


Artificial Intelligence and Big Data in VAT Enforcement of Colombia's Digital Economy

La inteligencia artificial y el big data en la aplicación de la normativa del IVA en la economía digital de Colombia

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Abstract

Introduction: This article analyzes the challenges that the digital economy presents for the implementation of the Value Added Tax (VAT) Destination Principle in the provision of cross-border services. While Colombia has adopted the OECD guidelines to ensure the proper taxation of these transactions, a significant discrepancy persists between the regulatory framework and the effective collection of VAT. **Objective:** The objective of this study is to analyze the nature and underlying causes of this gap. **Methods:** To this end, a qualitative documentary research design is adopted, grounded in a hermeneutic-legal approach that enables a critical interpretation of the regulatory framework and its practical operability. **Results and Discussion:** The findings reveal that this gap does not primarily stem from regulatory deficiencies but rather from institutional limitations, which is consistent with North's perspective on transaction costs and institutional performance. In particular, the National Tax and Customs Directorate (DIAN) faces monitoring and enforcement costs that are incompatible with the scale and speed of digital transactions when operating under an analog-based framework. **Conclusions:** the incorporation of artificial intelligence (AI) and Big Data tools constitutes the most viable pathway to reduce such costs, operationalize the Destination Principle, and effectively close the VAT compliance gap in cross-border digital services.

Keywords: Artificial intelligence (AI); Big Data; Destination Principle; Digital economy; tax Compliance; Value Added Tax (VAT).

Resumen

Introducción: El presente artículo analiza los retos que plantea la economía digital para la aplicación del principio de destino del Impuesto sobre el Valor Añadido (IVA) en la prestación de servicios transfronterizos. Si bien Colombia ha adoptado las directrices de la OCDE para garantizar la tributación adecuada de estas transacciones, persiste una discrepancia significativa entre el marco normativo y la recaudación efectiva del IVA. **Objetivo:** El objetivo de este estudio es analizar la naturaleza y las causas subyacentes de esta brecha. **Métodos:** Para ello, se adopta un diseño de investigación documental cualitativa, basado en un enfoque hermenéutico-jurídico que permite una interpretación crítica del marco normativo y su operatividad práctica. **Resultados y discusión:** Los resultados revelan que esta brecha no se deriva principalmente de deficiencias normativas, sino más bien de limitaciones institucionales, lo cual concuerda con la perspectiva de North sobre los costes de transacción y el desempeño institucional. En particular, la Dirección Nacional de Impuestos y Aduanas (DIAN) se enfrenta a costes de supervisión y ejecución que son incompatibles con la escala y la velocidad de las transacciones digitales cuando opera bajo un marco analógico. **Conclusiones:** la incorporación de herramientas de inteligencia artificial (IA) y Big Data constituye la vía más viable para reducir dichos costes, poner en práctica el principio de destino y cerrar de manera efectiva la brecha de cumplimiento del IVA en los servicios digitales transfronterizos.

Palabras clave: Inteligencia artificial (IA); Big Data; Principio de destino; Economía digital; Cumplimiento tributario; Impuesto sobre el valor añadido (IVA).



1. INTRODUCTION

The digital transformation of the global economy in recent years has redefined the ways in which goods and services are produced, consumed, and taxed, generating unprecedented opportunities as well as fiscal challenges of considerable magnitude. In this new context, States face the need to adapt their tax systems to an environment in which transactions occur without physical borders and digital services expand rapidly. The debate on how to tax these operations is not merely technical but also political and social, as it directly affects countries' ability to sustain public finances and ensure equity in citizens' tax contributions. In Latin America, the Comisión Económica para América Latina y el Caribe (Economic Commission for Latin America and the Caribbean, ECLAC, 2021) warns that the region faces a dual gap: insufficient regulatory frameworks for taxing digital services and institutional weakness within tax administrations, a combination that generates significant fiscal losses and limits States' capacity to finance public policies.

