Digitalization of Financial Reporting through XBRL and Corporate Tax Avoidance: Evidence from Indonesia

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A B S T R A C T

Corporate tax avoidance has been the subject of international debate since the Enron scandal and has raised awareness of the need for greater transparency in financial markets. Efforts have been made to strengthen financial reporting requirements and meet the needs of investors and other stakeholders, including digitalization of financial reporting through Extensible Business Reporting Language (XBRL). This study examines the impact of the mandatory adoption of XBRL on corporate tax avoidance. We tested our predictions using a panel dataset of Indonesian firms listed on the IDX stock exchange. Based on available information in the DATASTREAM database covering the 2013-2017 period, we used two proxies for tax avoidance i.e., GAAP effective tax rate and current effective tax rate. We estimated multiple regression model including industry and year fixed effects. The results show that XBRL implementation has reduced corporate tax avoidance. These findings suggest that improving corporate transparency through XBRL could play a deterrent tool to corporate tax avoidance. The results of this study should be useful to tax authorities and accounting standard setters supporting the benefits of digitalizing financial reporting and continuing to complete XBRL taxonomies around the world.

Keywords: Digitalization, Effective Tax Rate, Indonesia, Tax Avoidance, XBRL

Ⅰ. Introduction

Corporate tax avoidance has been the subject of international debate since the Enron scandal and has raised awareness of the need for greater transparency in financial markets. Efforts have been made to strengthen financial reporting requirements and meet the needs of investors and other stakeholders, including digital reporting. The Institute of Chartered Accountants in England and Wales (ICAEW) distinguishes between two levels of digital reporting. The first-tier deals with the first generation of digital

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reporting, which involves disclosure of information on the Internet. The second-tier involves second generation reporting, which aims to improve information transparency for stakeholders and standardize the conceptual framework.

Our research focuses on EXtensible Business Reporting Language (XBRL), which represents the second generation of digital reporting. It's considered as an integrated solution to standardize the presentation of information and ensure its transparency (Zamroni and Aryani, 2018). It represents a new language for exchanging dynamic and unified financial information, increasing its relevance.

Since its inception, XBRL has received strong support from software developers, regulators, auditors and other stakeholders (Abdullah et al., 2009). Several jurisdictions in Europe, North America and Asia have adopted it as the new financial reporting format. Particularly, since 2015, The Indonesian Stock Exchange (IDX) has required public companies to use XBRL. Therefore, public companies must file their annual accounts and annual reports in both traditional and XBRL formats. According to the IDX website[1] "*The main benefits of using XBRL-based reporting is to improve the efficiency, speed and automate data processing that could support the process of analysis and quality of information that will be used for corporate decision-making*".

The adoption of XBRL has sparked interest among several researchers to study its impact on financial markets (Dong et al., 2016; Kim et al., 2012; Kim et al., 2019a; Li, 2013; Liu et al., 2014). More recently, other studies have focused on the impact of XBRL on corporate practices from different perspectives, especially earnings management (Kim et al., 2019b)

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1) https://www.idx.co.id/en/listed-companies/xbrl/ *(accessed 13-05-2023).*

and tax avoidance (Chen et al., 2021; Saragih and Ali, 2022). However, results have been mixed, confirming theoretical predictions that highlighted the advantages and disadvantages of using XBRL as a new reporting mode (Avallone et al., 2016; Guragai et al., 2017).

Building on previous developments, this study focuses on the effect of digitalization of financial reporting through XBRL on corporate tax avoidance. Particularly, it aims to test whether the mandatory XBRL adoption in Indonesia affects corporate tax avoidance.

To achieve our purpose, we selected non-financial firms listed in the Indonesia Stock Exchange (IDX) spanning the period from 2013 to 2017. The choice of Indonesia as the context of the study is justified by the fact that, to our knowledge, it is one of the latest adopters of XBRL for which XBRL became mandatory for listed firms as of 2015. 738 firm-year observations were retained excluding the financial sector.

To measure corporate tax avoidance, we used the GAAP effective tax rate (ETR) and the current effective tax rate (CUETR). These proxies have been, extensively, used in numerous empirical tax researches (Armstrong et al., 2012; Ayers et al., 2009; Chen et al., 2012; Hanlon and Heitzman, 2010; Jaafar and Thornton, 2015). Hanlon and Heitzman (2010, page 11) stated that "*there are no universally accepted definitions of, or constructs for, tax avoidance or tax aggressiveness*". They provided a conceptual definition of tax avoidance as "*the reduction of explicit taxes*". Kirchler et al. (2003) distinguished three main concepts, namely tax avoidance, tax flight and tax evasion. The authors, showed that, from an economic perspective, all these concepts have similar budgetary implications and are all based on the same desire to reduce firm's tax burden. However, these concepts

are different from a psychological perspective due to legal differences and ethical considerations. Based on social representations, the authors showed that tax avoidance is considered legal and ethical and is associated with the intention to save taxes. Tax evasion is considered illegal and unethical and involves criminal prosecution, risk, tax audits and penalties. Finally, tax flight is considered legal but unethical and is related to the intention to save taxes by shifting income to low-tax, low-offset countries. In this study, tax avoidance refers to reducing taxes by using legal means, for instance by exploiting tax-loopholes.

