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The Relationship between Tax Incidence and Tax Avoidance in Indonesia's Industrial Sector

Abstract. Taxes are believed to distort how firms behave and market equilibrium. Since tax reduces equity returns, firms will intuitively reduce tax costs through tax avoidance and any other production or operational cost to achieve the highest returns. One of the production costs that often under hair cross is labour cost. Firms can use their bargaining power to reduce wages to offset tax costs. On the other hand, firms' attempt to reduce wages might, in turn, lower their production output. Lower output means a lesser taxable base and less marginal benefit for tax avoidance. Lower output also means lower equity returns and might incentivize firms to do more tax avoidance. Therefore, many researchers are looking for answers to the following question: how much do firms avoid tax in the face of their capability to shift the tax burden to labour? This study aims to investigate the relationship between tax incidence and tax avoidance in the industrial sector in Indonesia. While previous studies have shown solid empirical support for this relationship, Indonesia's employment conditions and industrial characteristics differ from those in the United States and other countries. The data for the study was taken from the reports of IDX-listed companies in the industrial sector ranging from the year 2018 to the year 2022. The data analysis uses Generalized Least Square (GLS) panel data regression. Using education level as a proxy for tax incidence and cash ETR as a proxy for tax avoidance, the authors found no significant connection between them because the industrial sector predominantly employs a much higher number of workers with low education levels compared to those with higher education. Additionally, highly educated workers in Indonesia often face job market challenges; thus, horizontal mismatches happen. Instead, other variables like sales growth, leverage, firm size, SG&A expenses, and loss carryforward significantly influence tax avoidance.

Keywords: tax avoidance, tax incidence, education level, cash ETR, sales growth, leverage, firm size, SG&A expenses, loss carryforward.

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Зв'язок між оподаткуванням та ухиленням від сплати податків у промисловому секторі Індонезії

Анотація. Вважається, що податки спотворюють поведінку компаній і ринкову рівновагу. Оскільки податок зменшує прибутковість акціонерного капіталу, компанії будуть інтуїтивно зменшувати податкові витрати шляхом ухилення від сплати податків, а також будь-які інші виробничі або операційні витрати для досягнення вищих прибутків. Частиною виробничих витрат, яка часто перебуває під загрозою, є вартість робочої сили. Компанії можуть використовувати свою перевагу на переговорах, щоб зменшити заробітну плату для компенсації податкових витрат. З іншого боку, намагання компаній зменшити заробітну плату може, у свою чергу, знизити обсяг виробництва. Менший випуск товарів і послуг означає меншу базу оподаткування та меншу граничну вигоду від ухилення у сплаті податків. Нижчий обсяг виробництва також означає нижчу прибутковість акціонерного капіталу та може спонукати компанії більше уникати сплати податків. Тому багато дослідників шукають відповіді на таке питання: наскільки компанії ухиляються від сплати податків за умови їхньої спроможності перекласти податковий тягар на працівників? Це дослідження має на меті дослідити зв'язок між оподаткуванням та ухиленням від сплати податків в промисловому секторі Індонезії. Хоча попередні дослідження показали надійну емпіричну підтримку цього зв'язку, умови працевлаштування та промислові характеристики в Індонезії відрізняються від тих, що існують у Сполучених Штатах та інших країнах. Дані для дослідження були взяті зі звітів промислових компаній, зареєстрованих на біржі IDX, за період з 2018 по 2022 рік. Для аналізу даних використано панельну регресію даних з узагальненням найменших квадратів. Використовуючи рівень освіти як показник оподаткування та ефективну ставку податку як показник ухилення від сплати податків, автори не виявили істотного зв'язку між ними, оскільки в промисловому секторі переважно працює набагато більша кількість працівників з низьким рівнем освіти порівняно з працівниками з вищою освітою. Крім того, високоосвічені працівники в Індонезії часто стикаються з проблемами ринку праці; таким чином виникають горизонтальні невідповідності. Натомість інші змінні, такі як зростання продажів, кредитне плече, розмір фірми, загальні та адміністративні витрати та перенесення збитків значно впливають на ухилення від сплати податків.

Ключові слова: ухилення від сплати податків, оподаткування, рівень освіти, ефективна ставка податку, зростання продажів, кредитне плече, розмір фірми, операційні, загальні та адміністративні витрати, перенесення збитків.

INTRODUCTION

Paying taxes reduces a company's resources. Meanwhile, managers are being tasked by companies to maximize returns with their limited resources. When a manager plans to reduce the tax burden through legal means, henceforth we call it tax avoidance, he has to consider three things:

- How does tax avoidance implicate transactions for all parties involved?
- How will tax avoidance affect several types of taxes altogether?
- How will tax avoidance incur additional costs to be implemented?

Factors that affect tax avoidance are business strategies (Higgins et al., 2015), minimum wage at the location of investment (Li et al., 2022; Xiang et al., 2023), capital structure (Desai & Dharmapala, 2009), institutional ownership, manager's incentive scheme, manager's income tax, independency of audit committee and internal control (Wang et al., 2020).

The firms can shift the tax burden to employees in the form of lower wages (Fuest et al., 2018; Serrato & Zidar, 2016) or to consumers in the form of higher product prices (Baker et al., 2021; Kubick et al., 2015) or firm's manager can ultimately shift it to capital owner in forms of lower net returns (Agarwal & Chakraborty, 2018; Auerbach, 2006)

The relationship between tax incidence and tax avoidance is unclear because tax is not only about taking a certain percentage of net income from firms but also changes how firms react to it. Taxes not only affect firms on one side of the transaction but also affect firms on the other side of the transaction, making the behaviour of both sides distorted by the tax. Dyreng et al. (2022) explained that corporate tax affects managers' decisions on inputs (labour input and capital input) and outputs (increment of prices); meanwhile, at the same time, corporate tax drives managers to tax avoidance to reduce total costs borne by firms. Those decisions create feedback through market mechanisms, supply and

demand. So, managers must calculate the whole aspect to get net positive marginal benefits. As mentioned by Hanlon and Heitzman (2010), if tax avoidance brings benefits, then a firm will be shaped so that supporting tax efficient decisions, which benefits gained must overcome costs incurred. However, if the firms can shift the tax burden to other parties, the risk and costs incurred by tax avoidance efforts may be less appealing.

Previous studies of tax incidence were mainly conducted in developed countries such as the US and Europe (Arulampalam et al., 2012; Baker et al., 2021; Dwenger et al., 2019; Dyreng et al., 2022; Fuest et al., 2018; McKenzie, 2017; Serrato & Zidar, 2016). Meanwhile, Indonesia, as a developing country, has different conditions, like access to capital, market

openness, labour protection, labour demography, and industrial characteristics. Investigating the relationship between tax incidence and tax avoidance in Indonesia is interesting, as it may give different results compared to previous studies.

THEORITICAL BACKGROUND

Tax Avoidance

Hanlon and Heitzman (2010) measured tax avoidance as follows (Table 1). Financial data from publicly traded companies conforms to accounting standards, so measuring tax avoidance using Cash ETR is more straightforward and has no issue with conforming avoidance techniques.

