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THE EFFECT OF MACROECONOMIC UNCERTAINTIES ON COST STRUCTURE: AN APPLICATION TO THE BIST MANUFACTURING SECTOR*

Makroekonomik Belirsizliklerin Maliyet Yapışkanlığına Etkisi: BIST İmalat Sektöründe Bir Uygulama

Emre HORASAN** & **Emel KILIÇBEY*****

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E70, M49.

Abstract

In this study, which aims to ascertain the impact of macroeconomic uncertainty on cost stickiness, the annual data from 113 manufacturing companies operating in Borsa Istanbul (BIST) for the period 2007-2022 were analyzed using panel data regression analysis. In the study, six different models were developed to determine cost stickiness in various cost elements according to the "Anderson, Banker and Janakiraman" (ABJ) method. Subsequently, six additional models were also developed according to the extended ABJ method to ascertain the macroeconomic uncertainties influencing the level of stickiness in these cost elements. The analysis results indicate that the cost stickiness theory is applicable for all cost elements except the number of employees. However, the anti-stickiness theory is valid for the number of employees. Consequently, it can be said that macroeconomic uncertainties, company-specific factors, and macroeconomic factors affect the level of cost stickiness in different directions and at different levels in the specific cost elements analyzed.

Anahtar Kelimeler:
Asimetrik Maliyet Davranışı,
Maliyet Yapışkanlığı,
İmalat Sektörü,
Makroekonomik Belirsizlik,
BIST.

JEL Kodları:
D24, D89, E69,
E70, M49.

Öz

Makroekonomik belirsizliklerin maliyet yapışkanlığı üzerindeki etkisini tespit etmeyi amaçlayan bu çalışmada, Borsa İstanbul'da işlem gören 113 imalat şirketinin 2007-2022 dönemine ait yıllık verileri panel veri regresyon analizine tabi tutulmuştur. Çalışmada, "Anderson, Banker ve Janakiraman" (ABJ) yöntemine göre çeşitli maliyet unsurlarında maliyet yapışkanlığını belirlemek için altı farklı model kurulmuştur. Daha sonra, bu maliyet unsurlarındaki yapışkanlık düzeyini etkileyen makroekonomik belirsizlikleri belirlemek için genişletilmiş ABJ yöntemine göre de altı farklı model kurulmuştur. Analiz sonuçları, maliyet yapışkanlığı teorisinin çalışan sayısı hariç tüm maliyet unsurları için geçerli olduğunu göstermektedir. Ancak, maliyet yapışkanlığı karşıtı teori çalışan sayısı için geçerlidir. Analiz edilen maliyet unsurlarında makroekonomik belirsizliklerin, şirkete özgü faktörlerin ve makroekonomik faktörlerin maliyet yapışkanlığı düzeyini farklı yönlerde ve farklı düzeylerde etkilediği sonucuna varılabilir.

* This study is based on a PhD thesis prepared by the co-author.

** Assoc. Prof. Dr., Faculty of Economics and Administrative Sciences, Kafkas University, Türkiye, emrehorasan@gmail.com, (Corresponding Author)

*** Assist. Prof. Dr., Faculty of Economics and Administrative Sciences, Kafkas University, Türkiye, emel3606@hotmail.com

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1. Introduction

The concept of cost behavior, which refers to the alterations in cost elements in reaction to alterations in sales, operating volume, or output level (Garrison, 1988: 42; Hansen et al., 2009: 51) has long been a significant topic in cost and management accounting.

The literature presents two competing perspectives on cost behavior. The first of these is the traditional cost behavior, which has been accepted for many years and defends the theory that costs respond equally to increases and decreases in operations. The second is the asymmetric cost behavior or, in other words, cost stickiness, which was introduced to the literature by Anderson, Banker and Janakiraman (2003), argues that costs do not respond equally to increases and decreases in operations. Cost stickiness is defined as the level of increase in associated costs in the event of an increase in the volume of operations, which is greater than the level of decrease in associated costs in the event of an equivalent decrease in the volume of operations (Anderson et al., 2003: 47-48).

According to the traditional view of cost behavior, cost elements are divided into fixed and variable: fixed costs are assumed independent of the operating volume and while variable costs are assumed to change symmetrically and proportionally to fluctuations in the operating volume (Anderson et al., 2003: 47; Calleja et al., 2006: 127; Guenther et al., 2014: 302). According to this assumption, the linearity between costs and operating volume means that a 1% increase in operating level leads to a 1% increase in costs and a 1% decrease in operating level leads to a 1% decrease in costs (Calleja et al., 2006: 128). This implies that the magnitude of cost changes depends only on the degree of volume change, not its direction (Anderson et al., 2003: 47). The traditional view holds that cost behavior is independent of the direction of operational changes and of managers' resource commitment decisions (Guenther et al., 2014: 302).

Recent studies have found that costs do not behave symmetrically or linearly with respect to activity fluctuations. The findings of these studies contradict the traditional cost model that assumes that costs move symmetrically and linearly with increases and decreases in sales (Noreen and Soderstrom, 1997; Anderson et al., 2003; Calleja et al., 2006; He et al., 2010; Yükçü and Özkaya, 2011). In the literature, this phenomenon is called asymmetric cost behavior or cost stickiness.

Recent studies have attempted to explain the level of cost stickiness by macroeconomic uncertainties such as growth, elections, and uncertainties in economic policy. A review of the literature reveals that few studies have been published in this context, and no study has examined the effects of electoral and economic policy uncertainty (EPU) on cost elements in Türkiye. Therefore, this study tests whether cost stickiness holds in six different cost elements of the enterprises in the BIST manufacturing sector and addresses this gap by examining the effects of uncertainties such as elections and EPU on cost elements.

