



STICKINESS OF OPERATING EXPENSE IN ASSET, LIABILITY, AND INCOME ACTIVITIES: EVIDENCE FROM INDONESIA

Agung Nugroho Jati¹

Tri Utami²

Dang Thi Anh Duong³

Arif Julianto Sri Nugroho⁴

Titik Purwanti⁵

¹²⁴⁵Widya Dharma University,
Indonesia

³National Yunlin University of
Science and Technology, Taiwan

*corresponding author: agungnj70@gmail.com

Keywords:

sticky cost, operating expense,
operating asset, operating liability,
operating income

ABSTRACT

The purpose of this study is to understanding cost behavior is crucial in accounting management. Sticky costs literature discusses the responsiveness of costs to profits. This study examines the effect of operating expenses, including rental expenses, advertising, R&D, SG&A, and COGS, on operating income, operating assets, and operating liability. The population in this study is listed companies on the Indonesia Stock Exchange. The observation starts from 2010-2023. We use the OSIRIS-Bureau van Dijk Database to generate the data. We analyze the data using OLS regression with cluster robust standard error. We find that the rental, advertising, SG&A, and COGS expenses increase by 10%-14% per 1% increase in operating income. The rental and advertising costs show an estimated value of 33% and 47% per 1% increase in operating assets. Meanwhile, R&D expenses increase by 32% per 1% increase in operating liability.

INTRODUCTION

Understanding cost behavior is crucial in cost accounting (Noreen, 1991). Costs consist of two components: fixed and variable. Variable costs are proportional to their triggering activities; in other words, the magnitude of the change in costs depends on how much the activity is (Liu & Tyagi, 2017). In accounting management, there is a phenomena known as “sticky cost”. Cost stickiness is a misaligned response between costs and revenues (Anderson et al., 2003). Costs are sticky if the magnitude of the increase in cost associated with an increase in volume is greater than the magnitude of the decrease in cost associated with an equivalent decrease in volume (Makni Fourati et al., 2020; Dalla & Perego, 2014). Specifically, costs are increasing but disproportionate to revenue. On the other hand, the company bears operating expenses as a consequence of its main business. The company will use assets or increase debt to finance its activities and generate income. Furthermore, the income will be distributed to the company, investors, and creditors. Thus, there is a relationship between operating expense and operating asset, operating liability, and operating income. This study investigates whether operating expenses affect operating assets, operating liabilities, and operating income.

Empirical studies examine the relationship between cost behavior and revenue. This study refers to Anderson et al., (2003); Cook et al., (2019) which discusses about sticky costs. The difference between this study and (Anderson et al., 2003) is the scope of activities observed. This research investigates operating sticky costs in assets, liability, and income activities; this study also investigates operating sticky costs through operating expense components. Referring to (Cook et al., 2019), this study uses an operating expenses component consisting of rental expenses, R&D expenses, advertising expenses, SG&A expenses, and COGS. Meanwhile, the activities observed in this study were the changes in the growth of operating income, assets, and liabilities. For decades, cost accounting research has matured and challenged the fundamental assumptions between costs and activities (Teng & Wu, 2024; Xu & Zheng, 2020; Zhou, 2024). An initial study on sticky cost focused on the asymmetry relationship between costs and sales (Noreen, 1991), (Anderson

et al., 2003). Despite the rapid growth of research investigating cost stickiness, the validity of the theoretical construct and the generalizability of sticky costs are still debated (Fourati et al., 2020). Previous research found explanatory factors for sticky costs at the company and country levels, focusing on profit or loss statements, and ignored activities on the balance (Cook et al., 2019; Teng & Wu, 2024; Graham & King, 2013). This study offers novelty by considering activities on the balance sheet and estimating asset and liability growth. Were the growth in operating assets and liabilities proportional to the increase in operating expenses?

This study uses two clusters of theories to explain the relationship between firm activities and consumed costs. Traditional cost theory categorizes costs into fixed and variable; and cost changes depending on the activity. However, some research suggests that the magnitude of the cost depends on how managers recognize the costs (Teng & Wu, 2024; Zhou, 2024; Noreen, 1991). Managers use accounting data to determine the number of inputs, outputs, and profits, so this term is known as “cost management.” In cost management, managers review the relationship between input-output and revenue-costs, then evaluate the cost components to be adjusted. Based on traditional cost theory, every company’s activity incurs costs. The second theory is the stickiness theory, which explains the sensitivity of costs to firm activities (Anderson et al., 2003; Anderson et al., 2003) used a broad sample from companies for 20 years. He documented sticky costs, particularly in selling, general, and administration (SG&A). Specifically, he found that SG&A expenses tended to fall in proportion to the decrease in sales but not proportional to the rise in sales. These findings inconsistent with fixed and variable costs assumed in accounting management, i.e., variable costs move linearly to activity. Traditional and sticky cost theories lead us to investigate the relationship between costs and activities. This study analyzes operating cost stickiness from the activities in operating assets, operating liabilities, and operating income.