Table 1. Tax avoidance measurements

Measure	Description	Impact on Accounting Earnings	Reflect Deferral Strategies	Reflect non-conforming avoidance	Reflect conforming avoidance
GAAP ETR	Total tax expense per dollar of pre-tax book income	Yes	No	Yes	No
Cash ETR	Cash taxes paid per dollar of pre-tax book income	No	Yes	Yes	No
Long-run Cash ETR	Sum of cash taxes paid over <i>n</i> years divided by the sum of pre-tax earnings over <i>n</i> years	No	Yes	Yes	No
BTD	Total differences between book and taxable incomes	Yes for a portion, No for a portion	Yes	Yes	No

Source: Hanlon and Heitzman (2010).

As proven empirically in previous studies, tax avoidance could be predicted by factors such as business strategies, firm size, and multinational operations. Bigger firms have higher tax avoidance (Rego, 2003; Richardson & Lanis, 2007). Firms are still growing and willing to take more aggressive business strategies, which results in higher tax avoidance (Higgins et al., 2015). Firms that operate as multinational corporations have higher tax avoidance by shifting profits from high-tax-rate countries to low-tax-rate countries (Rego, 2003; Satyadini et al., 2019).

Rego (2003) measured firm size as natural logarithms of total net revenue; meanwhile, Richardson and Lanis (2007) used natural logarithms of a book's total asset. Higgins et al. (2015) measure business strategy using a combination of the ratio of R&D expense to revenue, the ratio of the number of employees to revenue, revenue growth, the ratio of SG&A expense to revenue, changes of total employees, and the ratio of net fixed asset to total assets. Rego (2003) measures multinational firms by whether they have assets outside of their home country or income generated by operations outside their home country. Types of business entities also affect how much tax is applied to a firm's profit. In Indonesia, sole proprietorships can get tax facilities (lower tax rates) that common LLCs do not have. Even among LLCs,

Indonesian tax law also gives favourable tax rates for lower revenue LLCs, which have under 50-billion-rupiah yearly revenue. Separation of ownership and control also can predict tax avoidance. Firms that have the same between owner and controlling party exhibit lower tax avoidance (Badertscher et al., 2013). The same is also shown in "family firms" that such firms have lower tax avoidance (Chen et al., 2010).

Tax Incidence

Tax incidence concerns those who ultimately suffer or bear the economic loss by the government's imposition of tax, especially in corporate relations (Fullerton & Metcalf, 2002; Kotlikoff & Summers, 1986). Tax triggers a chain reaction from one economic party to another economic party, changing market equilibrium and changing consumer price and producer price (Tresch, 2015). Thus, tax incidence is a function of the elasticity of demand and the elasticity of a product or labour supply. If the labour supply elasticity tends toward zero elasticity, then the corporate tax burden can be shifted to labour in the form of lower wages. The reason is that labourers are still willing to work roughly the same hours despite lower wages. If the elasticity of labour supply tends toward infinity, then the more corporations bear the

tax burden themselves. Because workers respond to lower wages with fewer working hours, it will lower corporate production output.

Because in the real world, the elasticity of labour supply can't be either zero or infinite, firms will adjust how much labour input and capital input to be lowered or raised to achieve maximum output. Labour input is just one part of the equation to the function of production. Here came the elasticity of substitution capital-to-labor into play, affecting tax incidence. The elasticity of substitution of larger than 1 means firms can substitute any labour input with capital input. The elasticity of fewer than 1 means firms have to increase capital input together with much higher labour input, i.e. capital is complementary to labour. Lastly, if the elasticity is exactly 1, then firms cannot substitute any labour input for capital input because both inputs are perfectly complementary. Shifting the tax burden to labour can achieve different output levels depending on firms' elasticity of substitution.

A popular way of analyzing tax incidence in the context of corporate tax, according to Tresch (2015), is in the general equilibrium framework introduced by Arnold Harberger. From his approaches, we can get three parameters that affect tax incidences of corporate taxes:

1. Intensity of production factor, the relative differences between taxed sector and not taxed sector.
2. The elasticity of substitution capital-to-labour of each sector (taxed sector and not taxed sector).
3. The elasticity of demand of the product from the taxed sector and not taxed sector.

Moreover, Harberger's analysis could be concluded as such (Fullerton & Metcalf, 2002; Tresch, 2015):

1. Capital is disproportionately borne by the tax burden if a sector or firm is labour-intensive or has an elasticity of substitution higher than the product elasticity of demand of that particular firm or sector.
2. The tax burden is shared equally between labour and capital if a sector/firm is labour-intensive and the product elasticity of demand of that particular sector/firm is higher than the elasticity of substitution.
3. The tax burden is disproportionately borne by labour if a sector or firm is very labour-intensive and consumers cannot substitute that particular product from that sector or firm with another product.
4. If a sector/firm is equally factor-intensive (factor-neutral), the tax burden entirely falls on capital; the elasticity of substitution is the same as the product elasticity of demand.

Tax Incidence and Labor Wage

Tax incidences fall on labour apply the same logic as tax incidences fall on consumers (product's price). Dwenger et al. (2019) started to investigate the direct incidence of labour, which is different from Harberger's approach, using the general equilibrium model, which is indirect. They found that labour bears some portion of the tax burden, albeit lower than Arulampalam et al. (2012) and Fuest et al. (2018) found. He mentioned that labour has two aspects: wage paid and quantity of labour hired. When the tax statutory rate is lowered, worker unions

may negotiate higher pay, but firms were, ultimately, in a decisive position to hire or not to hire, thus higher (lower) pay offset by the quantity of labour demanded by firms. The importance of the quantity of labour that firms readily hire is shown by Liu and Altshuler (2013). Labours work in high market concentration sectors and bear much more corporate tax. Moreover, the elasticity of wage to corporate tax increases as the number of firms decreases in a particular sector, and there is a stronger effect if the sector is capital-intensive. However, the effect is not very apparent in the labour-intensive sector.

McKenzie (2017) also studied indirect incidence and found that the tax burden is affected by a firm's capital-to-labor ratio.

Fuest et al. (2018) investigate tax incidence without seeing direct or indirect incidence, showing that tax incidence varies between the type of firm and the type of worker. The mechanisms from several theories could work simultaneously, so isolating each mechanism is deemed difficult. The result is that corporate tax does not affect the wages of high-skilled labour. However, it is different for medium-skilled and low-skilled labour. They argue that high-skilled labour has higher mobility.

Since skill can predict tax incidence, and information on skill level (measured by education level) is readily available among traded companies in Indonesia, we use education level as a proxy for tax incidence in this research.

Tax Avoidance and Tax Incidence

The relationship between tax incidence and tax avoidance described by Dyreng et al. (2022) using profit maximization model as follows:

$$\Pi(K, L, A) = [1 - (\tau - A)](F(K, L) - wL - \eta rK) - (1 - \eta)rK - C(A)$$

The part of $\Pi(K, L, A)$ means net income generated by management's decision of how much labour input, capital input, and level of tax avoidance. The part of $[1 - (\tau - A)](F(K, L) - wL - \eta rK)$ means fiscal net income after tax (tax at rates after account tax avoidance). The part of $((K, L) - wL - \eta rK)$ means fiscal net income after deducted by labour cost and capital cost, where ηrK is a capital cost that is tax deductible. (A) means the cost of tax avoidance efforts. So overall $\Pi(K, L, A)$ means net income after deducting all costs related to revenue generations, deduct capital cost which is non-tax deductible and deduct cost of tax avoidance. In this model, it was assumed labour cost is fully tax-deductible. Meanwhile, the cost of tax avoidance is not. The cost of capital is assumed to be partially tax-deductible (such as depreciation and amortization of fixed assets and some interest expense from financing costs).