The results show that mandatory adoption of XBRL has reduced tax avoidance which suggests that improving corporate transparency through XBRL could play a deterrent tool to corporate tax avoidance. The findings of this study should be useful to tax authorities fighting tax avoidance. Indeed, XBRL is supposed to be a suitable technology to fight tax avoidance when it supports the government's supervision by facilitating data extraction and analysis through improved data controls (Vasarhelyi et al., 2012).

This study contributes to the existing literature by examining corporate tax avoidance in a digital environment. To the best of our knowledge, apart from Chen et al. (2021) and Saragih and Ali (2022) there are no other studies that investigated this issue. Chen et al. (2021) found that the mandatory adoption of XBRL in the United States had a negative impact on corporate tax avoidance. Saragih and Ali (2022), on the other hand, look at the Asian context, particularly Indonesia. They found that the mandatory adoption of XBRL has no significant effect on corporate tax avoidance proxied by book-tax-differences. These mixed results prompted us to re-examine the impact of mandatory XBRL adoption on tax avoidance. Using the effective tax rate as measure

of corporate tax avoidance rather than book-tax-differences, we are able to show that the mandatory XBRL adoption in Indonesia reduces tax avoidance practices.

The next section provides background, literature review and hypothesis development. Section 3 outlines the research design. Section 4 presents and discusses the findings of the study. Section 5 provides additional analysis. Section 6 concludes.

Ⅱ. Background, Literature Review and Hypothesis Development

2.1. XBRL Implementation in Indonesia

XBRL is a data description language that enables the exchange of understandable and consistent information based on XML (Hentati et al., 2021; Roohani and Zheng 2013).

Launched by the American Institute of Certified Public Accountants, in 1998, XBRL is now managed by a global consortium that simplifies the preparation of internal and external financial statements (Taylor and Dzuranin, 2010). It is recognized as a key enabler of corporate transparency (Apostolou and Nanopoulos, 2009; Bonsón et al., 2010; Debreceny et al., 2011; Ionescu, 2011; Roohani et al., 2009) and an example of a breakthrough and value-added accounting information technology (Alles et al., 2008).

According to the U.S. Securities and Exchange Commission (SEC), the use of inline XBRL provides a wide range of benefits to users of corporate and financial information (Mishchenko, 2020). Reducing filing preparation costs, improving the quality of structured data, and increasing the use of XBRL data by investors and other market participants are some of the potential benefits (Kaya and Pronobis, 2016).

As a result, the Electronic Data Gathering, Analysis, and Retrieval (EDGAR) system has been updated to make it easier to use inline XBRL (Mousa and Pinsker, 2019).

In 2012, the IDX has launched a project in order to start preparing the financial reporting taxonomy for all listed companies. In March 2014, through a public review process, the IDX completed the classification and released it in late April of that year. On June 5 of the same year, the taxonomy was internationally recognized by XBRL. It is consistent with Indonesian Accounting Standards ("PSAK"), Financial Accounting Standards ("IFRS"), and the Indonesian Financial Services Authority ("FSA") and is reasonable, acceptable, and consistent with the specific circumstances of the firm (Mayapada et al., 2020; Tohang et al., 2020). The overall format of the financial statements is derived from a representative sample of IDX-listed companies. The requirement to file financial reports in XBRL format went into effect in 2015 (Tohang and Lusiana, 2022).

XBRL is developed for different purposes around the word. In particular, standardization of financial reporting format, in Indonesia, through XBRL is becoming a necessity for a number of reasons. In fact, as the Indonesian capital market grows, the need for available information that can be easily used by stakeholders and processed quickly and efficiently has become increasingly important. In this case, reports based on XBRL can help achieve the above goals. XBRL facilitates the development of business intelligence to facilitate decision-making in companies (Tohang et al., 2020).

XBRL, also, reduces inefficiencies and the potential for improper action, thereby improving oversight of tax mechanisms and reducing the risk of mismanagement, bureaucracy, paperwork, and fraud. Chen et al. (2021) argued that XBRL implementation allows for lower information processing costs, thereby facilitating the Internal Revenue Service (IRS) monitoring. They found that XBRL adoption in U.S. reduces tax avoidance practices. Throughout this study we investigate whether the results found by Chen et al. (2021) hold in a developing setting i.e. Indonesia. We test whether mandatory XBRL implementation in Indonesia deters corporate tax avoidance.

Research on tax avoidance is increasingly developing in the Indonesian context (e.g., Bimo et al., 2019; Kurniasih and Suranta, 2017; Manihuruk et al., 2021; Sonia and Suparmun, 2019; Sudibyo and Jianfu, 2016; Yuniarwati et al., 2017). This country is characterized by a weak institutional environment (Leuz and Oberholzer-Gee, 2006). Corruption is a serious problem in it. Despite these problems, its economic growth is very high and taxation is considered as an important source of government revenue which needs to be optimized significantly. Therefore, we expect that the Indonesian Directorate General of Taxes (IDGT) will benefit from transparency induced by digitalization of financial reporting through XBRL. Thus, Indonesian firms will stop to reduce their tax burden to avoid to be subject to scrutiny by the IDGT.