This research contributes to the sticky cost literature in two ways. First, previous research proves that corporate governance, labor market, and cost structure characteristics affect sticky costs (Cook et al., 2019; Barua et al., 2019; Brisker et al., 2022). (Dalla & Perego, 2014) raise the issue of firm size and sticky costs, while (Anderson et al., 2003;

Cook et al., 2019) link sticky costs to sales activities. This study investigates the relationship between operating sticky costs and operating income. So, we expand the accounting literature by documenting sticky costs in operating assets, operating liabilities, and operating income. Previous literature shows a relationship between income statements and statements of financial position (Cook et al., 2019; Haris et al., 2024; Utami & Kusuma, 2017). Firm assets that have been used will turn into expenses. In addition, the firm uses external funding from debt to succeeding operational activities. Thus, investigating cost behavior in the operating income, asset, and liability activity is crucial.

Second, previous research specifically reviewed cost behavior on SG&A expenses and sales (Dalla & Perego, 2014; Zhou, 2024; Fourati et al., 2020). In contrast, this study highlights the component of cost. Managerial discretion affects all the firm's cost components. Thus, the cost behavior differs depending on the behavior of the manager (Brisker et al., 2022; Chen et al., 2022; Faello & Yingge, 2023). This study develops a model referring to (Anderson et al., 2003; Cook et al., 2019; He & Narayanamoorthy, 2020). The study from (Anderson et al., 2003; Cook et al., 2019) explains cost behavior, while (He & Narayanamoorthy, 2020) describes growth of firm activity. This study investigates whether the increase in operating costs aligns with the increase in operating income. Furthermore, this study examines sticky costs on asset and liability growth, while previous research emphasizes sales activity.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Traditional and Stickiness of Cost Theory

The traditional cost theory hypothesizes that costs increase (decrease) when activity increases (decreases) in relatively equal amounts (Noreen, 1991). Activity-based costing, cost-volume-profit analysis, and other cost estimations are techniques to identify cost (Noreen, 1991), (Armstrong, 2002; Balakrishnan et al., 2014). Cost behavior is an exciting topic, and the research in this area covers various aspects (Zhou, 2024; Chen et al., 2022; Faello & Yingge, 2023). The first study that discusses sticky costs with new methodologies and models comes from (Anderson et al., 2003). He explains cost stickiness varies depending on manager's decision

to adjust resources. Furthermore, he showed an asymmetrical relationship between SG&A costs and sales.

Cost stickiness that documented in cost behavior research explains the asymmetrical relationship between costs and revenue. (Cannon, 2014) examines the source of stickiness and shows the existence of sticky costs because managers use their capacity to lower the prices when the demand decreases and raise the price when demand increases. (Fourati et al., 2020) connecting behaviors asymmetric cost with conditional conservatism. They found that conservatism and cost stickiness were positively related. Another study hooks the cost stickiness to earnings and stock return (Xu & Zheng, 2020; Brisker et al., 2022; Chen et al., 2022). (Dan, 2010) finds that higher-cost growth correlates with lower future stock returns than low-cost growth. We focused on the relationship between cost stickiness and operating assets, liabilities, and income growth. The company's expenses impact both its balance sheet and income statement. Thus, increasing or decreasing activities to assets, liabilities, and income affects company expenses. Based on traditional and sticky cost theories, this study investigates whether cost stickiness exists in operating asset, liability, and income activities. This research is more comprehensive because it considers the ability of assets and liabilities to generate profits, so the phenomena of sticky cost tend to occur there.

Operating Asset, Liability, and Income

Operating activity refers to the activities that are directly related to the main action of a firm. Operating expenses include cash inflows and outflows, such as providing credit to customers, investing in inventory, and acquiring credit from suppliers (Graham & King, 2013; Chuwonganant et al., 2023; Walsh, 1994). Operating activities related to income statement and balance-sheet elements such as receivables, inventories, advance payments, debts, and payable expenses. Operating income measures the firm's profit from ongoing operating activities. The aspects of operating income are operating profit from the firm's core activity and operating profit is only related to ongoing business activities (Papanastasopoulos et al., 2011). The accounting information preparer classified income statements into operating and non-operating components, assuming operating

activities are the most crucial for determining firm performance (Chuwonganant et al., 2023; Sellhorn & Stier, 2018). Operating activities encompass all the activities required to introduce products or services to the market and cater to the needs of customers. Operating activities in a profit or loss statement include sales, cost of goods sold, and SG&A expenses. On the balance sheet, operating activities are proxied by assets and liabilities related to sales and COGS, such as accounts receivable, inventory, fixed assets, accounts payable, and accrued expenses. This study examines the impact of balance sheet operating activities on income statements and the existence of sticky costs in these activities.

HYPOTHESIS DEVELOPMENT

Operating expense and Operating Asset

A business's objective is to maximize profits by enhancing asset productivity, which refers to the company's capacity to produce products or services efficiently (Sellhorn & Stier, 2018; Amoa, 2021; Jaiswal & Bhattacharyya, 2016). Operating assets play a crucial role in supporting the primary activities of a company (Faello & Yingge, 2023). Operating assets include cash, accounts receivable, inventory, prepaid expenses, deferred tax assets, fixed assets, and long-term investments related to strategic acquisitions, such as equity method investments, goodwill, and intangible assets (Chuwonganant et al., 2023; Jaiswal & Bhattacharyya, 2016). Operating expenses, such as purchases and COGS, are directly linked to cash and inventory activity. Then, SG&A, R&D, staff, and advertising expenses are fixed and cover operating asset activities. This study investigates the correlation between operating asset activity and operating expenses, highlighting the role of operating assets in generating income and explaining the emergence of operating expenses. Thus, we state the hypothesis (H1) as follows.