Dyreng et al. (2022) explain that when firms need less capital investment, the demand for labour will also be reduced. Several previous studies, as quoted by Dyreng, show that an increase in the tax rate or a decrease in the fiscal deductibility of the cost of capital will reduce capital input and labour input. Lower labour demand in a sector will shift the equilibrium of labour supply and labour demand, as shown in Figure 1.

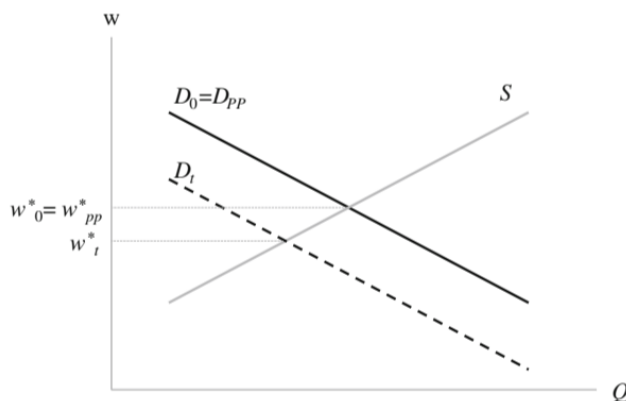


Figure 1. The effect of taxes on wages: baseline illustration

Source: Dyreng et al. (2022).

Degree of tax incidence on labor depends on how much wages responded to changes of labor demand. In Figure 2, line S_h represents the supply curve with higher elasticity than the S_l line. Reduction in wages is larger on lower elasticity of labour supply (lines S_l) than on higher elasticity of labour supply (lines S_h).

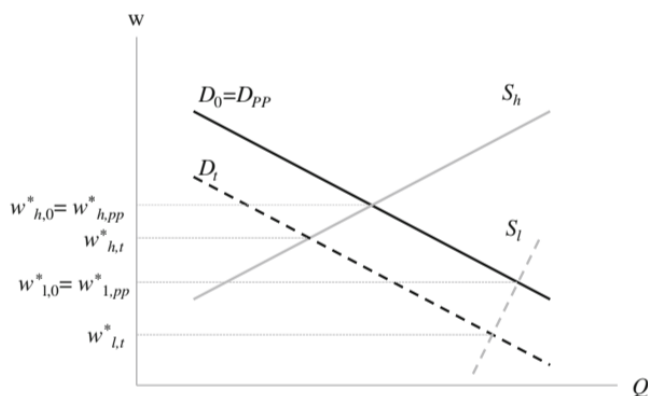


Figure 2. The effect of taxes on wages: high versus low labor supply elasticity

Source: Dyreng et al. (2022).

Factors affecting the direction of the relationship between tax incidence and tax avoidance are these four:

1. Labor elasticity;
2. Productivity of capital relative to labour;
3. Tax deductibility of the cost related to employing labour and capital;
4. The cost of tax avoidance.

From those four factors and profit maximization model, managers have three choices:

1. Level of capital;
2. Level of labour;
3. Level of tax avoidance.

When a manager decides the level of capital and labour, it will affect or down labour cost and capital costs. Labour cost changes depend on the elasticity of labour supply, and capital cost changes depend on the elasticity of capital supply, where both elasticities are out of the manager's control. The manager's decision will change labour and capital demand and, at the same time, affect the elasticity of supply.

Dyreng et al. (2022) explain if firms face high elasticity of labour supply, the firms will have to pay more expensive wages, thus will lowering the demand for labour (lower labour input and this also means lower

capital input). Then output will also get lower, and so will the marginal benefit of tax avoidance. Lower output means firms tend to be smaller in size, thus reducing the marginal benefit of tax avoidance. On the other hand, smaller firms will have lesser tax avoidance costs, which can, in turn, drive firms to do tax avoidance. They called this firm scale channel. Firm scale channel gives ambiguous predictions on the relationship between tax incidence and tax avoidance.

The other channel is called the input mix channel. Remember that a firm can adjust the labour and capital input mix to get optimal output. If tax incidence falls more on firms because of the higher elasticity of labour supply (that makes firms pay more expensive for labour), then firms will tend to shift toward capital input. This shift will reduce the firm's deductibility. A higher portion of non-deductible capital costs will drive firms to do more tax avoidance. The input mix channel predicts a positive relationship between tax incidence and tax avoidance.

Additionally, two conditions make a relationship positive, they are:

1. When the capital-to-labor ratio is disproportionately toward capital input, which in turn lowers the tax deductibility of the cost of capital, this will

increase the marginal benefit of tax avoidance and drive more tax avoidance.

2. When the firm is small enough, the benefit of tax avoidance can surpass the cost of tax avoidance.

The relationship can be negative (or have no relation at all) when the capital-to-labour ratio tends toward labour and the cost of tax avoidance is insensitive to firm size.

RESEARCH METHODOLOGY

To investigate the relationship between tax incidence and tax avoidance, we use follow model:

$$CashETR_{i,t} = \alpha_0 + \beta_1 \%HighSkill_{i,t} + \beta_2 Sales\ Growth_{i,t} + \beta_3 Leverage_{i,t} + \beta_4 Size_{i,t} + \beta_5 PPE_{i,t} + \beta_6 SG\&A_{i,t} + \beta_7 LCF_{i,t} + \alpha_t + \varepsilon_{i,t}$$

where *i* denotes individual firm, and *t* denotes year.

The definition of variables can be seen in Appendix 1.

The proxy for tax incidence is education level (Fuest et al., 2018). We use each firm's annual report submitted to the Indonesian Stock Exchange, where the demography of employee education level is inside. We calculate the percentage of employees with a bachelor's degree or higher education level compared to the total employees employed in a particular year. Proxy for tax avoidance is an effective tax rate where we use cash taxes paid scaled by the pre-tax income reported in each firm's financial report. We also include several control variables that have been proven to be related to tax avoidance, like

firm size, sales growth, SG&A expense, loss carry forward, and leverage.

The research sample's criteria are as follows:

1. Firms registered between 2018 and 2022 in the Industrial sector according to the Indonesian Stock Exchange classification.

2. Firms reported their Annual Reports and Financial Statements for five consecutive years between 2018 and 2022 without a miss and included employee education demographics in them.

Based on the above criteria, the sample can be summarized as follows (Table 2).

Table 2. Research sample

Criteria	Number of Observation
Firms registered between 2018 and 2022 in the Industrial sector	45 firms
Firms that did not report their Annual Reports and Financial Statements for five consecutive years between 2018 and 2022 or did not report employees' education demography	9 firms
Number of valid observation (firm-year)	180 firm-year

Source: Processed Data (2024).

We use generalized least squares to analyze the data because we found that the data suffer heteroscedasticity but not auto-correlation.

RESULTS AND DISCUSSION

Descriptive statistics of our sample are shown in Table 3.