Following the introduction, we provide a brief theoretical overview of cost behavior, cost stickiness, and macroeconomic uncertainty, followed by a literature review highlighting this study's contributions. The methodology section describes the data, models, and variables. The final section presents the results and conclusions.

2. Causes of Asymmetric Cost Behavior (Cost Stickiness)

Researchers attribute cost asymmetry to managers' asymmetric decisions regarding resource adjustment costs in response to sales changes and expectations about future demand and the presence of idle resources (Chen et al., 2019: 666). Adjustment costs include severance payments, contract termination penalties, asset disposal costs, costs of aligning assets with new demand, new contract costs, hiring costs, and training expenses. When sales decline, managers must choose between adjustment costs and the costs of maintaining idle resources. In this context, managers may prefer to incur the cost of retaining idle resources rather than reducing resources when they believe that the decline in demand is temporary. That is, when demand decreases are perceived as temporary, managers may not adjust operating resources significantly (Anderson et al., 2003: 48-49; Baumgarten, 2012: 10). For example, when sales decline, managers may prefer to keep idle resources to evade resource adjustment costs such as severance payments to workers in the event of layoffs and losses on the disposal of materials. Conversely, when demand exceeds available capacity, managers increase resources to meet demand, resulting in cost stickiness (Banker et al., 2014: 1). In this context, the situations that may lead to cost asymmetry include (Cannon, 2014: 1645-1646):

(i) Managers tend to increase capacity when demand rises and maintain idle capacity when demand falls,
(ii) In adjusting capacity, managers reduce it when demand falls and expand it when demand rises,
(iii) When adjusting prices based on capacity, managers may lower prices to fill capacity during demand decreases rather than leaving it idle, and expand capacity during demand increases rather than raising prices.

Cost asymmetry can also be seen as an indicator of management's ability to cope with upward and downward changes in the market that may affect company performance (Zanella et al., 2015: 6520).

Macroeconomic indicators and uncertainty are among the most significant factors directly influencing markets and should be considered in all corporate decision-making processes, including employment, investment, production, and marketing. During periods of heightened uncertainty, firms may delay or cancel investment, employment, and market entry decisions. Increased uncertainty also raises risk premiums and tightens credit conditions, thereby increasing financing costs. As a result, both investment and consumption expenditures tend to decline. This may lead to a sharper reduction in sales revenue relative to irreversible costs, potentially causing cost stickiness.

3. Macroeconomic Uncertainty

Knight (1921) argues that uncertainty inherent in economic systems is an important feature that plays a critical role in decision-making. According to Knight, entrepreneurs, the driving force behind economic progress, operate in uncertain environments, making decisions based on subjective judgments and expectations. Haddow (2013) presents a table (Table 1) illustrating how households, firms, and all sectors react to uncertainty:

Table 1. Channels of Uncertainty Affecting the Economy

Industry	Channel	Explanation	Affected Economic Variable
Household	Precautionary Savings	In the context of income uncertainty, households may adopt a strategy of delaying the consumption of durable goods to safeguard their financial position.	Consumption
Companies	Wait and See	Firms that are uncertain about their sales and profitability in the face of uncertainty shocks may adopt a "wait-and-see" strategy when making irreversible investment, employment, and entry decisions to avoid costly mistakes.	Investment and Productivity
	Entry and Exit	Firms that are uncertain about their sales and profitability in the face of uncertainty shocks may adopt a "wait-and-see" strategy when making irreversible investment, employment, and entry decisions to avoid costly mistakes.	Investment and Exports
	Labor Market Distortions	Matches may be less efficient as households are reluctant to seek more productive jobs and firms are reluctant to advertise vacancies.	Productivity
All Sectors	Financial	Uncertainty about the volatility in financial asset prices may increase the risk premium and consumer/commercial credit costs.	Credit, Consumption and Investment

Source: Haddow et.al. (2013: 102)

Economic uncertainty may affect both supply and demand factors. Moreover, employment is also negatively affected in such environments. Because employers doubt future economic conditions, they may postpone employment decisions. This may reduce productivity (Ahir et. al., 2019; Macit, 2022). As the expectation of "fewer workers, more jobs" becomes prevalent in the market, and, thus, unemployment rises.

4. Literature Review

Following the growing interest sparked by Anderson et al.'s (2003) study of United States (U.S.) manufacturing firms, which detected cost stickiness in selling, general, and administrative (SG&A) expenses and identified influencing factors such as economic growth, labor intensity, asset intensity, and successive sales decreases, numerous studies have supported the cost stickiness theory in many cost elements such as selling and general administrative expenses, cost of sales, operating expenses, advertising expenses, labor and investment costs (Çelik and Kök, 2013; Elden Ürgüp, 2022; Erdoğan et al., 2019; Hacıhasanoğlu and Dalkılıç, 2018; He et al., 2010; Ibrahim and Ezat, 2017; Karabayır, 2019; Karadeniz et al., 2019; Marques et al., 2014; Öztürk and Zeren, 2016; Pamplona et al., 2016; Yükçü and Özkaya, 2011; Weidenmier and Subramaniam, 2003). Some of these studies have sought to identify factors influencing the degree of cost stickiness, offering different perspectives. While some have examined corporate governance explanations, others have focused on firm-specific factors such as assets, labor force, debt, working capital intensity, or country-specific macroeconomic factors such as economic growth, inflation, interest rates, labor market conditions, and national regulations. Recent studies

have tried to explain the level of cost stickiness with macroeconomic uncertainties such as growth, elections, and uncertainties in economic policy.

