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Do Prudential Regulations Influence Banks' Tax Burden? Evidence from Indonesia

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ABSTRACT

This study examines the effect of existing prudential regulations on banks' income tax burden, addressing an existing gap in prior literature that has rarely linked regulatory compliance with fiscal outcomes. We focus on two main prudential elements in Indonesia: the minimum capital adequacy ratio provision, which mandates a capital buffer of at least eight per cent of risk-weighted assets, and the maximum non-performing loan ceiling, which limits bad debts to less than five per cent of total disbursed loans. Using panel data of 47 banks listed on the Indonesia Stock Exchange from 2012 to 2022 and applying multiple regression estimations, this study offers novel evidence on the regulatory-tax nexus. The results show that the minimum capital buffer provision does not influence banks' effective tax rates, whereas the maximum bad-debt ceiling has a substantial influence. Specifically, a one-percentage-point increase in the non-performing loan ratio is associated with a 0.6 to 0.8 percentage-point increase in the tax burden, reflecting the stringent requirements of tax-deductibility of bad debt. These findings highlight the critical role of prudential supervision in shaping fiscal responsibilities, as suggested by previous studies. More broadly, this study contributes to the banking and tax literature by demonstrating how financial stability regulations can influence fiscal accountability, with lessons relevant to both emerging economies and global tax practices.

Keywords: bank, prudential regulation, capital adequacy ratio, non-performing loan, tax burden

1. INTRODUCTION

1.1 Background

In the bustling landscape of modern economies, the financial sector stands as a vital pillar, quietly orchestrating the complex 'dance' of growth and stability. The financial sector is like the heart of a country's economy, with banks and other financial institutions acting as the veins and arteries, which facilitate transactions and channel the essential flow of capital throughout the nation.

Over the years, the financialisation phenomenon has emerged and reshaped the landscape of the global financial sector. This trend highlights the growing importance of financial motives, markets, and actors in driving the broader economy (Qi, 2019). As this financial machinery hums, it generates a crucial by-product: state revenue. This revenue, primarily derived from taxes, forms the backbone of public finance, enabling governments to invest in future development. In Indonesia, according to Law Number 16 of 2009 concerning General Provisions

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and Tax Procedures, tax is defined as a compulsory contribution to the state, incumbent upon individuals or entities, enforced by law without direct reciprocation, and allocated for state purposes to maximise the prosperity of the populace[1]. Accordingly, state expenditure is a critical process for achieving national development objectives, particularly in enhancing human resource quality, providing infrastructure, alleviating poverty, offering healthcare facilities, and ensuring equitable development across Indonesia (Isnanto et al., 2021). The proportion of realised tax revenue relative to state expenditure in 2022 stood at 55.55 per cent, making it the most significant contributor in financing state expenditures (Kementerian Keuangan Republik Indonesia, 2023). This underscores that robust tax performance is crucial in the government's efforts to achieve national development agendas, particularly in the economic domain.

Accordingly, financial institutions are pivotal in the economy as they facilitate the provision of credit, liquidity, and risk management (Neil et al., 2013). Banks, as one of the primary financial institutions, have critical intermediary roles; thus, their 'health' is a prerequisite for a well-functioning economy. Consequently, both depositors and recipients of funds must have sufficient confidence in banks. Concurrently, as a profit-oriented institution, a bank must be supported by a sufficient capital base. Banks' capital is defined as funds invested by investors with the intention to finance the bank's business activities, in addition to fulfilling the regulations set by the monetary authorities (Nazaf, 2014). Monetary authorities such as Bank Indonesia and Financial Services Authority (OJK) have issued policies to regulate and supervise banking institutions in Indonesia, which can be referred to as Prudential Regulations (Hery, 2015). In assessing banks' 'healthiness, the authorities mainly use two vital indicators: Capital Adequacy Ratio (CAR) and Non-Performing Loans (NPL).

CAR is a ratio employed to assess the sufficiency of banks' capital in absorbing potential losses (Hery, 2015). Indonesia's monetary authorities have mandated a minimum CAR requirement of eight per cent.[2] Following this regulation, banks in Indonesia are obligated to maintain a minimum CAR of eight per cent to be deemed as financially sound institutions. Additionally, banks' capital adequacy level can also be influenced by their asset quality. According to Nazaf (2014), asset qualities reflect banks' operational ability to manage their productive assets effectively. In this case, monetary authorities regulate the assessment of asset quality using a maximum of five per cent of NPL.[3] This ratio indicates the quality of productive assets from the total disbursed credit, which is influenced by their collectibility status. If a bank maintains high collectibility and adequate revenue-generating assets, its capital requirements will be met from its operating profits. Conversely, if a bank continues to incur losses, its capital will be progressively eroded (Azizah & Taswan, 2019).

Therefore, the oversight of prudential banking principles is of paramount importance, as it also has significant implications for tax compliance. As OECD (2009) argued, financial institutions engage in complex financial transactions, which enable them to evade their tax obligations. Furthermore, taxes paid by financial institutions, particularly banks, reduce the available cash, thereby limiting their capacity for lending activities, and creating an incentive for banks to adopt more aggressive tax planning strategies compared to non-bank entities. Correspondingly, Efendi et al. (2022) found that financial institutions, both banks and non-banks, are more aggressive in their tax avoidance activities than other industries. They are more effective in exploiting opportunities to evade tax, as evidenced by their lower tax burden than non-financial institutions. Despite extensive research on prudential regulations, prior studies have largely focused on their effects on

[1] Read more on https://peraturan.bpk.go.id/Details/38624/uu-no-16-tahun-2009.

[2] Read more on https://www.ojk.go.id/id/kanal/perbankan/regulasi/peraturan-ojk/Documents/Pages/pojk11-kewajiban-penyediaan-modal-minimum-bank-umum/SALINAN-POJK.11%20Konversi%20KPMM%20FINALE.pdf.