Table 3. Descriptive statistics

Variable	N Obs.	Mean	Std dev.	Min	Max
Cash ETR	147	0.553	1.263	- 0.148	11,890
%High Skill	180	0.240	0.182	0.014	0,805
Sales growth	179	0.069	0.334	- 1.238	2,152
Leverage	180	0.149	0.183	0.005	1,654
Size	180	28.56	1.833	24.712	33,655
SGA	180	0.172	0.266	0.027	2,517
LCF	180	0.394	0.490	0	1

Source: Processed Data (2024).

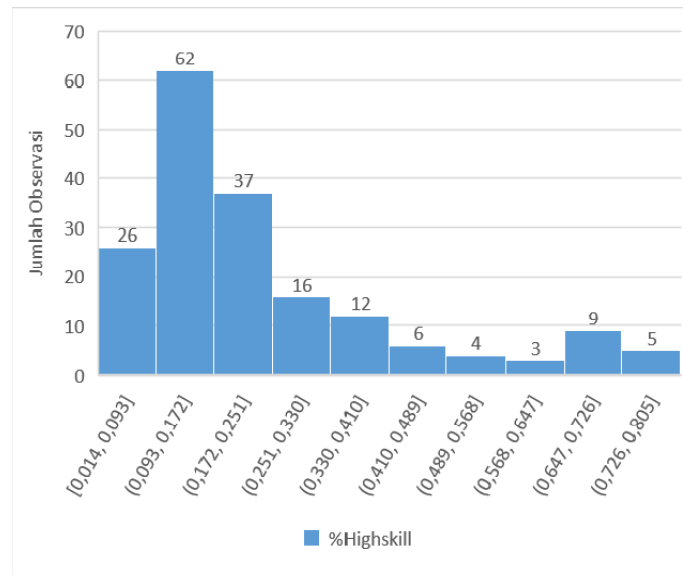


Figure 3. Histogram for %HighSkill (start = 0.014, bin = 0.079)

Source: Processed Data (2024).

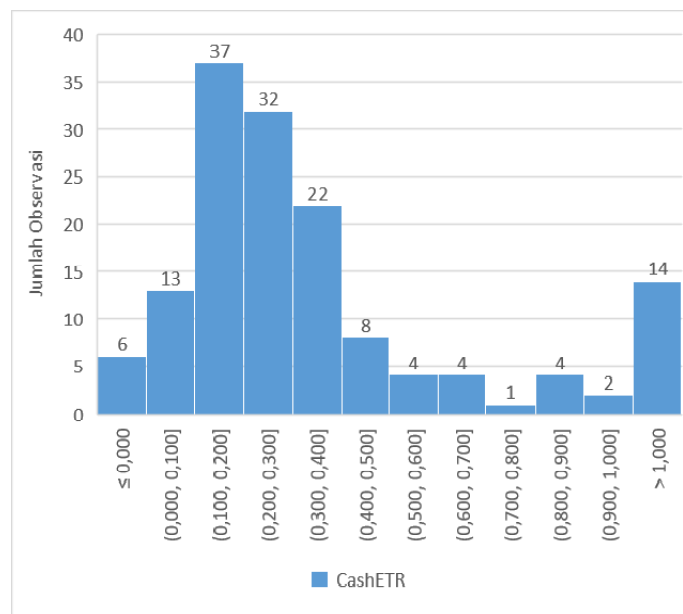


Figure 4. Histogram for CashETR (bin = 0.1, underflow <0.0, overflow > 1.0)

Source: Processed Data (2024).

Table 4. Regression results of the generalized least square (GLS) model

Variable	Coefficient	Standard Error	p-value
HighSkill	0.0653886	0.1825699	0.720
SalesGrowth	-0.3446543	0.0972286	0.000
Leverage	1.3996061	0.3684317	0.000
Size	-0.0409694	0.0169278	0.016
SG&A	1.424471	0.5317008	0.007
LCF	-0.2180039	0.0460627	0.000

Wald chi2	70,34
Prob > Chi2	0,0000

Source: Processed Data (2024).

The HighSkill variable does not have a significant influence on tax avoidance, which is different from previous studies (Dyrenge et al., 2022; Schochet et al., 2022).

The SalesGrowth variable has a significant influence on tax avoidance with a negative direction. It means an increment of sales growth will increase tax avoidance. This result supports Higgins et al.'s (2015) result. Generally, firms in a growing phase tend to be more risk-takers, actively searching and exploiting opportunities, including tax avoidance.

The Leverage variable has a significant influence on tax avoidance and has a positive direction. It means increment of leverage will decrease tax avoidance. This result is the opposite of Richardson and Lanis's (2007) result. Usually, interest expense is tax-deductible expense. This positive direction could happen, as in Gupta and Newberry's (1997) study, where the cause is the usage of CashETR, in which the numerator came from the cash flow statement unaffected by accrual accounting. Meanwhile, the denominator came from the profit and loss statement affected by accrual accounting.

The Size variable has a significant influence on tax avoidance with a negative direction. This means that increasing firm size will increase tax avoidance. This result conforms to a previous study by Richardson and Lanis (2007), which argued that larger firms have economies of scale in utilizing tax planning.

The SG&A variable has a significant influence on tax avoidance with a positive direction. This means that an increase in SG&A expenses will decrease tax avoidance. Normally, firms can do tax avoidance by not amortizing certain costs with benefits lasting for more than 1 year, such as costs related to advertising, building brand awareness, some licenses, research and development. The sure thing is that SG&A is supposed to significantly affect tax avoidance, albeit it can generate ambiguous direction, as shown by Dyrenge et al. (2022) (positive direction and negative direction).

The LCF (loss carryforward) variable has a significant influence on tax avoidance with a negative direction. It means firms that have loss carry forward have higher tax avoidance. This result conforms with previous studies (Chen et al., 2010; Rego, 2003). In tax law, losses can be carried forward to offset future taxes, allowing firms to manipulate this mechanism to appear as if they are incurring losses in order to avoid paying taxes.

This study focuses on tax incidence proxied by the %HighSkill variable. The result is to have no significant influence on tax avoidance, which differs from previous studies. Comparing the nature of Dyrenge et al.'s (2022) samples, we found that samples have a mean of %Highskill 0.569, inter-quartile 0.499 and 0.631. Meanwhile, the samples in this study have a mean of 0.240, and the interquartiles are 0.1203 and 0.2967. This means that firms in Indonesia's industrial sector employed largely low-skilled workers, which is starkly different from the United States, where half of the

employed high-skilled workers are employed. Among 45 firms in the Industrial sector, only 4 firms have %HighSkill above 50%, and they are firms heavily focused on services, not manufacturing.

These factors could cause no significant relationship between tax incidence and tax avoidance:

1. Education level can not predict tax incidence well enough.
2. The elasticity of labour supply tends toward zero (inelastic).
3. The firm's characteristics are more labour-intensive than capital-intensive (i.e. the elasticity of substitution is equal to or less than one).

Firstly, about education, we look into the labour market and compare Indonesia to Germany and the United States. We found that unemployment in the high-education labour force in Indonesia is higher than in Germany and the United States. Meanwhile, unemployment in Indonesia's medium and low-education labour force is lower than in Germany and the United States (see Figure 5, Figure 6, and Figure 7). It means job opportunities in Indonesia are more abundant for and readily absorb low-education workers, but job opportunities for high-education workers are more limited. This affects the elasticity of labour supply, affecting tax incidence. In Indonesia, education level may not be sensitive enough to predict tax incidence.

