JOURNAL OF ACCOUNTING AND BUSINESS EDUCATION
P-ISSN 2528-7281 E-ISSN 2528-729X
E-mail: jabe.journal@um.ac.id
http://journal2.um.ac.id/index.php/jabe/

Digital Transformation and Regulatory Arbitrage: How Cash Holdings Facilitate Corporate Tax Avoidance

Fadlil Abdani[1]
Moh. Afani[2]
Rama Putra Adi Cahaya[3]
Izzun Nisa'yanayiroh [4]
Ananda Sriphol [5]
[1] *Accounting Department, Faculty of Economic, UIN Maulana Malik Ibrahim Malang, Indonesia*
[2,3] *Accounting Department, Faculty of Economic, Universitas Brawijaya, Indonesia*
[4] *Islamic Economy Department, UIN Maulana Malik Ibrahim Malang, Indonesia*
[5] *Business English Department, Faculty of Arts, Assumption University of Thailand*
email: fadlilabdani@uin-malang.ac.id

***DOI**: http://dx.doi.org/10.17977/jabe.v11i1.68112*

Abstract: This study aims to examine the effect of digital transformation on tax avoidance and the mediating role of cash holdings in public companies in Indonesia. Using a purposive sampling technique, a final sample of 2,040 firm-year observations was obtained from non-financial companies listed on the Indonesia Stock Exchange for the 2020–2024 period. The data were analyzed using panel data regression, a mediation approach, and two-stage least squares (2SLS) to address potential endogeneity. The results demonstrate that digital transformation consistently and robustly reduces tax avoidance through a direct channel while increasing cash holdings. Cash holdings partially mediate this relationship in a competitive manner, where larger cash reserves actually increase tax avoidance, consistent with the pecuniary motive hypothesis. Nevertheless, the total effect of digital transformation on tax avoidance remains negative. These findings provide crucial implications for tax authorities, particularly in developing countries, highlighting the necessity of technology-based oversight mechanisms to enhance corporate tax compliance and overcome administrative capacity limitations.

Article History
Received:
8 August 2026

Revised:
14 September 2026

Accepted:
15 September 2026

Keywords
Digital transformation; Cash holding; Tax avoidance

Citation: Abdani et al. (2026). Digital transformation and regulatory arbitrage: how cash holdings facilitate corporate tax avoidance. *Journal of Accounting and Business Education, 11*(1),47-68

INTRODUCTION

The ongoing digital transformation has placed Indonesia's tax system in a significant fiscal dilemma. The government faces the challenge of Indonesia's low tax-to-GDP ratio in 2023, which stood at only 10.31% far below the Asia-Pacific regional average of 19.6% and the OECD average of 33.9% and is projected to decline to 10.03% by 2025. This situation is a critical issue given that Indonesia's revenue structure relies heavily on corporate income tax (PPh) revenue; thus, the widespread practice of corporate

tax avoidance directly erodes fiscal capacity and hinders the financing of national development (Hanlon and Heitzman 2010). The limitations of conventional oversight and weaknesses in tax governance to date have underscored the need for fundamental systemic reform. As a strategic response, the government has adopted Coretax, a large-scale digital tax administration system designed to integrate governance, enhance transparency, and strengthen taxpayer compliance (Rahayu & Kusdianto, 2023). However, this technological integration presents complex implications: while digital transformation has the potential to curb fraudulent practices, it also risks triggering adaptive responses from corporations in the form of regulatory arbitrage to minimize their tax liabilities.

The relationship between digital transformation (DIGIT) and tax avoidance has sparked academic interest in this issue, but empirical evidence shows inconsistent results. Some studies have found that DT can curb tax avoidance practices by optimizing corporate transparency, improving information disclosure, and enhancing internal control systems, which in turn increase the potential for detecting avoidance strategies (Azenzoul et al., 2025; Zhang & She, 2024). The implementation of AI- and big data-based tax administration systems is considered effective in mitigating tax avoidance (Belahouaoui & Attak, 2024). Conversely, Chen and Meng (2024) argue that digitalization creates risks of potential tax avoidance. This is because technology enables companies to conduct complex transactions with affiliates and exploit legal loopholes to shift profits to lower-tax jurisdictions. Another perspective from Qu and Jing (2025) explains that high technology adoption costs can weaken a company's financial position, leading management to engage in tax avoidance to maintain cash flow stability. These inconsistencies in the literature suggest the involvement of mediating variables in the relationship between digital transformation and tax avoidance. Research findings in Indonesia indicate that digital transformation fails to moderate the influence of controlling shareholders on tax avoidance (Reswita et al., 2026), this finding points to a theoretical gap regarding mediating variables that have not yet been identified in greater detail within the tax literature. Thus, tax avoidance behavior is driven by the motive of budget efficiency to anticipate external constraints, and cash holdings play a crucial role in managing corporate liquidity. The cash holdings variable defines the formulation of tax strategies based on information transitions resulting from the adoption of digital technology (Edwards et al., 2016; Xu & Zhang, 2026). However, the cash holdings variable, as a mechanism variable, has not been explored in depth in previous studies.

This study suggests that cash holdings serve as the primary mediating variable linking digital transformation to tax avoidance practices. Consistent with Jensen and Meckling (1976), agency theory, although digitization increases transparency, it creates potential scope for managerial discretion that gives rise to information asymmetry. Given their ability to create a financial cushion through liquidity reserves, managers tend to hold larger amounts of cash to capitalize on the strategic advantages arising from regulatory arbitrage strategies, which often involve the implementation of complex policies (Khuong et al. 2019). The availability of adequate liquid resources is crucial for mitigating the risk of future penalties and fines related to tax compliance. Empirical findings reported by Foley et al. (2007) and Hanlon et al. (2017) also indicate that cost savings derived from implementing efficient tax planning activities are typically reinvested to strengthen a company's liquidity reserves. Thus, the process of accumulating cash holdings triggered by the adoption of technology is a key mechanism underpinning the effective optimization of a company's tax position.

Although the literature on this topic has grown rapidly in recent years, there is an urgent need to theoretically explain the mechanisms underlying the relationship between digital transformation and tax avoidance. While previous research has largely examined direct effects yielding conflicting findings on the one hand, digitalization is viewed as a means of disciplining governance (Azenzoul et al., 2025; Xie & Huang, 2023), while on the other hand, it has raised concerns about the potential misuse of technology to develop non-transparent tax schemes (Chen et al., 2024; Qu & Jing, 2025). A recent study by Sun et al. (2025) has sought to address some of these gaps by identifying the risk of losses and political costs as

potential mediating variables in this relationship; however, it did not investigate whether ownership structure plays a significant role in facilitating these outcomes through its primary transmission mechanisms. Furthermore, the dominance of empirical research on corporations in China (Tiantian et al., 2023) limits the generalizability of the findings to other developing countries. Institutional characteristics in Southeast Asia particularly in Indonesia, which is undergoing massive digital tax reforms provide a unique context for testing the extent to which cash holdings facilitate regulatory arbitrage in the era of digital transformation.

Indonesia offers a unique research context because it serves as a bridge between the challenges faced by tax authorities due to concentrated ownership structures and the government's efforts to modernize tax administration (Reswita et al., 2026). The implementation of the Coretax system in 2025 a form of digital transformation is one of the concrete steps toward realizing the government's Tax Administration 3.0 vision, specifically in terms of establishing stricter, data-driven tax oversight (Anjarwi, 2026). In addition, cash management also plays a crucial role in the efficient use of information generated through digital transformation, enabling companies to maximize their cash holdings and subsequently implement tax avoidance strategies as a form of protection or preventive savings (Foley et al., 2007). The position of companies in Indonesia serves as a comprehensive research laboratory for developing countries, providing insight into the diversity of institutional characteristics. Companies in emerging markets face numerous specific issues, including ownership concentration, insufficient investor protection, and an increasingly mature digital infrastructure all of which create an institutional framework that contrasts with the literature on digital transformation, which typically focuses on developed countries. Due to these distinctive institutional characteristics, the relationship between digital transformation and tax avoidance may differ from that in developed countries. Therefore, by exploring the mediating role of cash holdings in emerging markets, this study contributes to expanding the literature while addressing the lack of empirical evidence in developing countries. This study focuses on non-financial companies listed on the Indonesia Stock Exchange with the aim of analyzing the mediating role of cash holdings in the relationship between digital transformation and tax avoidance. The main contribution of this study's findings is to expand the literature on tax governance and digital transformation, as well as to assist tax authorities in formulating tax policies amid ongoing digital reforms.

