

The Algorithmic Investor and the Accountability Gap: Reimagining State Responsibility and Investment Protection in the Age of Artificial Intelligence

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Abstract

The rapid integration of artificial intelligence into global financial markets is transforming the nature of cross-border investment in ways that existing international investment law has yet to adequately address. Contemporary investment treaties were negotiated on the assumption that investment decisions are made by natural persons or corporations acting through identifiable human agents. Increasingly, however, investment strategies, capital allocation decisions, portfolio management functions and market responses are being generated or substantially influenced by autonomous algorithmic systems capable of operating with limited human intervention. This development raises profound questions regarding legal responsibility, regulatory authority and treaty protection within the international investment regime. This article examines the emerging phenomenon of algorithm-driven foreign investment and argues that it exposes a significant accountability gap in contemporary international investment law. Existing doctrines governing investor protection, state responsibility and investor-state dispute settlement remain largely premised upon human agency and are therefore ill-equipped to address disputes arising from autonomous or semi-autonomous investment conduct. The article analyses the challenges that artificial intelligence poses to traditional principles of attribution, causation, foreseeability and liability under international law. It further evaluates whether existing treaty frameworks can effectively accommodate investment decisions generated through artificial intelligence without undermining either regulatory sovereignty or legitimate investor expectations. Drawing upon international investment jurisprudence, principles of state responsibility, emerging artificial intelligence governance frameworks and comparative regulatory developments, the article proposes a responsibility-based framework capable of addressing the legal complexities created by algorithmic investment. It concludes that meaningful reform of international investment law is necessary to preserve both accountability and legitimacy in an increasingly automated global investment environment.

Keywords: *artificial intelligence; international investment law; state responsibility; investor-state dispute settlement; algorithmic investment; investment treaties.*

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1. Introduction

The relationship between technological innovation and international investment has historically been characterised by continuous adaptation. From the development of electronic trading systems and digital financial markets to the emergence of sophisticated data analytics, advances in technology have repeatedly altered the manner in which capital is generated, transferred and managed across national boundaries. Artificial intelligence represents a more profound transformation because it does not merely facilitate investment decisions; it increasingly participates in making them. Contemporary artificial intelligence systems are capable of processing enormous volumes of information, identifying investment opportunities, assessing political and commercial risks and executing transactions at speeds far beyond human capacity. As these systems become more integrated into global investment activity, traditional assumptions regarding how investment decisions are formed are being steadily challenged. Decisions once attributable to identifiable individuals or corporate officers may now be substantially influenced by autonomous or semi-autonomous technologies whose operations are neither entirely transparent nor fully predictable. This development carries significant implications for international investment law, a field whose foundational doctrines were developed within a legal environment that presumed the centrality of human judgment and accountability.²

The challenge is particularly evident within the legal architecture of investment protection. Bilateral investment treaties, investment chapters of free trade agreements and the jurisprudence of international arbitral tribunals generally conceive of investors as natural persons or juridical entities acting through human agents. Likewise, doctrines concerning attribution, causation, due diligence, legitimate expectations and state responsibility rest upon assumptions that human actors make choices, exercise discretion and bear responsibility for the consequences of their conduct. The increasing use of artificial intelligence in investment activities raises difficult questions regarding the continuing adequacy of these assumptions. Where an algorithm independently reallocates capital, alters investment strategies, executes transactions or reacts to governmental measures, determining legal responsibility becomes considerably more complex. Questions arise as to whether the resulting conduct should be attributed exclusively to the investor, whether responsibility should extend to the designers and operators of the technology, or whether existing legal frameworks require conceptual adjustment to accommodate a new category of decision-making. These concerns are no longer hypothetical. Artificial intelligence is already being deployed by multinational enterprises, institutional investors and financial intermediaries to evaluate regulatory environments, forecast market behaviour and manage cross-border investments. At the same time, states are introducing regulatory measures directed at artificial intelligence, data governance, cybersecurity and digital sovereignty, thereby creating new points of interaction between public regulation and private investment activity.³

² Zachary Douglas, Joost Pauwelyn, and Jorge E. Viñuales, eds., *The Foundations of International Investment Law: Bringing Theory into Practice* (Oxford: Oxford University Press, 2014), 3–9, <https://doi.org/10.1093/acprof:oso/9780199685387.001.0001>.

³ United Nations Conference on Trade and Development (UNCTAD), *World Investment Report 2025: International Investment in the Digital Economy* (Geneva: United Nations, 2025), 45–61, <https://unctad.org/publication/world-investment-report-2025>.

Against this background, the article argues that the growing reliance on artificial intelligence in international investment activities has exposed a significant accountability gap within contemporary investment law. Existing treaty frameworks provide extensive protection for foreign investors and establish detailed mechanisms for resolving disputes between investors and states, yet they offer limited guidance on the legal consequences of autonomous investment conduct. The resulting uncertainty threatens both regulatory effectiveness and legal predictability. While scholarly attention to artificial intelligence has expanded rapidly in recent years, much of the literature has concentrated on questions of privacy, human rights, data protection and algorithmic governance. Comparatively little consideration has been given to the implications of autonomous decision-making for investment treaty protection, investor responsibility and the law of state responsibility. This article seeks to address that deficiency by examining the legal challenges generated by algorithm-driven investment activity and by evaluating whether existing principles of international investment law remain capable of responding to increasingly automated forms of economic participation. Drawing upon investment treaty jurisprudence, the law of international responsibility and emerging regulatory approaches to artificial intelligence, the article proposes a responsibility-based framework designed to preserve accountability, legal certainty and institutional legitimacy within an evolving global investment landscape.⁴