In contrast, some studies argue that traditional cost behavior prevails, failing to support the cost stickiness hypothesis (Nassirzadeh et al., 2013; Dalla Via and Perego, 2014; Bengü and Fidancan, 2020; Kaçar and Demirci, 2022).

Firm-specific factors influencing cost stickiness have also been extensively examined. Asset intensity emerges as a primary factor reinforcing cost stickiness through increased adjustment costs (Anderson et al., 2003; Calleja et al., 2006; Chen et al., 2012; Banker et al., 2014; Kim and Wang, 2014; Bu et al., 2015; Günay, 2019; Hartlieb and Loy, 2022; Li and Zheng, 2020). Conversely, successive sales decreases lead managers to perceive demand declines as permanent, prompting divestment of slack resources and reducing cost stickiness (Anderson et al., 2003; Subramaniam and Watson, 2016; Li and Zheng, 2020; Hartlieb and Loy, 2022). Economic growth reinforces managers' optimistic expectations about the future, increasing their tendency to retain resources and potentially elevating cost stickiness (Anderson et al., 2003; Venieris et al., 2015; Jiang et al., 2016; Magheed, 2016; Ola et al., 2018). Financial structure variables are also significant determinants of cost behavior. Increases in financial leverage and debt intensity pressure managers regarding interest and debt repayments. This pressure may lead to stricter cost monitoring, subsequently reducing cost stickiness (Abu-Serdaneh, 2014; Magheed, 2016; Argilés-Bosch et al., 2017; Günay, 2019; Jin and Wu, 2021; Li and Zheng, 2020). From an agency theory perspective, these findings suggest that reduced discretionary resources induce more disciplined cost behavior.

The remainder of this literature review first discusses Anderson et al. (2003), who introduced cost stickiness to the literature, followed by studies examining cost stickiness and macroeconomic factors:

Anderson et al. (2003) examined SG&A expenses in U.S. industrial firms and the stickiness of costs was analyzed by using the data of the firms for the period 1979-1998. They found that it was ascertained that a 1% sales increase led to a 0.55% increase in SG&A expenses, while a 1% sales decrease led to only a 0.35% decrease. The study concludes that cost stickiness increases with economic growth, labor intensity, and asset intensity, but decreases during successive sales declines (i.e., permanent downward trends).

Ola et al. (2018) investigated the effect of political uncertainty on cost stickiness using data from 131 firms listed on the Tehran Stock Exchange from 2009 to 2016. They designated the 2009 and 2013 presidential election years as periods of high political uncertainty, concluding that cost stickiness was higher during election years than during non-election periods. They concluded that SG&A expenses exhibit stickiness during periods of high political uncertainty.

Li et al. (2020) examined the impact of macroeconomic uncertainty on cost stickiness using 58,513 firm-year observations from Chinese listed companies from 2013 to 2019. Their analysis reveals a positive relationship between macroeconomic uncertainty and the degree of cost asymmetry, suggesting that macroeconomic uncertainty increases cost stickiness due to agency problems in firms. However, they also find that macroeconomic uncertainty significantly reduces cost stickiness by lowering adjustment costs such as search and contract costs for hiring new employees. In other words, macroeconomic uncertainty raises overall cost stickiness but reduces human resource cost stickiness to some extent.

Lee et al. (2020) examined the impact of political uncertainty on cost stickiness during national election years, using 228,405 firm-year observations from 31,158 firms across 55 countries from 1995 to 2012. Regression results controlling for firm- and country-level determinants indicate that cost stickiness is higher during election years. They find that cost stickiness increases during high-uncertainty election years, as managers maintain existing capacity despite reduced activity, expecting uncertainty to resolve quickly. This suggests that managers perceive demand declines as temporary due to optimistic expectations about post-election resolution, increasing cost stickiness through resource retention despite decreasing activity.

Jin and Wu (2021) examined the relationship between cost behavior and EPU using 75,348 firm-year observations from 11,131 U.S. firms from 1987 to 2017 and 133,832 firm-year observations of firms in 18 countries between 1992 and 2012. They rejected Lee et al.'s (2020) hypothesis of higher cost stickiness during election periods, arguing instead that EPU is higher in non-election years. Their results indicate that when EPU is high during sales declines in non-election years, managers are more likely to cut idle resources, and they are reluctant to add resources when sales increase. In short, it is found that managers significantly reduce operating costs in high-EPU years by revising their expectations about future demand and adjusting costs downward.

Pan et al. (2021) analyzed how political unpredictability affects cost stickiness using 20,392 firm-year observations from 260 Chinese cities (comprising 1,206 managers and 1,346 mayors) from 2000 to 2018. They used local government turnover as a gauge of local political uncertainty. Their findings indicate that cost stickiness is higher during years of local government turnover than in other years. Thus, local political uncertainty affects firm cost behavior, with firms considering political uncertainty when determining resource adjustment policies.

Maquiaveli et al. (2022) analyzed the effects of EPU on cost asymmetry using data from companies listed on B3 (Brasil Bolsa Balcão) from 2010 to 2020. They identified sector, asset utilization intensity, manager pessimism, and economic policy as factors affecting cost asymmetry in Brazil. They found that EPU adversely affects cost asymmetry in Brazil, as Brazilian firms react strongly to changes in expectations about future conditions.

A review of the literature reveals that SG&A expenses serve as the dependent variable in all these studies and that independent variables and sample countries constitute the main differences across studies. While some common elements appear in the independent variables, different elements have been examined to establish each study's contribution.