[3] Read more on https://peraturan.bpk.go.id/Details/128351/peraturan-ojk-no-4pojk032016-tahun-2016

profitability, credit supply, and financial stability (Huizinga & Laeven, 2012; Mendicino et al., 2021; Vinh, 2017). The fiscal consequences of prudential compliance—specifically, how CAR and NPL thresholds shape banks' tax burden—remain underexplored, especially in emerging economies like Indonesia. Only limited evidence suggests that prudential supervision may influence tax planning and avoidance strategies (Gawehn & Müller, 2019; Efendi et al., 2022). This existing gap in the literature motivates our study.

This study offers comprehensive insights into how Prudential regulations influence banks' tax burden by examining all banks listed on the Indonesia Stock Exchange over a specific period, where we find consistent evidence that only restrictions on NPL affect banks' income tax burdens. We consider this study a modest response to the call by Efendi et al. (2022) for further analyses investigating the impacts of specific regulations concerning the soundness of financial firms on tax aggressiveness.

2. THEORETICAL FRAMEWORK AND HYPOTHESIS DEVELOPMENT

2.1 Financial Institutions and Banks

Financial institutions are taxable entities classified as corporate taxpayers, whether they are domestic, foreign, or have permanent establishments. A financial institution is an entity that provides financial services to its clients or customers. The business processes of such firms play a crucial role in the economy, as they facilitate transactions and offer mechanisms for savings, investments, and credit facilities (Hyman, 2014). However, OECD (2009) argued that the tax compliance of financial institutions needs more attention and supervision, considering that their business operations involve complex transactions that enable them to avoid taxes. Financial institutions have many opportunities to avoid paying taxes, such as the ability to shift profits to lower tax jurisdictions, engage in off-balance-sheet activities like derivative transactions, and have easier access to capital (Langenmayr & Reiter, 2022; Merz & Overesch, 2016; OECD, 2009; Schandlbauer, 2017). This is supported by the previous examination by Efendi et al. (2022), which found that financial institutions have a lower tax burden compared to non-financial firms by employing sophisticated and cost-effective techniques such as tax shelters, and permanent and temporary differences between accounting standards and the income tax law.

Saunders & Cornett (2014) categorised financial institutions into banks and non-banks. A bank, as one of the financial institutions, constitutes an entity that receives deposits from the public, extends credit, and provides an array of financial services to cater to its clients' needs (Madura, 2015). Furthermore, banks are pivotal in the economy by functioning as financial intermediaries, bridging the gap between depositors and borrowers (Mishkin et al., 2013).

2.2 Prudential Regulations

Given their indispensable role, the stability and operational soundness of banks are essential for a growing economy. The health of a bank is indicative of its capacity to execute efficient, effective, and prudent operational activities. Dendawijaya (2013) argued that the health of a bank can be assessed through various financial and non-financial indicators such as capital adequacy, asset quality, profitability, liquidity, management, and market risk sensitivity. Therefore, assessing banks' operational soundness is critical to ascertain that banks can discharge their obligations, thereby bolstering the financial system's stability (Kasmir, 2018). Accordingly, banks are subject to stringent supervision from various regulatory bodies such as Bank Indonesia, OJK, and the Ministry of Finance, especially the Directorate General of Taxes. The Bank Indonesia and OJK have established regulations to assess the 'health' of banks and ensure the stability of the banking system, which are referred to as Prudential regulations (Hery, 2015). These regulations include critical indicators such as a minimum CAR and a maximum level of NPL.

CAR is a ratio used to assess a bank's capital adequacy relative to its risk-weighted assets, indicating the bank's ability to cover potential losses and maintain operational stability

(Hanafi & Halim, 2018; Hery, 2015). Therefore, CAR can be formulated as follows:

$$CAR = \left(\frac{Tier\ 1\ Capital + Tier\ 2\ Capital}{Risk\ Weighted\ Assets}\right) x\ 100\% \quad (1)$$

On the other hand, a study by Gawehn & Müller (2019) indicates that financial institutions covered by the existing prudential regulations, particularly banks, could strengthen their financial motivation to engage in more aggressive tax planning compared to non-bank institutions. Mendicino et al. (2021) also find that banks with higher CAR have a more remarkable ability to handle defaults by debtors, thereby reducing financial losses and resulting in a consistent and stable tax burden. Meanwhile, banks with a lower CAR face a higher risk of incurring losses, which may lead to a reduction in their tax liabilities. Thus, we formulate the first hypothesis as follows:

H1: Capital adequacy ratio restriction is negatively associated with banks' tax burden.

Another critical operational indicator that is strictly regulated is the non-performing loans. NPL represents the proportion of loans in default or close to being in default, scaled by the total outstanding loans. Therefore, NPL could be formulated as follows:

$$NPL = \left(\frac{Non\ Performing\ Loans}{Total\ Loans}\right) x\ 100\% \quad (2)$$

The presence of a higher NPL leads to a decrease in the interest income that could be accrued by the bank, thereby reducing its taxable profit. Accordingly, a study by Vinh (2017) in Vietnam shows that an increase in NPL has a negative relationship with taxable profit and also contributes to the rise in uncollectible receivables, which could reduce banks' tax burden. This finding is supported by a study conducted by Huizinga and Laeven (2012) in Europe, which found that an increase in write-offs for uncollectible receivables significantly impacts the reduction of banks' tax burdens. In addition, Chen et al. (2018) found that the tightening of regulations related to NPL in China results in the reduction of tax avoidance carried out through the manipulation of loss reserves. Khan et al. (2020) also show that banks with higher NPL tend to engage more aggressively in tax planning. Therefore, this leads to our second hypothesis as follows:

H2: Non-performing loan restriction is negatively associated with banks' tax burden.

As mandated by the Prudential regulations, the primary concern of banks is to maintain an adequate level of CAR and keep NPL as low as possible. However, the income tax liability that a bank must pay results in a reduction of its available cash, weakens its reserves, and limits its lending capacities (Gawehn & Müller, 2019). A higher CAR level indeed reduces the likelihood of a default; however, it can affect profitability due to credit restrictions. Thus, banks must maintain sufficient capital and optimise credit to sustain profitability (Grilseda & Riyadi, 2021; Mendicino et al., 2021). Meanwhile, a low NPL indicates low credit risk, which results in higher profitability (Bhattarai, 2020; Saleh & Winarso, 2021; Vinh, 2017). Hence, banks tend to maintain a high CAR while keeping NPL low to ensure high profitability, although this may increase their tax burden. This leads to our third hypothesis:

H3: Capital adequacy ratio and Non-Performing Loan restrictions are simultaneously negatively associated with banks' tax burden.