2. The Rise of Algorithmic Investment and the Transformation of Global Capital Flows

The integration of artificial intelligence into international investment activity marks a significant shift in the manner in which global capital is generated, allocated and managed. Technological innovation has long influenced financial markets, but recent developments in artificial intelligence have moved beyond improving efficiency and entered the realm of decision-making itself. Contemporary investment systems are increasingly capable of processing vast quantities of information drawn from financial statements, market indicators, geopolitical developments, regulatory announcements and consumer behaviour in real time. Through machine-learning techniques and predictive analytics, these systems can identify patterns, forecast trends and recommend investment strategies with a speed and sophistication that far exceeds traditional methods of human analysis. What distinguishes this development from earlier technological advances is that artificial intelligence is no longer functioning merely as an instrument through which investors act. In many circumstances, it plays a direct role in determining how, when and where investment decisions are made. As a result, the foundations upon which many legal assumptions concerning investment behaviour have traditionally rested are beginning to shift.⁵

The growing reliance on algorithmic systems has correspondingly transformed the structure of international capital flows. Investment decisions that once depended upon lengthy deliberations by corporate boards, financial analysts and investment

⁴ Julien Chaisse, Leïla Choukroune, and Sufian Jusoh, eds., *Handbook of International Investment Law and Policy* (Singapore: Springer, 2021), 3–20, <https://doi.org/10.1007/978-981-13-3615-7>.

⁵ Henry Kissinger, Eric Schmidt, and Daniel Huttenlocher, *The Age of AI: And Our Human Future* (London: John Murray, 2021), 35–58, <https://www.hachette.co.uk/titles/eric-schmidt/the-age-of-ai/9781529376005/>.

managers are increasingly influenced by automated systems capable of evaluating multiple variables simultaneously across different jurisdictions. Multinational corporations, sovereign wealth funds, institutional investors and asset management firms now employ artificial intelligence to assess political stability, evaluate regulatory risks, predict market fluctuations and optimise portfolio performance. The attraction of these systems lies not only in their speed but also in their ability to process information on a scale beyond human capability. Yet the efficiencies generated by artificial intelligence are accompanied by challenges that have profound legal implications. Many advanced algorithmic models operate through processes that are difficult to explain even to those who design or deploy them. The resulting opacity raises important questions concerning accountability, particularly where substantial financial losses occur or where disputes arise regarding the consequences of regulatory measures adopted by host states. Traditional legal concepts frequently assume that decision-makers can explain the reasoning that informed their conduct. Artificial intelligence complicates that assumption by introducing forms of decision-making that may be highly effective in practice while remaining partially inaccessible to conventional legal scrutiny.⁶

These developments have also altered the relationship between foreign investors and regulatory authorities. Historically, states have exercised control over investment activities through regulatory measures designed to protect public interests, maintain market integrity and promote national development objectives. The rise of artificial intelligence has expanded the range of issues requiring regulatory attention. Governments are increasingly concerned with matters such as algorithmic transparency, cybersecurity, data localisation, digital infrastructure, competition policy and technological sovereignty. Measures adopted in these areas may have direct implications for foreign investments that rely upon access to data, digital networks or proprietary artificial intelligence systems. At the same time, algorithmic investment technologies enable investors to react to regulatory developments with unprecedented speed, often adjusting investment strategies, reallocating resources or withdrawing capital in response to perceived legal or political risks. The interaction between rapidly evolving regulatory frameworks and equally dynamic investment technologies creates a relationship that is considerably more complex than the one envisaged by many existing investment treaties. The resulting tensions have the potential to generate disputes that challenge established understandings of investor protection and regulatory autonomy.⁷

An equally significant development concerns the changing nature of the investment itself. International investment law emerged during a period in which investment was commonly associated with physical infrastructure, manufacturing facilities, extractive industries and other tangible economic assets. Although contemporary treaty practice recognises a broader range of protected interests, many doctrinal assumptions continue to reflect this historical background. Artificial intelligence has accelerated the movement towards an economy in which value is increasingly derived from intangible assets, including proprietary algorithms, datasets, software architecture and digital platforms. In many sectors, these assets constitute the core commercial value of an enterprise and serve as the principal drivers of investment

⁶ Organisation for Economic Co-operation and Development (OECD), *Artificial Intelligence in Society* (Paris: OECD Publishing, 2019), 67–85, <https://doi.org/10.1787/eedfee77-en>.

⁷ UNCTAD, *World Investment Report 2025*, 73–95.

decisions. Consequently, questions arise regarding whether existing treaty definitions of investment, as well as established doctrines relating to expropriation, fair and equitable treatment and compensation, remain fully capable of addressing the realities of a digital economy. The challenge is not merely one of interpretation but of conceptual adaptation. Legal frameworks developed for a predominantly physical economy must now confront investments whose most valuable components are intangible, mobile and technologically complex.⁸

Viewed in its broader historical context, the rise of algorithmic investment represents more than a technological development; it signals a structural transformation in the operation of international economic relations. International investment law has repeatedly evolved in response to major changes in the global economy, whether through the expansion of multinational enterprise, the liberalisation of international markets or the growing significance of cross-border capital flows. Artificial intelligence presents a comparable moment of transition. As autonomous systems assume a greater role in shaping investment behaviour, legal doctrines grounded in assumptions of human agency face increasing pressure. Understanding the emergence of algorithmic investment is therefore essential to any meaningful examination of the future of investor protection, state responsibility and dispute settlement. Before questions of liability and accountability can be resolved, it is necessary to appreciate the extent to which artificial intelligence is redefining both the mechanics of investment decision-making and the broader landscape within which international investment law operates.⁹

