

The Critical Role of Effective Tax Rates in Using AI to Reduce the CIT Gap – A Comparative Analysis of Poland and the Czech Republic^{*}

Abstract

The article analyzes the key role of the effective tax rate (ETR), supported by artificial intelligence (AI), in reducing the corporate income tax (CIT) gap, along with a comparative analysis between Poland and the Czech Republic. In the era of AI and Pillar Two, ETR is becoming a key objective indicator enabling a shift from subjective assessment of taxpayer intent to data-driven analysis. The article verifies the hypothesis that ETR using AI can play a key role in reducing the CIT gap through actual monitoring of ETR and comparison with the profiles of similar entities for early detection of base erosion; quantitative measurement of the compliance gap using reference ETR levels and deviations; and behavioral impact through algorithmic risk scoring, early warning, and integration with the minimum tax, encouraging voluntary reduction of aggressive optimization. A comparative analysis of Poland and the Czech Republic has allowed us to draw universal conclusions about CIT compliance systems using AI under Pillar Two. The added value lies in showing how AI transforms ETR from a simple reporting indicator into a proactive tool for systematically and sustainably reducing the CIT tax gap.

KEYWORDS: CIT gap, corporate income tax, tax law, artificial intelligence, effective tax rate.

SŁOWA KLUCZOWE: luka CIT, podatek dochodowy od osób prawnych, prawo podatkowe, sztuczna inteligencja, efektywna stawka podatkowa.

MICHAŁ RADVAŃ – prof. JUDr. Ing., Ph.D., Masaryk University, e-mail: michal.radvan@law.muni.cz, ORCID – 0000-0002-9858-4555.

ROBERT LIZAK – PhD, Pomeranian University in Słupsk, e-mail: robertpol25@wp.pl, ORCID – 0000-0001-7980-2409.

^{*} Artykuł został przygotowany w trakcie stażu naukowego na Uniwersytecie Masaryka w Brnie, odbytego we wrześniu i październiku 2025 r. Pragnę serdecznie podziękować Panu Profesorowi Dariuszowi Szpoperowi oraz Panu Profesorowi Michałowi Radvańowi za życzliwość i umożliwienie mi odbycia tego stażu, który stanowił dla mnie niezwykle cenne doświadczenie badawcze.

1 | Introduction

The Corporate Income Tax (CIT) Gap is the difference between theoretical and actual CIT revenues, with theoretical revenues representing the amount that would be collected in full compliance with the regulations^[1]. In Poland and the Czech Republic, there is no statutory definition of the term „CIT gap”, although it is used in analytical, economic, control and international contexts^[2]. While the CIT gap has been extremely significant so far, it can be assumed that it will continue to grow rapidly. Firstly, the increasing pressure on public finances, stimulated by a surge in fixed and development expenditures, dictates the need for states to intensify their efforts to increase fiscal efficiency in the CIT area^[3]. Secondly, the increasing internationalization of capital groups, which utilize arbitrage mechanisms and multi-level holding structures as part of aggressive tax planning, poses a significant barrier to the stability of budget revenues. These phenomena, coupled with the dynamic digitalization of economic activity and the proliferation of unconventional business models, significantly limit the effectiveness of conventional tax governance instruments^[4].

1 Patricio Barra, Eric Hutton, Polina Prokof'yeva, *Corporate Income Tax Gap Estimation by Using Bottom-Up Approaches* (International Monetary Fund, 2023), 4.

2 See Jakub Sawulski, Katarzyna Bąkowska, Michał Gniazdowski, *Luka CIT w Polsce w latach 2014–2018* (Warszawa: Polski Instytut Ekonomiczny, 2020), 4–30; Jakub Sawulski, Katarzyna Bąkowska, Michał Gniazdowski, *Luka CIT w Polsce*, Working Paper, no. 2 (Warszawa: Polski Instytut Ekonomiczny, 2022), 4–8; Karolina Konopczak, Aleksander Łżykowski, „Efekt fiskalny uszczelniania systemu podatkowego w Polsce: próba oszacowania w zakresie podatku CIT” *Ekonomista*, no. 1 (2021): 25–55; Najwyższa Izba Kontroli, *Informacja o wynikach kontroli. Nadzór naczelników niewyspecjalizowanych urzędów skarbowych nad prawidłowością rozliczeń podatku dochodowego od osób prawnych*, nr ewid. 84/2024/P/23/068/LLU (Warszawa, 2024).

3 See OECD, „Fiscal Challenges and Resilient Public Finances in an Era of Global Uncertainty” *OECD Economic Outlook* (2023): 55–78; European Commission, *Fiscal Sustainability Report 2024*, Institutional Paper 212 (Luxembourg: Publications Office of the European Union, 2024), 12–35; Dominik J. Gajewski, „Wpływ optymalizacji podatkowej na dochody budżetowe państwa”, in *Międzynarodowe unikanie opodatkowania. Wybrane zagadnienia*, edited by Dominik J. Gajewski (Warszawa: Wolters Kluwer, 2017).