3. RESEARCH METHODOLOGY

This section outlines the methodological approaches employed to investigate the hypotheses. The methods begin with identifying *CETR* as our primary measure of tax burden. We then assess the impact of CAR restrictions as addressed in Hypothesis$_1$, followed by an analysis of NPL ceilings as discussed in Hypothesis$_2$. Lastly, we explore the combined effects of CAR and NPL restrictions, as proposed in Hypothesis$_3$.

3.1 Measuring Corporate Income Tax Burdens

As stated by Spilker (2019), the portion of pre-tax income used by taxpayers to pay their taxes in cash is reflected in the Cash Effective Tax Rate (CETR). This measure of tax burden is considered superior because it reflects all transactions that have any effect on a firm's tax liability and is not affected by

changes in accounting estimates (Dyreng et al., 2008; Hanlon & Heitzman, 2010). Frenkel et al. (2008) also mention that the impact of tax regulations can be effectively analysed by examining the taxes paid in cash to observe the implementation of these regulations. Therefore, consistent with Efendi et al. (2022), we construct our primary tax burden measurement, *CETR*, by accumulating both a bank's comprehensive and final income tax paid in cash and dividing it by pre-tax income as follows:

$$CETR = \left(\frac{Corporate\ Income\ Tax\ Paid\ in\ Cash + Final\ Income\ Tax\ Paid\ in\ Cash}{Pretax\ Income} \right) \quad (3)$$

We interpret a near-zero *CETR* as a representation of banks with a low tax burden, a potentially tax-aggressive bank, whereas a near-one *CETR* indicates banks with a higher tax burden, a tax-compliant bank.

3.2 Sample Selection and Descriptives

In determining the sample group, we begin by screening all banks in Indonesia that are listed on the Indonesia Stock Exchange from 2012 to 2022. Later, we identified 47 banks, resulting in a total sample of 517. We then excluded 23 loss-making banks with a negative value of *CETR* (*CETR<0*) because their *CETR* is difficult to interpret (Dyreng et al., 2008; Efendi et al., 2022) and 111 banks with excessive income tax payment (*CETR>1*) because they are in abnormal operational conditions. Finally, we obtained the final sample of 383 observations. Table 1 summarises our sample selection criteria.

Table 1
Sample Composition

Sample Selection Criteria	Firm – years (2012-2022)
All listed Banks in Indonesia	517
Less:	
Loss-making firms (*CETR* < 0)	(23)
Firms with excessive income tax payments (*CETR* > 1)	(111)
Final sample	383

Note. Source: Author calculation

Table 2 displays descriptive statistics of the variables used in this study. All variables are as defined in Appendix 1. SIZE and INT are scaled by total assets. ROA and LEV are censored to -1 and 1. Similarly, CETR, ETR, CAR, and NPL are censored to 0 and 1. The table shows that the mean of *CETR* is 0.2609, which is higher than the corporate income tax rate of 22 per cent. Indicating, on average, banks' tax burdens are higher than they should be, suggesting that most banks in Indonesia are tax-compliant firms. Also, the median *CETR*, consistent with the mean value, is 0.2430, showing that more than half of the banks are compliant, as they pay income taxes exceeding the statutory tax rate. However, these mean and median values of *CETR* suggest a more sophisticated tax structure, requiring banks to pay additional taxes, such as final income taxes.

On the other hand, Table 2 also shows that the mean (median) of *CAR* and *NPL* are 0.2623 (0.2091) and 0.0263 (0.0237), respectively, indicating that the total sample significantly leans

Table 2
Descriptive Statistic

Variable	N	Mean	SD	Min.	p.25	Median	p.75	Max.
CAR	383	0.2623	0.2161	0.1025	0.1731	0.2091	0.2642	2.8338
NPL	376	0.0263	0.0164	0.0000	0.0153	0.0237	0.0333	0.1134
ETR	383	0.2346	0.2396	-4.0519	0.2155	0.2493	0.2665	0.9176
CETR	383	0.2609	0.1458	0.0005	0.1925	0.2430	0.3005	0.9485
SIZE	383	20.4752	4.4824	6.6685	17.2301	19.0523	22.5241	30.7753
INT	383	0.0339	0.0289	0.0005	0.0176	0.0264	0.0415	0.2209
ROA	383	0.0201	0.0349	-0.0489	0.0078	0.0154	0.0240	0.4485
LEV	383	0.7753	0.1905	0.0524	0.7766	0.8406	0.8703	0.9447

Note. Source: Author calculation

towards banks with lower CAR and NPLs. This suggests that most banks are in suboptimal conditions regarding capital adequacy and bad debts, although some banks perform well. In line with *CAR* and *NPL*, the mean (median) values of *SIZE*, *INT*, and *ROA* at 20.4752 (19.0523), 0.0339 (0.0264), and 0.0201 (0.0154), respectively, indicate that most banks are smaller in size, have a less intensive asset structure, and have moderate profitability. However, some banks are significantly larger with more intensive asset structures and higher profitability. Additionally, the mean (median) of *LEV* at 0.7753 (0.8406) shows that the overall sample substantially leans toward banks with less long-term debt and a higher debt ratio, thereby having a lower financial risk.

3.3 Bivariate Correlations

Table 3 presents bivariate correlations among the variables in the entire sample. This table shows the correlations among variables. Spearman correlations are presented above the diagonal, and Pearson correlations are presented below. The asterisk indicates that the correlation coefficients are statistically different from zero at 5% confidence level. All variables are as defined in Appendix 1. SIZE and INT are scaled by total assets. ROA and LEV are censored to -1 and 1. Similarly, CETR, ETR, CAR, and NPL are censored to 0 and 1. Based on the table, there appears to be a weak monotonic correlation between the tax burden proxies (*CETR* and *ETR*) at 0.0302, which may reflect the differing tax and accounting policies adopted by banks, thus not showing a strong direct relationship. In the meantime, the tax burdens proxy of *CETR* and the bad debt proxy (*NPL*) show positive correlations both linearly and monotonically at 0.3171 and 0.2485, respectively. This correlation indicates that as *CETR* increases, NPL also tends to increase, and vice versa. There is no strong and significant collinearity among other variables except for the *NPL* and *ROA* variables, which display a moderately strong monotonic correlation. Additionally, Table 3 shows a negative collinearity between *CETR* and *CAR*. This indicates that when banks pay higher taxes, they tend to have a lower capital adequacy level at the moment.

