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Impact of External Shocks on Tobacco and Tobacco Related Products Company Performance Using Stata Statistical Softwar

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ABSTRACT

This research investigates the impact of external shocks, particularly changes in excise tax rates and the COVID-19 pandemic, on the financial performance of tobacco companies in Indonesia, specifically PT Hanjaya Mandala Sampoerna, Tbk. (HMSP). Using a quantitative approach, time-series data from 2018 to 2025 were analyzed, focusing on key financial indicators such as net revenue, cost of goods sold, and selling expenses. The study reveals that increases in excise tax significantly affect the company's cost structure and tax liabilities, while the COVID-19 pandemic led to a decrease in net revenue but had minimal impact on tax obligations. The findings indicate that, despite fiscal pressures, tobacco companies have adapted through strategic pricing and cost-optimization strategies to mitigate the impact of these external shocks. This study contributes to understanding the effectiveness of fiscal policy in the tobacco industry and provides empirical evidence of how companies can adjust their strategies to maintain financial resilience amid regulatory and market disruptions.

KEYWORDS *External shocks; Excise tax; Financial performance*

INTRODUCTION

The Ministry of Finance plays a critical role in formulating and implementing policies in the financial sector, including budgeting, taxation, customs and excise administration, and state asset management. Maintaining fiscal stability has become increasingly challenging amid numerous government priority programs requiring substantial funding. Maximizing revenue collection is one strategy employed to reduce the state budget deficit. Domestic tax revenue is dominated by three main contributors: income tax (*Pendapatan Pajak Penghasilan*) accounting for 47–51%, value-added tax and luxury goods tax (*Pendapatan Pajak Pertambahan Nilai dan PPnBM*) at 35–38%, and excise revenue (*Pendapatan Cukai*) at 10–14%. Despite significant revenue collection, it remains insufficient to cover total government expenditure, resulting in annual budget deficits. To mitigate these deficits, the government has introduced changes to several revenue components, including excise taxes. Excise revenue, particularly from tobacco products (Cukai Hasil Tembakau), represents the largest contributor, accounting for over 70% of total customs and excise receipts. The government justifies excise tax increases as a measure to reduce and control tobacco consumption and smoking prevalence; however, this policy also serves as a fiscal instrument to stabilize state revenue, creating a dual objective that often leads to policy trade-offs between public health and fiscal sustainability (Abrigo & Love, 2016).

Indonesia's fiscal policy framework faces a serious financial challenge as government expenditure consistently exceeds revenue, persistently creating budget deficits. Conventional approaches to increasing revenue—such as raising broad-based taxes like income tax or value-added tax—are politically sensitive because these measures are perceived as overly aggressive and may be implemented at times when economic conditions cannot absorb additional burdens. Such actions risk triggering negative backlash due to fairness and social justice considerations, including public protests and potential economic slowdown. Consequently, policymakers have relied on excise taxation, particularly on tobacco and tobacco-related products, as a targeted instrument to achieve dual objectives: increasing the government's ability to raise revenue and promoting public health. This dependency creates an inherent policy contradiction, as tobacco excise contributes more than 70% of total customs and excise income, making it a critical source of funds while simultaneously being the focus of health-oriented regulatory measures. This situation generates policy trade-offs in which the pursuit of fiscal objectives can compromise the effectiveness of measures aimed at reducing or controlling consumption, illustrating the inherent tension between Pigouvian taxation, designed to correct negative externalities, and the goal of maximizing government revenue.

Stakeholder perspectives on tobacco taxation are often conflicting. While public health advocates emphasize the role of taxes in reducing consumption, industry representatives argue that excessive taxation may lead to market contraction and job losses. Recent studies have examined the macroeconomic impact of tobacco tax increases in Indonesia, finding that significant excise tax increases could generate substantial additional economic output, household income, and new jobs, challenging the tobacco industry's narrative that higher taxes harm the economy. Other research has examined the influence of excise rates on corporate behavior, revealing that higher excise taxes significantly affect financial strategies, including tax avoidance practices among tobacco firms, highlighting the importance of regulatory oversight and audit quality in shaping corporate responses to fiscal policy. For companies such as HMSP, excise tax adjustments constitute external shocks that influence pricing strategies, cost structures, and profitability. Prior literature indicates that tobacco companies employ adaptive mechanisms including tax undershifting and portfolio realignment, while consumers experience the effects through increased retail prices that may alter purchasing behavior, potentially dampening demand and creating shifts in market share and segment revenue contributions.