H1: sticky costs exist in the relationship between operating expenses and operating asset growth

Operating Expense and Operating Liability

Most of the literature shows that firm liability derives from operating or funding activities, and affects firm value differently (Barua et al., 2019; Lim, 2014). Previous research involves behavior issues in operating liability activities because some accrual components (e.g., deferred

revenues, accrued expenses, post-retirement benefit obligations) are susceptible to opportunistic manager behavior (Iancu et al., 2017; Petkevich & Prevost, 2018). Another study argues that operating liability components such as accounts payable and tax payable are measurable contractual obligations and highly realistic (Barua et al., 2019; Lim, 2014). This study examines the stickiness of operating expenses to operating liability activities. Operating liabilities comprise almost one-third of reported total assets in the balance sheet (Cook et al., 2019; Fourati et al., 2020; Graham & King, 2013). Credit from suppliers impacts inventory, accounts payable, operating expenses, and liability, thus shaping income statements and balance sheet elements (generally, working capital posts such as receivables, inventories, advance payments, debts, and expenses still have to be paid). Based on the relationship between operating expense-liability activities, manager behavior, and contractual obligations, the sticky cost hypothesis on operating liability is stated as follows.

H2: sticky costs exist in the relationship between operating expenses and operating liability growth.

Operating Expense and Operating Income

The difference between operating revenue and operating expense is operating income (Lim, 2014), (Falát, 2020). The costs are primarily attributed to activities and essential internal information for management (Cook et al., 2019; Balakrishnan et al., 2014; Zisis & Naoum, 2023). Costs are classified directly and indirectly based on their easy identification within the product. The traditional cost theory posits that cost changes are linked to activity levels, but it does not consider the role of managers in resource management (Noreen, 1991; Zisis & Naoum, 2023). Some costs are fixed, allowing managers to exercise discretion in their allocation and components (Brisker et al., 2022; Chen et al., 2022; Petkevich & Prevost, 2018). The manager has the discretion to manage resources and expenses, but identifying indirect costs in the product can be challenging (Chen et al., 2022). Comparing operating expenses and income helps us to determine a firm's ability to actualize operating activities (Haris et al., 2024; Utami, 2021). Sticky costs exist in the operating expense component due to the manager's discretion. This study examines cost stickiness due to changes in activities and operating expenses, encompassing all fixed, variable, direct,

and indirect cost components. This study suggests that operating income is directly linked to operating expenses, indicating a persistent cost behavior due to managers' discretion in resource allocation. So, this study states the hypothesis (H3) as follows.

H3: sticky costs exist in the relationship between operating expenses and operating income growth.

RESEARCH METHODS

This study examines listed companies on the Indonesia Stock Exchange from 2010 to 2023,

utilizing data from the OSIRIS-Bureau van Dijk Database. The data is analyzed using OLS regression with cluster robust standard error (Hanafi, 2021; Petersen, 2009; Utami & Irawan, 2022).

Variable Measurements

This study examines the effect of operating expenses to asset growth, liabilities, and income changes. We involve five components of operating costs: rental expenses, R&D expenses, advertising expenses, SG&A expenses, and COGS. The variable measurements are presented in Table 1.

Table 1. Variable Measurement

Variable	Notation	Measurement	Reference
Panel A. Activity:			
Asset Growth	$AssetACC_{i,t}$	changes in operating assets growth	He and Narayanamoorthy., (2020)
Liabilities Growth	$LiabACC_{i,t}$	changes in operating debt growth	He and Narayanamoorthy., (2020)
Operating Income Growth	$OIACC_{i,t}$	changes in operating income growth	He and Narayanamoorthy., (2020)
Panel B. Expenses:			
Operating Expense	$EXP_{OP\ i,t}$	Operating expense t scaled to t-1	Anderson et al., (2003); Cook et al., (2019)
Rental Expense	$EXP_{RENT\ i,t}$	Rental expense t scaled to t-1	Anderson et al., (2003); Cook et al., (2019)
R&D Expense	$EXP_{R\&D\ i,t}$	R&D expense t scaled to t-1	Anderson et al., (2003); Cook et al., (2019)
Advertising Expense	$EXP_{ADV\ i,t}$	Advertising expense t scaled to t-1	Anderson et al., (2003); Cook et al., (2019)
SG&A Expense	$EXP_{SG\&A\ i,t}$	SG&A expense t scaled to t-1	Anderson et al., (2003); Cook et al., (2019)
Cost of Good Sold (COGS)	$EXP_{COGS\ i,t}$	COGS expense t scaled to t-1	Anderson et al., (2003); Cook et al., (2019)

This study evaluates a company's performance by analyzing changes in growth of asset, liability, and income referring to (He & Narayanamoorthy,

2020). Equations 1-3 formalize operating assets, liabilities, and income growth.

