

Abnormal Production Activity in an Emerging Market: Short-Term Accounting Gains, Inventory Accumulation, and Cash-Flow Consequences

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Abstract. This study examines the economic consequences of abnormal production activity among Vietnamese listed manufacturing firms by investigating its effects on accounting performance, inventory accumulation, and future operating cash flows. Using an unbalanced panel of 243 firms over the period 2016–2024, abnormal production activity is estimated using the normal production cost model [2], and the hypotheses are tested with firm fixed-effects regressions. The results show that abnormal production activity improves short-term accounting performance but does not enhance longer-term performance, operating cash flows, or market-based performance. It also increases subsequent inventory intensity, while firms with high inventory intensity experience weaker future operating cash flows. These findings suggest that the accounting benefits of abnormal production activity are temporary and accompanied by inventory-related operating costs, providing new evidence on the economic consequences of production-based real earnings management in an emerging market.

1. INTRODUCTION

Earnings quality is a central issue in accounting and corporate finance because reported earnings influence the decisions of investors, creditors, and other stakeholders. Under pressure to meet earnings targets, managers may rely on either accrual-based earnings management or real earnings management. Unlike accrual-based earnings management, real earnings management alters actual business decisions and may therefore have direct consequences for firms' future operating performance [1], [2].

Among real earnings management activities, abnormal production activity is particularly relevant for manufacturing firms. [2] argues that firms may overproduce to spread fixed production

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overheads across more units, thereby reducing the cost of goods sold per unit and temporarily improving reported earnings. While this practice can improve short-term accounting performance, it may also increase inventory accumulation and create future operating costs.

International studies commonly measure abnormal production activity using the abnormal production cost model developed [2]. Subsequent studies show that managers strategically choose between accrual-based and real earnings management depending on reporting incentives and monitoring conditions [4], [5]. However, existing evidence mainly interprets abnormal production activity as opportunistic earnings management, while paying relatively little attention to whether it may also reflect economically rational production decisions. Consequently, the economic consequences of abnormal production activity remain insufficiently understood. [6] further suggests that real activities manipulation may, under certain circumstances, be associated with stronger future operating performance, indicating that its consequences are not uniformly negative.

This issue is particularly relevant in emerging markets, where high information asymmetry and weaker monitoring make it difficult to distinguish opportunistic overproduction from genuine production expansion. Vietnam provides an informative setting because listed manufacturing firms typically maintain substantial inventories while operating in a developing capital market. Although previous studies document the existence and determinants of real earnings management in Vietnam [7], [8], little is known about the economic consequences of abnormal production activity.

This study addresses this gap by examining abnormal production activity as a multidimensional operating decision rather than solely as a proxy for real earnings management. Specifically, it investigates whether abnormal production activity generates temporary accounting gains, whether these gains persist over time, and whether inventory accumulation represents the mechanism through which future cash-flow costs arise.

Using data from Vietnamese listed manufacturing firms, the results show that abnormal production activity improves one-year-ahead accounting performance but does not enhance longer-term operating or market performance. It also increases inventory intensity and weakens future operating cash flows among firms with high inventory intensity.

This study makes three contributions. First, it extends the real earnings management literature by shifting the focus from detecting abnormal production activity to explaining its economic consequences. Second, it identifies inventory accumulation as the operational mechanism linking abnormal production activity to future cash-flow outcomes. Third, it provides evidence from an emerging market, where distinguishing earnings management from production expansion is particularly challenging.

2. THEORETICAL DEVELOPMENT AND HYPOTHESIS DEVELOPMENT

2.1. Conceptual Framework

This study develops a conceptual framework by integrating real activities manipulation theory, agency theory, signaling theory, and the operating-cycle perspective to explain the economic consequences of abnormal production activity. Rather than treating abnormal production activity solely as a proxy for real earnings management, the framework conceptualises it as a managerial operating decision that may generate both short-term accounting gains and longer-term operational consequences.

Real activities manipulation theory and agency theory jointly explain why managers may increase production beyond normal demand. Managers facing earnings targets or market expectations may use production decisions to improve reported accounting performance because overproduction allocates fixed manufacturing overheads across a larger number of units, thereby reducing the reported cost of goods sold and increasing current earnings [1], [2], [9]. Accordingly, abnormal production activity is expected to generate temporary improvements in accounting performance.

However, abnormal production activity should not be interpreted exclusively as opportunistic earnings management. From the perspective of signaling theory, unusually high production may also reflect managers' expectations of future demand, production expansion, or capacity utilisation rather than attempts to manipulate reported earnings ([6]). The economic consequences of abnormal production activity therefore depend on the underlying managerial motivation, creating two competing interpretations: reporting incentives versus rational production decisions.

The operating-cycle perspective explains how these production decisions influence future operating outcomes. Production beyond current demand increases inventory accumulation, delaying cash conversion and increasing inventory-related costs and working-capital requirements [3], [10]. Inventory therefore represents the key operational mechanism through which temporary accounting gains may translate into future cash-flow consequences.

Taken together, the conceptual framework proposes that abnormal production activity may generate short-term accounting gains while simultaneously creating inventory accumulation that weakens future operating cash flows when production exceeds sustainable demand. At the same time, the framework recognises that abnormal production activity may also reflect economically rational production expansion rather than purely opportunistic reporting behaviour. Figure 1 summarises these conceptual relationships and provides the theoretical foundation for the hypotheses developed in the following sections.

Figure 1 illustrates the conceptual framework developed in this study. Based on this framework, the hypotheses are developed in the following section.