Taken together, previous studies Ola et al. (2018) and Lee et al. (2020) found that political uncertainty increases cost stickiness during election periods, as managers tend to retain resources, assuming that uncertainty will resolve quickly. Pan et al. (2021) confirmed these results using local government turnover as a measure of political uncertainty in China. In contrast, Jin and Wu (2021) argued that EPU prompts managers to cut idle resources and adopt cost-saving strategies, thereby reducing cost stickiness. Maquiaveli et al. (2022) supported this view for Brazil. Li et al. (2020), however, showed that macroeconomic uncertainty increases cost stickiness in China through higher adjustment costs and agency problems, despite reducing human resource cost stickiness. These studies suggest that political and economic uncertainties affect cost behavior differently but share important limitations: Most have focused on a single cost element, typically SG&A expenses; political and policy uncertainty have been examined separately; and samples

have been limited to China, Iran, Brazil, or the US. To address these gaps, this study employs an extended ABJ framework and robust panel data technique to analyze six cost categories from 2007 to 2022, providing the first empirical evidence on how macroeconomic and political uncertainty affect cost stickiness in Türkiye's BIST manufacturing sector. Thus, this study contributes empirically and theoretically by examining a new country context, integrating dual uncertainty dimensions (EPU and elections), employing a multi-cost approach, and revealing behavioral explanations for managerial cost adjustment decisions under uncertainty.

5. Research Methodology

5.1. Dataset

This study selects all companies in the BIST manufacturing sector as its sample. The BIST manufacturing sector was selected due to its relatively homogeneous financial structure, legal and institutional maturity, and widespread adoption of modern production systems. Moreover, the sector comprises over 43% of all firms listed on Borsa İstanbul, providing a large, comprehensive dataset including all required variables. Given the sector's strategic importance to the Turkish economy and its sensitivity to macroeconomic fluctuations, its inclusion enables robust examination of firm-level cost behavior under uncertainty while maintaining methodological consistency with prior studies (Kayalı and Terim, 2009: 130; Kiracı, 2009: 171; Taşbaş and Belen, 2020: 996). However, of 207 companies in the BIST manufacturing sector, only 113 with continuous operations and available data for 2007–2022 are included in the analysis. Because cost stickiness models require prior-period values, 2007 data are used for 2008 calculations, though the primary analysis period spans 2008 to 2022. Thus, the dataset comprises panel data covering 1,695 observations from 113 continuously operating BIST manufacturing sector companies from 2007 to 2022.

Company-specific data are obtained from the Finnet Financial Analysis Program (www.finnet.com.tr), election year data from the Supreme Election Board (www.ysk.gov.tr), and Gross Domestic Product (GDP) data from the Turkish Statistical Institute (www.tuik.gov.tr). The World Uncertainty Index (WUI) was used as a proxy for macroeconomic uncertainty (EPU). WUI data are obtained from https://worlduncertaintyindex.com.

5.2. Models and Variables

First, the "Anderson, Banker and Janakiraman" (ABJ) method in model 1, which was introduced to the literature by Anderson et al. (2003), was used to determine cost stickiness. Then, to investigate the impact of macroeconomic uncertainties on cost stickiness, the regression equation in model 5, which was created by using models 2, 3, and 4 together, which was created by Banker et al. (2013) by extending the ABJ method, was utilized.

$$log\left[\frac{C_{i,t}}{C_{i,t-1}}\right] = \beta_0 + \beta_1 \, x \, log\left[\frac{SR_{i,t}}{SR_{i,t-1}}\right] + \beta_2 \, x\left(d_{i,t} \, x \, log\left[\frac{SR_{i,t}}{SR_{i,t-1}}\right]\right) + \varepsilon_{i,t} \qquad (1)$$

In equation; $C_{i,t}$: The cost amount of company (i) in period (t), $C_{i,t-1}$: The cost amount of company (i) in period (t-1), $SR_{i,t}$: Sales revenues of company (i) in period (t), $SR_{i,t-1}$: Sales revenues of company (i) in period (t-1), $d_{i,t}$: Decline dummy variable (di,t = SRi,t< SRi,t-1=1⋀

SRi,t≥ SRi,t-1=0), β_1 : % increase in costs for a 1% increase in sales revenues, $\beta_1+\beta_2$: The level of % decrease in costs against 1% decrease in sales revenues, $\varepsilon_{i,t}$: The observed residuals (error term) in the regression model.

In the regression model, logarithmic transformations provide a simple interpretation of the coefficients. The dummy variable (d) added to the model was created by assigning a value of 1 when there is a decrease in sales revenues compared to the previous period and 0 when there is no increase or change. Thus, when the dummy variable (d) takes the value 0 when there is an increase in sales revenues, the coefficient β1 measures the percentage increase in costs caused by a 1% increase in sales revenues, while when the dummy variable (d) takes the value 1 when there is a decrease in sales revenues, the sum of the coefficients β1 and β2 measures the percentage decrease in costs in case of a 1% decrease in sales revenues. As a result of the analysis, when β1 = 1 and β2 = 0, it is accepted that the traditional theory is valid, i.e. there is a symmetric relation between sales and costs; when β1>0 and β2<0, it is accepted that the cost stickiness theory, i.e. there is an asymmetric relationship between sales and costs; when β1>0 and β2>0, it is accepted that there is "anti-stickiness" (Anderson et al., 2003: 51-53).

$$\Delta InC_{i,t} = a_0 + a_{1,i,t} \times \Delta InSR_{i,t} + a_{2,i,t} \times d_{i,t} \times \Delta InSR_{i,t} + \varepsilon_{i,t} \quad (2)$$

In equation; $\Delta In\ C_{i,t}$: Logarithmic change in the cost amount of company (i) in period (t), $\Delta InSR_{i,t}$: Logarithmic change in sales revenue of company (i) in period (t), $d_{i,t}$: Decline dummy variable (di,t=$SR_{i,t}$<$SR_{i,t-1}$=1⋀ $SR_{i,t}$≥$SR_{i,t-1}$=0), $a_{1,i,t}$: Percentage increase in costs for a 1% increase in sales, $a_{2,i,t}$: Cost stickiness coefficient, the degree of asymmetry in cost behavior (stickiness when it takes a negative value, non-stickiness when it takes a positive value), $a_{1,i,t} + a_{2,i,t}$: Represents the percentage decrease in costs for a 1% decrease in sales.