$$AssetACC_{i,t} = \frac{ASSET_{i,t} - ASSET_{i,t-1}}{|ASSET_{i,t-1}|} - \frac{ASSET_{i,t-1} - ASSET_{i,t-2}}{|ASSET_{i,t-2}|} \quad (1)$$

$$LiabACC_{i,t} = \frac{Liability_{i,t} - Liability_{i,t-1}}{|Liability_{i,t-1}|} - \frac{Liability_{i,t-1} - Liability_{i,t-2}}{|Liability_{i,t-2}|} \quad (2)$$

$$OIACC_{i,t} = \frac{OIACC_{i,t} - OIACC_{i,t-1}}{|OIACC_{i,t-1}|} - \frac{OIACC_{i,t-1} - OIACC_{i,t-2}}{|OIACC_{i,t-2}|} \quad (3)$$

Statistical Test

The statistical test in this study refers to Anderson, et al. [3] with the basic model in equation (4).

$$\ln \left[\frac{Expense_t}{Expense_{t-1}} \right] = \beta_0 + \beta_1 \log \left[\frac{Activity_{i,t}}{Activity_{i,t-1}} \right] + \beta_2 D * \log \left[\frac{Activity_{i,t}}{Activity_{i,t-1}} \right] + \beta_3 \log \left[\frac{Activity_{i,t-1}}{Activity_{i,t-2}} \right] + \beta_4 D * \log \left[\frac{Activity_{i,t-1}}{Activity_{i,t-2}} \right] + e_{i,t} \quad (4)$$

To determine the cost sensitivity of asset, liability, and income activities, we integrate equations (1) to (3) into equations (4) and formulate equations (5) to (7).

$$\ln \left[\frac{Expense_t}{Expense_{t-1}} \right] = \beta_0 + \beta_1 \log \left[\frac{AssetACC_{i,t}}{AssetACC_{i,t-1}} \right] + \beta_2 D * \log \left[\frac{AssetACC_{i,t}}{AssetACC_{i,t-1}} \right] + \beta_3 \log \left[\frac{AssetACC_{i,t-1}}{AssetACC_{i,t-2}} \right] + \beta_4 D * \log \left[\frac{AssetACC_{i,t-1}}{AssetACC_{i,t-2}} \right] + e_{i,t} \quad (5)$$

$$\ln \left[\frac{Expense_t}{Expense_{t-1}} \right] = \beta_0 + \beta_1 \log \left[\frac{LiabACC_{i,t}}{LiabACC_{i,t-1}} \right] + \beta_2 D * \log \left[\frac{LiabACC_{i,t}}{LiabACC_{i,t-1}} \right] + \beta_3 \log \left[\frac{LiabACC_{i,t-1}}{LiabACC_{i,t-2}} \right] + \beta_4 D * \log \left[\frac{LiabACC_{i,t-1}}{LiabACC_{i,t-2}} \right] + e_{i,t} \quad (6)$$

$$\ln \left[\frac{Expense_t}{Expense_{t-1}} \right] = \beta_0 + \beta_1 \log \left[\frac{LiabACC_{i,t}}{LiabACC_{i,t-1}} \right] + \beta_2 D * \log \left[\frac{LiabACC_{i,t}}{LiabACC_{i,t-1}} \right] + \beta_3 \log \left[\frac{LiabACC_{i,t-1}}{LiabACC_{i,t-2}} \right] + \beta_4 D * \log \left[\frac{LiabACC_{i,t-1}}{LiabACC_{i,t-2}} \right] + e_{i,t} \quad (7)$$

Equations (5) to (7) on the left side (expense) will be adjusted based on the operating expense component. The operating expense component is summarized in Table 1 Panel B. For example, the equation for rental expense to operating income is formulated in equation (8). In the same pattern, the left side is adjusted to other cost components, while the right side can be adjusted to asset or liability activity (see table 1).

$$\ln \left[\frac{Exp_RENT_{i,t}}{Exp_RENT_{i,t-1}} \right] = \beta_0 + \beta_1 \log \left[\frac{OIACC_{i,t}}{OIACC_{i,t-1}} \right] + \beta_2 D * \log \left[\frac{OIACC_{i,t}}{OIACC_{i,t-1}} \right] + \beta_3 \log \left[\frac{OIACC_{i,t-1}}{OIACC_{i,t-2}} \right] + \beta_2 D_{i,t-1} * \log \left[\frac{OIACC_{i,t-1}}{OIACC_{i,t-2}} \right] + e_{i,t} \quad (8)$$

RESULTS AND DISCUSSION

This study identifies an important model for investigating cost behavior. We estimate the model using ordinary least squares (OLS). We eliminate outlier or extreme observations by winzorized 1% in the top or bottom of its distributions. This study uses cluster robust standard error clustered

by firm, industry, and year to overcome firm and year effect bias (Hanafi, 2021), (Petersen, 2009), (Utami & Irawan, 2022). Table 2 presents the statistic descriptive and Table 3 summarizes the cost behavior of operating expenses in operating income, operating liability, and operating asset activities.