LITERATURE REVIEW AND HYPOTHESES

Agency Theory

Agency theory, introduced by Jensen and Meckling (1976), describes the relationship between a principal and an agent; this relationship is based on shareholders' complete trust in management, with the expectation that all decisions will be made in accordance with the shareholders' best interests. In reality, management prioritizes its own interests over the value of the company; this triggers a conflict of interest and is exacerbated by information asymmetry between the two parties (Jensen & Meckling, 1976). Jensen (1999) argues that managers are motivated to hoard excess cash with the aim of expanding their managerial control over the company's resources, and that this flexibility creates loopholes for investments that benefit only management. The existence of information asymmetry limits shareholders' ability to exercise full oversight over managerial decisions. Dittmar et al. (2003) concur with this view, noting that the retention of excess cash in companies with poor corporate governance is a direct indicator of the magnitude of agency costs arising from a lack of oversight over management. Expanding on the agency theory, Desai and Dharmapala (2006) demonstrate that tax avoidance decreases due to the combined pressure of high-powered incentives and a sound governance ecosystem, thereby enabling managers to maximize the principal's value objectives. A high level of tax avoidance expands the scope of managerial discretion and reduces the company's operational transparency vis-à-vis shareholders. This clearly explains why

companies with complex agency problems are actually more aggressive in executing their tax planning strategies. The interconnection between these two dimensions forms the central focus of this study. Since the profits from tax avoidance are accumulated as cash without distribution to shareholders, cash holdings serve as an indicator of agency problems that allow tax avoidance actors to operate more freely (Foley et al., 2007). In this study, digital transformation can reduce agency conflicts by enhancing information transparency and the integrity of internal controls (Zhang & She, 2024), thereby curbing companies' tendencies toward excessive cash accumulation and tax avoidance.

Precautionary Motive

The precautionary motive is one of several classic motives in Keynes (1936), theory of money demand, describing the tendency of economic agents to hold liquidity as a safeguard against uncertainty regarding future cash flows. In the context of corporate finance, this precautionary motive justifies why a company would hold more cash than the minimum amount required for daily operations namely, to ensure the availability of internal funds to meet potential urgent future needs when access to external financing is limited or expensive (Opler, 1999).

Empirically, Opler (1999) finds that firms experiencing greater levels of cash flow volatility as well as easier access to external financing hold more cash consistent with the prudence motive. Empirical work based on a longitudinal study of US public companies by Bates et al. (2009) also supports this finding by indicating that a considerable amount of an increase in the level of cash holdings between the years 1980-2006 was due to increased levels of cash flow volatility. Hence, we argue that uncertainty regarding their operations as well as constraints related to financing can be viewed as important determinants of cash-holdings decisions as per the prudence motive.

The relevance of this paper's research objective regarding the motive for prudence lies in its transformation as a result of the digitization process. This study shows that digitization affects the three sources of uncertainty underlying the motive for prudence. First, there has been an increase in the accuracy of liquidity forecasting through real-time management systems using enterprise resource planning (ERP). Consequently, firms no longer need to maintain excess liquidity reserves as a hedge against uncertainty. Second, a study by Pu (2025) shows that the adoption of technological innovations reduces cash holdings, although the reduction effect is weaker among firms facing financing constraints. Therefore, financial constraints moderate the ability of digitization to reduce the prudence motive. Finally, the improved quality of information disclosure resulting from digitalization enhances stock liquidity, thereby facilitating companies' access to capital markets, which in turn reduces the intensity of the precautionary motive when making decisions regarding cash holdings (Liu et al., 2024). Thus, digital transformation systematically mitigates the foundation of the precautionary motive that drives corporate cash accumulation, and this mechanism serves as one of the primary transmission channels explaining why DT has a negative effect on firms' cash holding levels.

Digital Transformation dan Tax Avoidance

According to Verhoef et al. (2021), digital transformation represents the integration of various technological innovations, such as big data and artificial intelligence (AI), into a company's business operations. As a long-term and risky process, digital transformation drives changes in business processes and corporate governance. Chen et al. (2024) assert that the combination of digital asset characteristics and high transaction volumes among related parties leveraging the effects of digital transformation will create obstacles for tax authorities in their oversight efforts. Regardless of the debate surrounding these findings, several empirical studies indicate that the role of digitalization in reducing tax avoidance practices is more significant than its potential for exploitation. The effectiveness of these tax avoidance mitigation measures aligns with the development of digital oversight in the era of Tax Administration 3.0 (Anjarwi, 2026; Belahouaoui & Attak, 2024). The implementation of AI- and big data-based technologies enhances the effectiveness of oversight by tax authorities; this efficiency can limit the tax strategies frequently employed

by companies (Nuryani et al., 2024; Sun et al., 2025). Based on this discussion, the first hypothesis is formulated as follows:

H_1: Digital transformation has a negative effect on tax avoidance

Digital Transformation dan Cash Holding

Cash balance indicates the level of liquidity or cash resources held by a company, calculated as the ratio of cash and cash equivalents to the entity's total assets Several empirical studies suggest that digital transformation can reduce cash holdings due to its effects in increasing transparency, reducing agency conflicts, and enhancing cash efficiency in fulfilling transaction motives (Fan et al., 2026; Pu, 2025; Sun et al., 2022). Furthermore, the adoption of digital technology also has a significant impact on a company's profitability and operational efficiency, which in turn contributes to an increase in the company's cash flow volume. In studies conducted by Asiri (2026) and Mai et al. (2026), the research findings confirmed a positive relationship between the implementation of digital transformation and a company's cash holdings. As noted by Mai et al. (2026), who found that the implementation of digital transformation has a positive effect on a company's level of cash holdings. Second, we consider the investment needs for a sustainable digital journey. The implementation of digital transformation requires capital allocation to support human resources, technological infrastructure, and system upgrades. Therefore, companies in this phase accumulate cash as a strategic step to ensure sustainability while avoiding high capital costs. Hindi and Sarhan (2025) assert that digital-based financial modernization encourages companies to retain cash as a strategy for making potential investments in the era of cutting-edge technology. Based on these arguments, our study posits that the implementation of digital transformation will drive an increase in liquidity. Based on the discussion above, our first hypothesis is formulated as follows:

H_2: Digital transformation has a positive effect on cash holding

Cash Holding dan Tax Avoidance

The correlation between cash holdings and tax avoidance plays a central role in the analysis of corporate financial decisions. From the perspective of the precautionary motive theory, tax efficiency is viewed as an internal mechanism for accumulating liquidity. Cash retention resulting from tax savings gradually strengthens a firm's liquidity structure (Foley et al., 2007; Khuong et al., 2019). where these funds serve as a financial flexibility buffer to minimize reliance on external capital (Guenther et al., 2020). In times of macroeconomic turmoil, tax aggressiveness is often transformed into a defensive strategy to build a liquidity buffer (Istiqfarosita & Abdani, 2022; Nguyen & Nguyen, 2020). From a risk perspective, cash accumulation serves as a hedge against the uncertainty of future tax liabilities (Hanlon et al., 2017). The effect of tax savings acceleration on cash holdings is primarily amplified in entities subject to financial constraints (Foley et al., 2007). Empirical evidence from emerging markets such as Vietnam (Khuong et al., 2019) and Saudi Arabia (El Sayad et al., 2026). consistently identifies a positive correlation between the level of tax avoidance and cash accumulation. This accumulation of liquidity is further accelerated in corporations with a broad customer base, where high financing risks drive the use of internal liquidity resulting from tax savings (Huang et al., 2016). Conversely, however, Kurniawan and Nuryanah (2017) failed to find a significant correlation between these two variables. This empirical discrepancy is believed to stem from the unique characteristics of the Indonesian capital market, which is dominated by concentrated ownership, causing the dynamics of agency problems to shift from the classic conflict (managers vs. shareholders) to a conflict among shareholders (controlling vs. non-controlling). Based on this theoretical synthesis and these phenomena, the proposed hypothesis is:

H_3: Cash holdings have a positive effect on tax avoidance

Digital Transformation, Cash Holding, and Tax Avoidance

The conceptual framework of this study positions cash holdings as a mediating variable linking digital transformation (DT) to tax avoidance. The causality of this intervention is explained through two interrelated theoretical transmission mechanisms. In the first mechanism, the adoption of DT drives operational efficiency and the automation of business processes, leading to increased profitability and free cash flow. This accumulation of abundant cash, in turn, strengthens management's incentive to implement tax avoidance strategies. From the perspective of agency theory (Jensen & Meckling, 1976), the size of cash reserves triggers pressure from shareholders demanding the redistribution of dividends from excess liquidity (excess cash). To respond to this pressure while safeguarding the corporation's cash reserves, managers are driven to implement tax-saving measures. This idea reinforces the findings of Foley et al. (2007) which confirmed the existence of a reciprocal relationship between cash accumulation and tax avoidance. Thus, the transmission of DT to an increase in cash holdings simultaneously amplifies tax avoidance practices in order to maintain the entity's liquidity stability.The second mechanism focuses on mitigating conflicts within the company, where the implementation of digital transformation enhances transparency and the quality of internal oversight. This helps curb opportunistic behavior by management in setting cash-holding policies. At the same time, strict digital-based oversight can curb management's tax avoidance strategies aimed at increasing non-transparent cash reserves (Desai & Dharmapala, 2006; Zhang & She, 2024). Under this mechanism, the presence of digital transformation directly curbs tax avoidance practices, as the transparency resulting from digitization limits management's room to maneuver. Conversely, the indirect mediating effect of cash holdings shows a positive direction: digital efficiency leads to cash accumulation and ultimately provides an incentive for tax avoidance. Integrating these two theoretical foundations, this study posits that the direction of the mediation will be determined by the dominance of either the efficiency effect or the governance control effect. The mediating variable, cash holdings, serves as a unique mechanism linking digital transformation and tax avoidance, an argument that has not yet been empirically tested in Indonesia. Therefore, to account for this dual causality, this study formulates the fourth hypothesis as follows:

H_4: Cash holdings mediate the effect of digital transformation on tax avoidance

METHODS

Data and sample selection

This study employs a quantitative approach to analyze the mediating role of cash holdings in the relationship between digital transformation and tax avoidance. The study uses secondary data sourced from the annual financial reports (annual reports) of non-financial companies listed on the Indonesia Stock Exchange (IDX) for the period 2020–2024. The selection of this period is based on two main considerations: first, this period reflects the accelerated adoption of digital technology, which has significantly driven the acceleration of corporate digital transformation in Indonesia; second, the availability of more comprehensive digital disclosure data in the annual reports of Indonesian public companies during this period.

The sampling technique was conducted in stages, beginning with an initial population of 4,147 firm-year observations obtained from the Osiris database and companies' annual reports published on the IDX. Companies in the financial industry were excluded from the sample because their regulatory characteristics and financial structures differ significantly from those of the non-financial sector, which could introduce bias in the measurement of tax avoidance and cash holdings. Furthermore, to address potential distortions in the measure of the effective tax rate caused by pre-tax profits that are close to zero or negative, this study excluded companies with negative pre-tax profits from the final sample, following common practice in the

literature on tax avoidance (Hanlon & Heitzman, 2010). Based on this process, 521 observations from the financial industry and 1,586 observations with incomplete data on key variables were excluded. The final sample size obtained through this process consists of 2,040 firm-year observations.

Measurement Variables

Tax avoidance, as the primary dependent variable in this study, is measured using the GAAP Effective Tax Rate (GAAPETR) metric proposed by Hanlon and Heitzman (2010), According to them, the calculation of this metric begins by determining the ratio of a company's total tax expense to its pre-tax income. After this calculation, the GAAPETR must be multiplied by –1. Thus, an increase in this value indicates an increase in the level of tax avoidance (Hanlon & Heitzman, 2010). The use of this GAAPETR-based measure provides a comprehensive picture of both permanent and temporary tax avoidance strategies employed by the companies under study (Hanlon & Heitzman, 2010). Therefore, a GAAPETR-based assessment of tax avoidance can yield more comprehensive results compared to a cash-based assessment.

For the purposes of the robustness test, the current effective tax rate (CURETR) and the cash effective tax rate (CASHETR) are also used as additional proxies for tax avoidance. CURETR is calculated by dividing the current tax burden by pre-tax profit. This proxy reflects the amount of current income tax liability for the current year, excluding deferred tax components. Meanwhile, CASHETR measures actual cash payments against taxes payable. CASHETR is calculated by dividing the actual cash actually paid for taxes payable by pre-tax income. Just like GAAPETR, both of these proxies are multiplied by -1, so a higher value indicates a higher level of tax avoidance.

The primary independent variable that is the focus of this study is digital transformation (DIGIT), as mentioned by Chen et al. (2024) and Zhang and She (2024). We use a text analysis approach to measure this construct by utilizing annual report data analyzed using Python. Specifically, the DIGIT index is calculated by counting the frequency of keywords such as artificial intelligence, big data, cloud computing, blockchain, and digital technology in corporate documents, normalized using the natural logarithm of the total number of words in those annual reports (Chen et al., 2024). This methodology has been proven to effectively capture the intensity and depth of digital adoption through text analysis of annual reports.

As a supplementary analysis to break down the DIGIT index, this study also developed the Cloud Computing (CLOUD) variable as a subcomponent of DIGIT, measured based on the number of keywords related to cloud computing in companies' annual reports, which was normalized in the same way as DIGIT. The CLOUD variable was used to test whether the impact of digital transformation is concentrated in specific technology components.

Cash holdings (CASH) serve as a mediating variable in this study. Consistent with Opler (1999) and Bates et al. (2009), cash holdings are defined as the ratio of cash and cash equivalents to a company's total assets. This measure has also been widely used in the corporate finance literature to indicate the proportion of liquidity held by a company relative to the size of its assets.

This study includes seven control variables derived from the empirical literature consensus to eliminate estimation bias. First, audit quality (BIG4) is quantified using a dummy variable (1 for Big Four auditors and 0 for non-Big Four) based on the consideration that top-tier public accounting firms tend to limit the scope for tax avoidance. Second, leverage (LEV) is calculated as the ratio of total debt to total assets and is included to control for tax-saving incentives arising from the tax shield provided by interest on debt. Third, growth (GROWTH) is projected using annual revenue growth as an indicator of investment capital needs.

Four residual variables are used to control for internal corporate characteristics. Board size (BSIZE) represents the number of board members to measure the effectiveness of corporate oversight. Meanwhile, firm size (FSIZE) and firm age (FAGE) are each transformed into the natural logarithm of total assets and the duration of listing on the IDX, respectively. These adjustments control for the effects of firm size and maturity on cash-holding and tax policies. Finally, state ownership (SOE) is indicated by a dichotomous

variable (1 if the government holds control and 0 for private ownership) to account for the impact of public oversight, which restricts tax avoidance practices.

To test the hypotheses, this study uses panel data regression analysis with fixed effects as the primary specification, selected based on the results of the Hausman test. This study adopts a mediation approach reinforced with bootstrapping to test the mediating role of cash holdings in the DIGIT–Tax Avoidance relationship. The empirical model is formulated as follows:

$$TA_{it} = \beta_0 + \beta_1 DIGIT_{it} + \beta_2 BIG4_{it} + \beta_3 LEV_{it} + \beta_4 GROWTH_{it} + \beta_5 BSIZE_{it} + \beta_6 FSIZE_{it} + \beta_7 FAGE_{it} + \beta_8 SOE_{it} + \varepsilon_{it}$$

(Equation 1)

$$CASH_{it} = \beta_0 + \beta_1 DIGIT_{it} + \beta_2 BIG4_{it} + \beta_3 LEV_{it} + \beta_4 GROWTH_{it} + \beta_5 BSIZE_{it} + \beta_6 FSIZE_{it} + \beta_7 FAGE_{it} + \beta_8 SOE_{it} + \varepsilon_{it}$$

(Equation 2)

$$TA_{it} = \beta_0 + \beta_1 DIGIT_{it} + \beta_2 CASH_{it} + \beta_3 BIG4_{it} + \beta_4 LEV_{it} + \beta_5 GROWTH_{it} + \beta_6 BSIZE_{it} + \beta_7 FSIZE_{it} + \beta_8 FAGE_{it} + \beta_9 SOE_{it} + \varepsilon_{it}$$

(Equation 3)

$$TA_{it} = \beta_0 + \beta_1 CLOUD_{it} + \beta_2 BIG4_{it} + \beta_3 LEV_{it} + \beta_4 GROWTH_{it} + \beta_5 BSIZE_{it} + \beta_6 FSIZE_{it} + \beta_7 FAGE_{it} + \beta_8 SOE_{it} + \varepsilon_{it}$$

(Equation 4)

RESULTS AND DISCUSSION

The sample for this study was obtained through a multistage selection process, as presented in Table 1. The initial population consisted of 4,147 firm-year observations available in the Osiris database and the annual reports of companies listed on the Indonesia Stock Exchange for the period 2020–2024. From this population, 521 observations were excluded because they belonged to the financial industry; given that the regulatory characteristics and financial structure of the financial industry are fundamentally different from those of the non-financial sector, their inclusion could potentially introduce bias in the measurement of tax avoidance and cash holdings. Furthermore, 1,586 observations were excluded due to missing data on key research variables. Following this selection process, a final sample of 2,040 firm-year observations was obtained, which forms the basis for the empirical analysis in this study.