In the Colombian case, the adoption of the Destination Principle in the taxation of digital services represents a regulatory advance; however, it has proven insufficient to ensure effective tax collection. Reyes Rojas (2024) argues that the mechanisms implemented must be assessed in light of the guidelines issued by the Organización para la Cooperación y el Desarrollo Económicos (Organization for Economic Co-operation and Development, OECD), which emphasize the need for international cooperation and technological traceability. A study conducted by the Rodríguez González y Orjuela Castellanos (2025) on the effects of the VAT on digital platforms shows that, although tax revenues increased between 2020 and 2024, the lack of technological tools constrains efficiency and generates inequities between local and non-resident service providers. At the regional level, Centro Interamericano de Administraciones Tributarias (Inter-American Center of Tax Administrations, CIAT, 2025) warns that the rapid expansion of digital services has created new fiscal challenges and that the solution lies in the adoption of electronic invoicing systems and the use of advanced technologies such as Big Data and artificial intelligence to reduce tax evasion.

From an academic perspective, this study contributes to the discussion on digital taxation in developing countries by integrating institutional theories with technological approaches. From a social standpoint, it is justified by the urgent need to strengthen the Colombian State's capacity to ensure tax equity and fiscal sustainability in a digital environment. Brinta (2024) shows that several Latin American countries have implemented registration and withholding mechanisms for non-resident companies; however, their effectiveness depends on the institutional capacity of each tax administration, reinforcing the relevance of this analysis.

The objective of this study is to analyze Colombia's institutional capacity gap regarding VAT on international digital services and to propose enforcement mechanisms based on artificial intelligence and Big Data (García Arango et al., 2021; Obando, 2022). The central hypothesis posits that the tax collection gap does not stem solely from legal loopholes but rather from institutional weakness and the prohibitive costs of oversight under an analog paradigm. It further argues that the adoption of these technologies constitutes the most viable mechanism to reduce such costs and render the regulation operational, provided that it is accompanied by regulatory frameworks

that ensure the protection of rights and the legitimacy of the tax system.

The research was conducted using a qualitative approach, employing a documentary and hermeneutic–legal design and applying normative analysis, systematic literature review, and technological surveillance. The findings reveal three critical dimensions: the regulatory gap, the institutional gap, and the technological solution. The conclusions confirm that Colombia must prioritize the digital transformation of the DIAN over further regulatory reforms, ensuring both tax collection efficiency and social legitimacy.

Fiscal Jurisdiction and the Destination Principle in the Digital Economy

The Destination Principle has long been the cornerstone of indirect taxation, granting fiscal authority to the jurisdiction in which consumption takes place. However, this principle—originally designed for tangible goods—faces significant limitations in the context of the digital economy, where services are provided in a cross-border and dematerialized manner. As noted by Cockfield (2006), digital globalization has eroded the traditional foundations of taxation, creating a regulatory vacuum that undermines States’ ability to tax digital services.

Devereux and Vella (2018) argue that international taxation requires a profound redesign that goes beyond the mere extension of the Destination Principle, incorporating mechanisms of multilateral cooperation and digital traceability. Along the same lines, Baistrocchi and Rocha (2020) emphasize that digitalization has outpaced traditional tax frameworks, generating jurisdictional tensions and regulatory gaps. Hanappi (2024) reinforces this view by demonstrating that the mobilization of tax revenues from digital products depends on States’ capacity to implement data-driven traceability systems based on large-scale data.

Academic critique further emphasizes that simplified registration regimes for non-resident providers, while useful, do not in themselves guarantee effective tax collection. Pomeranz (2015) shows that VAT evasion in contexts of low institutional capacity remains high even when clear regulations exist, indicating that the problem is not solely normative but also one of enforcement.

New Institutionalism and the Compliance Gap

The New Institutional Economics (NIE), formulated by North (1990), posits that economic efficiency depends on institutional strength and the costs of enforcing rules. In the Colombian case, the adoption of international standards has not been sufficient to ensure effective VAT collection on digital services. The compliance gap arises from the tax administration’s inability to audit cross-border transactions under an analog paradigm.

Bird and Gendron (2007) argue that VAT administration requires robust institutions capable of reducing evasion and ensuring tax neutrality. Keen (2013) warns that the complexity of the digital economy increases transaction costs and hinders the application of tax regulations, particularly in countries with institutional weakness. García Arango et al. (2021) show that VAT evasion in Latin America is a structural phenomenon that is exacerbated in contexts where tax

administrations lack technological tools and international cooperation mechanisms.

Barreix et al. (2023) maintain that digital taxation in Latin America requires not only legal reforms but also a profound institutional transformation that enables the reduction of enforcement costs and the closure of the compliance gap. Fenochietto (2021) complements this perspective by emphasizing that the digitalization of tax administrations is indispensable for improving tax collection efficiency and reducing evasion.