4 See Åsa Johansson, Øystein B. Skeie, Stéphane Sorbe, Carlo Menon, *Tax Planning by Multinational Firms: Firm-Level Evidence from a Cross-Country Database*, OECD Economics Department Working Papers, no. 1355 (Paris: OECD Publishing, 2017); Internal Revenue Service, „Large Business & International Division Compliance Campaigns: Transfer Pricing and Offshore Structures Analysis” *IRS Research Bulletin* (2019): 1–45;

Thirdly, the above-mentioned determinants – in particular the need to reduce the CIT gap – became the impetus for the implementation of the global reform under Pillar Two as of 1 January 2024^[5]. Implementing rules to counteract tax base erosion requires taxpayers and the tax administration to conduct advanced tax data analytics, which is essential for the accurate calculation of the global minimum tax^[6]. Fourthly, according to EU data, in 2017, the CIT gap in Poland was 20.2%, and the size of the shadow tax economy in Poland is estimated to be above the EU average. The Polish tax administration has never published any estimate of the CIT gap^[7]. In the Czech Republic, the estimated size of the CIT gap has not been published either, although the CIT gap in the Czech Republic is lower than in Poland and amounted to 11.1% in 2018^[8].

One of the main determinants of the CIT gap is the lack of sufficient taxpayer reliability in terms of tax compliance, which includes both intentional actions (fraud, tax evasion and avoidance) and negligence (errors and carelessness)^[9].

Rafał Lipniewicz, *Przeciwdziałanie międzynarodowemu unikaniu opodatkowania w polityce Unii Europejskiej* (Wrocław, 2025), 61–65.

⁵ See OECD, *Tax Challenges Arising from the Digitalisation of the Economy – Global Anti-Base Erosion Model Rules (Pillar Two): Inclusive Framework on BEPS* (Paris: OECD Publishing, 2021).

⁶ Roman Wiatrowski, „Czy globalny podatek minimalny rzeczywiście przyczyni się do zwalczania szkodliwej konkurencji podatkowej?”, in *Globalny podatek minimalny. Opodatkowanie wyrównawcze jednostek wchodzących w skład grup międzynarodowych i krajowych*, edited by Dominik J. Gajewski, Monika Laskowska (Warszawa: Wolters Kluwer, 2025), 25–39; Miłosz Kłosowiak, *Wymiana informacji w sprawach podatkowych a ochrona praw podatnika* (Warszawa: Wolters Kluwer, 2025), 21–97; Anna Derdak, *Wybrane obowiązki informacyjne podatników. System podatkowy w dobie digitalizacji* (Warszawa: C.H. Beck, 2024), 1–17.

⁷ See Lidia Brun, Raffael Speitmann, Andrzej L. Stasio, Daniel Stoehlker, *The Corporate Income Tax Gap. A European Approach to Measuring Losses in Corporate Tax Revenues*, JRC Working Papers on Taxation and Structural Reforms, no. 07/2025, JRC144350 (European Commission, Joint Research Centre, 2025), 75; European Commission, *Mind the Gap. Challenges and Opportunities for Tax Compliance and Tax Expenditures in the EU. Final Report* (2025).

⁸ See Brun et al., *The Corporate Income Tax Gap*, 75; European Commission, *Mind the Gap Report – Challenges and Opportunities for Tax Compliance and Tax Expenditure in the EU – Czechia*, Commission Staff Working Document (2025), 5, <https://data.consilium.europa.eu/doc/document/ST-16801-2025-ADD-6/en/pdf>.

⁹ See Brun et al., *The Corporate Income Tax Gap*, 9–11, 72–73. Cf. Richard Murphy, Andrei Guter-Sandu, *Resources Allocated to Tackling the Tax Gap: A Comparative EU Study* (London: City, University of London, 2018).

One of the most important indicators illustrating taxpayer integrity is the effective tax rate (ETR), as this rate can serve as a risk identification tool and a measure of the compliance gap. This occurs for at least three reasons. A significant discrepancy between the nominal CIT rate and the effective tax rate may indicate unreliable taxpayer behavior, particularly by violating the principle of equality and undermining trust in the tax system. On the other hand, a high consistency between the nominal and effective rates can facilitate the identification of honest taxpayers. Finally, a low ETR in selected groups of taxpayers may identify aggressive tax planning or tax avoidance. Because taxpayer integrity should generally be demonstrated by bearing a tax burden close to the statutory portion of income, the ETR can be a circumstantial indicator of this integrity.

There is no doubt that the use of artificial intelligence (AI) in the public sector, including the tax administration, is an important vector for increasing operational efficiency^[10]. This efficiency stems from the fact that the tax administration generates some of the largest volumes of data within the entire state apparatus, thus constituting an ideal environment for AI-based analytical applications^[11]. Systematic training of AI models on diverse datasets enables the precise identification of both known and emerging forms of tax non-compliance. Consequently, the tax administration's analytical and audit activities are optimized, becoming more proportionate to the actual risk. A preliminary review of the potential use of ETR in AI models indicates that ETR could become one of the most important inputs for AI in CIT analytics, as it reflects actual deviations from the normative CIT model, enables proportionate and legal risk

¹⁰ Robert Lizak, *Prawne aspekty neuronowego modelu zarządzania danymi w administracji federalnej Stanów Zjednoczonych z wykorzystaniem AI* (Warszawa: C.H. Beck, 2024); Robert Lizak, „Bariery wykorzystania AI w redukcji erozji bazy podatkowej CIT w Polsce na tle kontroli NIK”, in *AI 360°: innowacje i zastosowania sztucznej inteligencji w gospodarce, społeczeństwie i nauce*, edited by Agnieszka Siedlecka, Mariusz Pyra (Biała Podlaska: Akademia Bialska im. Jana Pawła II, 2026), 75–95, https://doi.org/10.29316/9788368103366_5; Dominik Bierecki, Christophe Gaie, Mirosław Karpiuk, „Artificial Intelligence in e-Administration” *Prawo i Więź*, no. 1(54) (2025): 383–407. <https://doi.org/10.36128/PRIW.VI54.1201>.