2.2. Empirical Evidence and Research Gap

Accounting performance

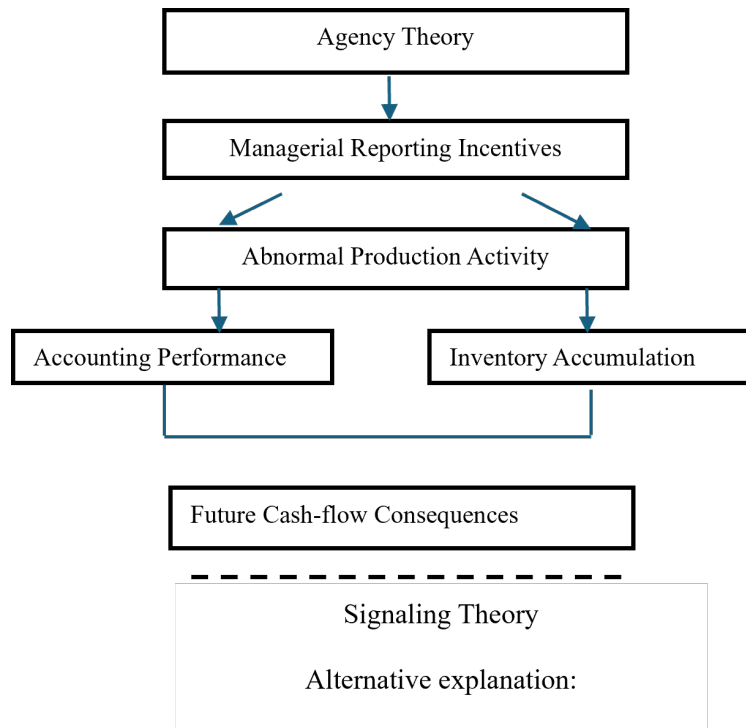


FIGURE 1. Conceptual Framework of the Study

Empirical evidence generally suggests that abnormal production activity improves short-term accounting performance by reducing the reported cost of goods sold through overproduction [1], [2]. Subsequent studies show that managers strategically substitute between accrual-based and real earnings management depending on reporting incentives and monitoring conditions [4], [5]. However, evidence on the persistence of these accounting gains remains mixed, with prior studies reporting both negative [11], [12] and positive [6], [13] subsequent performance.

Inventory and cash-flow consequences

Beyond reported earnings, abnormal production activity may create important operational consequences through inventory accumulation. Excess production increases inventory, delays cash conversion, and raises inventory-related costs, potentially weakening future operating cash flows [3], [10]. Although inventory is widely recognised as a direct consequence of overproduction, its role in transmitting the effects of abnormal production activity to future cash-flow performance remains largely unexplored.

Research gap

Existing evidence leaves three important questions unresolved. First, most studies focus on accounting outcomes rather than broader economic consequences. Second, the inventory channel has rarely been examined as the mechanism linking abnormal production activity to future cash flows. Third, evidence is concentrated in developed markets, leaving uncertainty regarding emerging manufacturing economies.

Building on the conceptual framework presented in Figure 1, this study addresses these gaps by examining whether abnormal production activity generates temporary accounting gains, whether these gains persist over time, and whether inventory accumulation explains subsequent cash-flow consequences. These arguments provide the basis for developing the research hypotheses in the following section.

2.3. Development of Research Hypotheses

Building on the conceptual framework presented in Figure 1 and the empirical evidence synthesised in the previous section, this study develops four hypotheses to explain the economic consequences of abnormal production activity. Rather than assuming that abnormal production activity is uniformly value-destroying, the proposed framework recognises that it may reflect both managerial reporting incentives and economically rational production decisions. Consequently, the hypotheses evaluate not only whether abnormal production activity improves reported accounting performance but also whether these gains persist and through which operational mechanism they influence future cash-flow outcomes.

Short-term accounting performance

The conceptual framework suggests that abnormal production activity may temporarily improve accounting performance because overproduction spreads fixed manufacturing overheads across a larger production volume, thereby reducing the reported cost of goods sold [2]. Existing evidence generally supports this short-term accounting benefit, although it remains unclear whether the improvement reflects earnings management or favourable operating conditions [1], [6]. Accordingly, abnormal production activity is expected to improve firms' short-term accounting performance.

H1. Abnormal production activity is positively associated with firms' short-term accounting performance.

Persistence of accounting gains

If the accounting benefits of abnormal production activity primarily result from fixed-cost allocation rather than sustainable improvements in operating performance, they are unlikely to persist over time. As inventory accumulates and resources become tied up in unsold products, the initial accounting gains should gradually diminish [4], [11]. Accordingly, the short-term accounting benefits of abnormal production activity are expected to weaken over time.

H2. The positive effect of abnormal production activity on accounting performance diminishes over time.

Inventory as the operational mechanism

The conceptual framework further proposes that inventory accumulation represents the primary operational consequence of abnormal production activity. When production exceeds current demand, unsold output is recognised as inventory, increasing inventory intensity in subsequent periods [3], [10]. If inventory represents the channel through which abnormal production activity generates future operating consequences, firms engaging in abnormal production activity should subsequently exhibit higher inventory intensity.

H3. Abnormal production activity is positively associated with subsequent inventory intensity.

Inventory intensity and future operating cash flows

The operating consequences of abnormal production activity are expected to depend on firms' inventory conditions. High inventory intensity increases working-capital requirements and delays cash conversion, implying that additional abnormal production is more likely to reduce future operating cash flows when inventory pressure is already high. Inventory intensity therefore conditions the economic consequences of abnormal production activity rather than its occurrence.

H4. High inventory intensity weakens the association between abnormal production activity and future operating cash flows.

3. RESEARCH DESIGN

3.1. Sample Selection

The study examines non-financial manufacturing firms listed on the Ho Chi Minh Stock Exchange (HOSE) and the Hanoi Stock Exchange (HNX) over the period 2016–2024. Manufacturing firms are selected because abnormal production activity is inherently associated with production, inventory, and cost allocation decisions, making this setting particularly suitable for examining the economic consequences of production-based real earnings management.