3. Investor Protection in a Human-Centred Legal Framework

International investment law developed within a legal and economic environment in which human decision-making occupied the centre of all investment activity. The architecture of bilateral investment treaties, multilateral investment instruments and investor-state dispute settlement mechanisms reflects this foundational assumption. Foreign investors are generally conceived as natural persons or corporate entities acting through identifiable human agents who exercise judgment, assume risks and make deliberate economic choices. Similarly, the substantive protections commonly found in investment treaties — including fair and equitable treatment, protection against unlawful expropriation, national treatment and full protection and security — have evolved around the expectation that investment conduct can be attributed to actors capable of intention, foresight and rational decision-making. Even where corporations are treated as juridical persons under international law, their conduct is ordinarily assessed through the actions and decisions of directors, managers, shareholders and other human representatives. The legal framework therefore rests upon an understanding of investment activity that is fundamentally anthropocentric, with human agency serving as the principal link between investment conduct and legal responsibility.¹⁰

This assumption is visible throughout investment treaty jurisprudence. Arbitral

⁸ Rudolf Dolzer, Ursula Kriebaum, and Christoph Schreuer, *Principles of International Investment Law*, 3rd ed. (Oxford: Oxford University Press, 2022), 61–88, <https://doi.org/10.1093/law/9780192857804.001.0001>.

⁹ World Economic Forum, *Global Risks Report 2025*, 20th ed. (Geneva: World Economic Forum, 2025), <https://www.weforum.org/publications/global-risks-report-2025/>.

¹⁰ Dolzer, Kriebaum, and Schreuer, *Principles of International Investment Law*, 1–34.

tribunals routinely assess whether an investor acted reasonably, exercised due diligence, relied upon legitimate expectations or contributed to the losses that later form the basis of a treaty claim. Concepts such as good faith, abuse of rights, investor misconduct and contributory fault are similarly rooted in the capacity of human actors to make choices and bear responsibility for their consequences. The doctrine of legitimate expectations, for example, presupposes that investors evaluate representations made by host states and organise their commercial activities in reliance upon those representations. Likewise, determinations concerning causation often require tribunals to examine whether particular actions or omissions by investors influenced the outcome of a dispute. These analytical frameworks function effectively when investment decisions are made by individuals or corporations acting through conventional decision-making processes. Difficulties begin to emerge, however, when decisions are generated or substantially influenced by autonomous systems capable of processing information, adapting strategies and responding to external developments without direct human intervention at every stage of the process.¹¹

The increasing deployment of artificial intelligence exposes the extent to which existing legal doctrines remain tied to assumptions that may no longer reflect contemporary investment realities. When an algorithm identifies an investment opportunity, reallocates capital, adjusts market exposure or withdraws resources from a particular jurisdiction, the resulting conduct may be economically significant while remaining difficult to explain through traditional concepts of human intention or judgment. A tribunal assessing a treaty dispute may therefore encounter circumstances in which the investment decision under scrutiny was not the product of a clearly identifiable human choice but rather the outcome of a complex technological process operating through machine-learning models and predictive analytics. In such situations, the application of established legal principles becomes considerably more complicated. Questions arise regarding whose expectations are legally relevant, whose knowledge should be attributed to the investor and whose conduct should be evaluated when determining responsibility. The challenge is not that artificial intelligence replaces investors as legal persons; rather, it disrupts the traditional relationship between legal personality and decision-making authority upon which much of investment law has been constructed.¹²

The problem becomes even more pronounced when viewed through the lens of treaty obligations and arbitral adjudication. Investment treaties rarely contain provisions addressing autonomous technologies, algorithmic decision-making or artificial intelligence-driven investment activity. Most treaty texts were drafted during periods when such developments were either technologically impossible or commercially insignificant. As a consequence, existing protections are framed in broad language that assumes the continued dominance of human agency within investment operations. While the flexibility of treaty interpretation has enabled international investment law to adapt to changing economic conditions over time, there are limits to what can be achieved

¹¹ Andrew Newcombe and Lluís Paradell, *Law and Practice of Investment Treaties: Standards of Treatment* (Alphen aan den Rijn: Kluwer Law International, 2009), 279–342, <https://law-store.wolterskluwer.com/s/product/law-and-practice-of-investment-treaties-standards-treatment/01t0f0000J3avwAAB>.

¹² Zachary Douglas, *The International Law of Investment Claims* (Cambridge: Cambridge University Press, 2009), 145–89, <https://doi.org/10.1017/CBO9780511581137>.

through interpretation alone. The emergence of algorithmic investment introduces questions that go beyond ordinary treaty application and reach into the conceptual foundations of the investment regime itself. If legal protections are granted to investors whose commercial activities are increasingly shaped by autonomous systems, then corresponding questions concerning accountability, responsibility and regulatory oversight cannot be avoided. The legitimacy of the investment regime may depend upon its ability to address these issues in a coherent and principled manner.¹³

The continued relevance of international investment law therefore requires more than the extension of existing doctrines to new technological circumstances. It requires a reassessment of whether a legal framework designed for a human-centred investment environment remains fully capable of regulating investment relationships in which artificial intelligence plays a substantial and sometimes decisive role. The challenge is neither purely technological nor merely theoretical. It concerns the allocation of rights and responsibilities within an international legal order that increasingly governs economic activities shaped by autonomous systems. Understanding the human-centred foundations of investor protection is therefore essential because it reveals the assumptions that artificial intelligence now places under strain. Once those assumptions are identified, it becomes possible to evaluate whether existing doctrines can accommodate algorithmic investment conduct or whether more fundamental adjustments to the structure of international investment law are required.¹⁴

