because platform companies are to varying degrees able to dictate or influence the terms of the exchanges that occur on their platform, much like a central organising authority. For instance, some platforms control access of suppliers to the platform, determine the conditions on which contracts are concluded and performed, and/or require the use of specific payment and fulfilment services.⁵⁰ Indeed, rather than being a marketplace, some online platforms turn out to

⁴⁵ Annabelle Gawer, “Digital platforms’ boundaries: The interplay of firm scope, platform sides, and digital interfaces” (2021) 54(5) *Long Range Planning* 102045 at 1.

⁴⁶ OECD, *An Introduction to Online Platforms and Their Role in the Digital Transformation* (Paris: OECD Publishing, 2019) at 23.

⁴⁷ See Christian Twigg-Flesner, “Online Intermediary Platforms and English Contract Law” in Paul S. Davies & Tan Cheng-Han, eds. *Intermediaries in Commercial Law* (London: Bloomsbury Publishing, 2022) at 171; Laurent Baronian, “Digital Platforms and the Nature of the Firm” (2020) 54 *Journal of Economic Issues* 214 at 216; Iris H-Y Chiu, “The Platform Economy and the Law of Organisations and Governance” in Roger M. Barker & Iris H-Y Chiu, eds. *The Law and Governance of Decentralised Business Models* (London: Routledge, 2021) at 189–243.

⁴⁸ Twigg-Flesner, *supra* note 47 at 171.

⁴⁹ Julia Tomassetti, “Does Uber Redefine the Firm? The Postindustrial Corporation and Advanced Information Technology” (2016) 34 *Hofstra Lab & Empl LJ* 1 at 13–15.

⁵⁰ Twigg-Flesner, *supra* note 47 at 172.

be online storefronts that let customers make purchases from just one party, namely, the business that operates the platform. These platforms may mimic the market and exchanges between different suppliers and buyers, but if there is only one available supplier, then the platform is not an actual market.

B. *Implications (and Challenges) for the Theory of the Firm*

This section considers the implications of the three phenomena outlined above for the so-called “theory of the firm”. The theory of the firm, foundational to corporate law and governance, seeks to answer questions about the existence, conceptualisation, size, and boundaries of firms. Pioneered in the 1960s by scholars like Ronald Coase, it relies traditionally on transaction cost economics (“TCE”) to explain the nature of firms.⁵¹ At its core, TCE asserts that a firm exists because, in some cases, it is more cost-effective to produce goods and services internally, under an organisational-hierarchical umbrella, than to purchase them from external suppliers on the open market. The decision to expand or shrink the firm is similarly influenced by changes in internal and external transaction costs. If a firm’s internal transaction costs decrease, then it becomes cheaper to expand in-house production or integrate some of the external suppliers. As a consequence, the firm’s boundaries grow and the firm becomes larger. Conversely, if external transactions costs are falling, it becomes cheaper to reduce in-house production and expand purchases on the market. In this scenario, the firm becomes smaller.

At first glance, it looks like the traditional TCE model can be easily and usefully applied to AI and new technologies. Based on technology’s impact on internal and external transaction costs, we should be able to predict how firms will develop. First, internal costs tend to decrease as technology facilitates supervision of human workers, allows for the replacement or enhancement of human (physical) labour, and – with the advent of AI – now even introduces the possibility of enhancing or substituting the human mind and intellectual processes. Second, external transaction costs are also falling due to advancements such as the internet, apps, mobile computing, and online platforms. These tools make it simpler for firms to connect with suppliers and increase competition among them, leading to a decrease in the costs of purchasing goods or services on the market.⁵² Thus, if technology reduces both internal and external transaction costs, predicting the effect of technology on firms comes down to a determination of the net effects. The basic premise is simple enough: if a firm’s internal transaction costs fall more or faster than its external costs, that firm will grow, and vice versa.⁵³

⁵¹ See generally Nicolai J. Foss *et al.*, “The Theory of the Firm” in Boudewijn Bouckaert & Gerrit De Geest, eds. *Encyclopedia of Law and Economics* (Cheltenham: Edward Elgar, 2000) vol 3 at 631–658.

⁵² Some commentators even assert that technology’s ability to reduce contracting costs will eventually make corporations unnecessary. *Eg.* Gerald F. Davis, “What Might Replace the Modern Corporation? Uberization and the Web Page Enterprise” (2016) 39 *Seattle UL Rev* 501 at 514.

⁵³ In practice, the answer to how these competing effects will play out will be industry-specific and depend on individual circumstances. See Assaf Hamdani, Niron Hashai, Eugene Kandel & Yishay Yafeh, “Technological Progress and the Future of the Corporation” (2018) 6 *Journal of the British Academy* 215 at 225–226.