The coefficients a_1 and a_2 in model 2 are determined as a function of country-level explanatory variables, company-level control variables, and country-level random effects. In this context, the equations established to determine the slopes of the coefficients a_1 and a_2 in the model are shown in models 3 and 4:

$$a_{1,i,t} = \beta_1 + \beta_3 EPU_t + \beta_4 EYear + \beta_5 EG_t + \beta_6 AI_{i,t} + \beta_7 LEV_{i,t} + \beta_8 DI_{i,t} + v_{1,i,t} \quad (3)$$

$$a_{2,i,t} = \beta_2 + \beta_9 EPU_t + \beta_{10} EYear + \beta_{11} EG_t + \beta_{12} AI_{i,t} + \beta_{13} LEV_{i,t} + \beta_{14} DI_{i,t} + \beta_{15} SD_{i,t} + v_{2,i,t} \quad (4)$$

In equation; EPU : Economic Policy Uncertainty (to measure Macroeconomic Uncertainty), EYear : Election Year (election years 1, other years 0), $EG_{i,t}$: Economic Growth Percentage change in the real GDP of company (i) during period (t), $AI_{i,t}$: Total Assets of company (i) in period (t), $LEV_{i,t}$: Financial Leverage Ratio of company (i) in period (t), $DI_{i,t}$: Debt Intensity of company (i) in period (t), $SD_{i,t}$: Successive Decrease dummy variable ($SD_{i,t}$ = $SR_{i,t}$< $SR_{i,t-1}$< $SR_{i,t-2}$=1 ⋀ $SR_{i,t}$< $SR_{i,t-1}$< $SR_{i,t-2}$≠ 0), $v_{1,i,t}$ and $v_{2,i,t}$: Random effects.

In the Extended ABJ Method, which combines models 2, 3 and 4, cost stickiness is determined by the regression equation shown in model 5:

$$\Delta InM_{n,i,t} = \beta_0 + (\beta_1 + \beta_3 EPU_t + \beta_4 EYear + \beta_5 EG_t + \beta_6 AI_{i,t} + \beta_7 LEV_{i,t} + \beta_8 DI_{i,t}) * \Delta InSR_{i,t} + (\beta_2 + \beta_9 EPU_t + \beta_{10} EYear + \beta_{11} EG_t + \beta_{12} AI_{i,t} + \beta_{13} LEV_{i,t} + \beta_{14} DI_{i,t} + \beta_{15} SD_{i,t})\ x\ d_{i,t} \times \Delta InSR_{i,t} + \varepsilon_{i,t} \quad (5)$$

Since the variables considered in β9,..., β15 in the model are included in the model by multiplying by the decrease dummy variable (d), when the calculated β coefficient takes a positive (negative) value, it decreases (increases) the level of cost stickiness.

In the estimation of the regression model using the Least Squares method in panel data analysis, the presence of heteroskedasticity, autocorrelation, non-normal distribution and correlation between units may result in inconsistencies in the model estimation results, given that the variance of the error term is not equal to the unit matrix. It is therefore necessary to eliminate these inconsistencies by smoothing the standard errors without affecting the parameter estimates. This can be achieved by obtaining robust standard errors and estimating them accordingly (Yerdelen Tatoğlu, 2013: 242). Considering the aforementioned considerations pertaining to heteroskedasticity, autocorrelation, non-normal distribution, insignificant R^2 values and correlation between units, the present study employs robust estimators.

The categorical classification and calculation methods of the variables utilized in the study are shown in Table 2 below:

Table 2. Categorical Classification of Variables Used in the Study and Calculation Methods

Dependent Variables	**Code**	**Calculation Method**
Cost of Sales	CoS	$CoS_{i,t} = ln\left(\frac{CoS_{i,t}}{CoS_{i,t-1}}\right)$
General Administrative Expenses	GAE	$GAE_{i,t} = ln\left(\frac{GAE_{i,t}}{GAE_{i,t-1}}\right)$
Marketing, Sales, and Distribution Expenses	MSDE	$MSDE_{i,t} = ln\left(\frac{MSDE_{i,t}}{MSDE_{i,t-1}}\right)$
Operating Expenses	OpE	$OpE_{i,t} = ln\left(\frac{OpE_{i.t}}{OpE_{i,t-1}}\right)$
Total Cost	TC	$TC_{i,t} = ln\left(\frac{TC_{i,t}}{TC_{i,t-1}}\right)$
Number of Employees	NoE	$NoE_{i,t} = ln\left(\frac{NoE_{i,t}}{NoE_{i,t-1}}\right)$
Independent Variables	**Code**	**Calculation Method**
Economic Policy Uncertainty	EPU	$EPU = \frac{1}{4}\sum_{q=1}^{4} WUI_{q,t}$
Election Year	EYear	Election years 1, other years 0
Economic Growth	EG	$EG_{n,t} = ln\left(\frac{GDP_t}{GDP_{t-1}}\right)_n$
Asset Intensity	AI	$AI_{i,t} = ln\left(\frac{Total\ Assets_{i,t}}{Sales\ Revenue_{i.t}}\right)$
Financial Leverage Ratio	LEV	$LEV_{i,t} = ln\left(\frac{Total\ Liabilities_{i.t}}{Total\ Assets_{i.t}}\right)$
Debt Intensity	DI	$DI_{i,t} = ln\left(\frac{Total\ Liabilities_{i,t}}{Sales\ Revenue_{i.t}}\right)$
Successive Decrease	SD	SD variable serves to identify consecutive sales downturns. It is a dummy variable set to 1 if sales revenues fall for two consecutive periods, and 0 otherwise.