Firm-level financial statement and market data are obtained from the FiinPro database. Financial institutions are excluded because of their distinct operating characteristics and regulatory environment. Observations with missing financial information or insufficient data to estimate abnormal production activity and construct the study variables are also removed.

After applying these screening procedures, the final sample comprises 243 listed manufacturing firms, yielding 1,939 firm-year observations in an unbalanced panel dataset. The study period spans the pre-COVID, COVID-19, and post-COVID recovery phases, allowing the analysis to evaluate abnormal production activity under different economic conditions while examining both its short-term accounting effects and longer-term operational consequences.

3.2. Variable Measurement

This study examines the economic consequences of abnormal production activity using four groups of variables. The main independent variable is abnormal production activity, measured by the residual from the normal production cost model proposed by [2]. The dependent variables include one-year-ahead accounting performance, two-year-ahead accounting performance, and inventory-related outcomes, while the moderating variable captures high inventory intensity and its interaction with abnormal production activity. One-year-ahead accounting performance is measured using return on assets, return on equity, earnings per share, operating cash flow, profit margin, gross margin, Tobin's Q, and the price-to-earnings ratio. Two-year-ahead performance is measured using return on assets, return on equity, earnings per share, and operating cash flow.

Inventory-related outcomes are measured by one-year-ahead inventory intensity and inventory growth.

Following the real earnings management literature, the regression models control for firm characteristics, including firm size, financial leverage, sales growth, current profitability, current operating cash flow, asset tangibility, inventory intensity, liquidity, cash holdings, financial health, and loss status. Table 1 summarises the definitions, measurements, variable coding, and references for all variables used in the empirical analysis.

3.3. Empirical Models

To examine the proposed hypotheses, this study estimates three panel regression models corresponding to the conceptual framework presented in Figure 1. The first model examines the association between abnormal production activity and firm performance over one-year and two-year horizons. The second model investigates whether abnormal production activity leads to subsequent inventory accumulation. The third model examines whether inventory intensity moderates the relationship between abnormal production activity and future operating cash flows. Variable definitions and measurements are reported in Table 1.

Equation (1): Firm performance model

$$Y_{i,t+k} = \beta_0 + \beta_1 \text{rem_overprod}_{i,t} + \sum \beta_j \text{Controls}_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t} \quad (1)$$

where $k=1$ for the one-year-ahead analysis and $k=2$ for the two-year-ahead analysis. The dependent variable Y is alternatively measured by one-year-ahead return on assets, return on equity, earnings per share, operating cash flow, profit margin, gross margin, Tobin's Q , and the price-to-earnings ratio, or by their corresponding two-year-ahead measures.

Equation (2): Inventory accumulation model

$$\text{INV}_{i,t+1} = \beta_0 + \beta_1 \text{rem_overprod}_{i,t} + \sum \beta_j \text{Controls}_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t} \quad (2)$$

Where INV is alternatively measured by one-year-ahead inventory intensity and inventory growth.

Equation (3): Moderating model

$$\begin{aligned} \text{F_cfo_at}_{i,t+1} = & \beta_0 + \beta_1 \text{rem_overprod}_{i,t} + \beta_2 \text{high_inv}_{i,t} \\ & + \beta_3 \text{rem_high_inv}_{i,t} + \sum \beta_j \text{Controls}_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t} \end{aligned} \quad (3)$$

where rem_high_inv represents the interaction between abnormal production activity and high inventory intensity.

Across all specifications, the regressions include firm fixed effects and year fixed effects to control for unobserved firm heterogeneity and common time-specific shocks. Standard errors are clustered at the firm level to account for heteroskedasticity and within-firm serial correlation.

TABLE 1. Research variables and measurement

Variable	Description	Measurement	References
Accounting performance (t+1)			
F_roa	One-year-ahead return on assets	Net income / Total assets _(t+1)	[12]; [6]
F_roe	One-year-ahead return on equity	Net income / Equity _(t+1)	[12]
F_eps	One-year-ahead earnings per share	Earnings per share _(t+1)	[12]
F_cfo_at	One-year-ahead operating cash flow	Operating cash flow / Total assets _(t+1)	[2]; [6]
F_profit_margin	One-year-ahead profit margin	Net income / Net sales _(t+1)	[13]
F_gross_margin	One-year-ahead gross margin	Gross profit / Net sales _(t+1)	[13]
F_tobin_q	One-year-ahead Tobin's Q	(Market value of equity + Book value of debt) / Total assets _(t+1)	[14]; [15]
F_pe	One-year-ahead price-to-earnings ratio	Market price per share / Earnings per share _(t+1)	
Accounting performance (t+2)			
F2_roa	Two-year-ahead return on assets	Net income / Total assets _(t+2)	[12]; [6]
F2_roe	Two-year-ahead return on equity	Net income / Equity _(t+2)	[12]
F2_eps	Two-year-ahead earnings per share	Earnings per share _(t+2)	[12]
F2_cfo_at	Two-year-ahead operating cash flow	Operating cash flow / Total assets _(t+2)	[2]; [6]
Mechanism variables			
F_inventory_intensity	One-year-ahead inventory intensity	Inventory / Total assets _(t+1)	[10]; [3]
F_inventory_growth	One-year-ahead inventory growth	Percentage change in inventory from t to t+1	[10]
Independent variables			
rem_overprod	Abnormal production activity	Residual from the normal production cost model (see Equations 1–2)	[2]; [4]
rem_overprod_pos	Positive abnormal production activity	Equals rem_overprod if rem_overprod > 0; otherwise 0	[2]; [4]
high_rem_overprod	High abnormal production activity	Dummy = 1 for firm-year observations with high abnormal production activity; otherwise 0	[2]; [4]
Moderating variables			
high_inv	High inventory intensity	Dummy = 1 if inventory intensity exceeds the annual median; otherwise 0	[10]
rem_high_inv	Interaction term	rem_overprod x high_inv	
Control variables			
size	Firm size	Natural logarithm of total assets	[2]; [6]
lev	Financial leverage	Total liabilities / Total assets	[12]; [13]
growth	Sales growth	(Net sales _t – Net sales _(t–1)) / Net sales _(t–1)	[2]; [6]
roa	Current profitability	Net income / Total assets	[2]
cfo_at	Current operating cash flow	Operating cash flow / Total assets	[2]; [6]
tang	Asset tangibility	Fixed assets / Total assets	[13]
inventory_intensity	Current inventory intensity	Inventory / Total assets	[10]
current_ratio	Liquidity	Current assets / Current liabilities	
cash_ratio	Cash holding ratio	Cash and cash equivalents / Total assets	
zscore	Financial health	Altman Z-score	[16]
loss	Loss dummy	Dummy = 1 if net income < 0; otherwise 0	[2]; [6]