Technological Innovation: Artificial Intelligence and Big Data as Enforcement Mechanisms

If the gap lies in institutional capacity, the solution must consist of a mechanism capable of radically reducing enforcement costs. Recent scientific literature identifies the adoption of AI and Big Data as the most viable mechanism to address this challenge.

The term Big Data was first used in 1997 in an article by NASA researchers Michael Cox and David Ellsworth and is defined as “the management and analysis of enormous volumes of data that cannot be processed through conventional means, as they exceed the limits and capacities of commonly used software tools for data capture, management, and processing” (Tattersall & Grant, 2016; Fox & Cutter, 2016). It involves the use of specialized infrastructures, technologies, and services designed to process vast datasets originating from multiple sources, such as files, networks, sensors, microphones, cameras, scanners, images, and videos. The objective of Big Data, like that of conventional analytical systems, is to transform data into useful information that facilitates decision-making, including in real time, thereby creating greater opportunities for economic and organizational optimization. Its analytical power lies in its ability to uncover new information about institutional or corporate value chains, enabling the resolution of previously intractable problems.

Brynjolfsson and McAfee (2017) highlight that AI and large-scale data analytics are transforming the global economy by providing States with unprecedented tools to enhance administrative efficiency.

In the fiscal domain, Alm and McClellan (2012) show that the use of advanced technologies reduces tax evasion and improves the detection of non-compliance. Gupta et al. (2018) reinforce this conclusion by noting that Big Data analytics offer tax administrations unparalleled tools for risk management and audit automation. Cerdeiro et al. (2020) analyze the use of AI in Latin American tax administrations, emphasizing its potential to characterize risks and automate audits, while also warning of the need to safeguard taxpayers' rights in the face of algorithmic enforcement mechanisms.

Literature also underscores the associated risks. Mittelstadt et al. (2016) argue that the use of algorithms in administrative processes must ensure transparency and the protection of rights, avoiding biases that may undermine tax equity. Zuboff (2019) warns that the surveillance economy can generate tensions between efficiency and privacy, making it imperative to design regu-

latory frameworks that balance innovation with fundamental guarantees.

This convergence of institutional theory and technological innovation suggests that the adoption of AI and big data is not an option but a necessity for closing the compliance gap. Without these tools, international standards remain inoperative, and Colombia's competitiveness in the international trade of digital services is compromised.

2. METHODOLOGY

Research Approach: The study is framed within a qualitative research approach, as it seeks to understand a complex phenomenon located at the intersection of tax law, the digital economy, and technological innovation. Flick (2018) argues that qualitative approaches are particularly appropriate when the objective is to explore meanings and institutional processes beyond mere quantification. Maxwell (2013) complements this view by emphasizing that qualitative designs allow for the construction of dynamic interpretations of social and legal phenomena.

Methodological Design: A documentary and hermeneutic–legal design was adopted, combining the systematic analysis of primary and secondary sources with the contextual interpretation of legal norms and doctrines. Ricoeur (1991) maintains that hermeneutics enables the understanding of normative texts within their historical and social context, while Bowen (2009) highlights documentary analysis as a key tool for identifying patterns and gaps in literature.

To ensure methodological rigor, a concurrent triangulation strategy was applied, integrating three analytical dimensions: normative, institutional, and technological. Patton (2015) explains that triangulation strengthens the credibility of findings by contrasting diverse perspectives.

Documentary Corpus: The documentary corpus was constructed based on criteria of relevance and timeliness, prioritizing documents published between 2000 and 2025. Legal and regulatory corpus: Colombian Tax Statute, official opinions issued by the DIAN, and international VAT guidelines issued by OECD (2017). Institutional and doctrinal corpus: peer-reviewed scientific literature on the tax compliance gap, as well as studies produced by multilateral organizations such as the Banco Mundial (World Bank, WB), Fondo Monetario Internacional (International Monetary Fund, IMF), and ECLAC. Technical corpus (grey literature): reports and manuals on the use of artificial intelligence and Big Data in tax administrations produced by CIAT and the Banco Interamericano de Desarrollo (Inter-American Development Bank, IDB). Krippendorff (2019) notes that qualitative content analysis enables a systematic reading of legal and doctrinal texts, facilitating the identification of gaps and tensions within regulatory and institutional frameworks.