The EPU indicator was employed as a proxy for macroeconomic uncertainty, using data obtained from the WUI. As WUI data is reported on a quarterly basis, it was aggregated to an annual frequency to ensure consistency with the annual firm-level data. This was achieved by

calculating the arithmetic means of the four quarters for each year. Thus, the annual EPU variable is calculated as shown in Table 2. In equation; EPU_t: Economic Policy Uncertainty for year t (Annual variable), $WUI_{q,t}$: World Uncertainty Index value for the q-th quarter of year t, q: The quarter (ranging from 1 to 4), t: The year.

5.3. Estimation Method

This study employs panel data analysis to examine the impact of macroeconomic uncertainties on cost stickiness. Panel data analysis combines time-series and cross-sectional data, controlling for unobserved firm-level heterogeneity and providing efficient estimates (Baltagi, 2005: 4-5; Gujarati, 2004: 637-638).

The dataset constitutes a balanced micro panel comprising 1,695 observations from 113 continuously operating BIST manufacturing sector firms from 2007 to 2022. Panel data literature suggests that applying unit root tests regarding the stationarity of variables is not mandatory in micro panel datasets where the cross-sectional dimension exceeds the time dimension (N > T) (Baltagi, 2013: 175; Wooldridge, 2002: 175). Consequently, considering that the cross-sectional dimension (N=113) exceeds the time dimension (T=15), a micro panel data approach was adopted; the series were assumed to be stationary, and unit root tests were not performed.

Various approaches exist for cross-sectional dependence testing in micro panels. Baltagi (2005) emphasizes that micro panels primarily aim to analyze within-firm variation and control for unobserved firm-specific effects (Baltagi, 2005: 11–13). Accordingly, given the study's focus and data structure, additional tests for cross-sectional dependence were not included in the analysis.

Consistent with the cost stickiness literature, the Ordinary Least Squares (OLS) estimation method was initially adopted for model estimation. For OLS to yield valid and efficient estimates, certain assumptions regarding error terms must be held. These assumptions include homoscedasticity, no autocorrelation, normality, and no cross-sectional correlation (Gujarati and Porter, 2010: 83–90; Yerdelen Tatoğlu, 2013: 240–242). Diagnostic tests reveal violations of these assumptions; therefore, robust standard errors were used to address these issues without altering parameter estimates. Robust estimators provide reliable standard errors and test statistics while preserving OLS coefficients, particularly when heteroskedasticity and autocorrelation coexist (Yerdelen Tatoğlu, 2013: 242–244). Thus, we report results based on robust standard errors rather than classical OLS.

Cost stickiness analysis may encounter endogeneity due to the potential simultaneous determination of sales and costs. However, standard cost stickiness models define sales effects on costs through within-firm variation, relying on panel data approaches (Anderson et al., 2003). This study follows this approach, employing robust standard errors to enhance statistical reliability.

5.4. Empirical Results

This section first presents descriptive statistics for the model variables and then reports the empirical findings. Descriptive statistics for the data appear in the Descriptive Statistics tables (Table 3 and 4). Table 5 presents findings on cost stickiness for cost of sales (CoS), general

administrative expenses (GAE), marketing/selling/distribution expenses (MSDE), operating expenses (OpE), total costs (TC), and number of employees (NoE). Finally, Table 6 reports findings on macroeconomic factors influencing stickiness levels across cost categories.

Table 3 shows that changes in CoS, MSDE, and TC are similar and highest in magnitude. OpE changes rank second, followed by GAE. NoE changes rank last, with the lowest average value. These results suggest that CoS, MSDE, and TC increased from the previous period. OpE ranks second, GAE third, and NoE last.

Table 3. Descriptive Statistics of the Dependent Variables

	CoS	GAE	MSDE	OpE	TC	NoE
Mean	1.257363	1.202255	1.258671	1.218659	1.251175	0.009955
Median	1.156276	1.140938	1.149060	1.139576	1.156718	0.001300
Maximum	5.966702	3.986097	10.22108	8.478548	6.868888	2.335400
Minimum	0.130280	0.355985	0.072924	0.187565	0.259483	-3.332200
Std. Dev.	0.449795	0.361021	0.620570	0.424686	0.425674	0.230928
Observations	1695	1695	1695	1695	1695	1695

Table 4 shows that the average sales revenue change ratio (CiSR) is 1.26, while the sales decrease dummy (D) averages 0.20, indicating that %20 of observations experienced sales decreases. EPU averages 0.32, ranging from 0.15 to 0.71. The parliamentary and presidential election years (EYear) comprise 26% of the sample. Average GDP growth (EG) from 2007 to 2022 is 4.89%. The maximum GDP growth ranges from -4.82% to 11.35%. Average asset intensity (AI) is 1.40, indicating that assets exceed sales revenue. Average financial leverage (LEV) is 0.56, and debt intensity (DI) is 0.74. These findings suggest high debt intensity in manufacturing companies, with correspondingly elevated financial leverage. The successive decrease dummy (SD) variable averages 0.04, indicating that 4% of observations involve two consecutive sales decreases.