To increase compliance and use of XBRL data, the IDX continues to improve the quality of tax services and meet industry and regulatory requirements. On January 25, 2019, it signed a cooperation agreement with the State Tax Administration (Mousa, 2016). To achieve good compliance, it, also, conducts outreach and consulting activities and continues to improve the XBRL reporting system (Mousa, 2016; Saragih et al., 2021). Now, IDX intends to expand its current classification by introducing notes to the financial statements to clarify the information provided.

2.2. Literature Review and Hypothesis Development

One of the main benefits of introducing XBRL reporting is to make financial reports machine-readable. XBRL allows tax authorities to efficiently and accurately retrieve, extract, compare, and classify information in financial statements (Dong et al., 2016), and then easily detect tax avoidance behavior.

Prior studies have examined the impact of XBRL on stock market (Dong et al., 2016; Kim et al., 2012; Kim et al., 2019b; Liu, 2013; Liu et al., 2014). They found that XBRL reporting both increased analyst coverage and expanded forecasts. The reporting also led to a reduction in the cost of equity capital and an increase in market liquidity.

More recently, other studies have focused on the effect of XBRL implementation on corporate practices including earnings management (Kim et al., 2019b) and tax avoidance (Chen et al., 2021; Saragih and Ali, 2022). Indeed, Kim et al. (2019b) tested the impact of XBRL use on earnings management in a U.S. context. Their study spanned a two-year period from June 15, 2009 to June 14, 2011, having in the sample the mandatory adopters of XBRL during the first and second implementation phases. The authors found that absolute discretionary accruals decrease after XBRL adoption, suggesting that mandatory XBRL adoption leads to reduced earnings management. These results are consistent with the idea that an XBRL-induced reporting environment makes it easier for users to control financial reporting information, thereby limiting earnings management. Furthermore, the impact of XBRL on earnings management is more (less) significant for companies using more standardized XBRL extensions (individualized XBRL extensions). This result supports the idea that standardized and SEC-regulated XBRL extensions are more effective in limiting earnings management than individualized ones.

With the additional data provided by XBRL reports, tax authorities can supplement the private information in corporate tax returns. For example, the IRS continually searches for public information in corporate financial reports to support their private information (Chen, 2017). In this context, Chen et al. (2021) pointed out that the mandatory introduction of XBRL not only facilitates the access of tax authorities, but also provides more information in an efficient manner. This improves the ability of tax authorities to track users' tax strategies against relevant benchmarks. The researchers added that the cross-firm data consistency provided by the XBRL format not only makes financial data timelier and more comparable, but also makes highly anomalous deviations from norms, such as industry averages of firms' reported performance or examples of historical trends, visible to the public. As a result, tax authorities provide its staff with specific guidance to better identify potential differences between firms (Cloyd et al., 1996).

To test the impact of XBRL adoption on corporate tax avoidance, Chen et al. (2021) carried out a study in the U.S. context. Their study was motivated by the recent debate in the US Congress on the costs and benefits of mandatory XBRL reporting. The SEC has adopted XBRL for financial reporting in three phases. The first phase includes large-cap companies with a public float of more than $5 billion. The second phase includes mid-cap companies with public float between $700 million and $5 billion, and the third phase includes small companies with public float below $700 million. Chen et al. (2021)focused on large-cap companies. The authors justified their choice by the fact that large-cap companies hold

a large amount of financial information. As a result, users of their financial statements face higher processing costs than those of medium and small companies. Furthermore, large-cap companies are more likely to engage in tax avoidance strategies (Zimmerman, 1983).

Chen et al. (2021) suggested that the reduction in information processing costs through XBRL should facilitate IRS examination. They found a significant negative association between mandatory XBRL adoption and tax avoidance. They justified this result by the fact that XBRL reporting is less costly for U.S. tax authorities, especially when processing annual financial statement information and reviewing tax avoidance cases. They also found that this association is less pronounced for firms that received more scrutiny from tax authorities prior to mandatory XBRL adoption.

In the same vein of thought, Saragih and Ali (2022) examined the impact of XBRL adoption on corporate tax avoidance in Indonesian context. To obtain empirical evidence on this issue, the authors used a sample of IDX-listed firms covered the period from 2011 to 2018. Specifically, the period before XBRL adoption was from 2011 to 2014, and the period after XBRL adoption was from 2015 to 2018. Saragih and Ali (2022) collected research data from databases, financial statements, and company reports. To measure tax avoidance, they used book tax differences (BTD). The main variable of interest was DXBRL. It was coded 1 if the firm is an XBRL filer for several years after XBRL implementation, 0 otherwise. The regression results showed that the introduction of XBRL has no significant effect on tax avoidance. The authors concluded that the adoption of XBRL in emerging countries does not prevent tax avoidance.

Based on the aforementioned theoretical arguments and the mixed empirical findings (Chen et al., 2021; Saragih and Ali, 2022), we can conclude that the effect of the mandatory XBRL adoption on corporate tax avoidance seems reasonable but is not clear ex-ante. Thus, we state our hypothesis in the alternative form, as follows:

Hypothesis: The mandatory XBRL adoption affects corporate tax avoidance.