Data collection and analysis: The procedure was carried out in three phases.

Regulatory analysis: Following the proposal of Krippendorff (2019), qualitative content

analysis was applied to identify gaps and ambiguities within the regulatory framework.

Systematic literature review (SLR): Petticrew and Roberts (2006) emphasize that the SLR ensures rigor and transparency in the synthesis of academic findings.

Technological surveillance (tech-mining): Porter et al. (2011) define technological surveillance as the systematic tracking of innovations, which is useful for assessing the suitability of AI and Big Data in the tax domain.

Criteria for Scientific Rigor: Methodological rigor was ensured through credibility, transferability, and confirmability (Lincoln & Guba, 1985). Credibility was achieved through source triangulation; transferability, by contextualizing the results within the Colombian context using comparative references; and confirmability, through documentary traceability and the explicit definition of inclusion and exclusion criteria.

3. RESULTS

The analysis of the documentary corpus made it possible to identify three central findings related to the compliance gap of VAT in cross-border digital services. Each of these findings was examined considering recent and comparative academic literature, with the aim of providing a comprehensive view of Colombia's capacity to address the challenges of digital taxation through the adoption of AI and Big Data.

3.1. Persistence of Operational Gaps in Colombian Tax Regulations. The regulatory analysis revealed that, although Colombia has adopted the international guidelines of OECD (2017) to tax digital services based on the Destination Principle, ambiguities persist in the definition of provider, user, and digital service, as well as in the mechanisms for determining the place of consumption. These gaps are reflected in difficulties in establishing the user's tax residence and in enforcing registration and filing obligations on non-resident providers. In relation to the objective of the study, these findings show that the gap does not originate from a lack of regulation but rather from the inability of the rules to be applied with precision in digital environments.

3.2. Institutional Limitations for Tax Enforcement. The documentary review of scientific literature and reports from multilateral organizations revealed that the compliance gap does not derive exclusively from regulatory shortcomings but primarily from institutional limitations. The analyzed documents indicate that the DIAN faces significantly high enforcement costs in an environment characterized by the speed, volume, and opacity of digital transactions. These limitations affect its capacity for verification, monitoring, and control, thereby reproducing the gap identified in international studies on tax administration in the digital economy. This finding directly addresses the objective of the study, demonstrating that the revenue gap is structural and rooted in the insufficiency of technological and operational capacities within the tax administration apparatus, rather than in deficiencies in legal design.

3.3. Insufficient Technological Maturity to Address the Digital Economy. The results of the technological surveillance indicate that, although there are global developments in AI and Big Data applied to tax administration—particularly in jurisdictions such as the European Union, Australia, and Canada—Colombia exhibits a significant lag. Reports from CIAT and IDB show that the country remains at an incipient stage of technological adoption, lacking fully implemented predictive models, risk algorithms, or digital traceability systems for intangible services. This technological gap limits the capacity of DIAN to reduce transaction costs and to effectively operationalize the Destination Principle. This finding reveals that the lack of technological infrastructure constitutes one of the core drivers of the compliance gap, as it prevents the reduction of transaction costs and hinders the effective application of the Destination Principle in highly digitalized environments.

4. DISCUSSION OF RESULTS

The results obtained allow for an understanding that the VAT compliance gap in cross-border digital services in Colombia is multidimensional in nature, as it arises from regulatory tensions, institutional limitations, and technological lag. This comprehensive interpretation aligns with the hermeneutic–legal approach and the New Institutional Economics framework that guided the study.

The persistence of regulatory gaps and ambiguities confirms that the adoption of the Destination Principle—aligned with OECD standards (2017)—does not guarantee the effectiveness of the tax system in the digital economy. Specialized literature warns that traditional tax frameworks are overwhelmed by the dematerialization of transactions. Baistrocchi and Rocha (2020) argue that digitalization has altered the very structure of international taxation, generating tensions between jurisdictions and new opportunities for tax evasion. Devereux and Vella (2018) deepen this argument by stating that the mere extension of the Destination Principle is insufficient without mechanisms of multilateral cooperation that enable the coordination of obligations for non-resident providers.