Table 4. Descriptive Statistics of the Independent Variables

	CiSR	D	EPU	EYear	EG	AI	LEV	DI	SD
Mean	1.263	0.208	0.322	0.267	4.893	1.408	0.557	0.737	0.046
Median	1.160	0.000	0.294	0.000	4.940	1.157	0.539	0.576	0.000
Maximum	10.96	1.000	0.710	1.000	11.350	13.745	5.975	9.045	1.000
Minimum	0.250	0.000	0.152	0.000	-4.820	0.127	0.027	0.025	0.000
Std. Dev.	0.494	0.406	0.141	0.442	4.151	1.128	0.427	0.750	0.210
Observations	1695	1695	1695	1695	1695	1695	1695	1695	1695

F-statistics in Table 5 indicate that all models are statistically significant overall. R^2 values are at acceptable levels for panel data analysis. Although Durbin-Watson statistics do not indicate severe autocorrelation, we employ robust standard errors to address potential assumption violations given the panel structure.

For Model 1 (CoS), $\beta 1 > 0$ and $\beta 2 < 0$, indicating cost stickiness. According to the results a 1% sales increase raises cost of sales by 0.96%, while a 1% sales decrease reduces it by only 0.79%.

For Model 2 (GAE), $\beta1 > 0$ and $\beta2 < 0$, indicating cost stickiness. According to the results a 1% sales increase raises general administrative expenses by 0.53%, while a 1% sales decrease reduces general administrative expenses by only 0.08%.

For Model 3 (MSDE), $\beta1 > 0$ and $\beta2 < 0$, indicating cost stickiness. According to the results A 1% sales increase raises these expenses by 0.76%, while a 1% decrease reduces them by only 0.47%.

For Model 4 (OpE), $\beta1 > 0$ and $\beta2 < 0$, indicating cost stickiness. According to the results A 1% sales increase raises operating expenses by 0.66%, while a 1% decrease reduces them by only 0.25%.

For Model 5 (TC), $\beta1 > 0$ and $\beta2 < 0$, indicating cost stickiness. According to the results A 1% sales increase raises total costs by 0.92%, while a 1% decrease reduces them by only 0.65%.

For Model 6 (NoE), $\beta1 > 0$ and $\beta2 > 0$, indicating anti-stickiness.

Table 5. Cost Stickiness in the BIST Manufacturing Sector

	MODELS					
	(1) CoS	**(2) GAE**	**(3) MSDE**	**(4) OpE**	**(5) TC**	**(6) NoE**
β_0 (Constant)	0.0002	0.0350***	0.0110	0.0219**	0.0044	0.0044
	(0.0334)	(5.3025)	(1.0919)	(3.0892)	(0.8780)	(0.5283)
β_1 ln(ΔSR)	0.9591***	0.5281***	0.7565***	0.6647***	0.9180***	0.0785**
	(48.2281)	(20.8951)	(19.6296)	(32.5418)	(63.8638)	(3.8885)
β_2 d*ln(ΔSR)	-0.1669**	-0.4458***	-0.2880**	-0.4106***	-0.2686**	0.2548**
	(-1.2092)	(-4.6548)	(-2.1990)	(-7.5722)	(-2.3586)	(1.9732)
R^2	0.88	0.26	0.34	0.43	0.86	0.04
Adjusted R^2	0.88	0.26	0.34	0.43	0.86	0.04
Durbin-Watson	2.3831	2.3282	2.2006	2.2841	2.2895	2.0506
F	6213.851***	294.802***	435.330***	637.858***	5383.122***	36.863***

Note: ***, **, * denote significance at 1%, 5% and 10% level of significance respectively and ( ) denotes the t-statistic value. In model estimation, robust estimator is used in the presence of autocorrelation and heteroscedasticity.

The results of the analysis of the models developed to identify the macroeconomic uncertainties affecting the level of price stickiness are presented in Table 6. For Model 7 (CoS with all variables), $\beta1 > 0$ and $\beta2 < 0$, indicating that cost stickiness persists. A 1% sales increase raises cost of sales by 0.92%, while a 1% decrease reduces it by 0.80%, yielding a stickiness level of 0.12%. EPU ($\beta9 < 0$) and asset intensity ($\beta12 < 0$) increase cost of sales stickiness, while election years ($\beta10 > 0$), financial leverage ($\beta13 > 0$), debt intensity ($\beta14 > 0$), and successive decreases ($\beta15 > 0$) decrease it. Economic growth ($\beta11 > 0$, $p = 0.523$) has no significant effect on the cost of sales stickiness.

For Model 8 (GAE with all variables), $\beta1 > 0$ and $\beta2 < 0$, indicating persistent cost stickiness. A 1% sales increase raises general administrative expenses by 0.54%, while a 1% decrease reduces them by only 0.16%, yielding a stickiness level of 0.38%. EPU ($\beta9 < 0$), economic growth ($\beta11 < 0$), and asset intensity ($\beta12 < 0$) increase general administrative expense stickiness, while election years ($\beta10 > 0$), financial leverage ($\beta13 > 0$), debt intensity ($\beta14 > 0$), and successive decreases ($\beta15 > 0$) decrease it.