4. Artificial Intelligence and the Accountability Gap

The growing incorporation of artificial intelligence into investment decision-making has exposed a significant accountability gap within contemporary international investment law. Although the investment regime has demonstrated considerable flexibility in adapting to changing commercial realities, its core doctrines continue to assume the existence of identifiable human actors whose decisions can be assessed, attributed and evaluated through established legal principles. Artificial intelligence challenges these assumptions in ways that are both practical and conceptual. Unlike conventional decision-support tools, advanced algorithmic systems are capable of processing information, adapting behaviour and generating outcomes through analytical pathways that may not be fully transparent even to their developers or operators. As artificial intelligence assumes a greater role in determining investment strategies, market entry decisions, asset allocation and responses to regulatory developments, the traditional connection between decision-making authority and legal responsibility becomes increasingly difficult to sustain. The result is a growing disconnect between the actors recognised by international investment law and the technological processes that increasingly influence investment conduct.¹⁵

¹³ Campbell McLachlan, Laurence Shore, and Matthew Weiniger, *International Investment Arbitration: Substantive Principles*, 2nd ed. (Oxford: Oxford University Press, 2017), 267–358, <https://doi.org/10.1093/law/9780199676798.001.0001>.

¹⁴ Jeswald W. Salacuse, *The Law of Investment Treaties*, 3rd ed. (Oxford: Oxford University Press, 2021), 23–49, <https://doi.org/10.1093/law/9780198850953.001.0001>.

¹⁵ Joanna J. Bryson, “The Artificial Intelligence of the Ethics of Artificial Intelligence: An Introductory Overview for Law and Regulation,” in *The Oxford Handbook of Ethics of AI*, ed. Markus D. Dubber, Frank Pasquale, and Sunit Das (Oxford: Oxford University Press, 2020), 2–25, <https://doi.org/10.1093/oxfordhb/9780198850953.001.0001>.

This disconnect becomes particularly apparent when questions of attribution arise. Attribution occupies a central place within international legal responsibility because it identifies the conduct for which a legal actor may be held accountable. In traditional investment disputes, tribunals generally have little difficulty identifying the conduct of investors or states and assessing the legal consequences that follow. Artificial intelligence complicates this process. An investment decision may originate from a machine-learning system trained on vast datasets and capable of adapting its behaviour through continuous interaction with changing market conditions. The resulting conduct may not reflect a specific instruction issued by a corporate officer or investment manager, yet it may nevertheless have profound legal and economic consequences. If an algorithm reallocates capital in response to a regulatory measure, initiates transactions that trigger treaty disputes or generates investment strategies based upon predictive assessments of governmental conduct, determining responsibility becomes considerably more complex. Existing legal doctrines offer limited guidance on how responsibility should be allocated where the immediate cause of the conduct is an autonomous technological process operating within parameters established by human actors but not entirely controlled by them.¹⁶

The accountability gap is equally visible in relation to causation and foreseeability. International investment tribunals frequently assess whether particular state measures caused investor losses and whether those losses were reasonably foreseeable consequences of governmental conduct. Such inquiries are relatively straightforward when investment decisions are made through conventional human processes. They become more difficult when artificial intelligence systems influence the chain of events leading to a dispute. Machine-learning models may respond to regulatory measures in ways that were not anticipated by investors, governments or even the designers of the technology itself. An algorithm may identify risks that human actors overlooked, react to market signals in unexpected ways or adopt investment strategies that significantly alter the commercial consequences of a state measure. In such circumstances, the relationship between governmental action and investor loss may be mediated through technological processes whose operation is not easily captured by traditional legal concepts. The question is no longer simply whether a state caused an investor's loss, but whether intervening algorithmic decisions affect the assessment of causation, foreseeability and responsibility.¹⁷

Further difficulties emerge in the context of investor conduct and contributory fault. Investment tribunals have increasingly recognised that investors bear responsibilities alongside the protections granted to them under international law. Issues such as due diligence, good faith and responsible commercial behaviour frequently influence arbitral determinations. Yet these doctrines presuppose the existence of actors capable of exercising judgment and understanding the consequences of their actions. Artificial intelligence challenges this premise because algorithmic systems may engage in conduct that is economically rational yet legally problematic. An autonomous system may pursue aggressive investment strategies, exploit regulatory asymmetries or react to

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¹⁶ James Crawford, *State Responsibility: The General Part* (Cambridge: Cambridge University Press, 2013), 105–38, <https://doi.org/10.1017/CBO9781139033060>.

¹⁷ Douglas, *International Law of Investment Claims*, 462–97.

governmental measures in ways that amplify commercial risks. Where such conduct contributes to a dispute, tribunals may struggle to determine whether responsibility should rest exclusively with the investor, be shared with technology developers or be assessed through an entirely different framework. The absence of clear legal standards governing these situations creates uncertainty not only for investors but also for states seeking to regulate emerging technologies without incurring unexpected treaty liability.¹⁸

The accountability gap therefore extends beyond isolated doctrinal difficulties and reflects a broader structural challenge confronting the international investment regime. The law continues to allocate rights and responsibilities through categories developed for a world in which investment decisions were made by human actors exercising direct control over commercial activities. Artificial intelligence has not displaced those actors, but it has altered the conditions under which they operate and has introduced new forms of decision-making that do not fit comfortably within existing legal frameworks. As the economic significance of algorithmic investment continues to grow, the inability of current doctrines to address questions of attribution, causation, foreseeability and responsibility will become increasingly difficult to ignore. Recognising the existence of this accountability gap is therefore a necessary first step towards developing a legal framework capable of preserving both investor protection and regulatory legitimacy in an era of technologically mediated investment activity. The challenge facing international investment law is not whether artificial intelligence should be accommodated within the existing regime, but how that accommodation can occur without undermining the principles of accountability upon which the legitimacy of the regime depends.¹⁹