Table 2. Descriptive Statistics

Variabel	N	Mean	Median	Maximum	Minimum	Std.Dev.
AssetACC _{i,t}	7695	1.1238	1.0355	10.110	0.0006	0.4928
LiabACC _{i,t}	7650	1.1224	1.0266	9.9314	0.0062	0.5802
OIACC _{i,t}	5819	1.2556	1.2556	10.613	0.0003	1.0826

Table 2. (continued)

Variabel	N	Mean	Median	Maximum	Minimum	Std.Dev.
$EXP_{OP\ i,t}$	7695	1.1431	1.0474	10.816	0.0004	0.6697
$EXP_{RENT\ i,t}$	4660	1.1865	1.0225	10.294	0.0002	0.9641
$EXP_{R\&D\ i,t}$	515	1.1700	0.9866	8.1611	0.0173	0.9098
$EXP_{ADV\ i,t}$	2665	1.2612	1.0277	11.925	0.0001	1.1763
$EXP_{SG\&A\ i,t}$	7445	1.1227	1.0475	12.318	0.0085	0.5773
$EXP_{COGS\ i,t}$	714	1.1233	1.0381	9.1061	0.0077	0.6414

Notes: This tables presents summary statistics for firm-year observation from 2010-2023. Panel reports a mean, median, maximum, minimum, and standard deviation. AssetACC_{it} is operating asset growth, LiabAcc_{it} is operating liability growth, OIAcc_{it} is operating income growth, EXP_{OP} is operating expense, EXP_{RENT} is rental expense, EXP_{R&D} is R&D expense, EXP_{ADV} is advertising expense, EXP_{SG&A} is sales, general, and administrations expense, EXP_{COGS} is cost of good sold.

Table 3.Stickiness of Operating Expenses in Operating Income, Asset, and Liability

Variable	Coefficient [t-statistic]		
	Activity:		
	Operating Asset	Operating Liability	Operating Income
β_0	0.0177	0.0326	0.0627
$\beta_1 \log \left[\frac{Activity_{i,t}}{Activity_{i,t-1}} \right]$	0.2799 [16.986]*** [5.7359]*** [6.3235]*** [5.7432]***	0.2101 [16.547]*** [8.3660]*** [13.638]*** [7.3478]***	0.1431 [22.781]*** [9.8537]*** [8.0502]*** [7.2784]***
$\beta_2 D$ $* \log \left[\frac{Activity_{i,t}}{Activity_{i,t-1}} \right]$	-0.0899 [-7.722]*** [-4.943]*** [-5.285]*** [-3.949]***	-0.0301 [-2.445]** [-2.150]** [-2.198]** [-2.218]**	-0.0404 [-3.035]*** [-2.796]*** [-2.713]*** [-3.051]***
$\beta_3 \log \left[\frac{Activity_{i,t-1}}{Activity_{i,t-2}} \right]$	0.3171 [20.749]*** [9.8129]*** [9.7652]*** [10.226]***	0.1842 [15.149]*** [8.0000]*** [7.2377]*** [14.494]***	0.0557 [7.830]*** [4.787]*** [3.919]*** [4.308]***
$\beta_4 D$ $* \log \left[\frac{Activity_{i,t-1}}{Activity_{i,t-2}} \right]$	0.0245 [2.088]** [1.730]* [1.710]* [1.899]*	0.0006 [0.051] [0.043] [0.051] [0.043]	-0.0076 [-0.550] [-0.533] [-0.439] [-0.594]
R-square	0.1490	0.0805	0.1034
F (p-value)	0.0000***	0.0000***	0.0000***
Observation	7695	7650	5819
Number of Clusters:			
By-firm	[7695]	[7650]	[5819]
By-industry	[58]	[58]	[58]
By-year	[14]	[14]	[14]

Notes: Sign ***, **, * are significant at levels 1%, 5%, and 10% respectively. The Estimation model uses OLS with and without cluster robust standard error—the t-statistic in brackets with the order regression, regression clustered by firm, industry, and year.

Table 3 shows a 28% increase in operating expense per 1% increase in operating assets, with a coefficient of $\beta_1 = 0.2799$ (t-statistic=16.98). The

estimated value of $\beta_2 = -0.0899$ (t-statistic= -7.72) strongly supports sticky costs in terms of operating expenses and operating assets (H1 is supported).

The combination $\beta_1+\beta_2=0.19$ indicates that a decrease in operating assets leads to a 19% decrease in operating expenses. That is an indicator of sticky behavior. The estimated value of $\beta_3 = 0.3171$ indicates that operating expense increased 31% per 1% increase in one period lagged of operating assets. Meanwhile, the estimated value of $\beta_4 (0.0245)+\beta_3=0.3416$ indicates that operating expenses in period t affect changes in operating assets in period $t-1$. The significant values of β_1 , β_2 , β_3 , and β_4 indicate that operating expenses were not proportional to changes in operating assets. The results of t-statistic regression with or without clusters are relatively similar. The t-statistic for regression is clustered by firm, industry, and year (the t-statistic is in brackets, respectively).