Ⅲ. Research Design

3.1. Variables Measurement

3.1.1. Dependent Variable: Corporate Tax Avoidance

To measure tax avoidance, prior studies used several proxies.[2] To empirically test the research hypothesis, we used the GAAP effective tax rate (ETR) and the current effective tax rate (CUETR) as proxies for corporate tax avoidance. These proxies have been, extensively, used in numerous empirical tax researches (Armstrong et al., 2012; Ayers et al., 2009; Chen et al., 2012; Hanlon and Heitzman, 2010; Jaafar and Thornton, 2015).

For a specific reporting year, the ETR was computed as income tax expenses divided by pre-tax book income.

This measure indicates the extent of firms' tax aggressiveness (Chen et al., 2010) and provides an inverse indicator of tax avoidance.

$$\text{ETR} = \text{Income tax expenses/Pre-tax book income}$$

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2) See Table 1 of Hanlon and Heitzman (2010, page 140) for alternatives proxies of tax avoidance used in tax literature.

For the CUETR, it was computed, for a specific reporting year, as current income tax divided by pre-tax book income.

CUETR = Current income tax/Pre-tax book income

We suppose that the more the firm engages in tax avoiding activities, the lower are the ETR and the CUETR.

3.1.2. Variable of Interest: Mandatory XBRL Adoption

The obligation to submit financial report in XBRL format has been implemented since 2015.[3] Therefore, we measured the mandatory XBRL adoption using a dummy variable. It takes 1 for all years when this requirement was in effect (2015-2017) and zero otherwise (2013-2014). We consider the post-mandatory XBRL adoption period (post-XBRL) to be from 2015 onward.

3.2. Sample Selection

To test our hypothesis, we selected non-financial firms listed in the IDX. The choice of Indonesia as the context of the study is justified by the fact that, to our knowledge, it is one of the countries that have most recently adopted XBRL which became mandatory for listed firms as of 2015.

584 listed firms operating in different sectors were initially identified from the DATASTREAM database, excluding the financial sector. For these 584 firms, we collected the necessary data to test our predictions spanning the 2013-2017 period. The 2013-2014 period was used as the pre-XBRL adoption period when

3) https://www.idx.co.id/en-us/listed-companies/xbrl/

2015-2017 were considered as the post-XBRL adoption period. We used a narrower time-window for testing the research hypothesis to isolate the effects of the XBRL mandatory adoption on corporate tax avoidance with minimal likelihood of contamination by other confounding events.

The primary sample consists of 2 920 firm-year observations. We, then, removed firm-year observations with missing data on ETR. Another set of observations was dropped for which ETR are negative because they are difficult to interpret (Richardson and Lanis, 2007) or exceed one since this can cause model estimation problems (Gupta and Newberry, 1997; Richardson and Lanis, 2007). In addition, we excluded observations with missing data to compute CUETR, with negative CUETR and with CUETR exceeding one. Lastly, we removed missing data from any of the variables needed as well as firm-year observations not assigned to any sector.

<Table 1> Panel A, illustrates the sample selection process. The final sample comprises a total of 738 firm-year observations. Panels B & C of <Table 1> display, respectively, the sample split by year and industry. <Table 1> panel B, indicates that our panel data is unbalanced. Furthermore, panel C of <Table 1> shows that most of the sampled firms operate in "Consumer goods" sector followed by "Industrials", "Consumer services" and "Basic materials" sectors.

3.3. Model Specification

To test the study hypothesis, we performed the following regression model:

MODEL: $TA_{i,t} = \beta_0 + \beta_1(XBRL)_{i,t} + \beta_2(FSIZE)_{i,t} + \beta_3(LEV)_{i,t} + \beta_4(ROA)_{i,t} + \beta_5(INTANG)_{i,t} + \beta_6(PPE)_{i,t} + \beta_7(INVENT)_{i,t} + \Sigma\beta_{7+j}YEARi,t + \Sigma\beta_{11+k}INDUSTRY_{i,t} + \varepsilon_{i,t}$

<Table 1> Summary of the Sample Selection Process and Sample Characteristics

Panel A: Sample Selection Criteria	
All Indonesian firms active in the DATASTREAM database and listed on the Indonesia Stock Exchange (IDX)	584
Total initial firm-year observations	2,920
Excluding firm-year observations:	
✓ With missing data on ETR	(1,365)
✓ With negative ETR or ETR exceeding 1	(29)
✓ Due to missing data to compute CUETR	(586)
✓ With negative CUETR	(5)
✓ With CUETR exceeding 1	(12)
✓ With missing data from any of the necessary variables	(67)
✓ Not assigned to any sector	(118)
Total final firm-year observations	738
Panel B: Distribution of Firm-Year Observations By Year		

Year	Number of obs.	Percentage
2013	169	22.90
2014	161	21.82
2015	116	15.72
2016	130	17.62
2017	162	21.95
Total	738	100.00
Panel C: Distribution of Firm-Year Observations By Sector		
Sector (*ICB classification*)	Number of obs.	Percentage
Oil & Gas	21	2.85
Basic Materials	118	15.99
Industrials	143	19.38
Consumer Goods	210	28.46
Health Care	47	6.37
Consumer Services	126	17.07
Telecommunications	15	2.03
Utilities	15	2.03
Technology	43	5.83
Total	738	100.00

We used ETR and CUETR as corporate tax avoidance proxies. XBRL represents a time-period variable which proxies for mandatory XBRL adoption. The main coefficient of interest in our regression model is β_1 which reflects the effect of the mandatory XBRL adoption on corporate tax avoidance (TA). The hypothesis predicts that β_1 should be significant.