5. State Responsibility and Algorithmic Conduct

The doctrine of state responsibility occupies a central position within the structure of international investment law. Although investment disputes are commonly framed as conflicts between investors and host states, the legal determination of responsibility ultimately depends upon broader principles of public international law governing attribution, breach and the legal consequences of internationally wrongful conduct. The modern law of state responsibility was developed on the premise that governmental decisions and actions originate from identifiable state organs, officials or entities exercising public authority. This framework has provided a relatively stable basis for assessing state conduct in investment disputes because the source of the relevant action is ordinarily apparent. Regulatory measures, legislative enactments, administrative decisions and judicial acts can generally be traced to institutions whose authority is recognised under international law. The increasing integration of artificial intelligence into public governance, however, introduces new complexities that challenge these traditional assumptions. As governments begin to rely upon algorithmic systems to assist with regulatory oversight, market supervision, licensing decisions, customs administration and other governmental functions, questions arise concerning

¹⁸ Stephan W. Schill, ed., *International Investment Law and Comparative Public Law* (Oxford: Oxford University Press, 2010), 821–57, <https://doi.org/10.1093/acprof:oso/9780199589104.001.0001>.

¹⁹ McLachlan, Shore, and Weiniger, *International Investment Arbitration*, 267–358.

how the law of state responsibility should respond when such systems contribute to conduct that affects foreign investment.²⁰

At present, international law does not recognise artificial intelligence as an independent legal actor capable of bearing international responsibility. Responsibility remains attached to states, international organisations, corporations and natural persons rather than technological systems. Nevertheless, the practical reality is that artificial intelligence increasingly influences decisions that may have significant legal consequences for investors. Governments across the world are experimenting with automated regulatory tools capable of processing large volumes of information and identifying patterns that would be difficult for human officials to detect. In certain contexts, algorithmic systems may assist in determining tax liabilities, monitoring financial transactions, allocating regulatory resources or assessing compliance with administrative requirements. Although these systems operate within frameworks established by public authorities, their outputs may substantially shape the decisions eventually adopted by governmental institutions. If a regulatory measure affecting a foreign investor is influenced by an algorithmic assessment that later proves flawed, discriminatory or unpredictable, the question becomes whether traditional principles of attribution remain sufficient to address the resulting dispute. Existing doctrine would suggest that responsibility continues to rest with the state because the technology functions as an instrument through which governmental authority is exercised. Yet this conclusion does not entirely resolve the deeper problem created by increasing reliance on autonomous systems whose reasoning processes may be opaque and whose behaviour may evolve beyond the specific expectations of those who deploy them.²¹

The challenge becomes more pronounced when questions of foreseeability and due diligence are considered. State responsibility often depends not only upon the existence of a wrongful act but also upon an assessment of whether governmental authorities exercised the level of care expected under international law. Artificial intelligence complicates this inquiry because algorithmic systems may generate outcomes that are difficult to predict, explain or fully control. A government that adopts a regulatory measure based upon algorithmic analysis may genuinely believe that the resulting decision is objective and evidence-based. Yet the technology may contain biases, operate on incomplete datasets or produce recommendations that create disproportionate consequences for particular investors. Where such outcomes contribute to treaty disputes, tribunals may be required to evaluate whether the state exercised adequate oversight over the technological systems upon which it relied. This introduces an additional layer of analysis that traditional doctrines were not designed to address. The focus shifts from the substantive decision itself to the quality of the processes through which algorithmic outputs were generated, verified and implemented. In this respect, artificial intelligence creates new dimensions of legal risk for states while simultaneously complicating the evidentiary assessment of governmental conduct.²²

Equally significant is the possibility that states may invoke artificial intelligence

²⁰ Crawford, *State Responsibility*, 17–52.

²¹ International Law Commission, “Draft Articles on Responsibility of States for Internationally Wrongful Acts, with Commentaries,” *Yearbook of the International Law Commission* 2001, vol. 2, pt. 2: 31–143, https://legal.un.org/ilc/texts/instruments/english/commentaries/9_6_2001.pdf.

²² André Nollkaemper and Ilias Plakokefalos, eds., *Principles of Shared Responsibility in International Law* (Cambridge: Cambridge University Press, 2014), 83–117, <https://doi.org/10.1017/CBO9781139940009>.

as a justification for decisions that adversely affect foreign investors. The increasing complexity of algorithmic systems may create opportunities for governments to attribute controversial outcomes to technological processes rather than to conscious policy choices. Such arguments would be difficult to reconcile with established principles of international law, which generally prevent states from avoiding responsibility by delegating functions to subordinate entities or instrumentalities. Nevertheless, the practical challenge remains substantial. A tribunal faced with a dispute involving algorithmically influenced regulation may encounter significant difficulties in understanding how a particular decision was reached, whether adequate safeguards were in place and whether the state exercised meaningful control over the relevant technological processes. The opacity often associated with advanced machine-learning systems could therefore create evidentiary obstacles capable of affecting both the adjudication of disputes and the broader legitimacy of investment arbitration. The law of state responsibility must consequently grapple not only with questions of attribution but also with concerns relating to transparency, explainability and accountability in public decision-making.²³