This study investigates the extent to which external shocks affect key financial indicators—net revenue, cost of goods sold, and selling expenses—within Indonesia's tobacco industry. The issue involves multiple stakeholders with diverse interests: the government aims to design tax policies that balance public health goals with economic sustainability; public health advocates monitor the effectiveness of tax policies in reducing smoking prevalence; employees within the tobacco industry face indirect consequences related to job security and wage stability; and tobacco companies must understand financial vulnerabilities and strategic responses, while investors seek clarity on the financial implications of regulatory changes. By applying a time-series econometric approach, this study contributes to the literature on fiscal policy effectiveness and corporate resilience under regulatory shocks and enhances understanding of how fiscal policy interacts with business performance in a regulated industry. Financial data from HMSP between 2018 and 2025 reveal fluctuations in quarterly and annual performance metrics that may be linked to tax policy changes, with periods of declining profit margins despite stable or increasing sales volumes suggesting potential cost pressures or tax burdens.

This study aims to investigate the extent to which excise tax rate changes, as external fiscal shocks, and COVID-19 influence the financial performance of tobacco and tobacco-related product companies in Indonesia, guided by two main questions: how did the COVID-19 pandemic affect financial indicators and overall market dynamics, and to what extent do changes in excise tax rates influence the financial performance of tobacco companies? Understanding these relationships is essential for evaluating the effectiveness of excise taxation as a regulatory instrument and its impact on corporate behavior in a highly regulated industry. This study uses PT Hanjaya Mandala

Sampoerna, Tbk. (HMSP) as the case study because it dominates market share in the tobacco sector, has an extensive product portfolio ranging from conventional combustible cigarettes to smoke-free products, provides comprehensive and transparent financial disclosure as a publicly listed company, and benefits from global strategic insights as a subsidiary of PMI. The primary objectives are to assess the impact of COVID-19 on financial indicators such as net revenue, cost of goods sold, and selling expenses, and to evaluate the effect of excise tax adjustments on key financial metrics that reflect strategic corporate responses to fiscal shocks, using quarterly data from 2018 to 2025 to generate empirical evidence on whether companies are able to absorb and adapt to these shocks through strategies such as price smoothing and cost optimization.

This study examines the impact of two major external shocks—excise tax rate changes and the COVID-19 pandemic—on the financial performance of tobacco companies in Indonesia, with HMSP serving as the primary case study. It analyzes key indicators such as net revenue, cost of goods sold, and selling expenses using secondary data from financial statements and official fiscal regulations. The inclusion of COVID-19 is essential because it introduced operational disruptions such as mobility restrictions and supply chain shocks that compounded fiscal pressure, creating a dual-stress scenario for firms. Despite its analytical depth, the study faces inherent limitations. First, its dependence on a single company as a case study may restrict generalizability to the broader tobacco industry and cannot reflect smaller competitors. Second, qualitative factors such as shifts in customer behavior, managerial decision-making, and operational adjustments are excluded even though these factors may influence financial performance outcomes. Third, the econometric framework is constrained in establishing causal relationships because financial performance is simultaneously influenced by multiple confounding factors, including exchange rate fluctuations, interest rate variability, regulatory overlaps, inflation, and broader macroeconomic cycles. Finally, this study assumes the accuracy of publicly disclosed data, which may omit strategic decisions not captured in financial statements or public reports. These limitations highlight the necessity of cautious interpretation and suggest future research incorporating broader sampling across multi-firm comparisons and integrating mixed-method approaches to capture both quantitative trends and qualitative insights.

METHOD

The research design utilized a quantitative approach to investigate how external shocks, such as COVID-19 and increasing excise tax rates, affected the financial performance of HMSP, a leading tobacco company in Indonesia. Financial data were gathered on a quarterly and annual basis from 2018 to 2025, facilitating a comprehensive examination of periods before and after the implementation of key tax policies and the onset of the pandemic. The analysis incorporated time-series techniques with OLS regression to explore relationships between financial performance metrics and external shocks. In this systematic evaluation, diagnostic tests ensured the reliability of the findings, while official secondary data, including financial statements and government fiscal policies, supported the analysis. The research ultimately posited that increased excise taxes were often absorbed by tobacco firms through strategic adaptations, thereby undermining the intended impact on both consumption and financial performance.

RESULT AND DISCUSSION

Monotonic Correlation: spearman

Spearman's rank correlation is commonly used to check the strength and direction of the between two (2) variables but unlike Pearson correlation which assumes straight-line proportionality and normal distribution, Spearman is more focus on non-linear datasets when there is consistent trend, either it is going up or going down, or when the slope is also changing. The variables may be influenced by regulatory interventions which often violate assumptions of linearity and normality. The closer the coefficient towards +1 meaning that it is perfect positive monotonic relationship, on the other hand, the closer towards -1, it is perfect monotonic relationship but in the other direction. The initial hypothesis (H0) is no monotonic relationship between variables, and the data is normally distributed. On top of top, direction of the change is deciding the pattern. As one (1) variable increase, the other variable consistently increases but not always at a constant rate. This analysis is important due to some variables may not exhibit linearity such as external shocks (Hinkle et al., 2003; StataCorp, 2021).