The above implies that by understanding how new technologies affect transaction costs, the TCE model can predict and explain the future development of firms. Yet, there are some challenges to applying the traditional model to the modern firm and our tech-dominated landscape. Coase's pioneering work in TCE emphasised the distinct separation of firms as enclosed entities, contrasting them with the market.⁵⁴ He likened firms to "islands of conscious power in [an] ocean of unconscious co-operation, like lumps of butter coagulating in a pail of buttermilk."⁵⁵ The main reason for emphasising the *separateness* of the firm was that within the organisation, production is centrally directed, guided by an entrepreneur or management, while outside of the firm, the market relies on unconscious cooperation that is driven by market forces. However, each of the phenomena discussed above challenges this traditional view.

First, the occurrence of perforated boundaries, with shared authority and access to information within the firm by a third party (the AI provider) blurs the clear distinction between different firms, questioning the applicability of the traditional theory of the firm. AIaaS can lead to firms whose core processes are increasingly influenced by third party tools over which they have limited or no control, and firms whose information might be not only accessed but also utilised by a supplier that can leverage this information for its own benefit. Such firms – the users of third party-provided AI services – can, however, hardly be described as neatly separated "islands of conscious power" anymore. Instead, technology establishes a two-way bridge between user firms and supplier firms, creating connections between entities.

Second, the traditional theory of the firm is also not well suited for explaining major online platforms. Platforms have varying degrees of centralised direction on the "exchanges" that they operate, which includes, above all, pricing power. Uber is the strongest here as it sets the prices and does not allow drivers to compete. Airbnb, meanwhile, lets hosts set their own prices, but offers an option under which Airbnb itself determines the listing prices. Amazon, while allowing merchants to set prices, also retains some power to intervene based on its policies. These powers, when examined through the lens of Coasian theory, suggest that the exchanges on major online platforms may not be markets but rather akin to intra-firm transactions. Platforms therefore put into doubt the distinction between firms and markets.⁵⁶ They seem to be firms and markets at the same time, or at least embody characteristics of both firms and markets, suggesting a hybrid nature that has no place in traditional TCE models. Again, the Coasian view hinges on a clear distinction: if a transaction is subject to centralised direction, which includes the power to set prices, then that is the hallmark of the firm. In contrast, where production is driven by price fluctuations and exchange transactions, this represents the hallmark of the market.⁵⁷ Platform companies are no doubt firms themselves, but the external markets that they claim to facilitate may well also be a part of their firms.

⁵⁴ Ronald H. Coase, "The Nature of the Firm" (1937) 4 *Economica* 386.

⁵⁵ *Ibid* at 388 (quoting D.H. Robertson).

⁵⁶ Twigg-Flesner, *supra* note 47 at 171; Chiu, *supra* note 47 at 201.

⁵⁷ It should be acknowledged that some strands of the theory of the firm literature recognise hybrid or intermediate organisational forms between firms and markets. See Foss *et al*, *supra* note 51 at 633.

Third, the emergence of reverse access, where businesses access resources from individuals instead of owning assets, further complicates traditional views of the firm. Traditional economic views define the firm as a collection of assets or property that it owns. Scholarly literature tends to disregard “reverse” access and instead, if at all, discuss access only in connection with third parties’ access to firm resources. Uber, as an example, which relative to the size of its operations and revenue generation owns few tangible assets, would be depicted as a small firm under the traditional property-focused models. The cars and drivers that are the lifeblood of its business would not count as part of the Uber firm. However, reverse access suggests that including “accessed assets”, namely, drivers and cars, expands the boundaries of Uber significantly, challenging conventional models. This latter view, with Uber the firm comprising also cars and drivers, is arguably a more realistic depiction of reality than what the traditional and dominant concepts models (which disregard access) would lead us to believe.

In summary, these challenges to – or difficulties in application of – traditional views highlight the need for a reevaluation of the theory of the firm in the context of new technologies generally, and perforated boundaries, online platforms, and reverse access specifically. The evolving nature of technology and business practices requires a more nuanced understanding of firms in the contemporary landscape. This is not only an academic exercise, but – as the next section will show – may also have practical implications for governance and regulation.