Table 3 describes the results of sticky costs on operating expenses and their relationship with activities in operating liability. The estimated value of $\beta_1 = 0.2101$ (t-statistic=16.547***) indicates that operating expenses increased almost 21% per 1% increase in operating liability. The estimated value of $\beta_2=-0.0301$ (t-statistic=-2.4450**) supports sticky operating costs in the operating liability activities. The combination of $\beta_1+\beta_2 = 0.18$ shows when operating assets decrease by 1%, the operating expense decreases by 18%. This indicator of sticky behavior of this type of cost strongly supports sticky costs concerning operating expenses and operating liability (H2 is supported). The estimated value of $\beta_3=0.1842$ denotes that operating expense

increases 18% per 1% increase in one period lagged of operating liability. These findings suggest that operating costs were not proportional to changes in operating liability. The results of t-statistic regression with or without clusters are relatively similar. The t-statistic for regression is clustered by firm, industry, and year (the t-statistic is in brackets, respectively).

Results from regression with cluster robust standard error in Table 3, operating income column, a coefficient $\beta_1=0.1431$ (t-statistic=22.78) indicates that operating expenses increase by 14.31% per 1% increase in operating income. The estimated value of $\beta_2=-0.0404$ (t-statistic=-3.03) strongly supports sticky costs concerning operating expenses and operating income (H3 is supported). The combination of $\beta_1+\beta_2=0.1027$ shows that operating expenses decreased by 10% per 1% decrease in operating income. The estimated value of $\beta_3 = 0.0557$, which shows one period lagged operating income, tells that operating expense increased 5.57% per 1% increase in one period lagged operating income. The fact that β_1 , β_2 , and β_3 are significant at 1% (***) indicates that operating expenses were not proportional to the change in operating income. The results of t-statistic regression with or without cluster were the same. The t-statistic for regression is clustered by firm, industry, and year (the t-statistic is in brackets, respectively).

Table 4. Stickiness of Operating Expense Component in Operating Income

Variable	Expense Component				
	Rental	R&D	Advertising	SG&A	COGS
<i>Intercept</i>	-0.0410	-0.1598	-0.0198	0.0704	0.0139
$\beta_1 \text{LogOIACC}_{i,t}$	0.1132	0.0938	0.1419	0.1003	0.1323
	[5.817]***	[1.477]	[5.972]***	[16.82]***	[4.345]***
	[5.818]***	[1.580]	[4.120]***	[10.65]***	[5.522]***
	[6.157]***	[1.283]	[4.068]***	[10.63]***	[3.979]***
	[4.295]***	[1.319]	[4.614]***	[8.629]***	[4.341]***
$\beta_2 \Delta \text{LogOIACC}_{i,t}$	-0.0324	0.0644	-0.0622	-0.0543	0.0765
	[-0.845]	[0.581]	[-1.350]	[-4.328]***	[1.656]*
	[-0.899]	[0.643]	[-1.299]	[-4.393]***	[1.683]*
	[-0.691]	[0.714]	[-1.541]	[-5.025]***	[1.506]
	[-0.947]	[0.570]	[-1.572]	[-6.224]***	[1.668]
$\beta_3 \text{LogOIACC}_{i,t-1}$	0.1037	0.1056	0.0775	0.0468	0.1229
	[4.809]***	[1.379]	[2.839]***	[6.879]***	[3.853]***
	[3.575]***	[1.518]	[2.088]**	[4.741]***	[4.399]***
	[4.101]***	[2.931]***	[2.268]**	[4.044]***	[2.645]**
	[3.556]***	[1.325]	[2.861]**	[5.340]***	[2.623]**

Table 4. (continued)

Variable	Expense Component				
	Rental	R&D	Advertising	SG&A	COGS
$\beta_4 D$ $* LogOIACC_{i,t-1}$	0.0373	0.1792	0.0241	0.0016	-0.0220
	[0.936]	[1.470]	[0.502]	[0.123]	[-0.465]
	[0.851]	[1.656]*	[0.550]	[0.127]	[-0.497]
	[0.782]	[2.591]**	[0.568]	[0.131]	[-0.505]
	[0.756]	[1.485]	[0.570]	[0.123]	[-0.493]
R-square	0.0185	0.0100	0.0243	0.0687	0.0497
F (p-value)	0.000***	0.0000***	0.0000***	0.0000***	0.0000***
Observation	3177	445	2054	5587	641
Number of Cluster:					
By-firm	[3177]	[445]	[2054]	[5587]	[641]
By-industry	[55]	[29]	[54]	[58]	[35]
By-year	[14]	[14]	[14]	[14]	[10]

Notes: Sign ***, **, * are significant at levels 1%, 5%, and 10%, respectively. This study uses OLS for estimation (with and without cluster robust standard error). The t-statistics in brackets for order regression, clustered by firm, industry, and year.

Furthermore, we investigate sticky costs in expense components to analyze cost drivers in operating asset, liability, and income activities. Table 4 presents the cost behavior of expense components and operating income. This study identifies the sticky cost of expense components and operating income activities. The result reveals that rental costs increased by 11.32% (coefficient=0.1132), advertising costs by 14.19%, SG&A costs by 10.03%, and COGS costs by 1.39% for a 1% increase in operating income. The R&D expense does not exhibit sticky costs, as the t-statistics for

regression with or without robust standard error clustering are insignificant. R&D expenses are distinct from other expenses as they involve large expenditures that have a long-lasting impact after they are released [38, 39]. The estimation from one period lagged operating income shows that sticky costs occurred in rental, advertising, SG&A, and COGS, with estimated values of 10%, 7%, 4%, and 12%, respectively. These findings indicate a lagged adjustment to rental, advertising, SG&A, and COGS for operating income changes.