Table 3

Bivariate Correlation

This table shows the correlations among variables. Spearman correlations are presented above the diagonal and Pearson correlations are presented below. The asterisk indicate that the correlation coefficients are statistically different from zero at 5% confidence level. All variables are as defined in Appendice 1. *SIZE* and *INT* are scaled by total assets. *ROA* and *LEV* are censored to -1 and 1. Identically, *CETR*, *ETR*, *CAR*, and *NPL* are censored to 0 and 1.

Variable	*CETR*	*ETR*	*CAR*	*NPL*	*SIZE*	*INT*	*ROA*	*LEV*
CETR		0.0302*	-0.037	0.2485*	-0.0068	-0.0906	-0.2066*	-0.1181
ETR	-0.0335		-0.0557	0.1176	-0.0734	-0.1158	-0.1987*	-0.0787
CAR	-0.0700	-0.0068		-0.0849	0.1280	0.1586*	0.1770*	-0.6893*
NPL	0.3171*	-0.0728	-0.1010		-0.0142	-0.0288	0.3893*	-0.0598
SIZE	-0.0395	-0.0414	0.1803*	-0.0069		0.1437*	0.1799*	-0.1005
INT	-0.1183	0.0467	0.1812*	-0.0648	0.2915*		0.1994*	-0.2184*
ROA	-0.1762*	0.0545	0.1644*	-0.1697*	-0.1410*	0.0917		-0.1935*
LEV	-0.0482	-0.0275	-0.4402*	-0.1081	-0.0354	-0.1312	-0.2699*	

Note. Source: Author calculation

3.4 Measuring the Effect of Capital Adequacy Ratio Restrictions on Banks' Tax Burden

In investigating the effect of CAR restrictions on banks' tax burden, we partially replicated the estimation methods used in Efendi et al. (2022) by assigning *CETR* as the dependent variable and *CAR* as the main independent variable in a regression equation. Additionally, year-fixed effects are included to control for year-to-year business variability that might affect the dependent variable. Thus, the complete regression equation is as follows:

$$CETR_{it} = \alpha + \beta CAR_{it} + \Sigma\delta_k CONTROLS_{it} + \Sigma\theta_n YEAR_{nt} + \varepsilon_{it} \quad (4)$$

CETR serves as a proxy for banks' tax burden, with *CAR* representing banks' capital adequacy ratio. In line with the first hypothesis, we predict that CAR restriction will have a negative and significant effect on banks' tax burden; thus, the value of β is expected to be negative and statistically significant. Conversely, the coefficient would be insignificant if the CAR restriction provision is irrelevant to banks' tax burden.

3.5 Measuring the Effect of Non-performing Loan Restrictions on Banks' Tax Burden

Consistent with the previous estimation method used in Efendi et al. (2022), we also assign CETR, the main proxy of banks' tax burden, as the dependent variable, and *NPL* as the main explanatory variable in the following regression equation:

$$CETR_{it} = \alpha + \beta NPL_{it} + \Sigma\delta_k CONTROLS_{it} + \Sigma\theta_n YEAR_{nt} + \varepsilon_{it} \quad (5)$$

Following our second hypothesis, NPL restrictions are predicted to have a negative and significant effect on banks' tax burden. Hence, the value of β is expected to be negative and statistically significant. However, if the NPL restrictions are trivial to banks' tax burden, the coefficient must be insignificant.

3.6 Simultaneous Effect of Capital Adequacy Ratio and Non-performing Loan Restrictions on Banks' Tax Burden

Following assertions in previous studies by Mendicino et al. (2021), Chen et al. (2018), and Khan et al. (2020), *CAR* and *NPL* may exert interdependent effects on banks' tax burden. Consequently, evaluating the simultaneous influence of *CAR* and *NPL* restrictions on a bank's tax burden is important. Accordingly, *CETR* is assigned as the dependent variable, whereas *CAR* and *NPL* are assigned as the independent variables in our next regression estimation. Consistent with the preceding regression equations, the year-fixed effect is also incorporated into the equation as follows:

$$CETR_{it} = \alpha + \beta_1 CAR_{it} + \beta_2 NPL_{it} + \Sigma\delta_k CONTROLS_{it} + \Sigma\theta_n YEAR_{nt} + \varepsilon_{it} \quad (6)$$

Consistent with the third hypothesis, we anticipate that *CAR* and *NPL* restrictions exert a simultaneous effect on banks' tax burden, as measured by *CETR*. Thus, we predict that the estimated coefficients of β_1 and β_2 are negative and statistically significant.

3.7 Control Variables

In a regression estimation, control variables are essential for controlling internal influences that may affect the relationship between variables. In this study, we include several firm characteristics that affect a bank's tax burden, as suggested by previous studies, control variables: *SIZE* acts as a proxy for a bank's economies of scale, quantified by the natural log of total assets owned (Athanasoglou et al., 2008; Berger et al., 2000; Gupta & Newberry, 1997). *INT* is a proxy for asset intensity, measured by scaling total fixed assets by

the total assets. This ensures that our analyses consider a bank's asset structure variability (Harris & Kemsley, 1999; Kieschnick & Moussawi, 2018; Kumara & Trisnawati, 2024).

Furthermore, return on assets, *ROA*, is a proxy for a bank's profitability, measured by scaling total net income by total assets. This variable is used to control for the influence of a bank's profitability on its tax liabilities (An & Habibullah, 2009; Chen et al., 2011; Gupta & Newberry, 1997). Leverage, *LEV*, is measured using the debt-to-asset methodology by scaling total long-term liabilities by total assets. This variable is pivotal as a control, considering that fluctuations in a bank's leverage can influence its tax planning strategy through thin capitalisation mechanisms (Efendi, 2020; Fama & French, 1998).