C. *Some Implications for Governance and Regulation*

In this final section, let us turn to consider what the three phenomena identified above could mean for corporate governance and regulation. In terms of corporate governance, the phenomena support a revival of resource dependence theories. These were developed and popularised decades ago by management scholars,⁵⁸ but largely overlooked in legal (corporate) scholarship. Resource dependence emphasises that businesses are not autonomous because of their interdependencies with other organisations and the external environment.⁵⁹ Based on this central theme, the theories outline consequences for governance, including that companies should act to reduce uncertainty and dependence, and thus reduce the power that others have over them.⁶⁰ The dependence-focused perspective and its insights turn out to be useful when thinking about the perforation of firm boundaries based on the use of AIaaS – where businesses rely on externally provided AI – as well as the reverse access phenomenon, where the key resources for online platforms, such as labour and assets, are also supplied by third parties.

⁵⁸ A prominent contribution is Jeffrey Pfeffer & Gerald Salancik, *The External Control of Organizations: A Resource Dependence Perspective* (Stanford: Stanford University Press, 2003, originally published by Harper & Row, 1978).

⁵⁹ Amy J. Hillman, Michael C. Withers & Brian J. Collins, “Resource Dependence Theory: A Review” (2009) 35(6) *Journal of Management* 1404; see also David Ulrich & Jay B. Barney, “Perspectives in Organizations: Resource Dependence, Efficiency, and Population” (1984) 9 *Academy of Management Review* 471.

⁶⁰ Hillman, Withers & Collins, *supra* note 59 at 1404.

The consequences of dependence on external resources include exposure to hold-ups by resource providers, potential goodwill and regulatory shocks, and challenges in managing access to external resources. For instance, if an AI provider seeks to impose new terms for its service, it will have considerable leverage. Especially in cases where an AI system has been trained on a business user's data, switching will be highly inconvenient and costly. Consequently, users are likely to agree to (renewal) terms proposed by their provider, even if they are disadvantageous to them. Similarly, if Uber drivers decide to strike (as they have in the past),⁶¹ they also hold leverage. Without their services, after all, Uber and its current business model stop working. Resource dependence also exposes firms to goodwill shocks and regulatory shocks. Airbnb provides a useful example in this regard. Several years ago, Airbnb was confronted with demonstrations and protests by local communities in Barcelona opposing its operations in the city.⁶² This, by itself, can harm business, but additionally also give an impetus to more stringent regulation, as it has in Barcelona and elsewhere.⁶³ Another possible consequence are regulatory shocks that threaten to disrupt Airbnb's access to its key external resource: properties.

To address these issues, board governance should focus on safeguarding access to external resources and reducing dependence on them. Some companies, including Airbnb and Uber, have already taken or considered steps in this direction by exploring initiatives such as building and owning homes (Airbnb) or investing in the development of self-driving cars (Uber) to reduce dependencies.⁶⁴ In terms of guarding access, platforms have also tried different strategies to increase gig workers' loyalty, such as rewarding them with shares.⁶⁵ It does not seem, however, that companies are generally adjusting their governance yet. Especially when it comes to AIaaS, this appears to be an emerging issue that many boards have not considered.

Finally, there are some implications for regulation as well. Specific considerations arise for AI and platforms in this respect. The rise of AIaaS introduces, as mentioned previously, concerns related to hold-ups by AI providers, the loss of authority on the part of businesses using AI services and the distribution of AI knowledge gains that result from machine learning and "Big Data". These issues

⁶¹ Kate Conger, Vicky Xiuzhong Xu & Zach Wichter, "Uber Drivers' Day of Strike Circles the Globe Before the Company's I.P.O.", *New York Times* (8 May 2019) <www.nytimes.com/2019/05/08/technology/uber-strike.html>.

⁶² Suna Erdem, "The cities hitting back at Airbnb", *The New European* (4 November 2021) <www.theneweuropean.co.uk/fight-against-airbnb-cities>.

⁶³ Mathieu Dion, "Airbnb to Face New Curbs in Canada With Rental Tax Rule Change", *BNN Bloomberg* (20 November 2023) <<https://www.bnnbloomberg.ca/airbnb-to-face-new-curbs-in-canada-with-rental-tax-rule-change-1.2001094>>; Angela Symons, "Italy, Austria, Malaysia: Which cities and countries are cracking down on Airbnb-style rentals?", *Euronews Travel* (11 June 2023) <<https://www.euronews.com/travel/2023/06/11/italy-malaysia-usa-which-cities-and-countries-are-cracking-down-on-airbnb-style-rentals>>.

⁶⁴ Sarah Berger, "Airbnb to start building homes for more communal living as soon as 2019", *CNBC* (30 November 2018) <www.cnbc.com/2018/11/30/airbnb-will-start-building-homes-as-soon-as-2019.html>; Jackie Davalos, "Uber Launches Robotaxis But Driverless Fleet Is 'Long Time' Away", *Bloomberg* (7 December 2022) <www.bloomberg.com/news/articles/2022-12-07/uber-rolls-out-robotaxis-even-as-self-driving-car-hype-wanes>.