In addition, we included firm-level characteristics as control variables. They include firm size (FSIZE), leverage (LEV), profitability (ROA), intensity of intangible (INTANG) and tangible assets (PPE) and importance of inventories (INVENT). These control variables are previously shown in the literature to be related to the level of corporate tax avoidance (Jaafar and Thornton, 2015; Kobbi-Fakhfakh, 2021; Kobbi-Fakhfakh and Bougacha, 2023; Markle and Shackelford, 2012; Richardson and Lanis, 2007; Taylor and Richardson, 2013).

Finally, to control for the effect of time and industry, we included respectively year and industry fixed effects in our model.

<Table 2> Variables Definitions

Variables	Measures
Dependent variable: Corporate tax avoidance proxies	
ETR	Income tax/Pre-tax book income
CUETR	Current income tax/Pre-tax book income
Independent variables	
XBRL	Dummy variable equal to 1 (0 otherwise) from 2015 onward.
FSIZE	Natural logarithm of total assets
LEV	Total debt/Total assets
ROA	Net income/Total assets
INTANG	Intangible assets/Total assets
PPE	Net property plant and equipment/Total assets
INVENT	Inventory/Total assets
YEAR	Year fixed effects
INDUSTRY	Industry fixed effects

Data collection for all study variables was derived from DATASTREAM database. <Table 2> contains full definitions of all the study variables.

Ⅳ. Empirical Results and Discussion

4.1. Descriptive Statistics

Our sample consists of 738 firm-year observations listed on the IDX and examined over the period 2013-2017.To avoid any problems related to the presence of outliers or extreme data, all continuous variables were winsorized at the 1st and 99th percentiles.

<Table 3>, presented below, summarizes the descriptive statistics of the dependent variables (ETR and CUETR), the variable of interest (XBRL), and the control variables included in the regression model.

<Table 3> shows that both effective tax rates ETR and CUETR range respectively from a minimum of 0.007 to a maximum of 0.866 and from a minimum

of 0 to a maximum of 0.781. Both tax rates have respectively an average (median) of 0.276 (0.256) and 0.264 (0.255). These statistics suggest that corporate tax avoidance in Indonesia differs substantially from listed firm to another.

<Table 3> also reports the summary descriptive statistics relating to the firm characteristics included as control variables in the regression model. Firm size (FSIZE) ranges from a minimum of 16.670 to a maximum of 25.299, with a mean (median) of 21.917 (22.022). Profitability (ROA) ranges from a minimum of 0.310 to a maximum of 47.180 with a mean (median) of 9.786 (7.560). In addition, leverage (LEV) ranges from a minimum of 0 to a maximum of 0.683 with a mean (median) of 0.241 (0.229).

In addition, intangible intensity (INTANG) ranges from a minimum of 0 to a maximum of 0.523. For the capital intensity (PPE), it ranges from a minimum of 0.008 to a maximum of 0.894. Both variables have respectively an average (median) of 0.025 (0) and 0.370 (0.334).

<Table 3> Summary Descriptive Statistics for Study Variables

Variables		Minimum	Maximum	Mean	Median	Standard deviation
Dependent variables	ETR	0.007	0.866	0.276	0.256	0.138
	CUETR	0.000	0.781	0.264	0.255	0.141
Independent variables	FSIZE	16.670	25.299	21.917	22.022	1.626
	LEV	0.000	0.683	0.241	0.229	0.185
	ROA	0.003	0.471	0.098	0.075	0.084
	INTANG	0.000	0.523	0.025	0.000	0.081
	PPE	0.008	0.894	0.370	0.334	0.235
	INVENT	0.000	0.587	0.142	0.105	0.136
				Modality	Frequency	%
	XBRL			1	408	55.28
				0	330	44.72

Note: This table reports the descriptive statistics for the study variables using 738 firm-year observations from 2013 to 2017. All variables are defined in <Table 2>. All continuous variables are winsorized at the 1st and 99th percentiles.

<Table 4> Correlation Matrix

	1	2	3	4	5	6	7
1. XBRL	1	0.143***	-0.019	0.039	0.054	-0.034	-0.028
2. FSIZE	0.112***	1	0.268***	-0.149***	0.345***	0.076**	-0.093**
3. LEV	-0.023	0.232***	1	-0.299***	0.125***	0.314***	-0.089**
4. ROA	0.047	-0.163***	-0.287***	1	-0.049	-0.102***	0.069*
5. INTANG	0.032	0.190***	0.116***	-0.028	1	-0.031	-0.163***
6. PPE	-0.038	0.105***	0.295***	-0.097***	-0.204***	1	-0.271***
7. INVENT	-0.034	-0.131***	-0.071*	0.033	-0.222***	-0.344***	1

Note: This table reports the correlation matrix using 738 firm-year observations from 2013 to 2017. All variables are defined in <Table 2>. All continuous variables are winsorized at the 1st and 99th percentiles. The bottom left half of the table contains Pearson's parametric correlation coefficients, while the upper right half of the table shows Spearman's non-parametric correlation coefficients. ***, **, and * denote significant at the 1%, 5%, and 10% levels, respectively.