¹¹ David F. Engstrom, Daniel E. Ho, Catherine M. Sharkey, Mariano-Florentino Cuéllar, „Algorithmic Governance and the Administrative State”, Stanford Law School Working Paper (2020), 26.

pre-selection, and ultimately allows for the distinction between planning and fraud at the systemic level.

This article attempts to verify the hypothesis that the effective tax rate using AI can play a significant role in reducing the CIT gap. To confirm this hypothesis, it demonstrates that in the era of AI and Pillar Two, the ETR allows for a shift from subjective assessments of taxpayer intentions to robust data analysis, where ETR becomes a critical metric in systemic tax analytics. This is important because the dynamic growth of tax and financial data sources enables continuous ETR measurement in near real time, and AI allows for comparisons of ETR with profiles of similar entities, providing early warning of tax base erosion.

Furthermore, it was assumed that using AI to determine the ETR enables a quantitative measurement of the CIT gap by setting reference ETR levels and identifying significant deviations between the actual and expected ETR, which facilitates diagnosing the sources of the tax gap. Finally, an attempt was made to verify that the use of ETR in AI-based algorithmic risk management systems can positively influence the behavior of CIT taxpayers, leading to a voluntary reduction in aggressive tax strategies, contributing to a reduction in the CIT gap. The added value of this publication is its analysis of the discussed issue in the context of Poland and the Czech Republic. The aim of the comparison was to extract universal conclusions, given relatively similar institutional and macroeconomic factors.

To achieve the aims of the paper, it is necessary to summarize the existing knowledge concerning the ETR as critical data for ex ante evaluation, specifically in the era of AI and Pillar Two, and to critically analyze this knowledge through several examples from both Poland and the Czech Republic. Based on the general knowledge, it is clear that the ETR is an essential tool for identifying the tax compliance gap in CIT. Several comparative examples from Poland and the Czech Republic will prove this fact. The following part will demonstrate the impact of the algorithmic ETR analysis on the voluntary limitation of aggressive tax optimization by the CIT taxpayer. The conclusion shall summarize and synthesize the existing knowledge from the perspectives of tax systems themselves, corporate income taxpayers, national tax administrations and the states, and present the future development in both countries.

2 | ETR as a Critical Data Point for Ex Ante Evaluation in the Era of AI and Pillar Two

In Polish and Czech law, there is no strict legal definition of ETR. The situation is similar in EU law. Although Article 26(1) of Council Directive (EU) 2022/2523 assumes that ETR is the percentage ratio of the sum of the adjusted eligible taxes of all component units in a given jurisdiction to the jurisdiction's eligible net income (loss), this definition is specific and autonomous in nature, as it constitutes a special calculation rule for ETR for the purpose of determining the equalization tax of component units of international and domestic groups^[12]. This definition differs significantly from the traditional understanding of the effective tax rate in CIT, according to which ETR is the ratio of the amount of tax ultimately due (after taking into account all reliefs, exemptions, etc.) to the value of the tax base, which is the balance sheet income before tax (gross result)^[13]. The above definition of ETR is understood the same way in Poland and the Czech Republic.

Importantly, the ETR differs fundamentally from the nominal CIT rate. In Poland, the basic nominal CIT rate is 19% and a reduced rate of 9% for so-called small taxpayers, while in the Czech Republic it is 21%. The difference between the ETR and the nominal rate stems from the fact that the actual tax burden is usually lower or higher than the nominal rate, for reasons such as tax relief or cost accounting rules. It is worth emphasizing that, from 2025, large international groups, including those in Poland and the Czech Republic, are required to set their effective tax rate in a given jurisdiction relative to the 15% global minimum tax rate (Pillar Two).

¹² Council Directive (EU) 2022/2523 of 14 December 2022 on ensuring a global minimum level of taxation for multinational enterprise groups and large-scale domestic groups in the Union (OJ L 328, 22.12.2022, p. 1).

¹³ Frédéric Halleux, Christian Valenduc, *Effective Tax Rate and the Size of the Company in Belgium: An Empirical Investigation on Micro-Data*, Technical Report (2007); Tomasz Berent, „Stawka podatkowa w kalkulacji EVA w kontekście ogólnego modelu podatku dochodowego” *Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu*, no. 48 (2009): 28–45; Michał Kowalski, „Miary efektywności podatkowej przedsiębiorstw” *Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu*, no. 472 (2017): 167–176; Pierre Bachas, Anne Brockmeyer, Roel Dom, Camille Semelet, *Effective Tax Rates, Firm Size and the Global Minimum Tax*, Policy Research Working Paper 11090 (Washington, DC: World Bank Group, 2025), 1–5.