Source: Authors' calculations using Stata 15.

3.4. Measurement of Abnormal Production Activity

Following [2], abnormal production activity is measured as the residual from the normal production cost model. Production costs are first defined as the sum of cost of goods sold and the change in inventory:

Equation (4): Production cost

$$\text{PROD}_{i,t} = \text{COGS}_{i,t} + \Delta \text{INV}_{i,t} \quad (4)$$

Where $\text{PROD}_{i,t}$ denotes production costs, $\text{COGS}_{i,t}$ is the cost of goods sold, and $\Delta \text{INV}_{i,t}$ represents the annual change in inventory.

Equation (5): Normal production cost model

$$\begin{aligned} \text{PROD}_{i,t} / A_{i,t-1} = & \alpha_0 + \alpha_1 (1 / A_{i,t-1}) + \beta_1 (\text{SALES}_{i,t} / A_{i,t-1}) \\ & + \beta_2 (\Delta \text{SALES}_{i,t} / A_{i,t-1}) + \beta_3 (\Delta \text{SALES}_{i,t-1} / A_{i,t-1}) + \varepsilon_{i,t} \end{aligned} \quad (5)$$

where $A_{i,t-1}$ is lagged total assets, $\text{SALES}_{i,t}$ is net sales, $\Delta \text{SALES}_{i,t}$ is the change in net sales from year $t-1$ to year t , and $\Delta \text{SALES}_{i,t-1}$ is the change in net sales from year $t-2$ to year $t-1$. The normal production cost model is estimated cross-sectionally by year for manufacturing firms. Years with insufficient observations are excluded from the estimation. The residual from this model, $\varepsilon_{i,t}$, is used as the measure of abnormal production activity and is denoted as $\text{remprod}_{i,t}$. A higher value of $\text{rem_overprod}_{i,t}$ indicates a higher level of abnormal production costs relative to the normal level predicted by sales and sales changes.

4. EMPIRICAL RESULTS

4.1. Descriptive statistics

Before estimating the regression models, this study reports descriptive statistics to summarize the distributional characteristics of the main variables used in the empirical analysis.

Table 2 presents the descriptive statistics for the variables used in the empirical analysis. The mean value of abnormal production activity is close to zero (-0.0021), consistent with its construction as the residual from the normal production cost model. Approximately 25.2% of the firm-year observations are classified as having high abnormal production activity, indicating that abnormal production is economically relevant among Vietnamese listed manufacturing firms.

The sample also exhibits variation in firm performance and inventory characteristics. The mean one-year-ahead return on assets and return on equity are 5.6% and 9.7%, respectively, while the mean Tobin's Q is 1.1652. Inventory represents a substantial component of firms' assets, with an average inventory intensity of 19.1%, supporting the examination of inventory accumulation as the transmission mechanism linking abnormal production activity to subsequent firm outcomes.

The control variables indicate considerable diversity in firm characteristics. For example, the average leverage ratio is 44.6%, whereas 6.6% of the firm-year observations report accounting

TABLE 2. Descriptive statistics

Variable code	N	Mean	Min	Max
Main explanatory variables				
rem_overprod	1,939	-0.0021	-0.4138	0.6234
rem_overprod_pos	1,939	0.0627	0	0.6234
high_rem_overprod	1,939	0.2522	0	1
One-year-ahead performance variables				
F_roa	1,685	0.0560	-0.1531	0.2950
F_roe	1,683	0.0971	-0.3633	0.4507
F_eps	1,685	2,007	-3,269	12,766
F_cfo_at	1,685	0.0546	-0.3081	0.4029
F_profit_margin	1,683	0.0883	-0.8307	0.7070
F_gross_margin	1,683	0.2155	-0.0782	0.7179
F_tobin_q	1,685	1.1652	0.3337	3.4674
F_pe	1,683	20.3794	-158.7900	378.6900
Two-year-ahead performance variables				
F2_roa	1,438	0.0550	-0.1531	0.2950
F2_roe	1,436	0.0937	-0.3585	0.4196
F2_eps	1,438	1,950	-3,226	12,559
F2_cfo_at	1,438	0.0548	-0.3081	0.4027
Mechanism variables				
F_inventory_intensity	1,685	0.1914	0	0.7035
F_inventory_growth	1,632	0.1936	-0.9112	4.7838
Control variables				
size	1,939	27.6148	23.9398	31.6144
lev	1,939	0.4459	0.0298	0.8972
growth	1,684	0.1758	-0.8938	6.9543
roa	1,939	0.0567	-0.1520	0.2950
cfo_at	1,939	0.0538	-0.3237	0.4056
tang	1,939	0.2226	0	0.8429
inventory_intensity	1,939	0.1914	0	0.7035
current_ratio	1,939	2.7362	0.3726	23.7465
cash_ratio	1,939	0.0886	0.0011	0.5066
zscore	1,939	3.7881	0.1170	31.8995
loss	1,939	0.0655	0	1

Source: Authors' calculations using Stata 15.

losses. Overall, the descriptive statistics suggest that the sample provides sufficient variation in the key variables for the subsequent empirical analyses.