Furthermore, the inventory intensity (INVENT) ranges from a minimum of 0 to a maximum of 0.587; with a mean (median) of 0.142 (0.105).

Based on these descriptive statistics, we can conclude that the distribution of all the study variables generally displays wide variations.

To test for multicollinearity, <Table 4> presents the correlation matrix for all the independent variables included in the regression model. The Pearson correlations are in the bottom left and the Spearman correlations are in the top right. The matrix shows that the magnitude and direction of both parametric and non-parametric coefficients are very similar.

In prior literature, there is no widely accepted threshold to determine the presence of a serious multicollinearity problem among independent variables. However, the general rule of thumb is that the absolute value of the correlation coefficient should not exceed 0.8 for Kennedy (2008) and 0.75 for Green (1978).

The highest correlation in the data employed, in our study, is 0.345. Therefore, all correlations are within the acceptable range, and then are fairly low.

4.2. The Impact of Mandatory XBRL Adoption on Corporate Tax Avoidance: Regression Results and Discussion

To examine our research question, we estimated a linear regression model with panel data using STATA software. To achieve robust estimations, several econometric tests were performed, including tests of specification, heteroscedasticity and autocorrelation. A "Breusch - Pagan test" for heteroscedasticity and a "Wooldridge test" for autocorrelation indicate the presence of both heteroscedasticity and autocorrelation problems for our regression model. We therefore estimated it using "Feasible Generalized Least Square" (FGLS) to obtain robust results.

<Table 5> above summarizes the FGLS estimates for our regression model in the Indonesian context. It shows that "Wald-Chi2" test of overall significance of the estimated model is significant at the 1% level (Prob > Chi2 = 0.000). This indicates that the explanatory power of our model is satisfactory.

Our research question is to test the impact of mandatory XBRL adoption (XBRL) on corporate tax

<Table 5> Baseline Results of Regression Model Estimation

Cross-Sectional Time-Series FGLS Regression				Panels: Heteroskedastic		
Coefficients: Generalized Least Squares				Correlation: Common AR(1)		
VARIABLES	ETR (Column 1)			CUETR (Column 2)		
	Coef.	Z	P-value	Coef.	Z	P-value
XBRL	0.006	(2.01)**	0.044	0.015	(3.67)***	0.000
FSIZE	0.000	(0.09)	0.930	-0.004	(-1.79)*	0.073
LEV	-0.001	(-0.07)	0.942	-0.013	(-0.73)	0.464
ROA	-0.413	(-12.02)***	0.000	-0.494	(-12.10)***	0.000
INTANG	0.092	(2.79)***	0.005	0.074	(1.50)	0.132
PPE	-0.009	(-0.73)	0.466	-0.009	(-0.44)	0.657
INVENT	-0.003	(-0.21)	0.831	0.094	(3.54)***	0.000
Constant	0.278	(9.40)***	0.000	0.347	(6.90)***	0.000
YEAR FE	YES			YES		
INDUSTRY FE	YES			YES		
Wald chi2 Prob>chi2	341.65 0.0000			264.71 0.0000		
Adjusted R2	0.15			0.07		
Observations	738			738		

avoidance (TA).

Before starting to interpret our results, it should be important to note that higher effective tax rate i.e., ETR or CUETR correspond to lower level of corporate tax avoidance. On the other hand, XBRL variable takes the value of 1 (0 otherwise) for all years when the mandatory XBRL adoption was in effect (2015-2017).

<Table 5> column 1, shows the estimation results of our model using ETR as the first proxy for corporate tax avoidance. Column 2 of <Table 5>, reports the model estimates using the second tax avoidance proxy which is CUETR.

<Table 5> column 1, shows that the estimated coefficient of XBRL variable is positive and statistically significant at the 5% level (β = 0.006, z-stat = 2.01, p < 0.05). This result suggests that the mandatory adoption of XBRL positively affects the effec-

tive tax rate (ETR), and then reduced corporate tax avoidance. This finding is the same when we use CUETR as a tax avoidance proxy as shown in <Table 5>, column 2. Indeed, the estimated coefficient of the variable of interest (XBRL) is positive and statistically significant at the 1% level (β = 0.015, z-stat = 3.67, p < 0.01) with CUETR.

Our results are consistent with our research hypothesis presuming that the mandatory XBRL adoption affects corporate tax avoidance. They, also, offer empirical support for Chen et al. (2021)'s results indicating that the digitalization of financial reporting through XBRL reduces the firm propensity to engage in tax avoidance activities.

By testing the effect of mandatory XBRL adoption on corporate tax avoidance, in the US, Chen et al. (2021) confirmed the idea that XBRL makes it easier for tax authorities to access necessary information.