Secondly, tax incidence can have a positive relation to tax avoidance through the input mix channel and firm scale channel when the elasticity of labour supply is elastic. According to Hidayati et al. (2022), five factors affecting the elasticity of labour supply are population size, age structure, productivity, wage level and government policies. Indonesia is the fourth most populous country in the world after the United States. However, the United States and Germany are developed countries with much higher per capita income, so they could have higher productivity and wages than Indonesia. Thus, they have different levels of elasticity of labour supply.

Indonesia's survey of the labour force conducted by the National Statistic Agency (Badan Pusat Statistik) in February 2023 shows an indication that Indonesia has a more limited job opportunity for high-education workers (in their survey, high education is anyone having a Diploma or College degree or above, meanwhile in this study high-education is anyone having bachelor's degree or above). Despite the low-education workforce being the largest pool, workers in this class have a lower unemployment rate compared to the high-education workforce (see Table 5). This indication is supported by Yonanda and Usman's (2023) study. They found that horizontal mismatches happened among high education workforce as much as 33.5%. Additionally, the workforce with a diploma degree is the highest mismatch to be found, followed by a bachelor's degree, a master's degree, and the least is a doctorate degree.

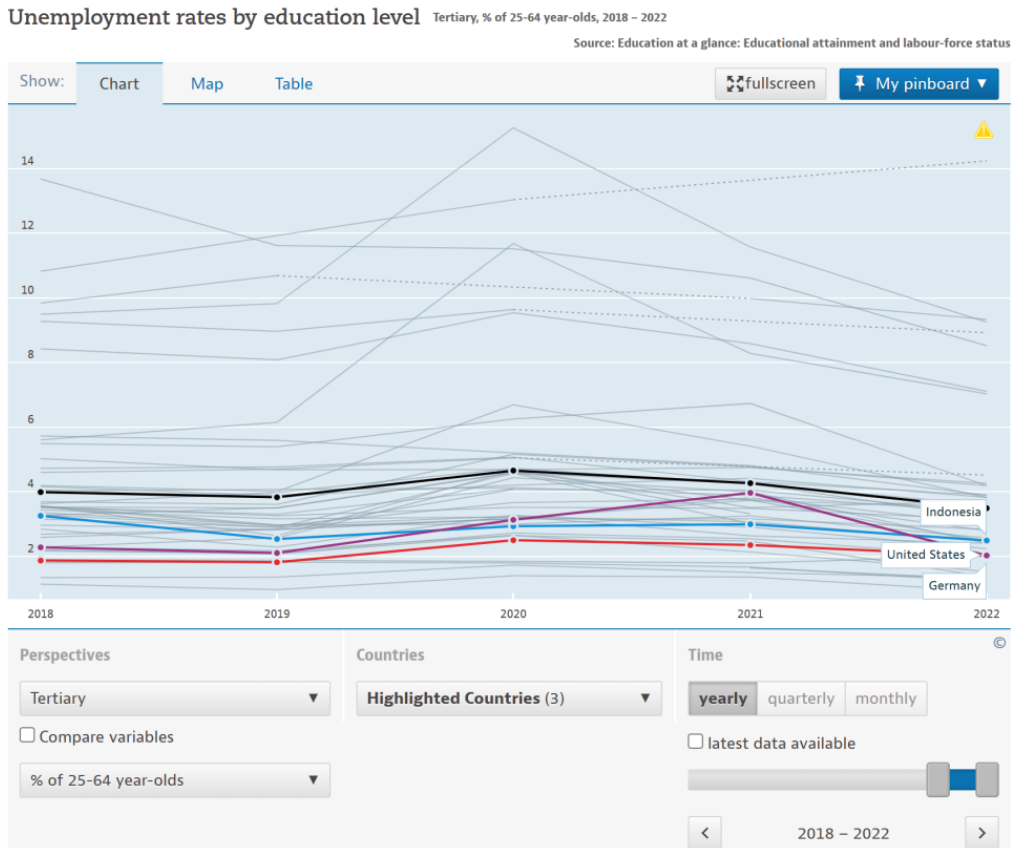


Figure 5. The unemployment rate of labour force having an education at bachelor's degree or higher
Source: OECD (2024).

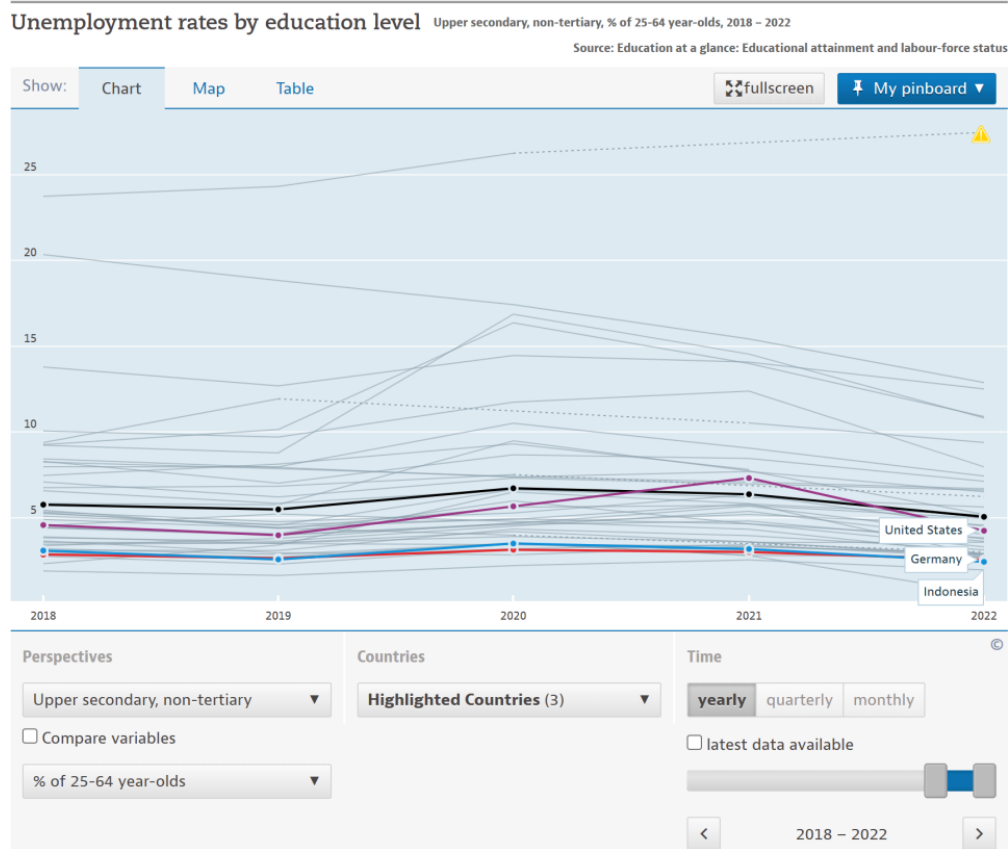


Figure 6. The unemployment rate of labour force having an education from secondary school to a diploma/college degree
Source: OECD (2024).