The annual distribution in Panel B of Table 1 shows a consistent upward trend, from 275 observations (13.48%) in 2020 to 495 observations (24.26%) in 2024. This upward trend aligns with the study's expectation that the observation period reflects a phase of accelerated adoption of corporate digital technology in Indonesia, while also indicating increasingly comprehensive disclosure of digital information in companies' annual reports from year to year. The industry distribution in Panel C shows a relatively proportional representation, with the industrial sector dominating the sample (21.81%), followed by the materials sector (15.39%) and consumer staples (15.20%), while the technology sector, which one might intuitively expect to be most relevant to digital transformation, contributed only 3.77% of the total sample. This composition is methodologically relevant because it indicates that the phenomenon of digital transformation in this study is not concentrated in a single specific sector but rather reflects the widespread adoption of technology across industries in Indonesia.

Table 1. Sample attrition

	Criteria	Number
1	Non-financial firm-year observations available in the Osiris database and IDX annual reports for the period 2020–2024	4,147
2	Financial industry firms excluded from the sample	(521)
3	Observations excluded due to missing data on key research variables	(1,586)
	Total observations that meet the criteria	**2,040**

Table 2 presents the descriptive statistics for all research variables. It shows that the dependent variable, GAAPETR, has a mean of –0.255 and a standard deviation of 0.295, with a range of observations from –2.288 to 0.000. Regarding the independent variables, the DIGIT variable has a mean of 1.055 and a standard deviation of 1.175, with an observation range from 0.000 to 5.182. The table indicates that there is considerable variation in the DIGIT variable, as its standard deviation is higher than its mean value. This also reflects that not all companies in the sample have adopted digital transformation to the same extent; some companies have not yet addressed digital transformation in their annual reports (with a value of 0.000), while others have already intensively integrated digital technology into their strategic narratives. The mediator variable, CASH, has a mean of 0.109, meaning that, on average, cash and cash equivalents in the sample companies account for 10.9% of their total assets. This relatively moderate proportion is consistent with typical conditions in emerging markets in general. The standard deviation of this mediator variable is 0.096, indicating variation in liquidity policies among companies.

Table 2. Descriptive statistics

Variable	Mean	SD	Minimum	Maximum
Panel A: Continuous variables				
GAAPETR	-0.255	0.295	-2.288	0.000
CURETR	-0.214	0.298	-2.168	0.000
CASHETR	-0.498	1.100	-8.256	0.000
DIGIT	1.055	1.175	0.000	5.182
CASH	0.109	0.096	0.000	0.430
CLOUD	0.526	2.063	0.000	34.00
LEV	0.412	0.240	0.022	1.468
GROWTH	0.228	0.694	-0.628	5.063
BSIZE	4.161	1.949	0.000	25.00
FSIZE	20.201	3.399	9.428	26.882
FAGE	2.193	1.115	0.000	3.850
Panel B: Dichotomous variables				
BIG4	28.94	71.06		
SOE	4.80	95.20		

Table 3 shows that there is a negative correlation between DIGIT and GAAPETR, with an r value of -0.038. This correlation is not significant. However, there is a statistically significant relationship between DIGIT and CURETR ($r = -0.063$, $p < 0.05$), as well as CASHETR ($r = -0.080$, $p < 0.05$). These results support the theoretical assumption of Hypothesis 1, as this is the initial stage of exploratory data analysis. In addition, we also found a positive and significant relationship between DIGIT and CASH ($r = 0.146$, $p < 0.01$). This finding provides preliminary evidence of a relationship between digital transformation and an increase in a company's cash reserves, as proposed in our second hypothesis.

More importantly from a methodological perspective, all correlation coefficients between the independent and control variables were well below the 0.7 threshold commonly used as an indicator of multicollinearity. The highest correlation among the explanatory variables was found between DIGIT and CLOUD ($r = 0.436$; $p < 0.01$), which is conceptually understandable given that CLOUD is one of the thematic components of the overall DIGIT index construct; however, this value is still well below the

critical threshold. The correlations between BIG4 and BSIZE ($r = 0.349$; $p < 0.01$) as well as between LEV and the other control variables also fall within a reasonable range. Thus, the results of the correlation test confirm that the regression model in this study is free from serious multicollinearity issues, meaning that the coefficient estimates in the subsequent regression stage can be reliably interpreted.

Hypothesis 1 predicts that digital transformation has a negative effect on tax avoidance. The coefficient for the DIGIT variable was found to be negative in all model specifications: $\beta = -0.010$ ($p < 0.10$) in Model (1) without control variables and fixed effects; $\beta = -0.015$ ($p < 0.01$) in Model (2) with fixed effects for year and industry; and $\beta = -0.021$ ($p < 0.01$) in Model (3), where Model (3) is the full specification that includes all control variables. The significant increase in these coefficient values indicates strong support for the robust negative relationship between DIGIT and tax avoidance and the absence of heterogeneity in the effect of DIGIT on tax avoidance at the year and industry levels. Therefore, H1 is confirmed by empirical evidence: for every one-unit increase in the digital transformation index, there is a 0.021-point decrease in GAAPETR in the full specification.

The results of this theoretical study are consistent with one of the theories underpinning our research, namely agency theory. According to Jensen and Meckling (1976), the digital transformation process serves as a tool to reduce information asymmetry between management and external parties by improving the quality of an organization's internal controls and the transparency of reporting within technology-based information systems. Thus, it is clear that when the organization's monitoring systems whether by shareholders, auditors, or tax authorities utilize technology that enables digitization, the scope of managerial discretion available for complex tax avoidance schemes becomes limited. Indeed, according to Desai and Dharmapala (2006) the level of complexity required to implement a tax avoidance scheme is proportional to the level of discretion available. These results confirm the findings Zhang and She (2024) and Chen and Meng (2024). In the Chinese context, the study found that DIGIT reduces tax evasion by improving the efficiency of internal information flows and reducing management agency costs. These findings are also consistent with those of Azenzoul et al. (2025) in the Moroccan context, which strengthen the generalizability of the argument regarding information discipline across different institutional contexts.

At the same time, these findings also underscore the relevance of the Tax Administration 3.0 policy framework currently being adopted by Indonesian tax authorities through the Coretax system. In line with the arguments of Belahouaoui and Attak (2024) and Anjarwi (2026), the use of big data and artificial intelligence by tax authorities significantly increases the risk of detecting tax avoidance activities, thereby limiting companies' ability to pursue aggressive tax strategies. However, it should be noted that these findings are not entirely consistent with a body of literature arguing the opposite, namely, that digitalization actually facilitates more sophisticated tax avoidance through the exploitation of intangible digital assets and the complexity of cross-border transactions (Chen & Meng, 2024; Qu & Jing, 2025). A plausible explanation for this discrepancy is that, in the Indonesian context during the 2020–2024 observation period, the disciplinary effect of increased transparency appears to be more dominant than the facilitating effect of technological complexity, likely because Indonesian corporations are still in the early to intermediate stages of digital adoption, where the risk of increased visibility to tax authorities is more pronounced than companies' capacity to exploit technological loopholes in sophisticated ways. This interpretation reinforces the argument that in emerging economies that are aggressively modernizing their tax administrations, the disciplinary effects of digitalization tend to dominate because companies experience a surge in visibility to tax authorities before acquiring sufficient technological sophistication to exploit cross-border loopholes a dynamic that distinguishes emerging markets from developed markets. Thus, these findings expand the empirical evidence, which has thus far been concentrated on Chinese public companies (Tiantian et al., 2023; Zhang & She, 2024), to the contrasting institutional setting of Southeast Asia, while confirming that the relevance of information discipline mechanisms is cross-contextual, though their intensity is conditioned by the stage of institutional development in emerging economies.

Table 3. Pearson correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) GAAPETR	1.000												
(2) CURETR	0.537*	1.000											
(3) CASHETR	0.320*	0.455*	1.000										
(4) CASH	0.066*	-0.004	0.020	1.000									
(5) DIGIT	-0.038	-0.063*	-0.080*	0.146*	1.000								
(6) CLOUD	-0.041	-0.064*	-0.066*	0.034	0.436*	1.000							
(7) BIG4	0.050*	0.034	0.060*	0.241*	0.174*	0.042	1.000						
(8) LEV	-0.112*	-0.030	-0.093*	-0.162*	0.092*	0.039	0.067*	1.000					
(9) GROWTH	0.072*	0.062*	0.104*	-0.042	-0.080*	-0.033	-0.075*	0.067*	1.000				
(10) BSIZE	0.042	0.003	-0.051*	0.097*	0.202*	0.064*	0.349*	0.085*	-0.072*	1.000			
(11) FSIZE	0.064*	0.020	-0.046*	-0.010	0.241*	0.094*	0.109*	-0.024	-0.056*	0.240*	1.000		
(12) FAGE	-0.006	0.001	0.013	0.130*	0.037	-0.040	0.244*	0.115*	-0.045	0.306*	0.029	1.000	
(13) SOE	-0.002	0.012	-0.135*	0.045*	0.172*	0.140*	0.109*	0.174*	-0.036	0.134*	0.122*	0.035	1.000

**** p<0.01, ** p<0.05, * p<0.1*

Notes: Pearson correlation coefficients calculated across 2,040 firm-year observations. Significance levels: *p < 0.10, **p < 0.05, ***p < 0.01.