4. RESULTS AND DISCUSSIONS

4.1 Regression Analyses

This section examines the relationship between various financial indicators and their effects on banks' tax burdens, as measured by *CETR*. Applying rigorous statistical examinations, this section not only provides a detailed report of the results but also offers insights into their broader implications, providing a comprehensive understanding of a bank's regulatory landscape and tax compliance under study.

Our first hypothesis examines the influence of a minimum CAR provision on banks' tax burden. To investigate this hypothesis, we regress the independent variable, *CAR*, on *CETR* using Equation (4). The results as displayed in Table 4. This table reports the coefficients of the following regression equation (4). This equation includes SIZE, INT, ROA, and LEV as control variables. In addition, we control for year-fixed effects. All variables are as defined in Appendix 1. SIZE and INT are scaled by total assets. ROA and LEV are censored to -1 and 1. Similarly, CETR, CAR, and NPL are censored to 0 and 1. Standard errors are robust and clustered by bank. The untabulated Variance Inflation Factor (VIF) analysis shows individual VIF of the independent variables is less than two, suggesting moderate correlations between independent variables and low risk of multicollinearity. R^2 is stated in percentage (%). The asterisk (*) indicates the statistical significance of the coefficients at 1 per cent (***), 5 per cent (**), and 10 per cent (*) significance level, respectively.

Table 4

Multivariate Regression Analysis on the Effect of Capital Adequacy Ratio Restrictions on Banks' Tax Burden

Variable	Predicted Sign	Coefficient	t-statistics
CAR	-	-0.038	-0.75
SIZE	+	-0.001	-0.29
INT	+	-0.566	-1.49
ROA	+	-0.785	-2.88***
LEV	-	-0.111	-1.51
Constant		0.381	4.25***
Year Fixed Effect		Yes	
N		383	
R^2		8.96	

Note. Source: Author calculation

Table 4 reveals a negative and insignificant ($p>0.1$) relationship between *CAR* and *CETR*. This indicates that *CAR* restrictions do not significantly influence banks' tax burden. The coefficient and t-value of *CAR*, respectively, are -0.038 and -0.75, signifying that increases in *CAR* do not significantly correlate with decreases in *CETR*. Consequently, the first hypothesis is rejected.

The second hypothesis analyses the influence of NPL restrictions on banks' tax burden. In examining this hypothesis, we perform a regression estimation with *NPL* as the independent variable and *CETR* as the dependent variable, utilising Equation (5) as reported in Table 5. This table reports the coefficients of the regression equation (5). This equation includes SIZE, INT, ROA, and LEV as control variables. In addition, we control for year-fixed effects. All variables are as defined in Appendix 1. SIZE and INT are scaled by total assets. ROA and LEV are censored to -1 and 1. Similarly, CETR, CAR, and NPL are censored to 0 and 1. Standard errors are robust and clustered by bank. The untabulated Variance Inflation Factor (VIF) analysis shows individual VIF of the independent variables is less than two, suggesting

moderate correlations between independent variables and low risk of multicollinearity. R^2 is stated in percentage (%). The asterisk (*) indicates the statistical significance of the coefficients at 1 per cent (***), 5 per cent (**), and 10 per cent (*) significance level, respectively.

Table 5
Multivariate Regression Analysis on the Effect of Non-Performing Loan Restriction on Banks' Tax Burdens

Variable	Predicted Sign	Coefficient	t-statistics
NPL	-	2.356	3.31***
SIZE	+	-0.002	-0.75
INT	+	-0.521	-1.44
ROA	+	-0.689	-4.17***
LEV	-	-0.080	-1.66
Constant		0.323	4.97
Year Fixed Effect		Yes	
N		376	
R^2		16.2	

Note. Source: Author calculation

Table 5 demonstrates that a positive and significant ($p<0.01$) relationship exists between *NPL* and *CETR*, thereby supporting the second hypothesis. The coefficient and t-value are 2.536 and 3.31, respectively, suggesting that *NPL* is an important *CETR* predictor, with an increase in *NPL* leading to a corresponding rise in *CETR*. As *NPL* rises, interest income declines as the primary source of bank revenue. Furthermore, banks must increase provisions for potential loan losses, which are stringently tax-deductible but may not fully offset the tax liability, leading to a higher *CETR*. Conservative revenue recognition practices due to increased *NPL*s can also affect taxable income and *CETR*. Additionally, heightened regulatory scrutiny and compliance costs associated with high *NPL* levels can influence tax planning and reporting, further impacting *CETR*. This relationship is compounded by macroeconomic conditions and regulatory policies that may necessitate aggressive tax strategies to manage cash flows and financial stability (Garretsen et al., 1999; Miglionico, 2019; Shakya, 2014). Furthermore, the analysis reveals that *NPL* and control variables account for approximately 16.20 per cent of the variability in *CETR*, while the remaining 83.80 per cent is attributable to other factors in the standard error.

Our third hypothesis examines the combined effect of *CAR* and *NPL* restrictions on banks' tax burden. To investigate this hypothesis, we run a regression estimation using *CETR* as the dependent variable and *CAR* and *NPL* as the predictors listed in Equation (6). This equation includes SIZE, INT, ROA, and LEV as control variables. In addition, we control for year-fixed effects. All variables are as defined in Appendix 1. SIZE and INT are scaled by total assets. ROA and LEV are censored to -1 and 1. Similarly, CETR, CAR, and NPL are censored to 0 and 1. Standard errors are robust and clustered by bank. The untabulated Variance Inflation Factor (VIF) analysis shows individual VIF of the independent variables is less than two, suggesting moderate correlations between independent variables and low risk of multicollinearity. R^2 is stated in percentage (%). The asterisk (*) indicates the statistical significance of the coefficients at 1 per cent (***), 5 per cent (**), and 10 per cent (*) significance level, respectively.