ETR could become a critical data point that is crucial to reducing the CIT gap^[14], because, being an indicator of the actual tax burden – calculated using AI – it enables the identification of deviations from the nominal CIT rate (19% or 9% in Poland and 21% in the Czech Republic), which can: 1) facilitate the identification of the risk of tax avoidance and aggressive optimization, 2) support the mechanism of the so-called minimum tax level, 3) automate risk analysis and reduce the CIT gap as part of the Organisation for Economic Co-operation and Development (OECD) vision of the digital transformation of tax administrations, aimed at making tax processes seamless, automatic and integrated with taxpayers' daily business systems.

For example, in practice, a low ETR level signals the risk of profit shifting, using tax havens, or abusing tax relief. Profit shifting may involve a manufacturing company generating very high revenues but reporting minimal profit or loss because it annually pays increasingly higher fees for „management services and know-how” to a parent company in another EU country. In Poland, processing data contained in JPK_CIT using an AI model can facilitate the detection of a sharp increase in the cost of intangible services, a lack of proportional growth in business scale, a significantly lower margin than comparable companies in the industry, and, ultimately, the concentration of costs in a single affiliated entity^[15]. In the Czech Republic, the tax administration does not use AI tools (including machine learning and data governance processes). Moreover, no clear timeframes for AI implementation in the tax administration have been set, despite the National Artificial Intelligence Strategy for 2030^[16] providing a general approach towards increased reliance on AI-driven tools in public administration and public services. Nonetheless, the

¹⁴ Cf. David Loshin, *The Practitioner's Guide to Data Quality Improvement*, MK Series on Business Intelligence (Burlington: Morgan Kaufmann, 2011).

¹⁵ Cf. *Kierunki działania i rozwoju Krajowej Administracji Skarbowej na lata 2025–2028*, załącznik do zarządzenia Ministra Finansów z dnia 22 grudnia 2024 r. (Dz.Urz. Min. Fin. poz. 123); Ministerstwo Cyfryzacji, *Polityka rozwoju sztucznej inteligencji w Polsce do 2030 roku* (2025); Ministerstwo Finansów, „Wyloniliśmy zwycięzców dwóch wyzwań KAS na HackNation 2025 w Bydgoszczy!”, <https://www.gov.pl/web/finanse/wylonilismy-zwyciezcow-dwoch-wyzwan-kas-na-hacknation-2025-w-bydgoszczy>; Lizak, „Bariery wykorzystania AI”, 79, 90–91.

¹⁶ Ministerstwo przemysłu a obchodu, *Národní strategie umělé inteligence České republiky 2030* (2024), https://mpo.gov.cz/assets/cz/rozcestnik/pro-media/tiskove-zpravy/2024/7/AI_strategie.pdf.

Czech tax administration uses back-end technologies to help ensure taxpayer compliance, manage audits, process and verify tax declarations, and forecast revenues. These tools include data science and related analytics tools, application programming interfaces, identification systems, cloud storage, robotic process automation and network analysis^[17]. The most important tool is the MOJE daně (My Taxes) portal^[18]. It is not only the main interface for taxpayers to access online tax services, but this automated system also provides support for various activities of the tax administration.

An example of the use of tax havens is a company regularly paying interest on a loan granted by a related entity registered in a tax haven, even though it generates high cash flows and the loan interest rate is significantly higher than market rates. In this situation, using AI to analyze tax data can help uncover recurring payments to high-risk jurisdictions, structurally inflated financing costs, and a lack of economic justification for the debt (violation of thin capitalization and transfer pricing principles).

Finally, a company's abuse of tax relief occurs when it deducts R&D tax relief annually, reporting nearly identical amounts for „development work” costs, despite no increase in engineering employment, no change in business profile, and no new assets or work results. In this case, the use of AI could allow for the identification of repetitive cost patterns, a lack of correlation with actual investments, and deviations from industry benchmarks. Importantly, the use of AI is not intended to „prove guilt”, but rather to precisely identify statistically unjustified patterns that constitute a risk signal, and only secondarily a basis for suspected criminal and fiscal risk and justified audits of a smaller but better-selected group of taxpayers (accumulation of signals, repetitiveness, lack of substance, spurious activities). AI's ability to integrate and analyze a range of data from various sources within a capital group facilitates the correct calculation of the ETR basis for Poland or the Czech Republic^[19]. *Prima facie*, it appears that the minimum data necessary to establish the basis of ETR, i.e. GloBE Income, includes financial data from the accounting and consolidation systems of the capital group, data on the gross financial result (profit/loss

¹⁷ European Commission, *Mind the Gap Report – Czechia*, 16.

¹⁸ See <https://adisspr.mfcr.cz/pmd/home>.

¹⁹ Robert Lizak, „A Vision for an Integrated Data Infrastructure Using Artificial Intelligence to Analyze Household Income, Consumption, and Wealth in US Federal Law” *Financial Law Review* 41, no. 1 (2026): 57.

before tax) for each entity belonging to the group, as well as data on the accounting standard (IFRS, local GAAP, US GAAP).

Furthermore, it is essential to recognize and properly classify dividends and capital gains, non-deductible expenses, permanent tax differences (e.g., penalties and fines), and temporary differences. As can be seen, manually verifying the correctness of ETR calculations in a large international group is extremely difficult, if only due to the need to maintain consistency between accounting, tax, consolidation data, and information on the economic substance in a given jurisdiction. The situation is reversed with the use of AI, which not only enables the detection of tax base erosion, as ETR represents the actual, not nominal, tax burden, but also allows for the simulation of ETR even before the end of the financial year.