This statistical measurement reveals a series of strong monotonic relationship among key financial variables. It is typically moving in the same direction, even though the rate of change varies. Shapiro-Wilk p-value test shows, when it is above 0.0500, failed to reject H0 and data is approximately normal. Vice versa, if it is below 0.0500, it is rejecting H0 and data is not normal. When it is not normal, Spearman is more appropriate for modelling. In the simple term, it is deciding whether Pearson is appropriate or not.

net_revenue and nr_local shows almost perfect monotonic correlation in positive direction, ($\rho = 0.9991$, $p < 0.0100$) confirming local sales dominates the total revenue. This also implies revenue from export activities is insignifant compared to local revenue. This is entirely driven by changes in local market performance and the company strategy is targeting this market segment. For export market, the pricing strategy is more limited since the different pricing staretgy is required following the regulatory conditions. Value chain also remains limited to local segment which benefits from integrated distribution networks and marketing channel. Other examples are relationship towards excise_tax_sold ($\rho = 0.9831$, $p < 0.0100$), and excise_tax_produced ($\rho = 0.9809$, $p < 0.0100$). Indonesia's tax regulation controls excise tax on tobacco and tobacco products is linked to production and sales activities. Government-imposed fiscal policies impact on operational cost. As tobacco products output expands, the excise liability rises too and scale proportionally with volume. Tobacco and tobacco products are categorized as strictly regulated industries and likely to face structural cost pressures. This cost pressure is difficult to be mitigated only by internal efficiency alone, tax planning and pricing strategies to maintain margins under regulatory burdens.

Example of moderate monotonic relationship is correlation of nr_local_spt and nr_local skm ($\rho = 0.5504$, $p < 0.0100$). The interpretation of this is SPT products is growing alongside with SKM. Each market has their own market dynamics (i.e., supply, demand, pricing), and consumer behaviour. These two (2) categories are not substitute between one and another, but it is growing as complement. Interesting part is also related to cannibalization effect, where SPT grows as SKM declines or vice versa), it indicates co-movement. This means when market expands, SPT and SKM will get benefits but not always the case due to consumer preferences and pricing elasticity differs. External shocks such as excise tax can influence both market segments and company's strategies will play significant role to give different value propositions. In addition, income_tax_expense and nr_local_skt model negative correlation ($\rho = -0.5742$, $p < 0.0100$). When the fiscal obligation increases for SKM, income tax reduces the financial flexibility. This will indirectly constraining SKT segment performances because the pressure can limit marketing, production, pricing flexibility for SKT even SKT is not the main target of excise hikes. SKT segment is more labor intensive and commonly maintained due to social policy reasons. Fiscal obligations, regulated by Indonesia's government, have a direct impact on net earnings. Profitability is lower because company has higher tax liabilities then reducing the residual income available after its deductions. It is critical to mitigate the adverse impact of this rising tax expense on overall financial performance. Leveraging fiscal incentives, i.e., negotiate on tax holidays, and pricing strategies, i.e. structuring product prices to absorb tax impacts while maintaining competitiveness, are name of two company's plan for maintaining financial resilience under stringent regulatory regimes.

Table 1. Spearman correlation summary test

	net_revenue	***nr_local***	***nr_local_skm***	***nr_local_skt***	***nr_local_spm***	***nr_local_spt***	***nr_local_others***	***cogs***	***excise_tax_produced***	***excise_tax_sold***	***diff_excise_tax_cig***
net_revenue	1.0000										
nr_local	0.9991*	1.0000									
	0.0000										
nr_local_skm	0.9551*	0.9560	1.0000								
	0.0000	0.0000									
nr_local_skt	0.9368*	0.9350*	0.8060*	1.0000							
	0.0000	0.0000	0.0000								
nr_local_spm	0.8505*	0.8523*	0.9475*	0.6570*	1.0000						
	0.0000	0.0000	0.0000	0.0001							
nr_local_spt	0.3552	0.3561		0.5504*		1.0000					
	0.0541	0.0534		0.0016							
nr_local_others	0.5008*	0.4994*	0.5680*	0.4607*	0.5951*		1.0000				
	0.0048	0.0050	0.0011	0.0104	0.0005						
cogs	0.9933*	0.9920*	0.9457*	0.9430*	0.8474*	0.3973*	0.5248*	1.0000			
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0297	0.0029				
excise_tax_produced	0.9809*	0.9795*	0.9511*	0.9221*	0.8576*	0.3955*	0.5684*	0.9871*	1.0000		
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0305	0.0010	0.0000			