Table 5. Stickiness Operating expense component in Operating Asset

Variable	Expense Component				
	Rental	R&D	Advertising	SG&A	COGS
Intercept	-0.1130	-0.0459	-0.0678	0.0219	-0.0164
$\beta_1 LogOIACC_{i,t}$	0.3399	0.1574	0.4714 [7.444]***	0.2654	0.1822
	[7.487]***	[0.952]	[5.463]***	[17.58]***	[1.433]
	[5.716]***	[0.799]	[6.136]***	[7.795]***	[1.010]
	[6.082]***	[0.800]	[7.076]***	[7.026]***	[0.928]
	[5.884]***	[0.813]		[6.860]***	[0.975]
$\beta_2 D$ $* LogOIACC_{i,t}$	-0.0547	-0.1147	-0.1022	-0.0802	-0.0029
	[-1.833]*	[-1.268]	[-2.543]***	[-7.44]***	[-0.064]
	[-1.812]*	[-1.381]	[-2.511]**	[-6.04]***	[-0.065]
	[-1.517]	[-1.181]	[-3.265]***	[-7.37]***	[-0.066]
	[-1.670]	[-1.241]	[-1.587]	[-5.81]***	[-0.044]
$\beta_3 LogOIACC_{i,t-1}$	0.2450	-0.1482	0.0722 [1.410]	0.2206	0.3725
	[6.431]***	[-0.862]	[0.856]	[15.52]***	[4.233]***
	[3.567]***	[-0.646]	[1.084]	[6.867]***	[3.891]***
	[3.383]***	[-0.560]	[1.242]	[5.673]***	[4.191]***
	[5.810]***	[-0.570]		[6.667]***	[4.683]***

Table 5. (continued)

Variable	Expense Component				
	Rental	R&D	Advertising	SG&A	COGS
$\beta_4 D$ $* \text{LogOIACC}_{i,t-1}$	0.0592	0.0070	0.0671	0.0316	0.0162
	[1.992]**	[0.077]	[1.707]*	[2.908]***	[0.372]
	[1.774]*	[0.082]	[1.571]	[2.311]**	[0.361]
	[1.337]	[0.064]	[1.724]*	[2.090]**	[0.345]
	[0.813]	[0.097]	[1.579]	[1.660]	[0.508]
R-square	0.0333	0.0109	0.0388	0.1236	0.0382
F (p-value)	0.0000***	0.2307	0.0000***	0.0000***	0.0000***
Observation	4660	515	2665	7445	714
Number of Clusters:	-	-	-	-	-
By-firm	[4660]	[515]	[2665]	[7445]	[714]
By-industry	[56]	[31]	[54]	[58]	[37]
By-year	[14]	[14]	[14]	[14]	[10]

Notes: Sign ***, **, * are significant at levels 1%, 5%, and 10%, respectively. This study uses OLS for estimation, with and without cluster robust standard error. The t-statistics in brackets for order regression, clustered by firm, industry, and year.

Table 5 presents the estimated value for expense component and operating asset changes. This study investigates whether the operating cost components (rental, R&D, advertising, SG&A, and COGS) experience sticky costs related to operating asset activities. In operating asset activities, sticky costs occur on rental, advertising, and SG&A expenses. The estimated value of rental expense 0.3399 (t-statistic=7.4876***) indicates that rental

expense increases by 33.99%, advertising expense by 47.14%, and SG&A by 26.54%, for a 1% increase in operating assets. R&D and COGS expenses show no sticky costs in operating asset activities (t-statistics for regression with or without robust standard error clustering are insignificant). For t-1 operating asset activities, the sticky cost occurs in rental, SG&A, and COGS expenses, with estimated values of 24%, 22%, and 37%, respectively.

Table 6. Stickiness Operating expense component in Operating Liability

Variable	Expense Component				
	Rental	R&D	Advertising	SG&A	COGS
Intercept	-0.0786	-0.1462	-0.0987	0.0426	0.0107
$\text{LogLiabACC}_{i,t}$	0.1555	0.3280	0.2499 [5.689]***	0.1559	0.0762
	[4.838]***	[2.511]**	[3.859]***	[13.71]***	[1.119]
	[4.062]***	[1.968]**	[4.087]***	[8.281]***	[0.857]
	[3.837]***	[2.170]**	[2.969]***	[7.380]***	[0.763]
	[3.757]***	[1.894]*		[7.639]***	[1.488]
$D * \text{LogLiabACC}_{i,t}$	-0.0547	0.0233	-0.0262	-0.0462	-0.0091
	[-1.643]*	[0.231]	[-0.649]	[-4.149]***	[-0.206]
	[-1.694]*	[0.238]	[-0.621]	[-3.864]***	[-0.176]
	[-1.800]*	[0.238]	[-0.725]	[-3.551]***	[-0.176]
	[-1.551]	[0.255]	[-0.454]	[-4.746]***	[-0.166]
$\text{LogLiabACC}_{i,t-1}$	0.2450	-0.0490	0.1416 [3.410]***	0.1284	0.1372
	[4.313]***	[-0.372]	[2.160]**	[11.66]***	[1.905]*
	[3.327]***	[-0.267]	[2.355]**	[7.301]***	[1.572]
	[2.618]**	[-0.288]	[2.489]**	[7.451]***	[1.605]
	[3.065]***	[-0.316]		[12.64]***	[2.250]**