3 | ETR as a Tool for Identifying the Tax Compliance Gap in CIT

The goal of the Tax Administration 3.0 vision is to change the paradigm of tax administration functioning, consisting of moving from a post-control model to a near-real-time risk management model^[20]. This transition can also be understood as a shift from reactive tax enforcement towards a proactive model, in which predictive analytics enables tax risks to be identified before tax arrears or formal non-compliance materialize^[21]. In practice, this means that it is possible to detect early artificial reductions in ETR through intra-group costs, before tax arrears arise. For example, this can be achieved by analyzing data from electronic tax records, which allow for ongoing analysis of cost structure, transactions with related entities, and tax results. Data from the national e-invoicing system, in turn, enables the identification of invoices documenting intangible services, such as management, IT, or licensing services, along with information on their frequency, value, and contractors. Financial data then allows for the reconciliation of tax data with the balance sheet result and cash flows.

²⁰ See OECD, *Tax Administration 3.0: The Digital Transformation of Tax Administration* (Paris: OECD Publishing, 2020); OECD, *Tax Administration 3.0: From Vision to Strategy* (Paris: OECD Publishing, 2025).

²¹ Lizak, „Bariery wykorzystania AI”, 89.

The ability to integrate these data sources enables the effective use of AI in near-real-time, analyzing transaction patterns, detecting anomalies in intra-group cost structures, and automatically calculating the estimated ETR level. AI can then compare current ETRs with historical taxpayer data and industry benchmarks, and estimate ETR as the ratio of adjusted eligible taxes to eligible net income (taking into account Pillar Two/GloBE adjustments). If a risk of ETR falling below the minimum threshold (e.g., 15%) is detected, the system would generate a risk alert, enabling the tax administration to immediately intervene preventively, such as issuing a request for clarification, thereby minimizing potential arrears and ensuring compliance with the global minimum taxation rules. Such AI-supported risk assessment should, however, be distinguished from fully or partially automated administrative decision-making, which raises separate questions concerning the legal prerequisites and limits of algorithmic decision-making in administrative proceedings[22].

The AI-based ETR can be an objective tool for estimating the CIT tax gap. This is because the statutory CIT rate of 21%, adopted in the Czech Republic, which in Poland is 19% (with the possibility of a reduction to 9% for small taxpayers), can be a basic benchmark for deviations from these rates, which may indicate tax avoidance. More broadly, such an approach reflects a shift in public financial governance towards decision-making models in which risk and uncertainty are increasingly subject to quantitative assessment rather than exclusively ex post evaluation[23]. Therefore, it is first reasonable to compare the actual ETR for a specific taxpayer with the statutory CIT rate. If the actual rate is significantly lower than the statutory rate, there is a likelihood of identifying a tax gap caused by optimization or profit shifting. This gap can be quantified by multiplying the difference between the statutory rate and the actual ETR by the income base. Importantly, in Poland, the above monitoring would be facilitated by the minimum income tax introduced in 2024 for low-profit or loss-making

22 Marcin Kamiński, „Akt administracyjny zautomatyzowany. Zasadnicze problemy konstrukcyjne zastosowania systemów sztucznej inteligencji w procesach decyzyjnych postępowania administracyjnego na tle prawnoporównawczym” *Prawo i Więź*, no. 4(47) (2023): 281–304. <https://doi.org/10.36128/PRIW.VI47.798>.

23 Dominik Bierecki, Małgorzata Czuryk, Christophe Gaie, Jean Langlois-Berthelot, „Sovereignty by Design: Embedding Fiscal Risk Intelligence in Europe’s Defence-Digital Strategy” *Prawo i Więź*, no. 1(60) (2026): 147–164. <https://doi.org/10.36128/222k7566>.

companies (the so-called minimum CIT)[24]. In the Czech Republic, a similar role could be played by the temporary windfall tax (daň z neočekávaných zisků) introduced in 2023–2025 (a 60% surcharge on extraordinary profits in the energy, fuel, and banking sectors), which does not apply in 2026[25].

Additionally, ETR enables quantitative measurement of the CIT gap by establishing industry or sectoral benchmarks for ETR. Industry averages are already available through business intelligence platforms[26]. Benchmarks would enable comparison of a specific taxpayer's results with competitors, and identification of significant deviations from these levels may indicate aggressive tax planning (e.g., through high costs of intangible services). In Poland, data sources such as eKRS, PKD, e-Sprawozdania Finansowe, JPK_SF, CIT-8 with attachments, JPK_KR, JPK_CIT and other JPK_PD, KSeF, Country-by-Country Reporting (CbCR), and GloBE Information Returns can be used to establish industry or sector-specific benchmarks for the ETR. In the Czech Republic, all data can be gained from the MOJE daně portal. Another example of quantitatively measuring the CIT gap using ETR is the integration of ETR with the global minimum income tax (Pillar Two), which introduced a minimum effective tax rate of 15%. In Poland and the Czech Republic, a drop in ETR below 15% (after taking into account substantive exemptions) triggers a top-up tax mechanism. This mechanism allows for measuring and filling the tax gap, as the difference between 15% and the actual ETR, multiplied by GloBE income, determines the top-up amount.