The control variables showed patterns consistent with theoretical expectations. The Big Four had a positive and significant effect (β = 0.058; p < 0.01) an interesting finding that can be interpreted to mean that large companies with high-quality auditors possess more sophisticated tax planning capabilities, or that the presence of the Big Four is associated with larger and structurally more complex companies, which consequently have more opportunities for legal tax savings (Armstrong et al., 2015). LEV has a significant negative effect (β = −0.134; p < 0.01); the negative coefficient for this reverse-scaled measure indicates that higher leverage is associated with lower tax avoidance. BSIZE showed a significant positive coefficient (β = 0.011; p < 0.01), meaning that a larger board is associated with higher tax avoidance; thus, this finding suggests that, in the Indonesian context, a larger board size may reflect corporate complexity rather than stronger oversight capacity.

Table 4. Baseline regression

	(1)	(2)	(3)
VARIABLES	GAAPETR	GAAPETR	GAAPETR
DIGIT	-0.010*	-0.015***	-0.021***
	(-1.73)	(-2.60)	(-3.21)
BIG4			0.058***
			(3.50)
LEV			-0.134***
			(-4.52)
GROWTH			0.031***
			(3.00)
BSIZE			0.011***
			(2.83)
FSIZE			-0.001
			(-0.22)
FAGE			-0.009
			(-1.39)
SOE			0.037
			(1.10)
Constant	-0.245***	-0.335***	-0.320***
	(-27.90)	(-14.69)	(-5.93)
Year FE	NO	YES	YES
Industry FE	NO	YES	YES

Notes: Fixed-effects panel regression outputs derived from 2,040 firm-year observations. Parentheses indicate t-statistics. Significance thresholds: *p < 0.10, **p < 0.05, ***p < 0.01.
Source: Authors' own creation

Mediation analysis

Table 5 presents the results of the mediation test following the approach of Baron and Kenny (1986) supplemented with bootstrapped standard errors to test the role of cash holdings as a transmission mechanism in the DIGIT–tax avoidance relationship. This approach requires three conditions to be met sequentially. The first condition, tested in Model (1), requires that the independent variable have a significant effect on the mediator variable. The results show that DIGIT has a positive and highly significant effect on CASH (β = 0.009; p < 0.01), confirming Hypothesis 2 that digital transformation drives an increase in corporate cash holdings a finding consistent with the argument that the operational efficiencies resulting from the adoption of digital technology generate greater free cash flow, as empirically supported by Asiri (2026) dan Mai et al. (2026).

The second condition tested in Model (2) requires that the independent variable have a significant effect on the dependent variable in the absence of a mediator. The results for this model confirm a negative and significant total effect of DIGIT on GAAPETR ($\beta = -0.021$; $p < 0.01$), consistent with the findings in Table 4. The third condition tested in Model (3) requires that the mediator variable have a significant effect on the dependent variable when both independent variables and the mediator are simultaneously included in the model. Results indicated that CASH had a positive effect on GAAPETR ($\beta = 0{,}231$, $p < 0{,}01$). This finding supports the pecuniary motive mechanism as posited by Hypothesis 3 suggesting companies with larger cash reserves tend to show higher tax avoidance levels (higher GAAPETR). The direct effect of DIGIT on GAAPETR was also found significant statistically although its coefficient slightly strengthened (from $\beta = -0{,}079$ to $\beta = -0{,}023$, $p < 0{,}01$ compared to no mediation model).

This results' configurations prove the significance of all three paths (a, b, c), although insignificant changes are detected compared to the effect of DIGIT on tax avoidance in Model 3. The results' configurations give evidence of partial mediation in which the direct/indirect mechanisms compete with each other. The partial mediation is shown in CASH being the indirect mechanism which mediates partially the relationship between DIGIT and tax avoidance and which works against the direction of the effect of DIGIT on tax avoidance. First, the direct path proves how DIGIT reduces the level of tax avoidance because of improved transparency and oversight due to the increase of information disclosure (agency theory) (Desai & Dharmapala, 2006; Zhang & She, 2024). Second, the indirect path via CASH shows how DIGIT makes firms accumulate cash and how its accumulation has the positive effect on tax avoidance because of pecuniary motive and precautionary motive. In terms of pecuniary motives, the existence of financial slack through the process of cash accumulation due to efficiency of digital technologies allows firms to develop aggressive tax policies without losing liquidity (Foley et al., 2007; Opler, 1999).

Results validate Hypotheses 3 and 4 and reveal how both hypotheses coexist in our study. Following the assumption stated in Hypothesis 3 of the positive impact of cash holdings and tax avoidance based on the mechanism of financial motives (Foley et al., 2007; Khuong et al., 2019), we note the consistency in the direction of relationships in this case. Cash accumulated through the efficiency of technology utilization provides management with opportunities to use liquidity as a reason for using aggressive tax tactics. It is in line with the idea expressed by Guenther et al. (2020) about the connection between the allocation of cash flows within organizations and strategic choices of companies regarding taxation. The results are consistent with those reported by Khuong et al. (2019) concerning Vietnam and El Sayad et al. (2026) regarding Arab Saudi markets, where the consistently positive relationships between cash holdings and tax avoidance were revealed in developing economies. Nevertheless, the presence of the direct channel through which DIGIT affects tax avoidance negatively suggests that the disciplining effect of digital transparency is stronger than the factors supporting the accumulation of cash. The findings in this paper hence provide a significant contribution to the literature on accounting and digital transformation mechanisms in emerging economies. In essence, digital governance mechanisms negatively influence corporate tax avoidance practices on one side, whereas digital liquidity channels tend to reinforce opportunistic behaviors as a result of increased availability of liquid resources on the other side. The findings of the paper thus show how technology influences tax avoidance behaviors in emerging economies in a way that it both reinforces and contradicts tax avoidance practices simultaneously, hence shedding light on the unexplored complexities in the process of digital transformation impact on tax avoidance practices. This is contrary to common perceptions that have been built based on papers written in developed countries.

Robustness test

Results of tests conducted using the three proxies for tax avoidance, GAAPETR, CURETR, and CASHETR, are presented in Table 6. It is necessary to use all three proxies since each proxy measures tax avoidance along a different dimension. For instance, where GAAPETR is a measure of tax strategies that

involve both permanent and temporary tax schemes, CURETR emphasizes the current part of the scheme while CASHETR is a measure of the realization of payment of taxes (Hanlon & Heitzman, 2010).

The outcome of Table 6 is showing that the coefficient of DIGIT is consistently negative and significant at all three models with β value of -0.021 ($p<0.01$), -0.025 ($p<0.01$), and -0.065 ($p<0.01$) corresponding to GAAPETR, CURETR, and CASHETR. The consistent nature of the coefficients along with their directions and significance for different proxies of tax avoidance suggests very strongly that there exists a structural relationship between digital transformation and tax avoidance instead of being an artefact of our specific approach of measuring tax avoidance. It can be observed that the coefficient value of CASHETR model is much larger than those based on GAAPETR and CURETR models which suggests that disciplinary impact of DIGIT is mainly observed in form of cash taxes. cash tax payments a finding that reinforces the argument that increased digital transparency not only technically alters tax accounting reporting but also genuinely shifts firms' actual tax payment behavior.