Table 6. (continued)

Variable	Expense Component				
	Rental	R&D	Advertising	SG&A	COGS
<i>D</i> * <i>LogLiabACC</i> _{<i>i,t-1</i>}	0.0592	0.0817	0.1180	0.0070	0.0129
	[1.672]*	[0.811]	[2.889]***	[0.621]	[0.282]
	[1.643]*	[0.824]	[2.682]***	[0.581]	[0.297]
	[1.474]	[0.939]	[3.160]***	[0.491]	[0.327]
	[1.285]	[0.804]	[4.785]***	[0.565]	[0.323]
R-square	0.0129	0.0180	0.0203	0.0601	0.0090
F (p-value)	0.0000***	0.0500**	0.0000***	0.0000***	0.0000***
Observation	4636	516	2645	7404	714
Number of Clusters:	-	-	-	-	-
By-firm	[4636]	[516]	[2645]	[7404]	[714]
By-industry	[56]	[31]	[54]	[58]	[37]
By-year	[14]	[14]	[14]	[14]	[10]

Notes: Sign ***, **, * are significant at levels 1%, 5%, and 10%, respectively. This study uses OLS for estimation, with and without cluster robust standard error. The t-statistics in brackets for order regression, clustered by firm, industry, and year.

Table 6 presents the estimated value of expense component and operating liability changes. This study examines whether the operating expense components (rental, R&D, advertising, SG&A, and COGS) experience sticky costs related to operating liability activities. Concerning operating liability activities, sticky costs occur in rental, R&D, advertising, and SG&A expenses. The estimated value of rental expense is 0.1555 (t-statistic=4.8384***), which indicates that rental cost increases on average by 15.55% for a 1% increase in operating liability. The cost of R&D is 32.80%, advertising 24.99%, and SG&A 15.59%, for a 1% increase in operating liability. COGS expense does not show any sticky costs in operating asset activities (t-statistics for regression with or without robust standard error clustering are insignificant). R&D expense is strongly related to operating liability, indicating that companies likely use debt to fund R&D (Ray & Lynch, 2019), (Thakor & Lo, 2022). For t-1 operating liability, the sticky cost occurred in rental, advertising, and SG&A expenses with estimated value of approximately 24%, 14%, and 13%, respectively. These findings suggest a lagged adjustment to rental, advertising, and SG&A for operating liability activities, or managers delay decisions to reduce committed resources.

CONCLUSION

This study investigates the stickiness of operating expenses in operating income, asset, and liability activities. The results show a sticky cost of operating expenses in operating income, assets, and liability are true and not just anecdotal evidence. This study confirms the existence of operating expenses in operating income, assets, and liability, based on reliable data. Our evidence differs from previous studies about cost stickiness in revenue or sales (Anderson et al., 2003; Cook et al., 2019; Fourati et al., 2020; Balakrishnan et al., 2014). Our study differs from the common model; we separate costs into fixed and variable costs. The model in this study is helpful as an alternative model in cost behavior. Our findings show the role of managers in adjusting cost vs. activity. Our findings have important implications for cost accounting. Accountants and other professionals use these findings to assess income, assets, and liability expenses, and if cost changes outweigh revenue, the cost component must be evaluated.

Cost accounting textbooks suggest regression methods to estimate cost-activity relationship, while sticky cost studies examine cost responsiveness

to activity changes. This study investigates cost drivers such as rental expenses, advertising, R&D, SG&A, and COGS, and their correlation with operating income, asset, and liability activities. The rental, advertising, SG&A, and COGS sectors show a 10%-14% cost increase per 1% increase in operating income. For operating assets, the rental and advertising costs show estimation value of 33% and 47% per 1% increase in operating assets. Meanwhile, R&D expense shows an association only in operating liabilities activities, approximately 32% per 1% increase in operating liabilities.

The implication for analysts and auditors is to interpret negative signals from operating expense stickiness as a result of managerial control loss. The analysis may be misleading because of the disproportionate increase in cost and income. The managerial implication of our study is sticky costs can be controlled and recognized. Managers evaluate marked sticky costs, considering cost changes to

reduced volume activity. Managers create policies or contracts to increase the sensitivity of change alignment between cost and committed resources. For example, managers make policies for using irregular or outsourced labor based on the volume of work required or control COGS by pressing supplies of raw materials and finished goods.

In conclusion, this study detects sticky cost behavior in our analysis. We suggest that future studies conduct different levels of analysis, adopt other methodologies, and adopt cross-country comparative studies to provide significant information for improving decision-making. Studies involving analysis in each industry or single-firm cost data are potential alternative research in the future. Finally, the issue of managerial behaviour and underlying cognitive factors inducing cost stickiness can be addressed using experimental methods.

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