This issue acquires a hermeneutic dimension. As Ricoeur (1991) notes, legal norms must be interpreted considering their historical and social context; a norm designed under an analog logic can hardly operate effectively in digital environments without interpretative and operational adjustments. In this regard, Pomeranz (2015) warns that the absence of verifiable information renders VAT particularly vulnerable to evasion, especially in the case of digital services supplied from abroad. In line with Hanappi (2024), effective revenue collection from digital products depends on traceability systems and large-scale data—elements that are still lacking in Colombia.

The evidence suggests that the compliance gap does not originate solely from regulatory shortcomings but, more profoundly, from institutional limitations. According to North (1990), institutions fail when transaction and enforcement costs exceed their operational capacity, a condition that becomes evident in highly digitalized economies. DIAN operates in an environ-

ment where digital transactions are massive, automated, and cross-border, and where traceability remains virtually nonexistent under analog enforcement schemes.

Comparative literature agrees that VAT administration requires strong and technologically advanced institutions to reduce evasion (Bird & Gendron, 2007). In Latin America, the structural VAT evasion documented by Gómez et al. (2016) reflects the region's institutional fragility, which is further exacerbated in the digital domain. Keen (2013) warns that the complexity of intangible services increases enforcement costs, while Barreix et al. (2023) argue that digital taxation demands profound institutional transformations beyond legal reforms. Fenochietto (2021) complements this diagnosis by emphasizing that the digitalization of tax administrations is indispensable for closing compliance gaps.

In the Colombian case, the absence of robust institutional capacities not only hinders the effective application of existing regulations but also undermines international competitiveness by subjecting local operators to tax burdens that many foreign digital providers manage to evade.

4.1 Artificial Intelligence and Big Data as Structural Requirements for Tax Modernization

The results of the technological surveillance indicate that closing the compliance gap requires more than regulatory adjustments; it demands deep transformations in the technological architecture of the tax system. Comparison with international experiences confirms that the adoption of AI and Big Data constitutes a structural component of digital enforcement. Brynjolfsson and McAfee (2017) highlight that these technologies are redefining the State's capacity to process information, reduce enforcement costs, and respond to the scale of the digital economy.

In the tax field, Alm and McClellan (2012) demonstrate that advanced analytics improve fraud detection and reduce evasion. Gupta et al. (2018) show that Big Data enables automated risk management and increases audit precision. Cerdeiro et al. (2020), in a study focused on Latin America, highlight the potential of AI to characterize risks, automate processes, and improve traceability, while also warning about the need to safeguard rights in the face of algorithmic decision-making.

The literature also underscores ethical risks and tensions. Mittelstadt et al. (2016) stress the importance of ensuring transparency, explainability, and the protection of rights in automated systems. Zuboff (2019) warns that the expansion of the surveillance economy may compromise privacy and autonomy in the absence of adequate regulatory frameworks.

Thus, the discussion shows that technological modernization is not an optional complement but an enabling condition for the effective application of the Destination Principle, the reduction of transaction costs, and the closure of the compliance gap. Without AI and big data, international standards remain inoperative, and Colombia's competitiveness in the international trade of digital services is compromised.

5. CONCLUSIONS

The analysis conducted confirms that the VAT revenue gap in international digital services in Colombia constitutes a structural problem in which normative, institutional, and technological factors converge. Although the country has formally adopted international standards such as the Destination Principle, the absence of effective operational mechanisms to ensure tax collection from non-resident providers reveals a legal inconsistency that limits the practical effectiveness of the rule and undermines tax equity.

The results indicate that the primary obstacle does not lie in normative formulation, but rather in the institutional incapacity to enforce taxation on cross-border operations within a highly digitalized environment. Enforcement costs under an analog administrative paradigm exceed the operational capacity of the tax administration, thereby perpetuating a compliance gap that is recurrently observed across Latin America.

In this context, the adoption of advanced technologies such as AI and Big Data emerges as the most effective mechanism for strengthening the State's enforcement capacity. The evidence indicates that these tools significantly reduce transaction costs, enable more precise risk management, and facilitate audit automation. However, their implementation requires adequate safeguards to ensure transparency, equity, and the protection of taxpayers' rights, in accordance with the ethical principles and the concerns regarding the risks of excessive surveillance.