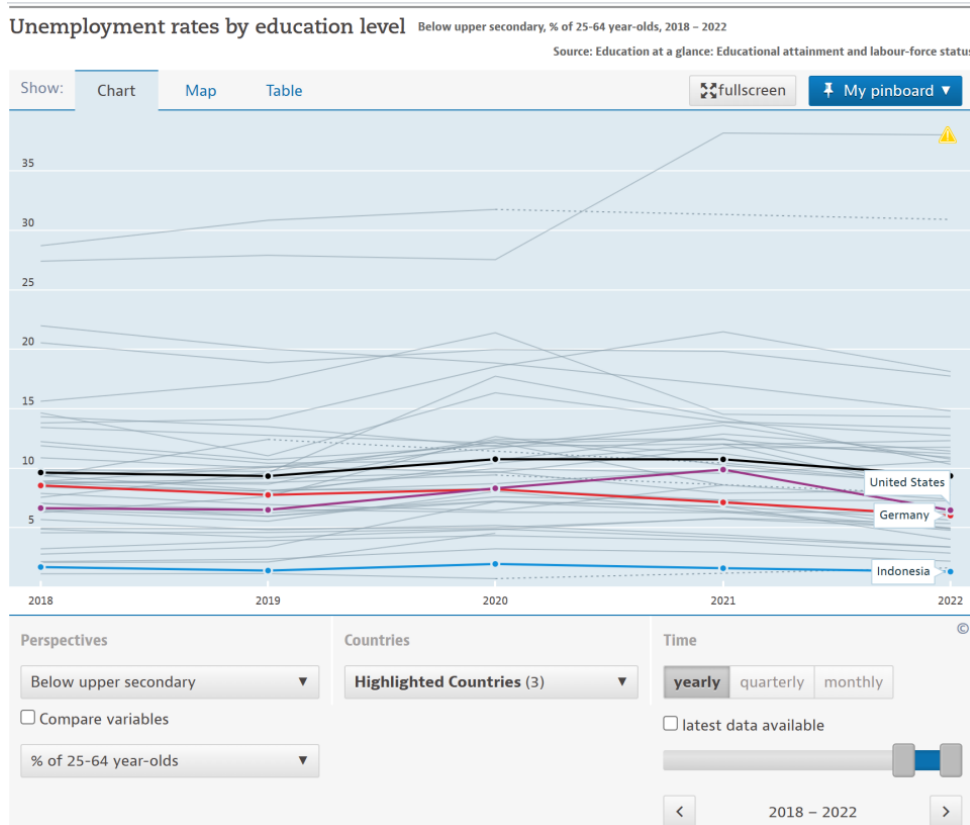


Figure 7. The unemployment rate of labour force having an education below secondary school or no education Source: OECD (2024).

Table 5. The unemployment rate by education level in Indonesia, released in February 2023

Education level	% of total work force	% unemployed
No education	1.97%	1.64%
Primary education	58.72%	3.85%
Secondary education	27.13%	8.41%
High education	12.18%	5.59%

Source: BPS (2023).

OECD data (OECD, 2017) shows that education returns for highly educated workers in the United States is about 13%. For Indonesia, education return for the overall workforce is about 5.52% (Martak & Chotib, 2021), 7.79% (Magdalyn, 2013), 3.7% (Kadir & Sukma, 2019) and if divided by education level 2.65% [bachelor's degree], 3.67% [master's degree], 4.14% [doctorate's degree] (Kadir & Sukma, 2019). Despite having comparability issues, it can show how the United States and Indonesia have different labour market characteristics, where education is much more rewarded in the United States than in Indonesia.

Since Indonesia has limited job opportunities for highly educated workers, demand for jobs is exceeding supply (availability of vacancy), making highly educated workers lower their expected wages and/or disregard their educational background to secure employment, thereby competing with less educated workers for job opportunities. As a result, tax incidence on highly educated workers may not differ significantly from the tax incidence on less educated workers.

Limited job opportunities may make the labour supply's elasticity more inelastic. Suppose firms face inelastic elasticity of labour supply. In that case, they may shift the tax burden more readily to labour in the form of lower wages without suffering a large drop in the quantity of labour willing to work, thus maintaining output level. By maintaining the output level, the firms get no additional marginal benefits of tax avoidance from the labour input's side.

Thirdly, the firm's characteristics are more labour-intensive than capital-intensive. Dyreng et al. (2022) show that a low K/L ratio (the ratio of fixed assets to total employees) can result in no significant relation between tax incidence and tax avoidance. We found that most industrial firms were in the lower class of K/L (Figure 8). This means most firms tend to be more labour-intensive than capital-intensive. To support this view, more data on the K/L ratio of firms in other sectors, especially the technology, health, and finance sectors, must be gathered, as these firms are known to hire many more highly educated workers.

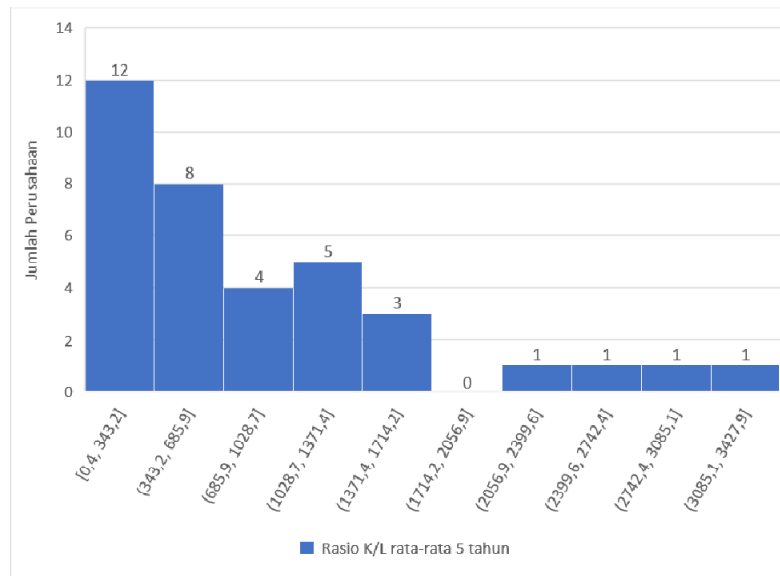


Figure 8. Histogram for K/L Ratio (start = 0.4, bin = 342.7)

Source: Processed Data (2024).

Last, despite having or not having additional data to investigate further and prove the existence of a relationship between tax incidence and tax avoidance, as Schochet et al. (2022) argued, the relationship is an empirical question. Thus, we can have theories that contradict each other when explaining how the relationship worked.

CONCLUSION

This study investigates and analyses the relationship between tax incidence and tax avoidance in Indonesia's Industrial sector between 2018 and 2022. Using a panel data regression generalized least square model, we found that tax incidence has no significant relationship to tax avoidance; instead, other variables like sales growth,

leverage, firm size, SG&A expense, and LCF significantly influence tax avoidance.

There is no significant relationship caused by the characteristics of the labour market in Indonesia, which differs from the United States or Germany. In addition, generally, in Indonesia, high-educated workers have limited job opportunities, specifically in the industrial sector, which predominantly hires low-skilled / low-educated workers. This makes the elasticity of labour supply tend to be inelastic.