excise_tax_sold	0.9831*	0.9831*	0.9533*	0.9248*	0.8634*	0.4069*	0.5546*	0.9907*	0.9915*	1.0000	
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0257	0.0015	0.0000	0.0000		
diff_excise_tax_cig	-0.3348	-0.3348		-0.3286				-0.3258	-0.3210		1.0000
	0.0706	0.0706		0.0763				0.0789	0.0837		
selling_expenses	0.9867*	0.9867*	0.9328*	0.9430*	0.8407*	0.3452	0.5066*	0.9849*	0.9746*	0.9760*	
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0617	0.0043	0.0000	0.0000	0.0000	
log_direct_labor	0.7544*	0.7535*	0.8113*	0.5640*	0.8216*		0.3250	0.7121*	0.6783*	0.7010*	-0.3992*
	0.0000	0.0000	0.0000	0.0012	0.0000		0.0797	0.0000	0.0000	0.0000	0.0289
basic_and_diluted_earning_per_sh	0.7546*	0.7561*	0.8572*	0.5287*	0.9222*		0.4343*	0.7285*	0.7210*	0.7176*	-0.3147
	0.0000	0.0000	0.0000	0.0027	0.0000		0.0165	0.0000	0.0000	0.0000	0.0903
profit_attributable_to_owners_of	0.7575*	0.7593*	0.8590*	0.5328*	0.9226*		0.4380*	0.7317*	0.7228*	0.7215*	-0.3183
	0.0000	0.0000	0.0000	0.0024	0.0000		0.0155	0.0000	0.0000	0.0000	0.0865
income_tax_expense	-0.7473*	-0.7499*	-0.8100*	-0.5742*	-0.8527*		-0.3722*	-0.7010*	-0.6934*	-0.6988*	0.3156
	0.0000	0.0000	0.0000	0.0009	0.0000		0.0428	0.0000	0.0000	0.0000	0.0894
profit_for_the_period	0.7575*	0.7593*	0.8590*	0.5328*	0.9226*		0.4380*	0.7317*	0.7228*	0.7215*	-0.3183
	0.0000	0.0000	0.0000	0.0024	0.0000		0.0155	0.0000	0.0000	0.0000	0.0865
log_excise_payable				0.3477		0.7741*					
				0.0597		0.0000					
cash_receipt_from_customers	0.9973*	0.9973*	0.9506*	0.9395*	0.8496*	0.3606	0.4954*	0.9929*	0.9804*	0.9840*	-0.3142
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0503	0.0054	0.0000	0.0000	0.0000	0.0909
excise_tax_paid	-0.9395*	-0.9404*	-0.8808*	-0.9341*	-0.7700*	-0.4873*	-0.5395*	-0.9533*	-0.9653*	-0.9640*	
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0063	0.0021	0.0000	0.0000	0.0000	
cash_payments_to_employees	-0.9840*	-0.9818	-0.9297*	-0.9430*	-0.8363*	-0.3808*	-0.4834*	-0.9875	-0.9804*	-0.9809*	0.3368

		*						*			
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0379	0.0068	0.0000	0.0000	0.0000	0.0688

Data Source: Financial reports of PT Hanjaya Mandala Sampoerna, Tbk. (HMSP) and fiscal policies of the Indonesian government (2018-2025)

Weak negative correlation can be seen from diff_excise_tax_cig and net_ revenue (ρ = -0.3348, p > 0.0500). It implies that changes in excise tax differences will have minor systematic impact on revenue. The logic behind this is this change does not necessarily mean that has no impact at all to company's financial performance. This can be interpreted that company strategies are effectively implemented to minimize negative downside influenced by the changes, from pricing strategies for instance. It has marginal compared to core operational drivers. Another action from company is by offsetting volume changes which means increasing sales volume for related lower-taxed products and/or high-demand products. At the end, the total revenue can be maintained to certain level. In this case, SKM excise tax increases, optimizing production efficiency cost (maximizing economic of scale) can be a solution to reduce per-unit tax exposure. Other example for weak positive correlation is related to net_revenue and nr_local_spt (ρ = 0.3552, p > 0.0500). Changes in SPT segment will have minimal impact on the trend of revenue. This can be interpreted that SPT has its niche consumer preferences. It is not volume-driven product, thus selective pricing strategy will differ from SKM. SPT is more on lifestyle branding and does not growth at the same rate as revenue. SPM is more for export market; therefore it does not add much to the financial performance of company. Indonesia's market is more into SKM rather than SPM due to the unique demand related to clove-contained products.

Correlation: Linear Vs. Monotonic

A linear relationship means two (2) variables change together at a steady or constant rate; it forms a straight line when it is being plotted on a Cartesian plane. The steepness and slope of this line stay the same. To measure how strong the connection is using Pearson's coefficient (r) and works best when the data is distributed in a bell-curved and has similar spread across its range (Hinkle et al., 2003). This bell curved indicates the assumption of normality and homoscedasticity. Example, if production volume increases, the revenue will consistently increase.