Table 6 reports the outcome of this estimation, revealing that, collectively, only *NPL* exerts a positive and significant ($p<0.01$) influence on *CETR*, whereas *CAR* exhibits a negative yet insignificant effect on *CETR*. The coefficient and (t-value) of *CAR* and *NPL* are 0.024 (0.69) and 2.401

Table 6
Multivariate Regression Analysis on the Simultaneous Effect of Capital Adequacy Ratio and Non-performing Loan Restrictions on Banks' Tax Burden

Variable	Predicted Sign	Coefficient	t-statistics
CAR	-	0.024	0.69
NPL	+	2.401	3.26***
SIZE	+	-0.002	-0.77
INT	+	-0.534	-1.46
ROA	+	-0.699	-4.13***
LEV	-	-0.068	-1.27
Constant		0.312	5.06***
Year-Fixed Effect		Yes	
N		376	
R^2		16.28	

Note. Source: Author calculation

(3.26), respectively. The R-squared value is 0.1628, suggesting that collectively, *CAR*, *NPL*, and control variables account for only 16.28 per cent of the variability in *CETR*, with the significant contribution originating from *NPL*. Consequently, banks' tax burden is significantly influenced by their level of non-performing loans, thus leading to the rejection of our third hypothesis.

4.2 Sensitivity Analysis

To evaluate the robustness of previous regression estimations, we conduct sensitivity testing on the results of our first and second hypotheses by replacing the proxy of a bank's tax burden, *CETR*, with the accounting version of corporate tax burden (*GAAP ETR/GETR*). This test is performed to ascertain the consistency of our initial result when a different metric is used as the dependent variable (Dyreng et al., 2007; Woolridge, 2010).

Furthermore, we perform sensitivity testing on the result of our second hypothesis using a panel data model estimation to understand how the independent variables, *CAR* and *NPL*, influence the dependent variable, *CETR*, within a dataset comprising multiple observation units over several periods, thereby providing more efficient and unbiased estimates (Hsiao, 2022; Woolridge, 2010).

Finally, a sensitivity test using quantile regression analyses is performed to evaluate the consistency of our initial result on the third hypothesis, assessing the impact of independent variables, *CAR* and *NPL*, on *CETR*, across various quantiles of the dependent variable's distribution. This approach allows us to obtain a more comprehensive analysis than ordinary least squares estimations, which only provide mean-level estimates (Efendi, 2022; Koenker, 2005).

4.2.1 Analysis Using an Alternative Metric of Banks' Tax Burden

The measurement of banks' total tax burden using a Cash Effective Tax Rate (*CETR*) is based on actual cash flows, encompassing only the amount of corporate income taxes that are truly paid. This measure can be sensitive to time differences in tax payments (Dyreng et al., 2007). Meanwhile, the GAAP Effective Tax Rate (*GETR*) metric uses accounting figures that include both current tax expenses (i.e., tax actually paid) and deferred tax expenses, scaled by total pre-tax income, thereby providing a more comprehensive view of the income tax burden faced by firms with more consistent analysis over time (Graham et al., 2013). Therefore, *GETR* can be described as follows:

$$GETR = \left(\frac{Corporate\ Income\ Tax + Final\ Income\ Tax + Deferred\ Tax}{Pretax\ Income}\right) \quad (7)$$

Accordingly, we re-estimate Equations (4) and (5) using *GETR* as the dependent variable. Table 7 reports the coefficients of equation (4). This equation includes SIZE, INT, ROA, and LEV as control variables. In addition, we control for year-fixed effects. All variables are as defined in Appendix 1. SIZE and INT are scaled by total assets. ROA and LEV are censored to -1 and 1. Similarly, GETR, CAR, and NPL are censored to 0 and 1. Standard errors are robust and clustered by bank. The untabulated Variance Inflation Factor (VIF) analysis shows individual VIF of the independent variables is less than two, suggesting moderate correlations between independent variables and low risk of multicollinearity. R^2 is stated in percentage (%). The asterisk (*) indicates the

Table 7

Multivariate Regression Analysis with an Alternative Metric of Tax Burden

Variable	Predicted Sign	Coefficient	t-statistics
CAR	+	0.001	0.09
SIZE	+	-0.001	-0.70
INT	+	-0.003	-0.02
ROA	+	0.052	0.31
LEV	-	-0.029	-1.15
Constant		0.288	9.77***
Year-Fixed Effect		Yes	
N		376	
R^2		5.49	

Note. Source: Author calculation

statistical significance of the coefficients at 1 per cent (***), 5 per cent (**), and 10 per cent (*) significance level, respectively.

Meanwhile, Table 8 reports the coefficients of equation (5). This equation includes SIZE, INT, ROA, and LEV as control variables. In addition, we control for year-fixed effects. All variables are as defined in Appendix 1. SIZE and INT are scaled by total assets. ROA and LEV are censored to -1 and 1. Similarly, GETR, CAR, and NPL are censored to 0 and 1. Standard errors are robust and clustered by bank. The untabulated Variance Inflation Factor (VIF) analysis shows individual VIF of the independent variables is less than two, suggesting moderate correlations between independent variables and low risk of multicollinearity. R^2 is stated in percentage (%). The asterisk (*) indicates the statistical significance of the coefficients at 1 per cent (***), 5 per cent (**), and 10 per cent (*) significance level, respectively.

Table 8

Multivariate Regression Analysis with an Alternative Metric of Tax Burden

Variable	Predicted Sign	Coefficient	t-statistics
NPL	+	1.035	3.48***
SIZE	+	-0.001	-0.59
INT	+	0.044	0.26
ROA	+	0.138	1.12
LEV	-	-0.016	-0.90
Constant		0.251	9.76***
Year-Fixed Effect		Yes	
N		370	
R^2		9.60	

Note. Source: Author calculation

The results shown in Tables 7 and 8 are consistent with the previous estimates in Tables 4 and 5. However, the results present lower significance and explanatory power than the earlier estimates. Additionally, *ROA* becomes irrelevant in explaining variations in banks' tax burden. This consistency indicates the robustness of the previous estimation results and implies that *CETR* is a superior metric to proxy for banks' tax burden over the long term, providing better cross-period comparisons.