For future research, the proxy of tax incidence should be changed, or the incidence may even be broadened beyond the scope of education or wages. Also, the results from other sectors that employed highly educated workers, such as technology, healthcare, and financial services, should be compared and analyzed.

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Appendix 1. Definition of variables

No	Variable	Definition	Formula
1	CashETR	Cash taxes paid scaled by pre-tax income in the current year	$= \frac{(Tax\ Cash\ Paid - Tax\ Refund)}{Pre\ Tax\ Income}$
2	%HighSkill	Percentage of the employees that has bachelor's degree or higher	$= \frac{Employee_{>S1}}{Total\ employee} \times 100\%$
3	Sales Growth	Natural logarithm of the growth rate of sales from $t-1$ to t	$= \ln\left(\frac{Net\ Sales_t}{Net\ Sales_{t-1}}\right)$
4	Leverage	Interest bearing debt scaled by total assets	$= \frac{Interest\ Bearing\ Debt}{Total\ Asset}$
5	Size	Natural logarithm of total asset	$= \ln(Total\ Asset)$
7	SG&A	Ratio of SG&A to sales	$= \frac{SG\&A\ Expense}{Net\ Sales}$
8	LCF	Dummy variable equal to one if the firm has non-missing, non-zero tax loss carryforwards and zero otherwise	$1\ or\ 0$
9	K/L ratio	Ratio of fixed asset (in million rupiah) scaled by the number of employees	$= \frac{Fixed\ Asset}{Total\ Employees}$

Appendix 2. Five years average of %HighSkill of each firm in Indonesia's Industrial sector

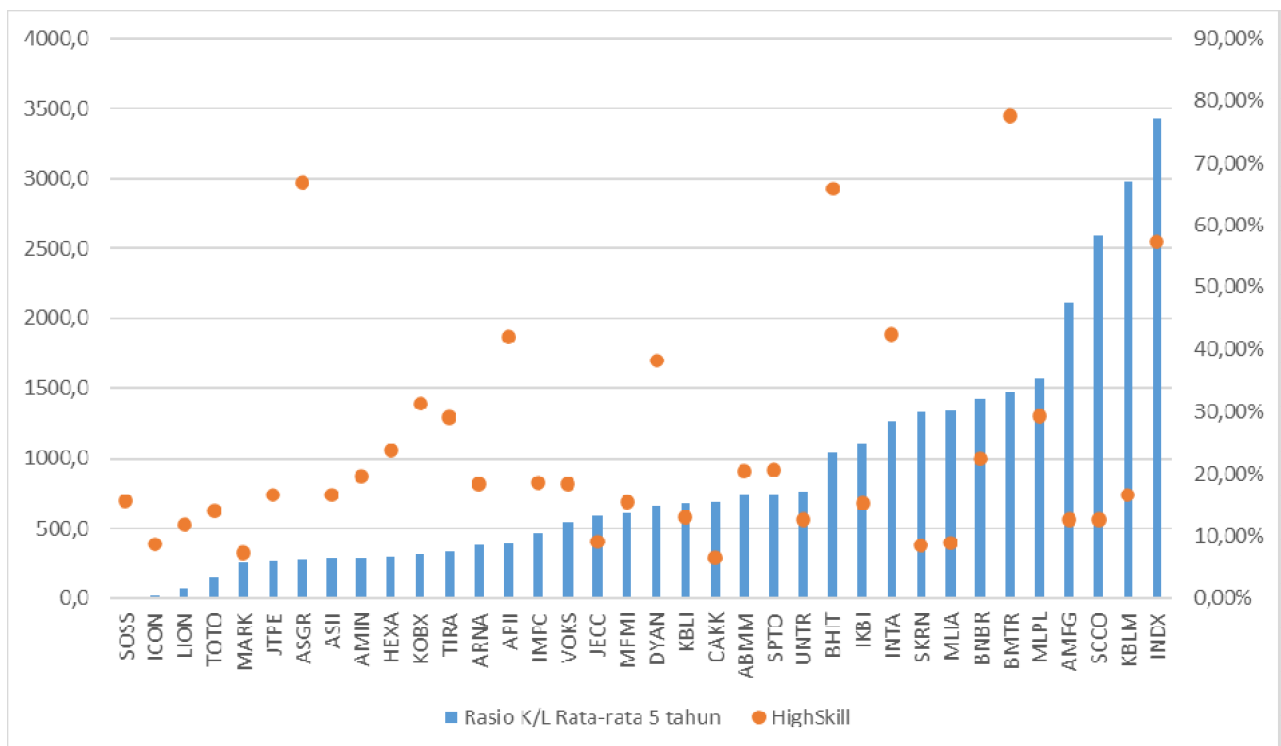
No	Code	Firm Name	Description	%HighSkill
1	SCCO	Supreme Cable Manufacturing & Commerce	Producers of telecom cable, electrical cable, and enamel cable	0,1269
2	BNBR	Bakrie & Brothers Tbk	Manufacturing automotive components, constructions, and industrial metal	0,2249
3	UNTR	United Tractors Tbk.	Sales of heavy equipment, mining contracts	0,1264
4	MLPL	Multipolar Tbk.	Retail trading	0,2920
5	ASGR	Astra Graphia Tbk.	Digital printing and services	0,6689
6	ASII	Astra International Tbk.	Retail trades of automotive, agribusiness, financial services, and heavy equipment	0,1661
7	TOTO	Surya Toto Indonesia Tbk.	Producer of industrial equipment	0,1413
8	VOKS	Voksel Electric Tbk.	Producer of electrical cable, telecom cable and fibre optics	0,1845
9	IKBI	Sumi Indo Kabel Tbk.	Producing conductor (copper and aluminium cable), electrical cable, controls cable, communication cable (copper, fibre optic) and automobile cables	0,1531
12	KBLM	Kabelindo Murni Tbk.	Producer of electrical cable and telecom cable	0,1669
13	KBLI	KMI Wire & Cable Tbk.	Industry of making accessories of and cable complementary parts	0,1308
14	JECC	Jembo Cable Company Tbk.	Solar panel trades	0,0915
15	TIRA	Tira Austenite Tbk	Manufacturing special steel and technical products	0,2893
16	LION	Lion Metal Works Tbk.	Metal fabrication	0,1188
17	INTA	Intraco Penta Tbk.	Trades and leases heavy equipment and spare parts	0,4242
18	MLIA	Mulia Industrindo Tbk	Trades and producer of glass tile, safety glass, bottle glass, glass block	0,0898
20	HEXA	Hexindo Adiperkasa Tbk.	Sales of heavy equipment and after-services	0,2387

Appendix 2. Five years average of %HighSkill of each firm in Indonesia's Industrial sector (continuation)