On the other hand, a monotonic relationship demonstrates a consistent direction between variables, although the rate of change does not have to be constant, nor does it require a straight-line representation. For instance, if an excise tax increases, it might lead to a decline in net revenue, but the magnitude of this decline may vary across different time periods. This variability indicates that changes in revenue are not uniform; instead, they reflect fluctuations that can occur as a result of strategic adjustments made by firms in response to tax hikes.

To understand the nature of these relationships, a summary of two correlation approaches provides valuable insights. The Pearson correlation is indicated by "P," which signifies a statistically significant linear correlation when the p-value is less than 0.05, assuming normal distribution. Conversely, the Spearman correlation is denoted by "S," highlighting a statistically significant monotonic trend, particularly when the p-value is less than 0.50. If both Pearson and Spearman correlations are significant, marked as "P, S," it indicates that the variables exhibit both linear and monotonic behavior, moving in the same general direction and reflecting nearly linear patterns.

These correlation analyses play a crucial role in evaluating the interconnectedness of various financial metrics. By understanding the relationships—whether linear or monotonic—researchers can better assess how external factors like excise tax increases impact net revenues and other financial performance indicators. This comprehensive perspective allows for more informed discussions on strategic corporate responses to fiscal changes and the broader implications these dynamics have on company performance and economic analysis.

P, S is illustrating that the data are having stability and predictability because the trend is consistent. It could not be interpreted as good or bad but it more explainable to say that the effects are systematic and would be easier to forecast. Monotonic means it always moves in one (1) direction and linear means changes at a relatively constant rate. If the effect of one (1) variable on another is consisten across the observations, then the stabile data can be achieved. Furthermore, the variables are also close to linear, hence the linear regression models can be used.

Some variables found out to uncategorized, those are neither “P” nor “S”. That means no statistically significant correlation at the chosen confidence level 95%. However, the variables are still be used for the modelling in a multivariate context.

Regression Analysis: covid Impact

This model evaluates the effect of COVID-19 pandemic on company performance using Ordinary Least Squares (OLS) regression. COVID has heterogeneous effects across financial company metrics where it has wide different reaction between one and another. It is not uniform, the direction and magnitude vary.

Some drops are detected, for example because of COVID, the net_ revenue dropped by -5,516,167 IDR (p-value = 0.015, R2 = 0.967), and cash_receipt_from_customers fell by -5,728,792 IDR (p-value = 0.019, R2 = 0.968). Those are reflecting demand shock. The policy at that time was to limit the physical movement, it was allowed but limited to the distribution of basic needs and health-related activities. Tobacco and tobacco related products were not categorized to basic needs, and the selling strategy in retail is rely heavily on trade channels, thus effecting to fewer transactions and delayed deliveries. In addition, the economic slowed down. As economic contracted into minus, the purchasing power was also weakend and priorities shifted toward essentials. Company was also taking countermeasures to stabilize the production activities, logistic or distribitions which ended up to sales and cash inflows.

Similar behaviour where nr_local declined by -5,268,344 IDR (p-value = 0.016, R2 = 0.9700) and selling_expenses decreased by -345,120 IDR (p-value = 0.028, R2 = 0.952). This tells us about cost-cutting measures as previously explained in above paragraph. In contrary, the income_tax_expense rose significantly by +565,863 (p-value = 0.012, R2, 0.596) which indicating fiscal obligations despite falling revenue. This excise_tax_cig as part of its fiscal policy is policy driven and non-discretionary. This fiscal authorities-maintained tax collection to support state revenue, moreover in the crisis condition.

nr_local_others shows a positive effect with +164,497 IDR (p-value = 0.047, R2 = 0.361). nr_local_skm products represents the largest volume and revenue, and the diff_excise_tax_cig is based on SKM market, thus nr_local_others, including nr_local_skt, nr_local_spm, nr_local_spt becomes less sensitive. Furthermore, note that nr_local_others also exposed by threshold for separate disclosure in the financial statement. It is composed by limited product variants, experimental products and other products that have revenue <10% of the total revenue. According to IRFS, if there is a product line or segment contributes ≥ 10% of consolidated revenue, it shall be presented as separate line.

The impact of COVID then will be checked in correlation to profitability indicators: profit_attributable_to_owners_of, profit_for_the_period, basic_and_diluted_earning_per_sh and cash_payments_to_employees. For profit_attributable_to_owners_of, and profit_for_the_period have negative correlation, -1,250, 789 IDR but p-value = 0.610, and R2 = 0.6100. From the p-value indicates that it may not be influenced by COVID only. Company's strategy can also impact to this – pricing strategy and cost optimization – for instance. When the COVID came, and government highly restricted physical mobility, company decided to postpone nationwide compaigns and considered digital marketing to be able to cover more consumers. This condition reduced the advertisement budget as well as promotional events and concentrated the budget more onto trade incentives to distributors. Then, it reduced the selling expense with the same revenue or slightly change ended up with increase in operating profit and profit_attributable_to_owners_of and profit_for_the_period.