This study confirms that technological modernization is not a complementary measure, but rather a necessary condition for closing the institutional capacity gap faced by Colombia in the taxation of digital services. The incorporation of AI and Big Data constitutes a critical pathway for rendering existing regulations effectively enforceable and for strengthening tax competitiveness within an increasingly digitalized global economy. Nonetheless, this transformation must be accompanied by robust regulatory frameworks capable of balancing revenue efficiency with rights protection and the legitimacy of the tax system.

5.1 Practical Implications

The findings of this study suggest that Colombia's strategic priority should not focus on the introduction of new normative reforms, but rather on the technological and institutional strengthening of the DIAN. The State's capacity to apply the Destination Principle depends less on legal adjustments and more on the deployment of digital infrastructures that enable real-time tracking, verification, and enforcement of cross-border transactions. In this sense, the digital transformation of tax administration becomes an indispensable requirement for closing the identified compliance gap.

The incorporation of traceability systems supported by Big Data represents an opportunity to rebuild State capacity in the face of a digital market characterized by high complexity, volume, and opacity. These tools not only allow for the identification of consumption patterns and transaction flows, but also substantially reduce the transaction costs associated with monitoring

non-resident providers. Likewise, the automation of audits through AI algorithms can optimize resource allocation, focus enforcement efforts, and enhance DIAN's predictive capacity with respect to emerging risks in digital trade.

Nevertheless, the adoption of these technologies entails significant challenges. Digitalization without clear criteria for transparency, data protection, and accountability may generate tensions with the principles of equity and legitimacy within the tax system. The implementation of AI in enforcement processes therefore requires accompanying regulatory frameworks that guarantee due process, prevent algorithmic bias, and ensure the traceability of automated decisions. Failure to address these concerns could result in technological modernization deepening institutional mistrust or reproducing existing inequalities within the fiscal system.

These practical implications demonstrate that the transition toward a digital enforcement model has the potential not only to strengthen Colombia's international competitiveness, but also to redefine the role of the State in the digital economy. When carried out under sound technical criteria and institutional safeguards, the modernization of the DIAN can contribute to closing the compliance gap, ensuring VAT neutrality in digital services, and consolidating a tax system that is more efficient, legitimate, and consistent with contemporary global dynamics.

5.2 Prospective Outlook

The results of this study open a set of research avenues that allow for projecting the development of the field and for further exploring the implications of tax digitalization in Colombia and Latin America. The prospective dimension of this study is outlined below.

- **Empirical evaluation of the revenue impact of Artificial Intelligence and Big Data**
Quantitative and experimental studies are required to measure the actual effects of implementing data analytics systems, traceability mechanisms, and predictive algorithms on VAT revenue from digital services. This would enable an assessment of the return on investment associated with technological transformation, as well as the validation of the hypothesis that these tools significantly reduce enforcement costs.
- **Comparative analysis of digital tax enforcement models:**
Future research should explore the experiences of countries that have successfully implemented advanced digital tax enforcement systems—such as Australia, the European Union, and Canada—in order to identify best practices, governance models, and lessons that can be adapted to the Colombian context. This comparative approach is essential for accelerating the institutional learning curve of tax administration.
- **Studies on tax legitimacy in contexts of automation:**
The incorporation of AI into tax enforcement processes raises critical questions related to trust, transparency, and algorithmic justice. Further research is needed to examine how taxpayers perceive the use of algorithms in fiscal decision-making and to identify the conditions required to preserve the legitimacy of the tax system in automated environments.

- **Risk assessment and regulatory frameworks for algorithmic tax enforcement:**
Legal and socio-technical studies are required to address the ethical challenges associated with tax automation, including algorithmic bias, privacy concerns, data governance, and accountability mechanisms. Such analyses can guide the development of regulatory frameworks that balance enforcement efficiency with constitutional guarantees and fundamental taxpayer rights.
- **Impact of the digitalization of tax administrations on economic competitiveness:**
An emerging line of research involves examining how the technological modernization of tax administrations influences a country's global economic competitiveness, particularly in the international trade of digital services. This perspective allows tax policy discussions to be linked to broader dynamics of productive development and digital transformation.
- **Modeling future scenarios of taxation in the digital economy:**
Finally, prospective studies are needed to model future scenarios for the evolution of VAT in contexts shaped by generative artificial intelligence, metaverses, decentralized platforms, and new forms of digital service provision. This approach makes it possible to anticipate regulatory challenges and to guide fiscal policy toward a horizon consistent with emerging technological trends.

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