1	2	3	4	5
21	BMTR	Global Mediacom Tbk.	Advertisement and contents	0,7761
23	AMFG	Asahimas Flat Glass Tbk.	Producer of flat glass and automotive glass	0,1273
25	BHIT	MNC Asia Holding Tbk.	Media, financial services, and energy	0,6592
26	INDX	Tanah Laut Tbk	Port operator and other port related facilities	0,5731
27	ARNA	Arwana Citramulia Tbk.	Ceramic manufactures	0,1839
28	JTPE	Jasuindo Tiga Perkasa Tbk.	Security seals for documents, label, holograms, and cards	0,1678
29	ICON	Island Concepts Indonesia Tbk.	Hotels and accommodations	0,0876
32	MFMI	Multifiling Mitra Indonesia Tb	Achieves management and storage	0,1549
33	ABMM	ABM Investama Tbk.	Integrated energy producer	0,2054
34	KOBX	Kobexindo Tractors Tbk.	Heavy equipment distributor	0,3131
35	DYAN	Dyandra Media International Tbk	Event organizer	0,3814
36	APII	Arita Prima Indonesia Tbk.	Imports, distribution, and services of valve products, fitting, instrumentation and controls	0,4205
38	IMPC	Impack Pratama Industri Tbk.	Plastics manufacturer	0,1861
39	AMIN	Ateliers Mecaniques D'Indonesie Tbk	Boiler manufacturer	0,1977
40	MARK	Mark Dynamics Indonesia Tbk.	Rubber gloves manufacturer	0,0730
41	SPTO	Surya Pertiwi Tbk.	Distributor of branded sanitary products	0,2065
43	SKRN	Superkrane Mitra Utama Tbk.	Leasor and operator of heavy equipment like cranes	0,0850
44	CAKK	Cahayaputra Asa Keramik Tbk.	Trades and producer of ceramic	0,0647
45	SOSS	Shield On Service Tbk.	Outsourcing company for security, landscape maintenance and parking management	0,1572

Appendix 3. Five-year average of K/L ratio and %HighSkill of each firm

Firm Code	K/L Ratio	%HighSkill	Firm Code	K/L Rasio	%HighSkill
SCCO	2591,3	12,69%	AMFG	2109,8	12,73%
BNBR	1420,4	22,49%	BHIT	1042,4	65,92%
UNTR	765,1	12,64%	INDX	3427,9	57,31%
MLPL	1563,1	29,20%	ARNA	377,5	18,39%
ASGR	277,8	66,89%	JTPE	263,2	16,78%
ASII	288,1	16,61%	ICON	17,5	8,76%
TOTO	159,1	14,13%	MFMI	608,0	15,49%
VOKS	549,8	18,45%	ABMM	745,8	20,54%
IKBI	1108,8	15,31%	KOBX	321,3	31,31%
KBLM	2982,9	16,69%	DYAN	658,2	38,14%
KBLI	679,7	13,08%	APII	385,2	42,05%
JECC	589,9	9,15%	IMPC	469,1	18,61%
TIRA	337,5	28,93%	AMIN	289,1	19,77%
LION	71,7	11,88%	MARK	255,8	7,30%
INTA	1267,3	42,42%	SPTO	754,3	20,65%
MLIA	1333,2	8,98%	SKRN	1327,7	8,50%
HEXA	302,6	23,87%	CAKK	691,2	6,47%
BMTR	1465,0	77,61%	SOSS	0,4	15,72%



Appendix 4. Heteroscedasticity test results

```
. xtreg cashetr highskill salesgrowth leverage size sga lcf, fe robust
```

```
Fixed-effects (within) regression      Number of obs   =      147
Group variable: kp                    Number of groups =      35
```

```
R-squared:                            Obs per group:
  Within = 0.3212                       min =          2
  Between = 0.2857                      avg =         4.2
  Overall = 0.1206                      max =          5
```

```
corr(u_i, Xb) = -0.9006                 F(6, 34)       =      3.52
                                           Prob > F       =      0.0082
```

(Std. err. adjusted for 35 clusters in kp)

cashetr	Robust					
	Coefficient	std. err.	t	P> t	[95% conf. interval]	
highskill	-1.846845	1.877613	-0.98	0.332	-5.662614	1.968925
salesgrowth	.0215546	.3483363	0.06	0.951	-.68635	.7294591
leverage	1.68248	1.382527	1.22	0.232	-1.127152	4.492113
size	.1077605	.2072674	0.52	0.606	-.3134576	.5289786
sga	25.95308	15.25697	1.70	0.098	-5.052816	56.95898
lcf	-.573077	.5632197	-1.02	0.316	-1.717677	.5715231
_cons	-5.72886	7.0595	-0.81	0.423	-20.07549	8.61777
sigma_u	2.016653					
sigma_e	.94739768					
rho	.81920211	(fraction of variance due to u_i)				

```
. xttest3
```

Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model

H0: $\sigma(i)^2 = \sigma^2$ for all i

```
chi2 (35) = 2.8e+30
Prob>chi2 = 0.0000
```

Appendix 5. Auto-correlation test results

```
. xtreg cashetr highskill salesgrowth leverage size sga lcf, fe robust

Fixed-effects (within) regression           Number of obs   =       147
Group variable: kp                         Number of groups =        35

R-squared:                                 Obs per group:
    Within = 0.3212                          min =           2
    Between = 0.2857                         avg =           4.2
    Overall = 0.1206                          max =           5

corr(u_i, Xb) = -0.9006                      F(6, 34)        =        3.52
                                           Prob > F        =        0.0082
```

(Std. err. adjusted for 35 clusters in kp)

cashetr	Robust					
	Coefficient	std. err.	t	P> t	[95% conf. interval]	
highskill	-1.846845	1.877613	-0.98	0.332	-5.662614	1.968925
salesgrowth	.0215546	.3483363	0.06	0.951	-.68635	.7294591
leverage	1.68248	1.382527	1.22	0.232	-1.127152	4.492113
size	.1077605	.2072674	0.52	0.606	-.3134576	.5289786
sga	25.95308	15.25697	1.70	0.098	-5.052816	56.95898
lcf	-.573077	.5632197	-1.02	0.316	-1.717677	.5715231
_cons	-5.72886	7.0595	-0.81	0.423	-20.07549	8.61777
sigma_u	2.016653					
sigma_e	.94739768					
rho	.81920211	(fraction of variance due to u_i)				

```
. xtserial cashetr highskill salesgrowth leverage size sga lcf
```

Wooldridge test for autocorrelation in panel data

H0: no first-order autocorrelation

F(1, 22) = 0.040

Prob > F = 0.8434

Appendix 6. The results of regression using generalized least squares

. xtgls cashetr highskill salesgrowth leverage size sga lcf, panels(hetero)

Cross-sectional time-series FGLS regression

Coefficients: generalized least squares

Panels: heteroskedastic

Correlation: no autocorrelation

Estimated covariances	=	35	Number of obs	=	147
Estimated autocorrelations	=	0	Number of groups	=	35
Estimated coefficients	=	7	Obs per group:		
			min	=	2
			avg	=	4.2
			max	=	5
			Wald chi2(6)	=	70.34
			Prob > chi2	=	0.0000

cashetr	Coefficient	Std. err.	z	P> z	[95% conf. interval]	
highskill	.0653886	.1825699	0.36	0.720	-.2924419	.423219
salesgrowth	-.3446543	.0972286	-3.54	0.000	-.5352189	-.1540897
leverage	1.399061	.3684317	3.80	0.000	.6769483	2.121174
size	-.0409694	.0169278	-2.42	0.016	-.0741474	-.0077915
sga	1.424471	.5317008	2.68	0.007	.3823567	2.466586
lcf	-.2180039	.0460627	-4.73	0.000	-.3082851	-.1277226
_cons	1.24921	.469543	2.66	0.008	.3289223	2.169497

. estimates store final