4.2. Correlation analysis

Table 3 presents the Pearson correlation matrix for the main variables included in the baseline regression models. To improve readability, only the principal variables are reported, while alternative performance measures used in the additional analyses are excluded. The results indicate that abnormal production activity is positively correlated with one-year-ahead return on assets, return on equity, and operating cash flow, suggesting that firms with higher abnormal production activity tend to exhibit stronger subsequent performance. In addition, abnormal production activity is positively associated with both current and future inventory intensity, providing preliminary support for the proposed inventory accumulation mechanism.

Although several variables exhibit relatively high pairwise correlations, particularly between return on assets and return on equity, and between current and future inventory intensity, these relationships are expected because the variables capture closely related aspects of firm performance and inventory conditions. To further assess multicollinearity, the variance inflation factor (VIF) was calculated for all explanatory variables. As reported in Table 3, all VIF values are well below the conventional threshold of 10, indicating that multicollinearity is unlikely to affect the reliability of the regression estimates.

TABLE 3. Correlation matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
(1) rem_overprod	1.000															
(2) F_roa	0.387*	1.000														
(3) F_roe	0.350*	0.894*	1.000													
(4) F_cfo_at	0.199*	0.411*	0.350*	1.000												
(5) F_inventory_intensity	0.178*	-0.091*	-0.020	-0.171*	1.000											
(6) size	0.005	0.023	0.123*	-0.007	-0.019	1.000										
(7) lev	-0.104*	-0.317*	-0.047	-0.130*	0.190*	0.313*	1.000									
(8) growth	-0.030	0.018	0.021	-0.014	-0.037	-0.001	0.045	1.000								
(9) roa	0.433*	0.698*	0.575*	0.319*	-0.060*	0.032	-0.361*	0.041	1.000							
(10) cfo_at	0.159*	0.407*	0.351*	0.225*	-0.143*	-0.023	-0.161*	-0.109*	0.419*	1.000						
(11) tang	0.088*	0.140*	0.115*	0.318*	-0.348*	0.071*	-0.017	-0.072*	0.108*	0.312*	1.000					
(12) inventory_intensity	0.179*	-0.085*	-0.009	-0.085*	0.912*	-0.016	0.208*	-0.021	-0.084*	-0.166*	-0.349*	1.000				
(13) current_ratio	-0.042	0.099*	-0.023	-0.024	-0.064*	-0.204*	-0.590*	-0.009	0.130*	-0.048*	-0.174*	-0.077*	1.000			
(14) cash_ratio	0.114*	0.172*	0.139*	-0.045	-0.031	-0.185*	-0.198*	-0.032	0.220*	0.216*	-0.097*	-0.063*	0.153*	1.000		
(15) zscore	0.118*	0.381*	0.218*	0.164*	-0.078*	-0.232*	-0.572*	-0.022	0.408*	0.179*	-0.030	-0.095*	0.665*	0.220*	1.000	
(16) loss	-0.138*	-0.196*	-0.216*	-0.081*	-0.003	-0.094*	0.050*	-0.038	-0.455*	-0.135*	-0.016	0.016	-0.014	-0.080*	-0.103*	1.000

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

Source: Authors' calculations using Stata 15.

4.3. Short-term firm performance

Table 4 presents the baseline regression results examining whether abnormal production activity is associated with one-year-ahead firm performance.

Table 4 reports the baseline regression results for the association between abnormal production activity and short-term firm performance. The estimated coefficients on rem_overprod are positive and statistically significant in the F_roa, F_roe, and F_eps regressions, indicating that firms with higher abnormal production activity subsequently exhibit stronger accounting performance. By contrast, the coefficient on rem_overprod is negative but statistically insignificant in the F_cfo_at regression, suggesting that abnormal production activity is not associated with higher future operating cash flows.

Taken together, these findings provide consistent support for H1. The positive association is observed only for accounting-based performance measures, whereas no corresponding improvement is found in future cash-flow performance. This pattern indicates that the short-term effects of abnormal production activity are reflected primarily in reported accounting outcomes rather than operating cash flows.

4.4. Additional performance analyses

Table 5 reports additional analyses to assess whether the association between abnormal production activity and firm performance extends to alternative performance measures and a longer forecasting horizon.

TABLE 4. Baseline results: Abnormal production activity and short-term future performance

Variables	(1) F_roa	(2) F_roe	(3) F_eps	(4) F_cfo_at
rem_overprod	0.0397*** (0.0113)	0.0899*** (0.0233)	969.1610** (394.3859)	-0.0557 (0.0380)
size	-0.0272*** (0.0078)	-0.0660*** (0.0160)	-1076.7820*** (270.8798)	0.0081 (0.0181)
lev	0.0586** (0.0263)	0.2014*** (0.0521)	4743.4850*** (989.1087)	0.0213 (0.0549)
growth	0.0030 (0.0026)	0.0054 (0.0050)	63.1829 (53.4673)	0.0031 (0.0067)
roa	0.1816*** (0.0561)		5652.9363*** (1560.0489)	0.1494 (0.1045)
roe		0.1034* (0.0527)		
cfo_at	0.0455*** (0.0143)	0.0879*** (0.0238)	1520.9305*** (442.7946)	-0.1577*** (0.0429)
tang	-0.0245 (0.0261)	-0.0779* (0.0432)	-1745.6406** (736.5324)	0.0522 (0.0499)
inventory_intensity	-0.0151 (0.0193)	0.0061 (0.0400)	321.0626 (652.4368)	0.2002** (0.0866)
current_ratio	-0.0017 (0.0012)	-0.0002 (0.0015)	-19.2365 (31.0743)	0.0010 (0.0032)
cash_ratio	-0.0017 (0.0268)	0.0196 (0.0448)	421.3879 (784.3084)	-0.2538*** (0.0686)
zscore	0.0013* (0.0007)	0.0014 (0.0011)	41.4648* (23.9797)	0.0010 (0.0025)
loss	0.0240*** (0.0083)	0.0267 (0.0170)	626.6875*** (226.1166)	0.0056 (0.0175)
Constant	0.7727*** (0.2089)	1.8189*** (0.4283)	29291.2990*** (7207.4312)	-0.2151 (0.4874)
Firm fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
N	1,429	1,426	1,429	1,429
Adjusted R ²	0.612	0.540	0.675	0.307

Source: Authors' calculations using Stata 15.