The above indicates that ETR enables the diagnosis of the sources of the tax gap, providing a clear and quantitative reference point that allows for the transition from description to measurement. Furthermore, determining the difference between the statutory rate and the actual ETR can be directly converted into a monetary value by reference to the income base, meaning the tax gap is not a presumption but a quantifiable quantity. Finally, ETR allows for the

24 Ustawa o zmianie niektórych ustaw w celu deregulacji prawa gospodarczego i administracyjnego oraz doskonalenia zasad opracowywania prawa gospodarczego (Dz.U. z 2025 r., poz. 769).

25 Cf. Finanční správa, <https://financnisprava.gov.cz/cs/dane/dane/dan-z-prijmu/dan-z-neocekavanych-zisku/dotazy-a-odpovedi>.

26 Cf. Robert Lizak, Sebastian Skuza, „Propozycje ograniczenia nadużyć w VAT z wykorzystaniem rozwiązań Business Intelligence. Autorskie propozycje wniosków de lege ferenda”, in *Międzynarodowe unikanie opodatkowania. Wybrane zagadnienia*, edited by Dominik J. Gajewski (Warszawa: Wolters Kluwer, 2017), 195–208.

identification of specific sources of the gap, as it can be analyzed at sectoral (industry benchmarks), systemic (minimum tax, windfall tax), and cross-border levels (Pillar Two, including the 15% threshold and top-up tax). As a result, ETR, especially when using AI and integrated data sources, can not only pinpoint the existence of a CIT gap but also precisely determine its potential cause, scale, and origin.

4 | The Impact of the Algorithmic ETR Analysis on the Voluntary Limitation of Aggressive Tax Optimization by the CIT Taxpayer

The purpose of compliance with tax law is to ensure that the addressee of the norm behaves in the manner indicated by the normative authority, both in relation to the specific behavior specified in the wording of the legal norm, the legal system, as well as the mechanisms and policy of compliance with the law^[27]. There is no doubt that any change in law impacts the addressees of legal norms. The situation is similar to the use of new technologies or compliance strategies^[28]. ETR using AI is no exception, as it can have a significant impact on CIT taxpayers. The essence of this impact is to encourage CIT taxpayers to behave in a specific way, namely, to comply with tax law and voluntarily limit aggressive tax optimization.

First, it should be emphasized that the use of AI for algorithmic ETR risk assessment enables the ongoing generation of a specific tax rating, which assesses the reliability and credibility of a CIT taxpayer. While the tax administration's actions to date have been sporadic, with AI, the CIT taxpayer's assessment can be permanent, dynamic, and updated almost continuously. This means that a permanent deviation of the ETR from the reference level is identified as an increased risk, which should not be ignored by CIT taxpayers and the tax administration. As a result, there is a high probability that some CIT taxpayers will voluntarily adjust their ETR to an economically justified level, which would mitigate the risk and stabilize their tax rating.

²⁷ Lizak, *Prawne aspekty neuronowego modelu*, 111.

²⁸ Cf. Michał Mariański, Jakub Szczupakowski, „Rola soft law w zakresie MDR na przykładzie tzw. objaśnień podatkowych. Analiza prawno-porównawcza” *Studia Prawnoustrojowe*, no. 67 (2025): 269–282.

On the one hand, AI enables permanent, dynamic, and almost continuously updated assessment of CIT taxpayers. On the other hand, it allows for the generation of early warning signals, i.e., identifying symptoms of tax base erosion (e.g., a sudden drop in ETR). These signals could be automatically generated for CIT taxpayers, who could submit appropriate explanations or make self-corrections without escalating formal administrative or penal fiscal procedures. Finally, AI could be used to integrate ETR with Pillar Two requirements and national minimum tax mechanisms.

AI automatically monitors the effective rate by jurisdiction and group, identifying situations where it falls below statutory thresholds – including the key 15% threshold after taking into account substantive exclusions. The system can simulate the amount of a potential top-up tax before the end of the fiscal year. Aggressive optimization loses economic sense in such circumstances, as the potential benefit is neutralized by the algorithmically calculated top-up tax. Taxpayers see the direct cost of their strategy, and interpretational uncertainty gives way to a hard, predictable calculation. As a result, taxpayers cease striving to minimize their ETR below the minimum threshold and instead consciously maintain it safely above the minimum, systematically reducing the CIT gap.

5 | Conclusion

It is fundamental that the CIT tax system should strive to shift from ex post audits to continuous, data-driven risk management. In the context of digitalization, AI and Pillar Two, the traditional model of post-tax audit is losing its relevance, making a transition to an ex ante model based on data analytics necessary. The benefits include consistent compliance with tax regulations and increased tax revenue. Artificial intelligence and advanced tax analytics can more effectively combat tax evasion and avoidance, while also increasing fairness and reducing the costs of tax collection[29].

It seems necessary to combine data on all taxes, particularly in the area of VAT and income tax integration. Since the Czech Republic currently does not use any artificial intelligence tools in its tax administration, a first step could be to draw inspiration from an internal AI-based chatbot that helps auditors and public administration employees more quickly find and understand EU

29 See European Commission, *Mind the Gap Report – Czechia*, 1–2.

financing rules^[30]. In the case of Poland, it is recommended to increase the effectiveness of data reporting obligations enforcement and improve the efficiency of integrated database resource analysis^[31]. AI tools should be particularly helpful in tax audits. Artificial intelligence offers an opportunity to meet the growing demands for quality, speed, and consistency of audits^[32]. This is not about replacing human labor, but about intelligently using technology for routine and repetitive tasks. Artificial intelligence offers public administration a way to operate in a modern, efficient, and responsible manner.