Table 5. Mediation Analysis Results

VARIABLES	(1) CASH	(2) GAAPETR	(3) GAAPETR
DIGIT	0.009***	-0.021***	-0.023***
	(0.002)	(0.006)	(0.006)
CASH			0.231***
			(0.081)
BIG4	0.039***	0.058***	0.049***
	(0.005)	(0.017)	(0.017)
LEV	-0.092***	-0.134***	-0.113***
	(0.009)	(0.030)	(0.031)
GROWTH	-0.001	0.031***	0.031***
	(0.003)	(0.010)	(0.010)
BSIZE	0.000	0.011***	0.011***
	(0.001)	(0.004)	(0.004)
FSIZE	-0.001	-0.001	-0.000
	(0.001)	(0.002)	(0.002)
FAGE	0.011***	-0.009	-0.012*
	(0.002)	(0.007)	(0.007)
SOE	0.025***	0.037	0.031
	(0.010)	(0.033)	(0.034)
Constant	0.075***	-0.320***	-0.339***
	(0.016)	(0.054)	(0.055)
Observations	1,840	1,845	1,840
Adj R-squared	0.199	0.071	0.074
Year FE	YES	YES	YES
Industry FE	YES	YES	YES

Notes: Mediation models estimated using panel fixed-effects regressions across 1,845 firm-year observations. Parenthesized figures represent standard errors. Asterisks indicate statistical significance: *p < 0.10, **p < 0.05, ***p < 0.01.
Source: Authors' own creation

As can be seen, the structure of control variables also demonstrates consistent reliability in all the three models, as both the BIG4 and GROWTH exhibit a consistently positive impact on all three ETR proxies, whereas the LEV exhibits a consistently negative one. Thus, the results of the performed robustness tests

prove the reliability of the baseline model applied in the current research and demonstrate that it is not sensitive to the choice of the tax avoidance proxies used.

Endogeneity test

Possible endogeneity between digitalisation transformation and tax avoidance may arise either through reverse causality in which companies with varying degree of tax avoidance may have a propensity to adapt themselves to digitalisation technology or omitted variable bias in which factors that affect both variables may not be controlled for. In our study, we use estimation via two-stage least squares (2SLS) where the instrument is the variablePEER_DIGIT, representing the average index of digitalisation transformation in the industry-year excluding the focal firm.

Table 6. Robustness Check

VARIABLES	(1) GAAPETR	(2) CURETR	(3) CASHETR
DIGIT	-0.021***	-0.025***	-0.065***
	(-3.21)	(-3.73)	(-2.71)
BIG4	0.058***	0.048***	0.276***
	(3.50)	(2.81)	(4.46)
LEV	-0.134***	-0.029	-0.390***
	(-4.52)	(-0.95)	(-3.51)
GROWTH	0.031***	0.025**	0.155***
	(3.00)	(2.40)	(4.00)
BSIZE	0.011***	0.003	-0.029*
	(2.83)	(0.80)	(-1.95)
FSIZE	-0.001	-0.002	-0.019**
	(-0.22)	(-1.01)	(-2.11)
FAGE	-0.009	-0.003	0.024
	(-1.39)	(-0.48)	(0.95)
SOE	0.037	0.042	-0.526***
	(1.10)	(1.24)	(-4.20)
Constant	-0.320***	-0.218***	0.030
	(-5.93)	(-3.95)	(0.15)
Year FE	YES	YES	YES
Industry FE	YES	YES	YES
Adj. R-squared	0.0707	0.0494	0.0559

Notes: Panel fixed-effects robustness specifications based on 1,845 firm-year observations across alternative tax avoidance metrics. Parenthesized figures denote t-statistics. Significance levels: *p < 0.10, **p < 0.05, ***p < 0.01

Source: Authors' own creation

The selection of PEER_DIGIT as an instrument is based on two key justifications. First, the instrument's relevance: competitors' levels of digital adoption within the same industry are logically closely related to the focal firm's level of digital adoption, given the competitive pressures that drive firms to align their digitalization strategies with industry norms. The results of the first-stage regression in Table 7 confirm this relevance, with PEER_DIGIT showing a significant coefficient for DIGIT ($\beta = -1.150$; $p < 0.01$), and the first-stage model yielding an R^2 of 0.207, indicating adequate explanatory power of the instrument and far exceeding the instrument weakness threshold commonly used in the econometric literature. Second, the exclusion of the competitor's digitalization level as an instrument at the industry level theoretically does not directly influence the focal firm's tax avoidance decisions but only through an

indirect channel via the firm's own level of digital adoption, thereby satisfying the required exogeneity condition.

The results of the second-stage regression in Table 7 show that, after controlling for potential endogeneity, the coefficient of DIGIT with respect to GAAPETR remains negative and significant (β = -0.108; p < 0.05), as does that with respect to CURETR (β = -0.100; p < 0.05) and CASHETR (β = -0.329; p < 0.10). Notably, the magnitude of the coefficients in these 2SLS estimates is consistently larger than those in Tables 4 and 6. Thus, the results of this endogeneity test provide additional assurance that the negative relationship between digital transformation and tax avoidance is causal and does not merely reflect a correlation generated by unobserved confounding factors, thereby strengthening the internal validity of the causal conclusions proposed in this study.

Table 7. Instrumental Variable Two-Stage Regression 2SLS

VARIABLES	First-stage DIGIT	Second-stage GAAPETR	Second-stage CURETR	Second-stage CASHETR
PEER_DIGIT	-1.150***			
	(0.214)			
DIGIT		-0.108**	-0.100**	-0.329*
		(0.044)	(0.048)	(0.168)
BIG4	0.262***	0.082***	0.068**	0.347***
	(0.100)	(0.025)	(0.028)	(0.100)
LEV	0.281*	-0.108**	-0.007	-0.310*
	(0.160)	(0.042)	(0.044)	(0.168)
GROWTH	-0.079**	0.024**	0.020*	0.134***
	(0.034)	(0.010)	(0.010)	(0.034)
BSIZE	0.067**	0.018***	0.009	-0.011
	(0.026)	(0.006)	(0.006)	(0.023)
FSIZE	0.047***	0.004	0.001	-0.006
	(0.014)	(0.004)	(0.004)	(0.016)
FAGE	-0.026	-0.012	-0.005	0.018
	(0.036)	(0.008)	(0.008)	(0.028)
SOE	0.744***	0.104*	0.100*	-0.324
	(0.211)	(0.062)	(0.057)	(0.340)
Constant	-0.010	-0.391***	-0.279***	-0.187
	(0.362)	(0.080)	(0.082)	(0.312)
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Additional analysis

To deepen our understanding of the mechanisms of digital transformation that drive a reduction in tax avoidance, this study conducts an additional analysis focusing on one specific dimension of digital transformation, namely, cloud computing (CLOUD), which is measured as the number of cloud computing-related keywords in companies' annual reports. This disaggregation is important because the aggregate DIGIT index encompasses a variety of technological components (artificial intelligence, big data, blockchain, and cloud computing) that may have different governance implications for corporate tax behavior.

The results in Table 8 show that CLOUD has a consistently negative and significant effect on all three tax avoidance proxies: GAAPETR (β = -0.009; p < 0.05), CURETR (β = -0.011; p < 0.01), and CASHETR (β = -0.027; p < 0.10). The consistency of the direction of these relationships with the findings on the DIGIT index (Tables 4 and 6) indicates that the disciplinary effect of digital transformation on tax avoidance is not

concentrated in a single specific technology component but is rather a relatively comprehensive phenomenon. Considering that Cloud Computing allows for the centralization of data, integration of systems information within business organizations, and accessibility by external parties including auditors and tax departments with regard to the company's transactional data in real time all characteristics which according to agency theory (Xie & Huang, 2023) are the most compatible with transparency mechanisms then this technology is particularly important to examine.

Since the coefficient of CLOUD has less magnitude compared to that of DIGIT (-0.027 vs -0.065) on Cashetr, it means that although cloud computing is one of the factors involved in the overall transformation's disciplinary effect, it is not the only factor. This means that although cloud computing alone has some disciplinary effect, the combined effect of different types of digital technologies (including big data analysis, artificial intelligence, and others) has a larger disciplinary effect. Therefore, this implies that in accordance with the concept of digital transformation being an integrated and holistic organizational transformation process (Hanelt et al., 2021; Verhoef et al., 2021) a single technology can never fully explain digital transformations.

Table 8. Additional Analysis

	(1)	(2)	(3)
VARIABLES	GAAPETR	CURETR	CASHETR
CLOUD	-0.009**	-0.011***	-0.027*
	(-2.35)	(-2.89)	(-1.94)
BIG4	0.053***	0.042*	0.262***
	(3.24)	(2.51)	(4.25)
LEV	-0.138***	-0.034***	-0.403***
	(-4.66)	(-1.11)	(-3.64)
GROWTH	0.032***	0.027**	0.158***
	(3.11)	(2.52)	(4.10)
BSIZE	0.010***	0.002	-0.033**
	(2.59)	(0.52)	(-2.17)
FSIZE	-0.001	-0.003	-0.021**
	(-0.54)	(-1.37)	(-2.39)
FAGE	-0.010	-0.004	0.023
	(-1.43)	(-0.54)	(0.90)
SOE	0.032	0.037	-0.543***
	(0.95)	(1.08)	(-4.34)
Constant	-0.308***	-0.204***	0.070***
	(-5.72)	(-3.70)	(0.35)
Year FE	YES	YES	YES
Industry FE	YES	YES	YES
Adj. R-squared	0.0683	0.0465	0.0541

Notes: Additional analysis panel fixed-effects regressions (N = 1,845 firm-years) examining cloud computing adoption. Parenthesized values represent t-statistics. Significance thresholds: *p < 0.10, **p < 0.05, ***p < 0.01.