Notes: Firm fixed effects and year fixed effects are included in all specifications. Standard errors are clustered at the firm level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Notes: This table reports firm fixed-effects regressions with year fixed effects. Standard errors are clustered at the firm level. F_roa, F_roe, F_eps, and F_cfo_at denote one-year-ahead firm performance measures. rem_overprod is the measure of abnormal production activity estimated following [2]. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 5 reports the results for alternative outcome measures and two-year-ahead performance. Panel A shows that the coefficient of rem_overprod is not statistically significant when future performance is measured by profit margin, gross margin, Tobin's Q, and P/E ratio. Specifically, the coefficients are 0.0599 for F_profit_margin, 0.0198 for F_gross_margin, -0.0259 for F_tobin_q, and 3.4163 for F_pe. These results indicate that the positive association between abnormal production activity and short-term accounting performance does not extend to margin-based performance or market-based valuation measures.

Panel B examines whether the effect of abnormal production activity persists over a longer horizon. The coefficients of rem_overprod are negative but statistically insignificant across all

TABLE 5. Additional analyses of firm performance

Variables	(1) F_profit_margin	(2) F_gross_margin	(3) F_tobin_q	(4) F_pe
Panel A. Alternative one-year-ahead outcomes				
rem_overprod	0.0599 (0.0435)	0.0198 (0.0240)	-0.0259 (0.0666)	3.4163 (17.8095)
Controls	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
N	1,428	1,428	1,429	1,427
Adjusted R ²	0.441	0.784	0.735	0.202
Variables	(1) F2_roa	(2) F2_roe	(3) F2_eps	(4) F2_cfo_at
Panel B. Two-year-ahead performance				
rem_overprod	-0.0157 (0.0130)	-0.0227 (0.0231)	-330.7629 (445.3218)	-0.0183 (0.0334)
Controls	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
N	1,183	1,179	1,183	1,183
Adjusted R ²	0.584	0.497	0.672	0.269

Source: Authors' calculations using Stata 15.

Notes: Panel A reports alternative one-year-ahead outcomes; Panel B reports two-year-ahead performance. Firm fixed effects and year fixed effects are included in all specifications. Standard errors are clustered at the firm level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

two-year-ahead performance measures, including F2_roa, F2_roe, F2_eps, and F2_cfo_at. The corresponding coefficients are -0.0157, -0.0227, -330.7629, and -0.0183. This suggests that the short-term accounting gains associated with abnormal production activity are not persistent over a two-year horizon. Overall, Table 4 supports the view that abnormal production activity is related to short-term accounting gains, but these gains do not translate into broader performance improvements or sustained future performance.

4.5. Mechanism analysis

TABLE 6. Inventory mechanism and inventory-condition effect

Variables	(1) F_inventory_intensity	(2) F_inventory_growth	(3) F_cfo_at	(4) F_roa	(5) F_cfo_at	(6) F_profit_margin
Panel A. Inventory accumulation mechanism						
rem_overprod	0.0512** (0.0207)	0.1757 (0.1966)	-0.0557 (0.0380)			
Panel B. Moderating effect of high inventory intensity						
rem_overprod				0.0258 (0.0188)	0.0200 (0.0461)	0.0256 (0.0641)
high_inv				-0.0058 (0.0049)	-0.0135 (0.0146)	-0.0130 (0.0156)
rem_overprod × high_inv				0.0162 (0.0211)	-0.0886*** (0.0329)	0.0399 (0.0587)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N	1,429	1,382	1,429	1,429	1,429	1,428
Adjusted R ²	0.871	0.137	0.307	0.612	0.310	0.441

Source: Authors' calculations using Stata 15.

Notes: Firm fixed effects and year fixed effects are included in all specifications. Standard errors are clustered at the firm level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 6 reports the results on the inventory mechanism and the conditional cash-flow consequences of abnormal production activity. Panel A shows that *rem_overprod* is positively and significantly associated with one-year-ahead inventory intensity. The coefficient is 0.0512 and is statistically significant at the 5% level, indicating that firms with higher abnormal production activity tend to report higher inventory intensity in the following year. This finding supports the view that abnormal production activity leaves an inventory footprint and is consistent with the mechanism through which overproduction may lead to inventory accumulation.

However, the coefficient of *rem_overprod* is not statistically significant when the dependent variable is inventory growth or future operating cash flow in the full sample. This suggests that the cash-flow consequences of abnormal production activity may not be uniform across all firms. Panel B therefore examines whether inventory intensity moderates this relationship. The coefficient of the interaction term *rem_overprod* $\times$ *high_inv* is negative and statistically significant in the model using one-year-ahead operating cash flow as the dependent variable. Specifically, the coefficient is -0.0886 and significant at the 1% level. This result indicates that among firms with high inventory intensity, abnormal production activity is associated with weaker future operating cash flows.

Overall, Table 6 provides evidence that abnormal production activity is followed by higher inventory intensity and that its adverse cash-flow consequences emerge particularly among inventory-intensive firms. These findings support the argument that abnormal production activity may generate short-term accounting gains, but it can also create inventory-related pressure and cash-flow costs when firms already hold high levels of inventory.

4.6. Moderating analysis

This section reports additional robustness tests and endogeneity checks to assess the reliability of the baseline findings and address potential concerns about alternative explanations.