The research determined that ETR should be treated as a critical data point in CIT analytics, as it enables objective, quantitative, and comparative identification of the CIT gap, providing measurable benchmarks (statutory rate, industry benchmarks, and the 15% Pillar Two threshold) and its sectoral, systemic, and cross-border location. ETR should even become a central input in CIT gap management systems. Consequently, tax administrations should base CIT oversight on algorithmic ETR analytics rather than on assessing taxpayer intent, as taxpayer intent is subjective, costly, and difficult to prove. This entails the need to change the paradigm in the qualification of taxpayers' activities by moving away from examining the taxpayer's motives towards determining the actual tax effect of the activity performed.

ETR is a critical data point in reducing the CIT gap using AI, as it enables ex ante identification and reduction of the gap, promotes taxpayer self-control, reduces the randomness of audits, increases system predictability and legal security for taxpayers, while transforming the taxpayer-administration relationship into a continuous and data-driven one. Furthermore, ETR is becoming a key indicator of CIT taxpayers' own tax risk, as the actual level of effective taxation, rather than formal compliance, increasingly determines the taxpayer's assessment by the administration, which not only encourages, but even forces active management of ETR as part of their own compliance strategies. This is further supported by the fact that in the AI era, aggressive tax optimization is no longer profitable and is becoming more predictable, as the administration

³⁰ Cf. Ministerstwo finansów, <https://www.mfcr.cz/cs/zahranici-a-eu/podpora-ze-zahranici/auditni-organ/zakladni-informace/umela-intelligence-ve-sluzbach-auditu>.

³¹ Najwyższa Izba Kontroli, *Informacja o wynikach kontroli*, passim.

³² Cf. Sebastian Skuza, Robert Lizak, „AI Enables the Control of Public Finances: US Federal Government Initiatives” *Białostockie Studia Prawnicze* 28, no. 2 (2023): 184–185. <https://doi.org/10.15290/bsp.2023.28.02.11>.

has tools to neutralize its benefits even before the end of the tax year. Thus, maintaining the ETR at an economically justified level becomes a rational business strategy, because in an AI-based system the safest solution is to voluntarily maintain the ETR within the reference range, and compliance ceases to be a cost, becoming an element of risk and tax reputation management.

The integration of tax and financial data, ETR, and AI effectively ensures that the state has the tools to sustainably increase CIT revenues, as it becomes possible to systemically reduce the tax gap while simultaneously shifting from a repressive model to a preventive, proportionate, and data-driven one. This increases efficiency, reduces costs, and strengthens the legitimacy of the tax administration. Furthermore, combining ETR with Pillar Two strengthens the state's fiscal sovereignty in the global economy, enabling the effective enforcement of a global minimum tax rate and counteracting profit shifting by international groups. Finally, a comparison of Poland and the Czech Republic demonstrates the universality of ETR as an indicator of tax fairness, regardless of differing nominal CIT rates and national instruments, demonstrating that ETR acts as a neutral and comparable metric. Equally important is the fact that, on the one hand, ETR is not specific to a given country's legal system, and, on the other, the impact of ETR and AI on taxpayer behavior is transnational in nature.

Bibliography

- Bachas, Pierre, Anne Brockmeyer, Roel Dom, and Camille Semelet. *Effective Tax Rates, Firm Size and the Global Minimum Tax*. Policy Research Working Paper 11090. Washington, DC: World Bank Group, 2025.
- Barra, Patricio, Eric Hutton, and Polina Prokof'yeva. *Corporate Income Tax Gap Estimation by Using Bottom-Up Approaches*. International Monetary Fund, 2023.
- Berent, Tomasz. „Stawka podatkowa w kalkulacji EVA w kontekście ogólnego modelu podatku dochodowego.” *Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu*, no. 48 (2009): 28–45.
- Bierecki, Dominik, Małgorzata Czuryk, Christophe Gaie, and Jean Langlois-Berthelot. „Sovereignty by Design: Embedding Fiscal Risk Intelligence in Europe's Defence-Digital Strategy.” *Prawo i Wiąż*, no. 1(60) (2026): 147–164. <https://doi.org/10.36128/2z2k7566>.
- Bierecki, Dominik, Christophe Gaie, and Mirosław Karpiuk. „Artificial Intelligence in e-Administration.” *Prawo i Wiąż*, no. 1(54) (2025): 383–407. <https://doi.org/10.36128/PRIW.VI54.1201>.