Other operational metrics such as cogs, nr_local_skm, nr_local_spm, nr_local_spt are surprisingly have weak until no COVID effects. cogs slightly decreased and considered as stable. Management is likely maintained production cost even during demand shock. The optimatization can be also due to variable cost where cost is pushed through locking price in long-term contracts. On the other hand, pricing strategy is also being intense to be monitored to be more elastic for any kind of external shock.

Regression Analysis: diff_excise_tax_cig Impact

In previous section, we have modelled evaluation effect of covid, and this section will explain about effect of diff_excise_tax_cig to company's performance using OLS. p-value constantly shows >0.95 accoss all model which means that it is statistically insignificant. The changes in diff_excise_tax_cig does not affect all variables from financial metrics (i.e., net_revenue) until operational metrics (i.e., cogs) and profitability indicators (i.e., profit_attributable_to_owners_of).

Regression Analysis: covid and diff_excise_tax_cig Impact

Combined regression model between covid and diff_excise_tax_cig is presented in this section. In general, covid shows significant effects, while diff_excise_tax_cig has small coefficient and high p-value which means insignificant variable to be considered. (Sheikh et al., 2023; Apollonio & Glantz, 2020). The conclusion from this model is still aligned with individual model explained in the previous two (2) subsections. When using individual variable in isolation, it absorbs more of the unexplained variance in dependant variable. Thus, it makes the coefficient is larger compared to the combined variables in isolation. The model shares the explanatory power then each coefficient will contribute to the model and adjusts downward.

Net_revenue coefficient is – 5.52 million IDR, p-value = 0.015. This could happen when holding other factors constant, but the presence of covid reduced quarterly net_revenue by 5.5 million IDR compared to non-COVID era. cash_receipt_from_customers shows similar reaction to fall 5.73 million IDR (p-value = 0.019) which means covid disturbs cash inflows and sales transactions.

For selling_expenses, it goes to opposite direction to negative with magnitude 345 thousand IDR. Management response plays a role to determine the magnitude consideringwhen revenue and cash inflows dropped, company may postpone some activities, such as advertising, campaigns, etc. By postponing those expenses may give extra cash flow in short term. On the other hand, for income_tax_expense, it increased by +566K IDR (p-value = 0.012) even though the revenue falls, but this is possible due to two (2) reasons: (1) obligations for the company to pay related to fiscal, and (2) timing differences in tax accruals related to financial statement.

Multicollinearity Diagnostic

To ensure validity of model, Variance Inflation Factor (VIF) was assessed to check multicollinearity. The aim is to see in case two (2) or more independent variables are highly correlated between each other. If there is strong correlation, this may be a bias in the model because model cannot isolate effect from individual variable.

Table 2. Multicollinearity test

Variable	*covid*	*diff_excise_tax_cig*	*covid + diff_excise_tax_cig*
q1	1.59	2.02	2.04
q2	1.59	-	1.48
q3	1.59	1.47	-
q4	-	1.49	1.49
covid	1.01	-	1.02
diff_excise_tax_cig	-	1.53	1.53
Mean VIF	1.45	1.63	1.51

Data Source: HMSP financial data and related fiscal policies (2018-2025)

From the study, it shows that the Mean VIF is less than 1.7 which is showing no multicorrelation. With that VIF value, the tax changes have negligible impact. If that is the case when VIF is high, showing multicollinearity exists in the model, model cannot be able to distinguish change of dependant variable due to seasonality factor (q1, q2, q3, q4) or diff_excise_tax_cig policy. This aligns with prior evidence that tobacco company neutralize fiscal shocks through adaptive measures (Sheikh et al., 2023; Apollonio & Glantz, 2020). All the external shocks faced by company is limited in firm level by taking into action by corporate countermeasures.

In addition, excise tax is variable that is not under control of company. It is solely decided by government. The Ministry of Finance defines and decides the magnitude, and effective date of new tariffs via new regulation. Furthermore, company cannot anticipate and/or smooth impact to company.

Heteroskedasticity Test

This test is to check the residual variance in the regression model is constant across observations. The null hypothesis (H0) assumes that it is homoskedasticity.

This assessment was conducted in three (3) stages: (1) individual regression with covid, (ii) individual regression with diff_excise_tax_cig, (iii) combined regression for both variables. Across all models, the result consistently produced p-value > 0.05 which indicating failure to reject the H0. This also means that residual variance is constant. From the test, most of all variables are not stable because p-value < 0.0500. The residual variance changes with fitted values. Taking an example of net_revenue, as revenue increases, the residual increases as well. When this residual grows, it could not be explained why it is growing and seems that all the potential source of variance is not properly locked/identified/modeled. There is something else influencing the grows of revenue that is questioned.