Table 7 reports the robustness and endogeneity checks. Panel A shows that the positive association between abnormal production activity and short-term accounting performance remains robust when alternative measures of abnormal production activity are used. Specifically, positive abnormal production activity is positively associated with one-year-ahead ROA and ROE, with coefficients of 0.0544 and 0.1242, respectively. Similarly, the high abnormal production dummy is positively associated with one-year-ahead ROA and ROE, with coefficients of 0.0098 and 0.0213. However, neither alternative measure has a significant effect on one-year-ahead operating cash flow.

Panel B indicates that the baseline result is not driven by the COVID-19 period. After excluding the COVID years, the coefficient of *rem_overprod* remains positive and statistically significant for *F_roa* at 0.0342, while its effect on *F_cfo_at* remains insignificant. This supports the robustness of the short-term accounting performance result.

Panels C and D provide a more cautious view regarding causality. The placebo tests show that current abnormal production activity is positively associated with past ROA and past operating

TABLE 7. Robustness and endogeneity checks

Test	Dependent variable	Main variable	Coefficient / Effect	Significance	Interpretation
Panel A. Alternative measures of abnormal production activity					
Positive abnormal production	F_roa	rem_overprod_pos	0.0544	***	Positive REMPROD is associated with higher one-year-ahead ROA
Positive abnormal production	F_roe	rem_overprod_pos	0.1242	***	Positive REMPROD is associated with higher one-year-ahead ROE
Positive abnormal production	F_cfo_at	rem_overprod_pos	-0.0621	n.s.	No significant effect on future operating cash flow
High abnormal production	F_roa	high_rem_overprod	0.0098	**	High REMPROD firms have higher future ROA
High abnormal production	F_roe	high_rem_overprod	0.0213	***	High REMPROD firms have higher future ROE
High abnormal production	F_cfo_at	high_rem_overprod	-0.0050	n.s.	No significant effect on future operating cash flow
Panel B. Excluding COVID years					
Excluding 2020–2021	F_roa	rem_overprod	0.0342	***	Baseline result remains robust after excluding COVID years
Excluding 2020–2021	F_cfo_at	rem_overprod	-0.0572	n.s.	No significant effect on operating cash flow
Panel C. Placebo tests					
Placebo test	L_roa	rem_overprod	0.0432	***	Current REMPROD is associated with past ROA
Placebo test	L_roe	rem_overprod	0.0324	n.s.	No significant association with past ROE
Placebo test	L_cfo_at	rem_overprod	0.0800	**	Current REMPROD is associated with past CFO
Panel D. Dynamic GMM					
Dynamic GMM	roa	L_rem_overprod	0.0333	n.s.	Effect is not significant after controlling for dynamic endogeneity
Dynamic GMM	cfo_at	L_rem_overprod	0.4236	n.s.	Effect on cash flow is not statistically significant
Panel E. Propensity score matching					
PSM	F_roa	high_rem_overprod	0.0226	***	High REMPROD firms have higher future ROA after matching
PSM	F_cfo_at	high_rem_overprod	0.0342	**	High REMPROD firms have higher future CFO after matching
PSM	F_profit_margin	high_rem_overprod	-0.0013	n.s.	No significant effect on future profit margin

Source: Authors' calculations using Stata 15.

Notes: Panel A reports alternative measures of abnormal production activity; Panel B excludes COVID-19 years; Panel C presents placebo tests; Panel D reports dynamic GMM estimates; Panel E reports propensity score matching results. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively; n.s. denotes statistical insignificance.

Note: ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. n.s. denotes statistical insignificance.

cash flow, with coefficients of 0.0432 and 0.0800, respectively. This suggests that firms with higher abnormal production activity may already have stronger prior operating conditions. In addition, the dynamic GMM results show that the coefficient of lagged abnormal production activity is not statistically significant after controlling for performance dynamics and potential endogeneity. Therefore, the baseline findings should be interpreted as empirical associations rather than definitive causal effects.

Finally, Panel E reports the propensity score matching results. Firms with high abnormal production activity exhibit higher one-year-ahead ROA and operating cash flow after matching, with estimated effects of 0.0226 and 0.0342, respectively. Overall, the robustness checks support the existence of short-term accounting gains associated with abnormal production activity, while the endogeneity checks suggest that these gains may partly reflect stronger prior operating conditions or real production expansion rather than purely opportunistic earnings management.

5. DISCUSSION

The findings suggest that the economic consequences of abnormal production activity are more nuanced than those implied by the conventional real earnings management literature. Rather than representing purely opportunistic earnings management, abnormal production activity appears to generate temporary improvements in reported accounting performance without corresponding improvements in firms' underlying economic performance. This distinction is central to the conceptual framework proposed in Figure 1, which argues that abnormal production activity simultaneously affects accounting outcomes, inventory accumulation, and subsequent operating performance. Accordingly, the results indicate that abnormal production activity should not be evaluated solely through reported earnings, but also through its operational consequences.

The positive association between abnormal production activity and one-year-ahead accounting performance is consistent with the production-cost allocation mechanism proposed by [2]. By producing above normal demand, firms spread fixed manufacturing overhead across a larger number of units, temporarily reducing reported cost of goods sold and improving accounting profitability. This interpretation is also consistent with [1], who argue that managers may alter real operating decisions to satisfy short-term earnings objectives. From an agency theory perspective, abnormal production activity may therefore represent a managerial response to reporting incentives rather than an immediate improvement in operating efficiency. However, the absence of significant effects on operating cash flows, market-based performance, and two-year-ahead performance indicates that the accounting benefits are largely transitory. The findings therefore suggest that reported earnings capture only part of the economic consequences of abnormal production activity.