These developments do not suggest that the existing law of state responsibility has become obsolete. On the contrary, many of its foundational principles remain sufficiently flexible to accommodate technological change. States cannot escape international responsibility merely because decisions are influenced by artificial intelligence, just as they cannot avoid responsibility by acting through agencies, contractors or other intermediaries. What artificial intelligence does reveal, however, is the need for a more refined understanding of how responsibility should operate when governmental conduct is shaped by systems capable of exercising significant practical influence over regulatory outcomes. As artificial intelligence becomes increasingly embedded within public administration, international investment law will be required to confront questions that extend beyond traditional debates concerning state sovereignty and investor protection. The challenge is to ensure that technological innovation does not erode the accountability that lies at the heart of the international legal order. Achieving that objective will require a framework capable of preserving the attribution of responsibility to states while also recognising the distinctive risks created by algorithmic governance. Such a framework is essential if the legitimacy of investment protection is to be maintained in an era in which public authority is increasingly exercised through technologically mediated processes.²⁴

6. Investor–State Arbitration in the Age of Artificial Intelligence

Investor–State Dispute Settlement (ISDS) was designed to provide a neutral mechanism through which disputes arising between foreign investors and host states could be resolved according to established principles of international law. For decades, the system has operated on the assumption that disputes emerge from decisions and conduct attributable to identifiable human actors. Investors formulate commercial strategies, governments adopt regulatory measures, and arbitral tribunals evaluate the legal consequences of those actions through established doctrines governing jurisdiction,

²³ Bryson, “Artificial Intelligence of the Ethics of Artificial Intelligence,” 2–25.

²⁴ McLachlan, Shore, and Weiniger, *International Investment Arbitration*, 267–358.

liability and remedies. The increasing integration of artificial intelligence into both commercial activity and public governance has begun to challenge these assumptions. As algorithmic systems assume a greater role in shaping investment decisions, managing assets and influencing regulatory outcomes, arbitral tribunals are likely to encounter disputes in which crucial aspects of the factual matrix are generated by technological processes rather than direct human decision-making. The emergence of such disputes raises important questions concerning evidence, transparency, procedural fairness and the continued suitability of existing arbitral frameworks for resolving conflicts arising within an increasingly automated economic environment.²⁵

One of the most immediate challenges concerns the evidentiary process. Investment arbitration is heavily dependent upon the ability of parties to establish facts, explain conduct and demonstrate causal connections between governmental measures and investor losses. Artificial intelligence complicates this process because the operation of many algorithmic systems is not readily transparent. Sophisticated machine-learning models frequently reach conclusions through analytical pathways that are difficult to explain even to the individuals who designed them. Consequently, an investor seeking to demonstrate that a regulatory measure caused a particular loss may rely upon decisions generated by a system whose internal reasoning cannot be fully articulated before a tribunal. Similarly, a state defending its actions may have utilised algorithmic tools in developing policies or regulatory responses that subsequently became the subject of arbitration. In both situations, tribunals may find themselves required to assess evidence derived from technological systems whose operation is only partially understood by the parties themselves. This presents difficulties not only for fact-finding but also for broader principles of procedural fairness, as parties must be able to understand and challenge the evidence upon which legal determinations are based.²⁶

Artificial intelligence also raises important questions concerning transparency and legitimacy within the arbitral process. One of the longstanding criticisms directed at investment arbitration concerns perceptions of opacity and inconsistency. The introduction of algorithmic evidence may intensify these concerns. If disputes increasingly involve proprietary technologies, confidential datasets and complex machine-learning models, tribunals may face pressure to protect commercially sensitive information while simultaneously ensuring that proceedings remain transparent and fair. Striking this balance is unlikely to be straightforward. Excessive confidentiality may undermine confidence in arbitral outcomes, while extensive disclosure obligations may expose valuable intellectual property or commercially sensitive data. The challenge is compounded by the fact that many algorithmic systems are developed and maintained by third-party technology providers who are not themselves parties to the dispute but whose technologies may nevertheless play a significant role in determining the issues before the tribunal. The growing presence of such actors within the factual background of investment disputes introduces additional layers of complexity that traditional arbitral procedures were not specifically designed to address.²⁷

²⁵ McLachlan, Shore, and Weiniger, *International Investment Arbitration*, 47–92.

²⁶ Gary B. Born, *International Commercial Arbitration*, 3rd ed., 3 vols. (Alphen aan den Rijn: Kluwer Law International, 2021), 2493–531, <https://law-store.wolterskluwer.com/s/product/international-commercial-arbitration-3e-3-volume-set/01t4R00000OkdUZQAZ>.

²⁷ UNCTAD, *Reforming Investment Dispute Settlement: A Stocktaking*, IIA Issues Note no. 1 (Geneva: United Nations, 2019), <https://investmentpolicy.unctad.org/publications/1194/reforming-investment-dispu>

Questions concerning expertise are equally significant. Investment tribunals have historically drawn upon legal principles, economic analysis and factual evidence to resolve disputes. Artificial intelligence introduces technical dimensions that may require specialised knowledge extending beyond conventional legal and economic expertise. Arbitrators may increasingly encounter disputes involving algorithmic modelling, data governance, machine-learning systems and digital infrastructure. While tribunals frequently rely upon expert witnesses, the growing complexity of artificial intelligence may create situations in which technical evidence becomes central to the resolution of legal issues. This raises concerns regarding the ability of tribunals to evaluate competing expert opinions and to assess the reliability of sophisticated technological systems. The challenge is not merely technical but institutional. The legitimacy of investment arbitration depends in part upon confidence in the capacity of tribunals to understand the issues before them and to reach reasoned decisions grounded in both law and fact. As artificial intelligence becomes more deeply embedded in investment activity, arbitral institutions may need to reconsider procedural practices, evidentiary standards and approaches to expert testimony in order to maintain that confidence.²⁸