CONCLUSION

This study investigates the effect of digital transformation on tax avoidance, as well as the mediating role of cash holdings in that relationship, among non-financial companies listed on the Indonesia Stock Exchange during the 2020–2024 period. Empirical results show that digital transformation has a consistently negative and significant effect on tax avoidance across all specifications of the baseline model; robustness checks using three alternative proxies, as well as after correcting for endogeneity via the

instrumental variables approach, confirm Hypothesis 1 that corporate digitalization acts as a disciplinary mechanism that curbs tax avoidance by enhancing information transparency and the quality of internal oversight. Digital transformation was also found to significantly increase corporate cash holdings, supporting Hypothesis 2. However, mediation tests revealed a more complex pattern than originally predicted: cash holdings partially mediate the relationship between DIGIT and tax avoidance, but through a mechanism that competes with its direct effect, whereby higher cash holdings are actually associated with higher tax avoidance, consistent with Hypothesis 3 based on the pecuniary motive perspective a pattern that runs counter to the direct disciplinary effect of DIGIT, resulting in competitive mediation. Additional analysis of cloud computing further confirms that the disciplinary effects of digital transformation are comprehensive and not concentrated on any single technological component.

Contributions of this paper to theoretical knowledge are doublefold: First, we show that cash balance serves as a competitive mediator of the DIGIT-tax avoidance effect since one mediating channel operates in terms of transparency, and another provides an opportunity for tax evasion because of liquidity formation. Second, by revealing the disciplining impact of digitization on firm's behavior relevant not only for developed countries but for emerging economies as well, our results make an important contribution to accounting research in the field of the latter. In terms of practice, the revealed positive role of technology-based mechanisms for supervision by tax authorities to increase corporate tax compliance supports the reasoning behind such investments made by tax authorities with this aim in view. Despite the fact that we have no time span sufficient for evaluation of Coretax (2020-2024 versus the official introduction at the beginning of 2025), our findings provide an additional empirical proof regarding the phenomenon of corporation's digitization process and its possible positive outcomes concerning modernization of tax supervision systems using technological innovations. As far as policy implications go, they can be applied to any tax authorities of the emerging economies experiencing problems with low taxation rate and low administrative capabilities, respectively.

This study has several limitations that open up opportunities for future research. The fact needs to be acknowledged that an index measuring digital transformation only based on how often certain keywords were used in annual reports does not completely capture the real implementation of technologies. In the future, research studies might choose to use more specific indicators, such as the investment in IT infrastructures, in order to examine the relationship between policy and outcome. Another drawback is the limited observation period (2020 – 2024) that prevents us from properly assessing the effect of launching the Coretax system in early 2025. This is because by expanding the observation period, researchers can investigate the effects of independent variables more. Lastly, there is still the possibility of different moderating paths, such as the effect of ownership concentration or political connections (Abdani & Sya'bania, 2020: Firmansyah et al., 2022), or the replication of this competitive mediating effect in other Southeast Asia emerging market settings.

REFERENCES

Abdani, F., & Sya'bania, A. F. (2020). Political connection and tax avoidance on sharia stocks; good for business? *Al-Amwal : Jurnal Ekonomi Dan Perbankan Syari'ah*, *12*(2), 157. https://doi.org/10.24235/amwal.v12i2.7182

Istiqfarosita, M., & Abdani, F. (2022). EnglishPolitical Connections and Thin Capitalization on Tax Avoidance During The Covid-19 Pandemic. *E-Jurnal Akuntansi*, *32*(5), 1238. https://doi.org/10.24843/EJA.2022.v32.i05.p10

Anjarwi, A. W. (2026). The digital transformation of tax audits: how AI, big data, blockchain, and advanced analytics are reshaping tax evasion detection. *Journal of Business Analytics*, 1–12. https://doi.org/10.1080/2573234X.2026.2644363

Armstrong, C. S., Blouin, J. L., Jagolinzer, A. D., & Larcker, D. F. (2015). Corporate governance, incentives, and tax avoidance. *Journal of Accounting and Economics*, *60*(1), 1–17. https://doi.org/10.1016/j.jacceco.2015.02.003

Asiri, M. (2026). The impact of digital transformation on cash holding: evidence from Saudi Arabia. *Digital Policy, Regulation and Governance*, *28*(2), 113–131. https://doi.org/10.1108/DPRG-11-2024-0299

Azenzoul, A., Mahouat, N., Mokhlis, K., & Moussaid, A. (2025). Digital Transformation and Corporate Tax Avoidance: Evidence from Moroccan Listed Firms. *Journal of Risk and Financial Management*, *18*(10), 575–575. https://doi.org/10.3390/jrfm18100575

Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, *51*(6), 1173–1182. https://doi.org/10.1037/0022-3514.51.6.1173

Bates, T. W., Kahle, K. M., & Stulz, R. M. (2009). Why Do U.S. Firms Hold So Much More Cash than They Used To? *The Journal of Finance*, *64*(5), 1985–2021. https://doi.org/10.1111/j.1540-6261.2009.01492.x

Belahouaoui, R., & Attak, E. H. (2024). Digital taxation, artificial intelligence and Tax Administration 3.0: improving tax compliance behavior – a systematic literature review using textometry (2016–2023). *Accounting Research Journal*, *37*(2), 172–191. https://doi.org/10.1108/ARJ-12-2023-0372

Chen, M., Zhao, K., & Jin, W. (2024). Corporate digital transformation and tax avoidance: evidence from China. *Pacific-Basin Finance Journal*, *85*, 102400–102400. https://doi.org/10.1016/j.pacfin.2024.102400

Chen, W., & Meng, F. (2024). Is corporate digital transformation a tax haven? *International Journal of Managerial Finance*, *20*(2), 304–333. https://doi.org/10.1108/IJMF-11-2022-0505

Desai, M. A., & Dharmapala, D. (2006). Corporate tax avoidance and high-powered incentives. *Journal of Financial Economics*, *79*(1), 145–179. https://doi.org/10.1016/j.jfineco.2005.02.002

Dittmar, A., Mahrt-Smith, J., & Servaes, H. (2003). International Corporate Governance and Corporate Cash Holdings. *The Journal of Financial and Quantitative Analysis*, *38*(1), 111–111. https://doi.org/10.2307/4126766

Edwards, A., Schwab, C., & Shevlin, T. (2016). Financial Constraints and Cash Tax Savings. *The Accounting Review*, *91*(3), 859–881. https://doi.org/10.2308/accr-51282

El Sayad, S., Diab, A., Elsayed, M. F., & Aladwey, L. (2026). Does Gender Diversity Mitigate the Relationship Between Tax Avoidance and Cash Holdings? *International Journal of Service Science, Management, Engineering, and Technology*, *17*(1), 1–31. https://doi.org/10.4018/IJSSMET.400761

Fan, C., Bae, S., & Liu, Y. (2026). Shifting paradigms: digital transformation's role in corporate cash management. *Technology Analysis & Strategic Management*, *38*(4), 358–372. https://doi.org/10.1080/09537325.2025.2475939

Firmansyah, A., Arham, A., Qadri, R. A., Wibowo, P., Irawan, F., Kustiani, N. A., Wijaya, S., Andriani, A. F., Arfiansyah, Z., Kurniawati, L., Mabrur, A., Dinarjito, A., Kusumawati, R., & Mahrus, M. L. (2022). Political connections, investment opportunity sets, tax avoidance: does corporate social responsibility disclosure in Indonesia have a role? *Heliyon*, *8*(8), e10155–e10155. https://doi.org/10.1016/j.heliyon.2022.e10155

Foley, C., Hartzell, J. C., Titman, S., & Twite, G. (2007). Why do firms hold so much cash? A tax-based explanation. *Journal of Financial Economics*, *86*(3), 579–607. https://doi.org/10.1016/j.jfineco.2006.11.006

Guenther, D. A., Njoroge, K., & Williams, B. M. (2020). Allocation of Internal Cash Flow when Firms Pay Less Tax. *The Accounting Review*, *95*(5), 185–210. https://doi.org/10.2308/accr-52623