Upon re-estimating Equation (5) using *GETR* as the dependent variable, as shown in Table 8, we observed that the coefficient of *NPL* is lower, whereas its t-statistic is slightly higher than those reported in Table 5, indicating that, while the effect size of *NPL* on *GETR* is smaller, it is statistically more significant, suggesting a more substantial confidence in the relationship when using *GETR* as the measure. Nonetheless, the lower coefficient implies that *NPL* has a reduced impact on *GETR* compared to *CETR*, highlighting the different sensitivity of these tax burden metrics to *NPL* variations.

4.2.2 Analysis Using Panel Data Estimations

A previous study by Efendi et al. (2022) suggested that re-estimation using a fixed effects-panel data model is essential to mitigate the potential inadequacy of control variables included in previous estimates in fully capturing the influence of internal characteristics on the dependent variable. This model posits that the differences among variables exhibit fixed effects that may correlate with the independent variables (Bell & Jones, 2015; Woolridge, 2010).

Moreover, Griliches & Hausman (1986) and Plesko (2003) demonstrated that panel data models can rectify estimation bias resulting from serial correlation of independent variables and omitted individual effects, although they may amplify negative correlations between variable measurement errors and model residuals. Consequently, following Efendi et al. (2022), we re-estimate Equation (5) using panel data with a fixed-effects model. The results, as shown in Table 9, align with the findings outlined in Table 5, highlighting a positive and significant ($p<0.01$) influence of the *NPL* level on *CETR*, albeit with a lower explanatory power. Furthermore, Table 9 reveals that *ROA* exerts a negative and significant

Table 9
Panel Data Regression Analysis on the Simultaneous Effect of Capital Adequacy Ratio and Non-Performing Loan Restrictions on Banks' Tax Burden

Variable	Predicted Sign	Coefficient	t-statistics
CAR	+	0.086	1.20
NPL	+	2.075	3.66***
SIZE	+	-0.009	-1.23
INT	+	0.197	0.37
ROA	+	-0.942	-2.85***
LEV	-	0.171	0.88
Constant		0.271	1.11
N (group)		376 (45)	
R^2		5.47	

Note. Source: Author calculation

(p<0.01) effect on *CETR*. An intriguing finding that contradicts conventional understanding, as it implies that increased profitability correlates with a reduced income tax burden for banks over time.

4.2.3 Quantile Regression Estimations

Sensitivity testing using quantile regression analyses enabled an assessment of the influence of our independent variables, *CAR* and *NPL*, across different quantiles of the dependent variable's distribution, *CETR*. Our previous estimations using standard ordinary least square models, which are susceptible to outliers and skewed distributions, only present the conditional mean effect of the independent variables. Thus, quantile regressions provide more robust estimates against outliers and a more accurate representation of the influence of *CAR* and *NPL* on the abnormal distribution of *CETR* (Hao & Naiman, 2007).

Banks with a lower tax burden (i.e., towards the left tail of the *CETR* distribution) may be influenced by different variables compared to banks with a higher tax burden (i.e., towards the right tail of the *CETR* distribution). Therefore, the relationship between *CAR* and *NPL* restrictions and *CETR*, as previously presented in Table 6, may not accurately represent the true relationship at different tax burden levels. In order to address this potential issue, following Armstrong et al. (2015), Efendi (2020), Efendi et al. (2022), and Hoopes et al. (2011), we evaluate the consistency of *CAR* and *NPL* restrictions' influence on *CETR* across the entire distribution of *CETR* using quantile regressions. This approach fully captures the influence of independent variables on each quantile, rather than relying solely on the average effect inferred by ordinary least squares estimations.

Table 9 shows the coefficients of a fixed-effect panel data specification of equation (6). This equation includes SIZE, INT, ROA, and LEV as control variables. All variables are as defined in Appendix 1. SIZE and INT are scaled by total assets. ROA and LEV are censored to -1 and 1. Similarly, CETR, CAR, and NPL are censored to 0 and 1. R^2 is stated in percentage (%). The asterisk (*) indicates the statistical significance of the coefficients at 1 per cent (***), 5 per cent (**), and 10 per cent (*) significance level, respectively.

Accordingly, we re-estimate Equation (6) using quantile regressions and report the results in Appendix 2. The table shows that *NPL* consistently has a positive and significant effect on *CETR* across quantiles 4-10. Meanwhile, *CAR* consistently shows no significant influence on *CETR* across all quantiles. These results support the findings in Table 6, indicating that *CAR* and *NPL* collectively do not significantly influence *CETR*, as *CETR* is positively and significantly affected only by *NPL* in the moderate-to-higher tax burden groups.

Moreover, the re-estimation results reveal that in quantiles 1-3, banks' tax burden is significantly influenced by their economic size (*SIZE*) and asset intensity *(INT*), suggesting that banks with a lower tax burden have more resources to manage their taxes through sophisticated and less costly tax structures (Efendi et al., 2022). Additionally, banks with a higher asset intensity have greater opportunities to use depreciation and other tax deductions based on various expenses associated with their assets. In quantiles 6-10, *ROA* negatively and significantly

impacts *CETR*, reinforcing earlier findings that banks' increased profitability leads to a reduced tax burden.

5. CONCLUSION

Tax revenue is one of the primary sources of government income used to finance various expenditures within the national development agenda. Financial institutions, particularly banks, play a pivotal role in domestic revenue mobilisation as they facilitate financial transactions, execute financial intermediations, and supply sufficient liquidity to the economy. Given the complexity of their business operations and the stringent regulations governing banks and other financial institutions, conducting a thorough analysis of how standard prudential regulations impact banks' tax burden is essential. This study provides valuable insights into how banks exploit existing regulations to minimise their tax burden. Utilising a comprehensive sample of all banks listed on the Indonesia Stock Exchange, this study reveals several key findings.

Our findings suggest that a restriction on a bank's capital adequacy does not exert a significant influence on its tax burden. This implies that, although CAR is a vital indicator of banks' financial stability and operational viability, it is not an important consideration in the context of tax planning.