Beyond procedural considerations, artificial intelligence has the potential to influence the substantive development of investment jurisprudence itself. Disputes involving algorithmic decision-making are likely to generate novel questions concerning attribution, causation, foreseeability, investor conduct and regulatory responsibility. The manner in which tribunals address these questions may shape the future trajectory of international investment law for decades to come. Just as earlier arbitral decisions played a significant role in defining concepts such as fair and equitable treatment, indirect expropriation and legitimate expectations, future awards may establish important principles governing the legal consequences of artificial intelligence-driven investment activity. Investor–state arbitration therefore stands at a critical point of transition. The challenge is not simply to accommodate new technologies within existing procedures but to ensure that the fundamental values of fairness, accountability, transparency and legal certainty remain effective in an environment increasingly shaped by autonomous systems. The continued legitimacy of the investment regime may depend upon its ability to adapt to these realities while preserving the procedural safeguards that have long been regarded as essential components of international adjudication.²⁹

7. Towards a Responsibility-Based Framework for Algorithmic Investment

The preceding analysis has demonstrated that the growing use of artificial intelligence in international investment activity has exposed limitations within legal doctrines that were developed for a predominantly human-centred commercial environment. Existing rules governing investor protection, state responsibility and investment arbitration remain capable of addressing many contemporary disputes, yet they provide only partial answers to the unique challenges created by algorithmic

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²⁸ Catherine A. Rogers, *Ethics in International Arbitration* (Oxford: Oxford University Press, 2014), 89–118, <https://doi.org/10.1093/law/9780198713203.001.0001>.

²⁹ Stephan W. Schill, Christian J. Tams, and Rainer Hofmann, eds., *International Investment Law and Development: Bridging the Gap* (Cheltenham: Edward Elgar Publishing, 2015), 201–27, <https://doi.org/10.4337/9781784711351>.

decision-making. The difficulty lies not in the existence of a regulatory vacuum but in the increasing mismatch between legal assumptions and technological realities. International investment law continues to allocate rights and obligations through frameworks that presuppose identifiable human decision-makers exercising direct control over investment conduct. Artificial intelligence complicates that assumption by introducing autonomous or semi-autonomous processes that influence commercial behaviour without fitting neatly within existing categories of responsibility. If the legitimacy and effectiveness of the investment regime are to be preserved, a more coherent framework is required — one that recognises the realities of algorithmic investment while maintaining accountability as a central principle of international economic governance.³⁰

A responsibility-based framework offers a useful starting point for addressing this challenge. Such an approach would reject the notion that artificial intelligence should be treated as an independent bearer of international rights or obligations. Contemporary artificial intelligence systems possess neither legal personality nor the capacity to participate directly in international legal relations. Responsibility must therefore continue to rest with recognised legal actors, including investors, states and, where appropriate, other entities involved in the development and deployment of relevant technologies. The significance of a responsibility-based approach lies in its insistence that the increasing sophistication of technological systems should not diminish accountability. Investors who choose to employ artificial intelligence in the management of foreign investments should remain responsible for the foreseeable consequences of those systems, just as states that incorporate algorithmic tools into regulatory processes should remain accountable for decisions taken through mechanisms operating under their authority. Technological complexity may alter the manner in which responsibility is assessed, but it should not operate as a shield against legal scrutiny.³¹

An essential component of this framework is the recognition of enhanced due diligence obligations. The deployment of artificial intelligence within investment activities creates risks that differ in both scale and nature from those associated with conventional commercial decision-making. Investors who rely upon algorithmic systems should therefore be expected to undertake reasonable measures to understand the capabilities, limitations and potential risks associated with those technologies. This obligation does not require investors to anticipate every possible outcome generated by complex systems, nor does it impose strict liability for all algorithmic conduct. Rather, it reflects the principle that parties introducing sophisticated technologies into international economic activities should bear a corresponding responsibility to ensure that those technologies are subject to appropriate oversight and risk management. Similar considerations apply to states. Governments that employ artificial intelligence within regulatory processes should be required to maintain adequate safeguards, transparency mechanisms and review procedures capable of reducing the likelihood of arbitrary or discriminatory outcomes. The objective is not to discourage technological innovation but to ensure that innovation develops within a framework that remains

³⁰ José E. Alvarez, *The Public International Law Regime Governing International Investment* (The Hague: Hague Academy of International Law, 2011), 55–79, <https://brill.com/display/title/18873>.

³¹ Crawford, *State Responsibility*, 489–516.

consistent with the principles of accountability and legality.³²

Transparency constitutes a second pillar of the proposed framework. One of the most persistent challenges associated with artificial intelligence is the opacity of certain algorithmic systems. Where disputes arise concerning investment decisions or regulatory measures influenced by artificial intelligence, tribunals must possess sufficient information to evaluate the conduct of the parties and the role played by the relevant technologies. This does not necessarily require the unrestricted disclosure of proprietary source code or commercially sensitive information. It does, however, require the development of procedural mechanisms capable of ensuring meaningful scrutiny of algorithmic processes where those processes become material to the resolution of a dispute. Without a minimum degree of transparency, tribunals may struggle to assess questions of causation, foreseeability, contributory fault or regulatory justification. The legitimacy of both investment protection and dispute settlement depends upon the ability of decision-makers to understand the factual foundations upon which legal claims are advanced. Transparency therefore functions not merely as a procedural value but as a prerequisite for effective accountability.³³