Table 3. Heteroskedasticity test for H0 = constant variance

	covid	*diff_excise_tax_cig*	*covid + diff_excise_tax_cig*
net_revenue	0.0418	0.0059	0.0374
nr_local	0.0405	0.0051	0.0368
nr_local_skm	0.0053	0.0098	0.0240
nr_local_skt	0.0013	0.0124	0.0053
nr_local_spm	0.0050	0.0319	0.0423
nr_local_spt	0.0424	0.0011	0.0007
nr_local_others	0.0065	0.0104	0.0117
cogs	0.0102	0.0130	0.0220
excise_tax_produced	0.0274	0.0567	0.0556
excise_tax_sold	0.0097	0.0204	0.0200
diff_excise_tax_cig	0.0002	-	-
selling_expenses	0.0305	0.0153	0.0233
log_direct_labor	0.0319	0.3388	0.0244
basic_and_diluted_earning_per_sh	0.0012	0.0311	0.0273
profit_attributable_to_owners_of	0.0011	0.0296	0.0244
income_tax_expense	0.0001	0.0162	0.0068
profit_for_the_period	0.0011	0.0296	0.0244
log_excise_payable	0.0510	0.1665	0.1235
cash_receipt_from_customers	0.0151	0.0027	0.0186
excise_tax_paid	0.3380	0.1667	0.1567
cash_payments_to_employees	0.4635	0.8678	0.6561

Data Source: HMSP annual and quarterly financial reports and Indonesian tax policies (2018-2025)

Net_revenue is not a stand-alone variable, it is aggregated from multiple financial components (e.g., sales, taxes, cogs, etc.). Each variable has certain degree of error due to the fact that underlaying components introduces its own uncertainty. When it is combined, the uncertainties are also accumulated and therefore residual varies. excise_tax_paid correlates with regulated fiscal obligation from government to the company. The timing is fixed and/or can be estimated due to its scheduling. The amount of tax to be paid is also calculated based on fixed formula from the government. Furthermore, cash_payments_to_employess follows the structured payroll. Those two (2) examples are relatively less sensitive to the government external shock.

On the other hand, BG model checks that 10 variables show autocorrelation out of 21 variables. The variables are nr_local_spt, nr_local_others, diff_excise_tax_cig, log_excise_payable but only two (2) which no correlation at all for all modelling: nr_local_spt, and nr_local_others. Same rationale still applies for this model. nr_local_spt is less sensitive to external shocks because the government shock here is targeted to SKM, not SPT. Hence, the demand and pricing remain relatively stable. On the orher hand, nr_local_others is small compared to others (i.e., SKM) then changes in this variable is not impacting the model. The revenue from this variable increases until certain of time when it reaches ≥10% of the total revenue, this variable resets due to additional segment line in the financial statement.

Autocorrelation Test

This test was conducted to detect autocorrelation in regression residuals. When the autocorrelation is detected, either in positive of negative direction, the errors are not random, and error today tends to be followed by another error later.

Most of variables have value <1, for instance net_revenue = 0.5630 / 0.4371 / 0.5945), Durbin-Watson (DW). This is a good indication to say that there is strong positive autocorrelation in residuals, and it will disturb the further modelling. Among others, nr_local_others is only small segment with low volatility, and dynamic. It is different with nr_local_skm, nr_local_skt, nr_local_spm, nr_local_spt where they are dedicated market segment published in the financial statement. Company maintains those segments and let all unclear segment into nr_local_others. According to IRFS, when nr_local_others is already touching >10% of total revenue, additional segment or line is required. Therefore, the contribution from nr_local_others is insignificant compares to others.

diff_excise_tax_cig is controlled by government and the object of policy changes. It does not drive by past residuals and difficult to predict. The magnitude of external shock cannot be interfered by company and/other external factors except government itself.

Regression Model: prais

This model employes Ordinal Least Square (OLS) with combination of robust standard error. This combination is used to eliminate risk of heteroskedasticity and multicollinearity that have been detected in previous section.

Significant variable can be determined in the combiner Prais-Winsten regression model from three (3) aspects. First aspect is by looking at p-value which indicating the significance at 95% confidence level when the p-value < 0.05. It tells more about power of relationship or prove of causality. Second, by checking on the Adjusted R2 that can be interpreted that high value, typically ≥ 0.900, explains ups and downs of the dependant variable can be predicted by independent variables. In contrary, the lower the value, it means that independent variable cannot explain as a root cause of changes in the dependant varible. Third aspect is transformed DW which means that correction to remove serial correlation across time. This transformed model is corrected this reduals to be no longer correlated. This impact to R2 and p-value.