They found that following the adoption of XBRL, U.S. companies decreased their tax avoidance practices to protect themselves from the risk of being suspected and sanctioned by the IRS. These researchers also added that the uniformity of data across companies through XBRL format not only makes financial data timelier and more comparable, but also allows high abnormal deviations from norms to be revealed to the public; such as the example of the industry average or historical trends in a company's reported performance.

Theoretically, our results confirm the predictions of agency theory. Indeed, according to this theory, managers can take advantage of the presence of information asymmetry and use aggressive tax saving strategies to extract tax rent at the expense of shareholders (Atwood and Lewellen, 2019). However, by implementing XBRL, the information asymmetry will be reduced through the digitalization of financial reporting. Thus, it will be easier to detect opportunistic behavior by executives, so that resorting to tax avoidance activities will be their last resort.

Overall, our findings suggest that improving corporate transparency through XBRL could play a deterrent tool to corporate tax avoidance. Indeed, XBRL is supposed to be a suitable technology to fight tax avoidance, as it increases the relevance, fairness, comparability and consistency of information, as well as its understandability. It supports the government's supervision by facilitating data extraction and analysis through improved data controls (Vasarhelyi et al., 2012). This is confirmed by the research of Rezaee and Turner (2002). These authors found that XBRL increases transparency by reducing the potential for inefficiency (Coffin, 2001) and misconduct, improving oversight of fiscal mechanisms, and reducing the risk of mismanagement, bureaucracy, and fraud.

With regard to control variables, <Table 5> shows that their impacts on tax avoidance are inconclusive. Indeed, the direction and the degree of significance of the coefficients associated to these variables are mixed and depend on the proxy of corporate tax avoidance used ETR or CUETR.

With respect to the size variable (SIZE), <Table 5>, Column 2, shows that it is negatively associated with CUETR with a coefficient of (β = -0.004) that is statistically significant at the 10% level (z-stat = -1.79, $p < 0.10$). This implies that tax avoidance increases with firm size. This is consistent with political power theory, which posits that large firms have more political power than small firms, implying the propensity of them to engage in tax avoidance activities. In fact, large firms in particular can use their resources and power to negotiate their tax burden or to influence legislation in their favor, which results in more tax avoidance (Gupta and Newberry, 1997; Richardson and Lanis, 2007; Siegfried, 1972; Stickney and McGee, 1982). Our results are consistent with previous empirical studies (Chen et al., 2021; Gupta and Newberry, 1997; Herron and Nahata, 2020; Khurana et al., 2018; Novita, 2016; Saragih and Ali, 2022; Zimmerman, 1983) which concluded that large firms have sufficient resources to deal with the policy process that encourages their engagement in tax avoidance activities.

Regarding the profitability variable (ROA), <Table 5>, columns 1 & 2, show that it has a negative and statistically significant coefficient at the 1% level for ETR (β = -0.004, z-stat = -12.02, $p < 0.01$) as well as CUETR (β = -0.005, z-stat = -12.10, $p < 0.01$). This result implies that corporate tax avoidance increases with firm profitability. It supports previous empirical studies by (Chen et al., 2021; Herron and Nahata, 2020; Khurana et al., 2018; Saragih and Ali, 2022; Wang, 2010) which documented that due to the wealth effect, corporate tax avoidance should

be positively correlated with firm performance.

For the inventory variable (INVENT), its coefficient is positive and statistically significant at the 1% level (ß = 0.094, z-stat = 3.54, p < 0.01) for the CUETR proxy (<Table 5>, column 2). This finding supports Newberry and Gupta (1997)'s suggestion, that inventory-intensive firms should face relatively high effective tax rates as long as they use the same inventory method for tax and accounting purposes. It also confirms prior studies (Richardson and Lanis, 2007).

Concerning the intangible assets intensity variable (INTANG), <Table 5>, column 1, reports a positive and statistically significant effect on ETR (ß = 0.092, z-stat = 2.79, p < 0.01) supporting prior empirical findings that there is a negative association between intangible assets intensity and corporate tax avoidance (Cai and Liu, 2009; Gordon and Li, 2009).

Finally, our results show that leverage and property plant and equipment (PPE) do not play a significant role in determining corporate tax avoidance in Indonesia.

V. Additional Analysis

Firms are not familiar with XBRL (Markelevich et al., 2021). The mandatory XBRL adoption may increase compliance costs for companies, especially for small and medium-sized enterprises that may not have the necessary resources or expertise to effectively implement XBRL reporting, and may require significant investments in training and technology.

As an additional analysis we investigate whether firm size moderates the association between the mandatory XBRL adoption and corporate tax avoidance. Therefore, we re-ran our baseline model by introducing an interaction term between FSIZE and XBRL variables as follows:

MODEL: $TA_{i,t} = \beta_0 + \beta_1(XBRL)_{i,t} + \beta_2(FSIZE)_{i,t} + \beta_3(XBRL{*}FSIZE)_{i,t}\ \beta_4(LEV)_{i,t} + \beta_5(ROA)_{i,t} + \beta_6(INTANG)_{i,t} + \beta_7(PPE)_{i,t} + \beta_8(INVENT)_{i,t} + \Sigma\beta_{8+j}YEARi,t + \Sigma\beta_{12+k}INDUSTRY_{i,t} + \varepsilon_{i,t}$

The main coefficient of interest in the above model is β_3. If firm size (FSIZE) moderates the association between the mandatory XBRL adoption (XBRL) and corporate tax avoidance (TA), β_3 will be significant.