- Brun, Lidia, Raffael Speitmann, Andrzej L. Stasio, and Daniel Stoehlker. *The Corporate Income Tax Gap. A European Approach to Measuring Losses in Corporate Tax Revenues*. JRC Working Papers on Taxation and Structural Reforms, no. 07/2025, JRC144350. European Commission, Joint Research Centre, 2025.
- Derdak, Anna. *Wybrane obowiązki informacyjne podatników. System podatkowy w dobie digitalizacji*. Warszawa: C.H. Beck, 2024.
- Engstrom, David F., Daniel E. Ho, Catherine M. Sharkey, and Mariano-Florentino Cuéllar. „Algorithmic Governance and the Administrative State.” Stanford Law School Working Paper, 2020.
- Gajewski, Dominik J. „Wpływ optymalizacji podatkowej na dochody budżetowe państwa.” In *Międzynarodowe unikanie opodatkowania. Wybrane zagadnienia*, edited by Dominik J. Gajewski. Warszawa: Wolters Kluwer, 2017.
- Halleux, Frédéric, and Christian Valenduc. *Effective Tax Rate and the Size of the Company in Belgium: An Empirical Investigation on Micro-Data*. Technical Report, 2007.
- Johansson, Åsa, Øystein B. Skeie, Stéphane Sorbe, and Carlo Menon. *Tax Planning by Multinational Firms: Firm-Level Evidence from a Cross-Country Database*. OECD Economics Department Working Papers, no. 1355. Paris: OECD Publishing, 2017.
- Kamiński, Marcin. „Akt administracyjny zautomatyzowany. Zasadnicze problemy konstrukcyjne zastosowania systemów sztucznej inteligencji w procesach decyzyjnych postępowania administracyjnego na tle prawnoporównawczym.” *Prawo i Więź*, no. 4(47) (2023): 281–304. <https://doi.org/10.36128/PRIW.VI47.798>.
- Kłosowiak, Miłosz. *Wymiana informacji w sprawach podatkowych a ochrona praw podatnika*. Warszawa: Wolters Kluwer, 2025.
- Konopczak, Karolina, and Aleksander Łżykowski. „Efekt fiskalny uszczelniania systemu podatkowego w Polsce: próba oszacowania w zakresie podatku CIT.” *Ekonomista*, no. 1 (2021): 25–55.
- Kowalski, Michał. „Miary efektywności podatkowej przedsiębiorstw.” *Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu*, no. 472 (2017): 167–176.
- Lipniewicz, Rafał. *Przeciwdziałanie międzynarodowemu unikaniu opodatkowania w polityce Unii Europejskiej*. Wrocław, 2025.
- Lizak, Robert. *Prawne aspekty neuronowego modelu zarządzania danymi w administracji federalnej Stanów Zjednoczonych z wykorzystaniem AI*. Warszawa: C.H. Beck, 2024.
- Lizak, Robert. „A Vision for an Integrated Data Infrastructure Using Artificial Intelligence to Analyze Household Income, Consumption, and Wealth in US Federal Law.” *Financial Law Review* 41, no. 1 (2026): 47–62.
- Lizak, Robert. „Bariery wykorzystania AI w redukcji erozji bazy podatkowej CIT w Polsce na tle kontroli NIK.” In *AI 360°: innowacje i zastosowania sztucznej inteligencji w gospodarce, społeczeństwie i nauce*, edited by Agnieszka Siedlecka, Mariusz Pyra, 75–95. Biała Podlaska: Akademia Bialska im. Jana Pawła II, 2026. https://doi.org/10.29316/9788368103366_5.

- Lizak, Robert, and Sebastian Skuza. „Propozycje ograniczenia nadużyć w VAT z wykorzystaniem rozwiązań Business Intelligence. Autorskie propozycje wniosków de lege ferenda.” In *Międzynarodowe unikanie opodatkowania. Wybrane zagadnienia*, edited by Dominik J. Gajewski, 195–208. Warszawa: Wolters Kluwer, 2017.
- Loshin, David. *The Practitioner's Guide to Data Quality Improvement*. MK Series on Business Intelligence. Burlington: Morgan Kaufmann, 2011.
- Mariański, Michał, and Jakub Szczupakowski. „Rola soft law w zakresie MDR na przykładzie tzw. objaśnień podatkowych. Analiza prawno-porównawcza.” *Studia Prawnoustrojowe*, no. 67 (2025): 269–282.
- Murphy, Richard, and Andrei Guter-Sandu. *Resources Allocated to Tackling the Tax Gap: A Comparative EU Study*. London: City, University of London, 2018.
- Sawulski, Jakub, Katarzyna Bąkowska, and Michał Gniazdowski. *Luka CIT w Polsce w latach 2014–2018*. Warszawa: Polski Instytut Ekonomiczny, 2020.
- Sawulski, Jakub, Katarzyna Bąkowska, and Michał Gniazdowski. *Luka CIT w Polsce*. Working Paper, no. 2. Warszawa: Polski Instytut Ekonomiczny, 2022.
- Skuza, Sebastian, and Robert Lizak. „AI Enables the Control of Public Finances: US Federal Government Initiatives.” *Białostockie Studia Prawnicze* 28, no. 2 (2023): 175–195. <https://doi.org/10.15290/bsp.2023.28.02.11>.
- Wiatrowski, Roman. „Czy globalny podatek minimalny rzeczywiście przyczyni się do zwalczania szkodliwej konkurencji podatkowej?” In *Globalny podatek minimalny. Opodatkowanie wyrównawcze jednostek wchodzących w skład grup międzynarodowych i krajowych*, edited by Dominik J. Gajewski, Monika Laskowska, 25–39. Warszawa: Wolters Kluwer, 2025.



This article is published under a Creative Commons Attribution 4.0 International license.
For guidelines on the permitted uses refer to
<https://creativecommons.org/licenses/by/4.0/legalcode>