Conversely, a restriction on non-performing loans exerts a positive and significant influence on a bank's tax burden. This suggests that an increase in NPL is associated with a rise in a bank's tax liability due to increased provisioning costs, which are tax-deductible upon realization, but with reduced tax income, which will lead to a higher effective tax rate if these deductions do not completely offset taxable income. Furthermore, higher NPL levels can prompt banks to adopt more conservative financial and tax reporting practices, including greater provisioning, due to regulatory scrutiny aimed at ensuring financial stability and tax compliance. This intensified oversight may also result in higher regulatory costs that are non-deductible for tax purposes, thereby further exacerbating the bank's overall tax burden. Thus, it can negatively affect profitability, increasing tax liability as banks manage the financial implications of higher NPL. This finding underscores the need for banks to allocate funds for potential NPL losses, thereby reducing their taxable income. Nevertheless, this strategy ultimately increases their tax burden relative to lower profits.

When analysed collectively, CAR and NPL restrictions do not exhibit a significant impact on a bank's tax burden. This suggests that NPL's individual influence on tax burden is overshadowed by its combined effect with CAR, rendering the overall effect statistically insignificant. Consequently, this finding implies that other factors may have a more substantial influence on determining a bank's overall tax burden.

6. IMPLICATIONS AND LIMITATIONS

Given that CAR restrictions do not influence a bank's tax burden, our findings suggest that a bank's tax aggressiveness, as reported in previous studies (e.g. Efendi et al., 2022; Gallemore et al., 2019), is not an unintended consequence of standard prudential regulations. Thus, financial sector authorities may continue to use CAR as an important metric in evaluating a bank's operational viability without considering its tax liability. Consequently, tax authorities may focus on other financial indicators that directly correlate with tax compliance.

On the other hand, our findings indicate that NPL restrictions significantly influence a bank's tax burden, suggesting that a higher level of non-performing loans leads to increased tax liabilities. Therefore, the financial sector and tax authorities must implement stringent measures to manage and mitigate NPL, such as enhancing credit risk assessment frameworks and promoting prudent lending practices. Furthermore, banks that maintain low NPL ratios could be provided with tax incentives, thereby encouraging healthier loan portfolios and ensuring stable tax contributions.

This study is not without limitations. The analysis is limited to banks listed on the Indonesia

Stock Exchange over a specific period, which may not be representative of all banks, especially smaller or private financial institutions, due to survivorship issues. Thus, the findings may not be generalisable to the broader banking sector. This limitation may be addressed in future research by including a wider range of bank categories and periods to enhance the generalisability of the findings. Additionally, the analysis conducted in this study may not fully account for dynamic changes in the banking sector and external economic conditions, as it only focuses on CAR and NPL. Other variables, such as corporate governance practices, market conditions, client profiles, and regulatory changes, may also influence a bank's tax burden. Including these factors in future studies could provide a more nuanced view of what drives banking sector tax liabilities. Future studies can also expand the scope of analysis to other critical elements of prudential regulations, such as risk management, governance, and internal controls.

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APPENDICES

Appendix 1
Variable Definitions

Variable	Definition
CAR_{it}	Proxy for bank's capital adequacy level, measured by scaling the total tier 1 and tier 2 capital by the risk-weighted assets at the of year *t*.
NPL_{it}	Proxy for bank's non-performing loan, measured by scaling the total non-performing loan by total loans disbursed at the end of year *t*.
$SIZE_{it}$	Log natural of bank's economic size based on its total assets at the end of year *t*.
INT_{it}	Bank's total asset intensity measured by scaling total fixed assets by total assets at the end of year *t*.
ROA_{tit}	Bank's total pre-tax income scaled by total assets at the end of year *t*.
LEV_t	Proxy for bank's thin capitalization, measured by scaling the total long-term liability by total assets at the end of year *t*.
$CETR_t$	Portion of pre-tax income used by taxpayers to pay their taxes in cash at the end of year *t*.
$GETR_t$	Sum of both current tax expenses and deferred tax expenses, scaled by total pre-tax income at the end of year *t*.

Note. Source: Author

Appendix 2
Quantile Regression Analysis on the Simultaneous Effect of Capital Adequacy Ratio and Non-performing Loan Restrictions on Banks' Tax Burden

Variable	Predicted Sign	*CETR* Quantiles								
		(10)	(20)	(30)	(40)	(50)	(60)	(70)	(80)	(90)
CAR	+	-0.135	0.001	-0.024	-0.019	-0.005	-0.013	-0.004	0.073	0.011
		(-0.88)	(0.01)	(-0.83)	(-0.76)	(-0.33)	(-0.75)	(-0.10)	(1.12)	(0.05)
NPL	+	-0.625	0.581	0.505	0.945	1.556	2.143	2.455	3.226	5.861
		(-0.78)	(1.24)	(1.16)	(2.25)**	(3.29)***	(5.64)***	(6.61)***	(4.13)***	(3.82)***
SIZE	+	0.004	0.002	0.001	0.001	-0.001	-0.001	-0.003	-0.002	-0.005
		(2.48)**	(2.00)**	(1.48)	(1.01)	(-0.75)	(-1.56)	(-4.32)***	(-1.31)	(-1.32)
INT	+	-0.580	-0.708	-0.714	-0.378	-0.259	0.038	-0.016	-0.121	-0.148
		(-1.64)	(-3.44)***	(-3.57)***	(-1.54)	(-1.09)	(0.19)	(-0.16)	(-0.50)	(-0.30)
ROA	+	0.122	-0.309	-0.419	-0.526	-0.614	-0.719	-0.804	-0.763	-1.158
		(0.07)	(-1.14)	(-0.60)	(-1.12)	(-1.09)	(-11.36)***	(-7.37)***	(-4.84)***	(-2.65)***
LEV	-	0.096	-0.043	-0.107	-0.071	-0.077	-0.079	-0.076	-0.063	-0.245
		(0.99)	(-0.32)	(-1.92)*	(-1.94)*	(-6.71)***	(-2.15)**	(-2.87)***	(-0.45)	(-1.51)
Constant		0.034	0.173	0.282	0.268	0.297	0.324	0.368	0.323	0.568
		(0.28)	(1.26)	(4.41)	(6.35)***	(16.35)***	(7.60)***	(13.15)***	(2.20)**	(3.02)***
Year-Fixed Effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N		376	376	376	376	376	376	376	376	376
Pseudo R^2		9.88	6.14	5.00	4.84	6.35	9.15	13.78	18.28	25.78

Note. Source: Author calculation