Hanelt, A., Bohnsack, R., Marz, D., & Antunes Marante, C. (2021). A Systematic Review of the Literature on Digital Transformation: Insights and Implications for Strategy and Organizational Change. *Journal of Management Studies*, *58*(5), 1159–1197. https://doi.org/10.1111/joms.12639

Hanlon, M., & Heitzman, S. (2010). A review of tax research. *Journal of Accounting and Economics*, *50*(2-3), 127–178. https://doi.org/10.1016/j.jacceco.2010.09.002

Hanlon, M., Maydew, E. L., & Saavedra, D. (2017). The taxman cometh: Does tax uncertainty affect corporate cash holdings? *Review of Accounting Studies*, *22*(3), 1198–1228. https://doi.org/10.1007/s11142-017-9398-y

Hindi, A.-A., & Sarhan, A.-R. (2025). Analyzing the Relationship between Financial Digitalization and Investment Opportunity set. *Finance: Theory and Practice*, *29*(1), 97–105. https://doi.org/10.26794/2587-5671-2025-29-1-97-105

Huang, H. H., Lobo, G. J., Wang, C., & Xie, H. (2016). Customer concentration and corporate tax avoidance. *Journal of Banking & Finance*, *72*, 184–200. https://doi.org/10.1016/j.jbankfin.2016.07.018

Jensen, M. C. (1999). Agency Cost Of Free Cash Flow, Corporate Finance, and Takeovers. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.99580

Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, *3*(4), 305–360. https://doi.org/10.1016/0304-405X(76)90026-X

Keynes, J. M. (1936). *The general theory of employment, interest and money*. Macmillan.

Khuong, N. V., Ha, N. T. T., Minh, M. T. H., & Thu, P. A. (2019). Does corporate tax avoidance explain cash holdings? The case of Vietnam. *Economics & Sociology*, *12*(2), 79–93. https://doi.org/10.14254/2071-789X.2019/12-2/5

Kurniawan, M. I., & Nuryanah, S. (2017). The Effect of Corporate Tax Avoidance on the Level of Corporate Cash Holdings: Evidence from Indonesian Public Listed Companies. *Australasian Accounting, Business and Finance Journal*, *11*(4), 38–52. https://doi.org/10.14453/aabfj.v11i4.4

Liu, H., Zhu, J., & Cheng, H. (2024). Enterprise digital transformation's impact on stock liquidity: A corporate governance perspective. *PLOS ONE*, *19*(3), e0293818–e0293818. https://doi.org/10.1371/journal.pone.0293818

Mai, T. H., Vu, T. X., Nguyen, D. D., & Dao, L. T. T. (2026). A Study of Factors Influencing the Cash Holding Ratio of Real Estate Firms Listed on Vietnam's Stock Market in the Digital Transformation Era. *International Journal of Asian Business and Information Management*, *17*(1), 1–17. https://doi.org/10.4018/IJABIM.402718

Nguyen, M., & Nguyen, J. H. (2020). Economic policy uncertainty and firm tax avoidance. *Accounting & Finance*, *60*(4), 3935–3978. https://doi.org/10.1111/acfi.12538

Nuryani, N., Mutiara, A. B., Wiryana, I. M., Purnamasari, D., & Putra, S. N. W. (2024). Artificial Intelligence Model for Detecting Tax Evasion Involving Complex Network Schemes. *Aptisi Transactions on Technopreneurship (ATT)*, *6*(3). https://doi.org/10.34306/att.v6i3.436

Opler, T. (1999). The determinants and implications of corporate cash holdings. *Journal of Financial Economics*, *52*(1), 3–46. https://doi.org/10.1016/S0304-405X(99)00003-3

Pu, T. (2025). Exploring the impact of digital technology adoption on cash holdings: financing constraints as a moderator. *Future Business Journal*, *11*(1), 243–243. https://doi.org/10.1186/s43093-025-00666-9

Qu, G., & Jing, H. (2025). Is new technology always good? Artificial intelligence and corporate tax avoidance: Evidence from China. *International Review of Economics & Finance*, *98*, 103949–103949. https://doi.org/10.1016/j.iref.2025.103949

Rahayu, S. K., & Kusdianto, A. (2023). Challenges of Digital Tax Administration Transformation in Indonesia. In. https://doi.org/10.5772/intechopen.111458

Reswita, Y., Lukman, S., Febrianto, R., & Adrianto, F. (2026). Ownership structure, digital transformation, and corporate tax avoidance: Evidence from Indonesia. *Investment Management and Financial Innovations*, *23*(1), 347–359. https://doi.org/10.21511/imfi.23(1).2026.26

Souguir, Z., Lassoued, N., Khanchel, I., & Bejaoui, E. (2025). Behind the Screens: Digital Transformation and Tax Policy. *Journal of Risk and Financial Management*, *18*(7), 390–390. https://doi.org/10.3390/jrfm18070390

Sun, C., Lin, Z., Vochozka, M., & Vincúrová, Z. (2022). Digital transformation and corporate cash holdings in China's A-share listed companies. *Oeconomia Copernicana*, *13*(4), 1081–1116. https://doi.org/10.24136/oc.2022.031

Sun, X., Han, J., & Işık, C. (2025). Can digital transformation be a "powerful tool" to curb corporate tax avoidance? Mechanism analysis and policy implications based on Chinese data. *International Review of Economics & Finance*, *102*, 104330–104330. https://doi.org/10.1016/j.iref.2025.104330

Tiantian, G., Hailin, C., Zhou, X., Ai, S., & Siyao, W. (2023). Does corporate digital transformation affect the level of corporate tax avoidance? Empirical evidence from Chinese listed tourism companies. *Finance Research Letters*, *57*, 104271–104271. https://doi.org/10.1016/j.frl.2023.104271

Van, H. V., & Kim, C. L. (2025). Does increased digital transformation decrease corporate cash holdings? The moderating role of business environment quality. *Finance Research Letters*, *75*, 106800–106800. https://doi.org/10.1016/j.frl.2025.106800

Verhoef, P. C., Broekhuizen, T., Bart, Y., Bhattacharya, A., Qi Dong, J., Fabian, N., & Haenlein, M. (2021). Digital transformation: A multidisciplinary reflection and research agenda. *Journal of Business Research*, *122*, 889–901. https://doi.org/10.1016/j.jbusres.2019.09.022

Xie, K., & Huang, W. (2023). The Impact of Digital Transformation on Corporate Tax Avoidance: Evidence from China. *Discrete Dynamics in Nature and Society*, *2023*, 1–13. https://doi.org/10.1155/2023/8597326

Xu, L., & Zhang, L. (2026). How digital capabilities affect tax planning: The internal information environment. *Finance Research Letters*, *92*, 109540–109540. https://doi.org/10.1016/j.frl.2026.109540

Yang, H., & Cai, C. (2026). Digital government construction and corporate cash holdings: evidence from China. *Applied Economics*, 1–20. https://doi.org/10.1080/00036846.2026.2622562

Zhang, Q., & She, J. (2024). Digital transformation and corporate tax avoidance: An analysis based on multiple perspectives and mechanisms. *PLOS ONE*, *19*(9), e0310241–e0310241. https://doi.org/10.1371/journal.pone.0310241

APPENDIX

Appendix: Definitions of Operational Variables

Variable	Definition	Measurement	Data Source
Dependent variable			
GAAPETR	Tax Avoidance	Total tax expense divided by pre-tax income	Financial Report
CURETR		Total current income tax expense divided by pre-tax income	Financial Report
CASHETR		Total cash tax paid divided by pre-tax income	Financial Report
Independent variable			
DT	Digital Transformation	Natural logarithm of the keywords (artificial intelligence, big data, cloud, blockchain, and technology)	Annual Report
CLOUD	Cloud Computing	Total number of keywords in cloud computing	Annual Report
Mediating variables			
CH	Cash Holdings	Ratio of cash and cash equivalents to total assets	Annual Report
Control variable			
FSIZE	Company Size	Natural logarithm of total assets	Osiris
LEV	Leverage	Total debt to assets	Osiris
FAGE	Company Age	Natural logarithm of company age based on listing date	Osiris
GROWTH	Growth	Annual sales growth	Osiris
BSIZE	Board Size	Total number of members of the Board of Commissioners and Directors	Osiris
BIG4	Audit Quality	Dummy variable: 1 if audited by the Big Four, 0 otherwise	Annual Report
SOE	State-Owned Enterprise	Dummy variable: 1 if the firm is a State-Owned Enterprise, 0 otherwise	Annual Report
Instrumental variable			
PEER_DIGIT	Peer-Industry Digitalization	The industry-year average of digital transformation scores, excluding the focal firm (leave-one-out mean)	Annual Report

Source: Authors' own creation