<Table 6>, column 1 (Column 2), reports the results of regression model estimation using ETR (CUETR) as proxy for corporate tax avoidance.

<Table 6> provides partial evidence. Indeed, there is a significant coefficient on the interaction term XBRL*FSIZE for only the dependent variable CUETR (β = 0.007, z-stat = 2.24, p < 0.05) which indicates that firm size moderates the association between XBRL mandatory adoption and tax avoidance. Particularly, it shows that the reducing (increasing) effect of mandatory XBRL adoption on tax avoidance (CUETR) is more pronounced for large firms. One plausible explanation of this finding is that the XBRL compliance costs (e.g., XBRl-enabled applications' set up and training costs) could play a role in determining the effectiveness of digitalization of financial reporting in reducing corporate tax avoidance.

VI. Conclusion

The diversity of financial reporting formats results in users frequently encountering issues that can have a significant impact on the quality of financial information. XBRL aims to solve these problems by becoming a common format for financial reporting. To this day, users and regulators are still exploring

<Table 6> Results of Additional Analysis

Cross-Sectional Time-Series FGLS Regression				Panels: Heteroskedastic		
Coefficients: Generalized Least Squares				*Correlation: Common AR(1)*		
VARIABLES	ETR (Column 1)			CUETR (Column 2)		
	Coef.	Z	P-value	Coef.	Z	P-value
XBRL	-0.048	(-1.03)	0.304	-0.135	(-2.00)**	0.046
FSIZE	-0.002	(-0.96)	0.339	-0.008	(-2.79)***	0.005
XBRL*FSIZE	0.002	(1.17)	0.244	0.007	(2.24)**	0.025
LEV	0.002	(0.14)	0.886	-0.010	(-0.57)	0.569
ROA	-0.420	(-11.75)***	0.000	-0.510	(-12.50)***	0.000
INTANG	0.093	(2.47)**	0.014	0.081	(1.52)	0.129
PPE	-0.012	(-0.88)	0.379	-0.011	(-0.56)	0.576
INVENT	0.003	(0.17)	0.865	0.103	(3.66)***	0.000
Constant	0.320	(7.80)***	0.000	0.421	(7.13)***	0.000
YEAR FE	YES			YES		
INDUSTRY FE	YES			YES		
Wald chi2	295.22			300.29		
Prob>chi2	0.0000			0.0000		
Adjusted R2	0.15			0.07		
Observations	738			738		

the benefits of using XBRL (Tohang and Lusiana, 2022).

Throughout this study, we have attempted to respond to the following research question: Does XBRL mandatory adoption affect corporate tax avoidance?

To achieve our purpose, we examined a unique institutional setting where, since 2015, Indonesian listed firms are required to provide financial statements in XBRL format. A sample of 738 firm-year observations was selected over a 5-year period from 2013 to 2017. We measured tax avoidance using two different proxies which are the GAAP effective tax rate (ETR) and the current effective tax rate (CUETR). Data collection for all the study variables was derived from DATASTREAM database.

The main finding that emerges from our study is that the mandatory adoption of XBRL leads to less engagement of Indonesian listed firms in tax avoidance practices. Drawing on insights from agency theory, this finding suggests that managers will be hindered following the XBRL implementation given that it is inconsistent with their rent extraction strategies. Indeed, according to the agency theory, managers can take advantage of the presence of information asymmetry and use aggressive tax saving strategies to extract tax rent at the expense of shareholders (Atwood and Lewellen, 2019). However, by implementing XBRL, the information asymmetry will be reduced through the digitalization of financial reporting. Thus, it will be easier to detect managers' opportunistic behavior, so that resorting to tax avoidance activities will be their last resort.

Our findings are robust to controlling for many firm-level characteristics and industry and year fixed

effects. They highlighted one of the impacts of the financial reporting digitization on corporate practices, namely tax avoidance. The research findings should be informative to tax authorities and accounting standard-setting that continue to combat tax avoidance and support the benefits of digital financial reporting and continue to complete XBRL taxonomy globally.

The findings of this study should be interpreted with three main caveats in mind. First, the sample size is relatively small and caution must be applied as the findings might not be generalized. Second, this study focuses only on Indonesia, and the findings may have limited generalizability to other contexts.

The impact of XBRL adoption on corporate tax avoidance may vary from country to country, depending on the tax system, level of technology adoption, and other factors. Third, to measure the mandatory XBRL adoption, we used a dummy variable which takes 1 for all years when this requirement was in effect (2015-2017) and zero otherwise (2013-2014). The use of a time-dependent dichotomous variable may however hide other events that could affect corporate tax avoidance.

In conclusion, the results obtained and the limitations encountered in our work open our horizons to extend this research to other contexts regulating digitalization of financial reporting through XBRL.

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