⁶⁵ Megan Cerullo, "Will Uber drivers profit from tech company's big IPO?", *CBS News* (7 May 2019) <www.cbsnews.com/news/uber-ipo-will-uber-drivers-profit-from-tech-companys-initial-public-offering>.

are exacerbated, and may not resolve themselves through market mechanisms, due to the typically large size of today's technology companies. To address them, regulation should ensure access to AI, fair terms of service, as well as transparency of AI systems.⁶⁶ Additionally, a regulatory solution for addressing the distribution of AI knowledge gains between providers, business users, and potentially consumers or the public (which, directly or indirectly, provide much of the data that fuels AI models) may also be necessary.⁶⁷ Although currently emerging AI regulations address the problem of transparency, they have thus far not focused on access, fair terms and the distribution of AI benefits.⁶⁸ A major policy challenge for AI regulation will be to strike the right balance between protecting competition and the public interest while maintaining incentives to innovate and encourage efficiency.

There are also regulatory implications based on the status of online platforms. As major platforms have evolved into markets or hybrids with significant power over billions of participants and users, they gain gatekeeper status. This, in conjunction with the "winner takes all" and network effects associated with the typical platform model,⁶⁹ creates the need to formalise platform responsibilities and oversight.⁷⁰ Some regulators have already recognised this need, with the EU leading the charge on platform-focused regulation.⁷¹ Regulatory measures should ensure equal access to platforms, fair competition among participants, and fair competition between the platforms themselves and participants. At the very least, regulation needs to provide a minimum set of standards and establish a level playing field for conduct by and on platforms. Establishing such frameworks will also have the welcome effect of reducing the significance of *who* controls a certain platform, and what this person or entity's preferences for specific views and policies are, which should not be reflected on the platform.

IV. CONCLUSION

This article has looked at the internal, management-related, effects of AI as well as external effects of AI and new technologies more generally, relating to firms and their relationships with other entities and markets. In terms of AI and its future

⁶⁶ See generally Steven Shavell, "Contractual Holdup and Legal Intervention" (2007) 36(2) *J Leg Stud* 325 (arguing that contractual hold-up problems may justify legal intervention).

⁶⁷ Other relevant aspects for AI regulation, but beyond the scope of this article and its focus on business-to-business, include data protection, privacy, bias mitigation, and liability issues.

⁶⁸ See generally Hannah Yee-Fen Lim, "Regulatory Compliance" in Charles Kerrigan, ed. *Artificial Intelligence: Law and Regulation* (Cheltenham: Edward Elgar Publishing, 2022) at 85–108.

⁶⁹ OECD, *supra* note 46 at 24–25.

⁷⁰ See also Michael A. Cusumano, David B. Yoffie & Annabelle Gawer, "The Future of Platforms", *MIT Sloan Management Review* (11 February 2020) (predicting increased government oversight and regulation of large platform companies).

⁷¹ P2B Regulation (Regulation on promoting fairness and transparency for business users of online intermediation services), EU Regulation 2019/1150, [2019] OJ L 186/57; Digital Services Act (Regulation on a Single Market for Digital Services and amending Directive 2000/31/EC), EU Regulation 2022/2065, [2022] OJ L 277/1; Digital Markets Act (Regulation on contestable and fair markets in the digital sector and amending Directives (EU) 2019/1937 and (EU) 2020/1828), EU Regulation 2022/1925, [2022] OJ L 265/1.

role for management, it is clear that corporate leadership will change drastically, whether or not technology will replace or *only* augment human leadership. This prompts a need for legislation that both facilitates positive changes and establishes limits to mitigate potential negative impacts. Considerations include the role of AI on boards, addressing managerial liability and regulating algorithmic entities. In terms of external effects, increasing challenges arise in defining firms as AI and other technologies blur or even outright perforate the boundaries between firms, markets, and other businesses. This necessitates a reconsideration of established corporate models. Corporate scholarship thus needs to adapt to tech-induced changes, recognising that models developed decades ago may no longer be suitable for the current business environment. Conceptions of the firm that emphasise the importance of external resource dependencies seem particularly well placed to explain firms in a technology-driven environment and provide impulses for future directions in corporate governance. Finally, and relatedly, there are challenges ahead for regulators as they should strive to develop appropriate guardrails for the provision and use of AI by businesses as well as keeping major online platforms in check.