A further dimension of the framework involves the gradual adaptation of treaty practice. Most contemporary investment treaties were negotiated before the emergence of artificial intelligence as a significant factor in international economic relations. As states continue to modernise their investment agreements, consideration should be given to provisions addressing digital assets, algorithmic decision-making, data governance and technological accountability. Such provisions need not attempt to regulate artificial intelligence comprehensively. Their purpose would be to clarify expectations concerning investor conduct, regulatory authority and the treatment of disputes involving autonomous systems. Treaty reform in this area would contribute to legal certainty by reducing the interpretative uncertainty that currently surrounds algorithmic investment activities. More importantly, it would signal recognition that technological developments are capable of altering the practical operation of investment relationships in ways that warrant explicit legal consideration.³⁴

The responsibility-based framework proposed in this article is not intended to provide definitive answers to every challenge presented by artificial intelligence. The technology continues to evolve, and legal responses must remain sufficiently flexible to accommodate future developments. Nevertheless, certain principles remain constant. Accountability cannot be displaced by automation; responsibility cannot disappear behind technological complexity; and the legitimacy of international investment law depends upon its ability to ensure that power, whether exercised by governments, corporations or technologically mediated systems, remains subject to legal oversight. Artificial intelligence may transform the manner in which investment decisions are made, but it should not alter the fundamental principle that significant economic decisions carrying legal consequences must remain attributable to actors capable of bearing responsibility under international law. The future stability of the investment

³² OECD, *Common Guideposts to Promote Interoperability in AI Risk Management*, OECD Artificial Intelligence Papers, no. 5 (Paris: OECD Publishing, 2023), <https://doi.org/10.1787/ba602d18-en>.

³³ Mireille Hildebrandt, *Law for Computer Scientists and Other Folk* (Oxford: Oxford University Press, 2020), 137–66, <https://doi.org/10.1093/oso/9780198860877.001.0001>.

³⁴ UNCTAD, *International Investment Agreements Reform Accelerator* (Geneva: United Nations, 2020), <https://unctad.org/publication/international-investment-agreements-reform-accelerator>.

regime may well depend upon the extent to which that principle is preserved in an increasingly automated world.³⁵

8. Conclusion

The emergence of artificial intelligence as a significant force within international investment activity represents more than a technological development; it signals a structural transformation in the way capital is allocated, managed and protected across national borders. This article has argued that the increasing use of algorithmic systems in investment decision-making challenges many of the assumptions upon which contemporary international investment law was constructed. Existing treaty frameworks, principles of state responsibility and mechanisms of investor–state dispute settlement evolved within a legal environment that presupposed human agency as the central source of commercial decision-making and legal accountability. While those foundations have provided stability and predictability for decades, the growing influence of artificial intelligence reveals important gaps in their ability to address the realities of increasingly automated investment conduct. The result is an emerging accountability deficit in which technologically mediated decisions produce significant legal consequences without fitting comfortably within established frameworks of responsibility, attribution and oversight.³⁶

The analysis undertaken in this article has shown that these challenges are not confined to a single area of international investment law. They extend across the entire investment regime. Questions concerning investor conduct, state responsibility, causation, foreseeability, due diligence and arbitral procedure are all affected by the increasing role of artificial intelligence in shaping investment behaviour. The problem is not that artificial intelligence has displaced investors or states as legal actors. Rather, it has complicated the relationship between legal personality and decision-making authority in ways that existing doctrines were not designed to accommodate. As algorithmic systems become more sophisticated and more deeply integrated into both private investment activity and public regulatory governance, disputes involving artificial intelligence are likely to become increasingly common. The absence of clear principles governing such disputes creates uncertainty for investors, regulators and arbitral tribunals alike, thereby threatening the predictability that remains one of the principal objectives of the international investment regime.³⁷

This article has further argued that the appropriate response is neither to resist technological innovation nor to abandon existing legal principles. The law of international investment possesses sufficient flexibility to adapt to changing economic realities, provided that adaptation remains anchored in the fundamental principle of accountability. For that reason, the article proposed a responsibility-based framework that preserves responsibility within recognised legal actors while acknowledging the distinctive challenges created by algorithmic decision-making. Such an approach ensures that investors remain accountable for the foreseeable consequences of technologies deployed within their investment operations and that states remain

³⁵ UNCTAD, *World Investment Report 2025*, 201–25.

³⁶ Alvarez, *Public International Law Regime*, 301–18.

³⁷ McLachlan, Shore, and Weiniger, *International Investment Arbitration*, 267–358.

responsible for decisions taken through regulatory systems operating under their authority. The framework also emphasises the importance of enhanced due diligence, procedural transparency and treaty modernisation as mechanisms for reducing uncertainty and strengthening legal legitimacy in disputes involving artificial intelligence. These measures do not require a radical reconstruction of international investment law. Rather, they represent a principled evolution of existing doctrines in response to new technological realities.³⁸

The broader significance of this discussion extends beyond the immediate context of artificial intelligence. At its core, the debate concerns the capacity of international law to remain effective in a rapidly changing technological environment. Throughout its history, international investment law has adapted to major shifts in global economic activity, from the expansion of multinational enterprise to the liberalisation of international markets and the rise of digital commerce. Artificial intelligence presents the latest and perhaps most complex stage in that process of adaptation. The challenge facing policymakers, treaty drafters, arbitral institutions and scholars is to ensure that technological advancement does not weaken the accountability upon which the legitimacy of international economic governance depends. If the investment regime is to retain its relevance in the decades ahead, it must develop legal frameworks capable of governing not only investments made by human actors but also investments increasingly shaped by autonomous systems. The future of international investment law may therefore depend upon its ability to reconcile innovation with responsibility, efficiency with accountability and technological progress with the enduring demands of justice and the rule of law.³⁹

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³⁸ UNCTAD, *World Investment Report 2025*, 201–25.

³⁹ UNCTAD, *World Investment Report 2025*, 201–25.

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