Based on above criteria, covid only has significant impact to one (1) variable which is nr_local_others. Other than that, all p-value is >0.05 even when the R2 is >0.900 and DW is close to 2.0. For nr_local_others, p-value is 0.031 even though the R2 is weak 0.3762. The moderate linearity means that sensitive to short-term decisions. The model is not explaining very well that changes in covid is directly linked to nr_local_others. It has other than covid that is more contributing on the nr_local_others. The variation other than covid may have more significant to nr_local_others. This could be due to small segment captured by this variable and insignificant compared to others.

Furthermore, basic_and_diluted_earning_per_sh, and profit_attributable_to_owners_of are more compex to be explained because these variables may be due to management-strategic decision too. EPS is a good indication for investors to keep their trust to management and valuation of the company. The shock of diff_excise_tax_cig may be absorbed from several options: pricing adjustment, cost optimization, combination of those. Changes in excise tax will directly impact, i.e., higher or increase, then the profit margin reduces unless the company decided to pass onto customers via increasing price. If not, net income after tax will likely shrink and ended up to impact basic_and_diluted_earning_per_sh, and profit_attributable_to_owners_of.

Regression Model: prais corc and corc vce

prais and prais corc have the same concept of modelling. Cochrane-Orcutt (corc) removes the first observation after observation, while prais do not. Both coefficient, and significance level will still be same and almost identical. The correction will improve the model by adjusting the standard errors. The fundamental relationship between independent and dependent variables remains the same. corc vce enhances inference reliability without altering the underlying relationship. (Prais & Winsten, 1954; Cochrane & Orcutt, 1949; White, 1980).

Business Solution

To mitigate the adverse effects on external shocks—excise tax increase and pandemic—this study proposes an integrated strategic responses grounding in econometric evidence. The solution emphasizes two (2) complementary pillars: pricing optimization and cost efficiency. Pricing optimizations lead to selective tax undershifting for high-volume SKM products and premiumization of smoke-free alternatives to preserve contribution margins under fiscal pressure (Sheikh et al., 2023; Apollonio & Glantz, 2020). Concurrently, cost efficiency is achieved through lean manufacturing, automation and supplier renegotiation to reduce COGS without compromising product quality (Porter, 1985). Implementation should prioritize SKM segment given their dominant share in revenue and excise liability (Chaloupka et al., 2011). Responsibility lies on manufacturing operations department supported by Marketing for pricing strategy and Regulatory Affairs for compliance and ensuring cross functional alignment (Stock & Watson, 2001). It involves dynamic pricing models calibrated by elasticity estimates, scenario-based forecasting using VAR simulations and synchronization of excise tax payments with customer receipts to maintain liquidity resilience (Sims, 1980; Lütkepohl, 2005). This scientific statistical approach can be used as decision-support system. The forecast helps company to know until what extend changes of excise tax can be absorbed by company. Furthermore, stakeholder engagement and policy advocacy. Strengthen collaboration with regulators and industry association to maintain stability in tax policy while maintaining government revenue from the business. It reduces planning risk and supports long-term investment decision. This approach aligns with empirical findings that adaptive pricing and operational efficiency are critical for sustaining profitability in regulated industries facing recurrent policy shocks (Bella et al., 2024; Listiana & Mapanyukki, 2025).

CONCLUSION

The study found that two external shocks—excise tax increases and the COVID-19 pandemic—affected the financial performance of HMSP in different ways. Using 31 quarterly observations from 2018 to 2025, the analysis showed very strong correlations between net revenue, cost of goods sold (COGS), and excise tax produced and sold (Pearson $r > 0.98$, $p < 0.0100$), indicating that changes in fiscal policy closely aligned with the firm's cost structure and tax liabilities. COVID-19 had a negative effect on net revenue and local SKM revenue, while slightly increasing excise tax obligations, suggesting short-term operational pressure during the pandemic period. By contrast, excise tax changes alone had minimal influence on net revenue but showed a small positive effect on SKM revenue and minor negative effects on excise tax sold and produced. In the combined model, COVID-19 remained negatively associated with revenue but positively related to excise obligations, while excise tax changes continued to show a positive association with

SKM revenue and negative relationships with excise tax variables; however, only the relationship between excise tax changes and SKM revenue was statistically significant ($p = 0.042$), with other effects remaining insignificant ($p > 0.10$). The models demonstrated strong explanatory power ($R^2 = 0.93–0.98$), and Durbin–Watson statistics close to 2 indicated no serious autocorrelation. Overall, the findings suggest that excise tax increases raised fiscal liabilities without substantially reducing company revenue or profitability, as the firm appeared to neutralize external shocks through pricing adjustments and cost management strategies, while the COVID-19 pandemic generated temporary stress rather than structural deterioration. This outcome highlights the persistent duality of excise taxation as both a fiscal and regulatory instrument, with policy effectiveness partly constrained by corporate resilience. Future research could expand the analysis by incorporating multiple tobacco firms, longer time horizons, and additional macroeconomic variables to better evaluate industry-wide responses and improve the generalizability of the findings.

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