The results also help reconcile the mixed evidence reported in previous studies. Prior research has produced conflicting conclusions regarding the consequences of production-based real earnings management. While [12] report that overproduction reduces subsequent operating performance, [6] argues that real operating decisions do not necessarily impair future performance and may instead reflect efficient managerial responses to expected business conditions. Similarly, [13] document positive operating consequences of abnormal real activities in an emerging economy. The present study suggests that these apparently conflicting findings may reflect differences in the performance dimensions being evaluated. Short-term accounting indicators respond positively to abnormal production activity, whereas operating cash flows, market-based performance, and longer-term performance do not exhibit comparable improvements. Consequently, the economic consequences of abnormal production activity appear to depend on whether performance is evaluated from an accounting, operational, or market perspective.

The inventory mechanism provides an important explanation for these findings. Consistent with the operating-cycle perspective, abnormal production activity increases subsequent inventory intensity, indicating that part of the observed accounting improvement is achieved through inventory accumulation rather than realised sales. This evidence is consistent with [3], who emphasise the close relationship between earnings, working capital, and cash flows, and with [10],

who demonstrate that inventory changes contain information about future operating performance. More importantly, the moderating analysis shows that the adverse cash-flow consequences of abnormal production activity become more pronounced when firms operate with high inventory intensity. This finding suggests that inventory accumulation is not merely a by-product of abnormal production activity but represents the principal transmission mechanism through which temporary accounting gains evolve into subsequent operating costs.

The Vietnamese setting further enriches the real earnings management literature. Compared with firms in developed capital markets, Vietnamese listed manufacturing firms operate in an institutional environment characterised by relatively high information asymmetry, evolving governance mechanisms, and rapid industrial expansion. Under these conditions, abnormal production activity may simultaneously reflect managerial reporting incentives, production expansion, and expectations of future demand. Consequently, interpreting abnormal production activity solely as opportunistic earnings management may oversimplify its economic role in emerging manufacturing economies. Instead, the findings support a more balanced interpretation in which abnormal production activity reflects both reporting incentives and real operating decisions, with its ultimate consequences depending on firms' inventory conditions and operating environments.

Overall, this study makes three theoretical contributions. First, it distinguishes between temporary accounting effects and longer-term economic consequences, demonstrating that improvements in reported accounting performance do not necessarily imply sustainable operating performance or value creation. Second, it identifies inventory accumulation as the primary mechanism linking abnormal production activity to subsequent operating outcomes, thereby extending the operating-cycle perspective within the real earnings management literature. Third, it shows that inventory intensity conditions the consequences of abnormal production activity, highlighting that the costs of production-based real earnings management depend not only on the extent of abnormal production but also on firms' operating environments. Collectively, these findings contribute to a more comprehensive understanding of abnormal production activity and help explain why previous studies have reported inconsistent evidence regarding its economic consequences.

6. CONCLUSION

This study re-examines the economic consequences of abnormal production activity from a broader perspective than the traditional real earnings management literature. Rather than assuming that abnormal production activity is inherently value-destroying, the study investigates whether it generates temporary accounting gains, whether these gains persist over time, and whether inventory accumulation explains their subsequent economic consequences. Using a sample of Vietnamese listed manufacturing firms, the findings suggest that abnormal production activity should be interpreted as a multidimensional operating decision rather than a purely opportunistic earnings-management practice.

The empirical evidence shows that abnormal production activity is associated with stronger short-term accounting performance but does not improve future operating cash flows, market-based performance, or longer-term firm performance. At the same time, abnormal production activity contributes to inventory accumulation, and its adverse cash-flow consequences become more pronounced when firms operate under high inventory intensity. These findings indicate that the apparent accounting benefits of abnormal production activity are temporary and conditional, reflecting differences between reported accounting performance and firms' underlying operating performance.

This study makes three principal contributions to the literature. First, it extends the real earnings management literature by distinguishing between the short-term accounting effects and the longer-term economic consequences of abnormal production activity, demonstrating that temporary improvements in reported earnings should not be interpreted as evidence of sustainable value creation. Second, it identifies inventory accumulation as the principal transmission mechanism through which abnormal production activity influences subsequent operating outcomes, thereby integrating the operating-cycle perspective into the analysis of real earnings management. Third, by providing evidence from Vietnam, the study shows that the implications of abnormal production activity are shaped by the institutional and operational characteristics of emerging manufacturing economies, suggesting that conclusions drawn from developed markets may not be directly generalisable.

The findings also have practical implications. Investors, financial analysts, and auditors should evaluate abnormal production activity together with inventory dynamics and future operating cash flows rather than relying solely on improvements in accounting profitability. For corporate managers, the results highlight the importance of balancing production expansion with inventory management to avoid subsequent working-capital pressure and cash-flow deterioration. For regulators and standard setters, strengthening disclosure of inventory-related information and operating cash flows would facilitate a more comprehensive assessment of earnings quality and firms' underlying economic performance.

Several limitations should be acknowledged. The analysis is restricted to listed manufacturing firms in Vietnam and focuses on production-based real earnings management. Accordingly, the findings may not be directly applicable to other industries or institutional settings. In addition, although extensive robustness analyses are performed, the results should be interpreted primarily as evidence of economic associations rather than definitive causal relationships. Future research may extend this framework to other emerging economies, incorporate alternative measures of real earnings management, or examine how corporate governance, ownership structure, and supply-chain characteristics influence the economic consequences of abnormal production activity.

7. LIMITATIONS AND FUTURE RESEARCH

This study has several limitations. First, the measure of abnormal production activity may capture both opportunistic earnings management and economically justified production expansion. Second, although the empirical analysis incorporates fixed-effects models and several robustness tests, the findings should be interpreted as evidence of association rather than definitive causality. Finally, the analysis is limited to Vietnamese listed manufacturing firms, which may restrict the generalisability of the findings. Future research could examine other institutional settings, develop alternative measures of abnormal production activity, and explore how corporate governance and production characteristics influence its economic consequences.

Conflicts of Interest:

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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