Table 6. Macroeconomic Uncertainties Affecting the Level of Cost Stickiness in the BIST Manufacturing Sector

	MODELS					
	(7) CoS	**(8) GAE**	**(9) MSDE**	**(10) OpE**	**(11) TC**	**(12) NoE**
β0 (Constant)	0.0092**	0.0497***	0.0124	0.0358***	0.0149***	-0.0019
	(3.0032)	(7.1182)	(1.2492)	(5.5260)	(5.0893)	(-0.2403)
β1 In(ΔSR)	0.9237***	0.5405***	0.7518***	0.6775***	0.9100***	0.0766
	(20.4988)	(5.2040)	(6.0497)	(7.3777)	(24.4183)	(1.0065)
β2 d*In(ΔSR)	-0.1207*	-0.3848**	-0.0992**	-0.2363**	-0.0602*	-0.0264
	(-1.3879)	(-2.1355)	(-0.3676)	(1.2194)	(-0.7403)	(-0.1648)
β3 In(ΔSR)*EPU	0.1210**	0.4039**	0.0316**	0.2721**	-0.1154**	-0.1000
	(1.2879)	(1.4881)	(0.0889)	(1.0328)	(-1.0958)	(-0.5131)
β4 In(ΔSR)*EYear	-0.0880***	-0.2375***	0.0748**	-0.1505**	-0.0263**	0.1616**
	(-5.3794)	(-4.5666)	(0.9644)	(-3.0260)	(-1.4640)	(3.2416)
β5 In(ΔSR)*EG	0.0048	-0.0083**	0.0055	-0.0070*	0.0098***	0.0024
	(1.6324)	(-1.2201)	(0.6784)	(-1.1315)	(4.2319)	(0.4921)
β6 In(ΔSR)*AI	0.3515***	1.4051***	1.1320***	-1.5736***	-0.0138	-0.0500
	(4.4547)	(8.9838)	(5.2326)	(-10.4553)	(-0.2132)	(-0.0419)
β7 In(ΔSR)*LEV	-0.3000***	-1.2268***	-1.0855***	-1.3861***	0.1022*	-0.0623
	(-4.5388)	(-9.4342)	(-6.2544)	(-10.4627)	(1.8539)	(-0.0522)
β8 In(ΔSR)*DI	0.3584***	1.3471***	1.1688***	1.4731***	-0.0463	0.0516
	(6.1379)	(10.258)	(6.7599)	(11.4960)	(-0.8710)	(0.0432)
β9 d*In(ΔSR)*EPU	-0.6192**	-0.1339**	-1.2603	-0.7621**	-0.1939*	0.4077
	(-1.9623)	(-0.2277)	(-1.6026)	(-1.2632)	(-0.5839)	(0.7805)
β10 d*In(ΔSR)*EYear	0.3194**	0.0914*	0.1375**	0.3195**	0.0674*	0.4053**
	(2.6715)	(0.5194)	(0.4539)	(1.5750)	(0.4478)	(2.6025)
β11 d*In(ΔSR)*EG	0.0050	-0.0108*	0.0255	0.0100*	-0.0124*	-0.0234**
	(0.6385)	(-0.6636)	(0.8387)	(0.4481)	(-1.7406)	(-1.7467)
β12 d*In(ΔSR)*AI	-4.6605***	-3.3575***	-4.8299***	-4.0939***	-3.9927***	0.3006
	(-8.8491)	(-7.8014)	(-6.4115)	(-8.9877)	(-9.4407)	(0.2250)
β13 d*In(ΔSR)*LEV	4.7717***	3.3256***	4.6918***	4.0735***	4.1302***	0.3169
	(8.9571)	(7.9140)	(6.5593)	(8.65844)	(9.8586)	(0.2378)
β14 d*In(ΔSR)*DI	4.7615***	3.3599***	4.9899***	4.1802***	4.1225***	-0.3991
	(8.8368)	(7.8903)	(6.9805)	(8.9999)	(9.9962)	(-0.2994)
β15 d*In(ΔSR)*SD	0.3745***	0.4291**	0.3465	0.5233**	0.3616***	0.3883**
	5.2479	(3.3005)	(1.4262)	(3.2310)	(5.0707)	(3.3647)
R2	0.92	0.30	0.36	0.47	0.90	0.07
Adjusted R2	0.91	0.29	0.36	0.46	0.90	0.06
Durbin-Watson	2.5053	2.3650	2.1860	2.306952	2.442336	1.993372
F	1216.000***	46.961***	63.827***	98.892***	980.429***	8.510***

Note: ***, **, * denotes significance at 1%, 5% and 10% significance level respectively and ( ) denotes t-statistic. In model estimation, robust estimator is used in the presence of autocorrelation and heteroscedasticity.

For Model 9 (MSDE with all variables), $\beta1 > 0$ and $\beta2 < 0$, indicating persistent cost stickiness. A 1% sales increase raises these expenses by 0.75%, while a 1% decrease reduces them by only 0.65%, yielding a stickiness level of 0.10%. Asset intensity ($\beta12 < 0$) increases stickiness in these expenses, while election years ($\beta10 > 0$), financial leverage ($\beta13 > 0$), and debt intensity ($\beta14 > 0$) decrease it. EPU ($\beta9 < 0$, $p = 0.109$), economic growth ($\beta11 > 0$, $p = 0.402$), and successive decreases ($\beta15 > 0$, $p = 0.154$) have no significant effect on stickiness in these expenses.

For Model 10 (OpE with all variables), $\beta1 > 0$ and $\beta2 < 0$, indicating persistent cost stickiness. A 1% sales increase raises operating expenses by 0.68%, while a 1% decrease reduces them by only 0.44%, yielding a stickiness level of 0.24%. EPU ($\beta9 < 0$) and asset intensity ($\beta12 < 0$) increase operating expense stickiness, while economic growth ($\beta11 > 0$), election years ($\beta10$

> 0), financial leverage (β13 > 0), debt intensity (β14 > 0), and successive decreases (β15 > 0) reduce it.

For Model 11 (TC with all variables), β1 > 0 and β2 < 0, indicating persistent cost stickiness. A 1% sales increase raises total costs by 0.91%, while a 1% decrease reduces them by only 0.85%, yielding a stickiness level of 0.06%. EPU (β9 < 0), economic growth (β11 < 0), and asset intensity (β12 < 0) increase total cost stickiness, while election years (β10 > 0), financial leverage (β13 > 0), debt intensity (β14 > 0), and successive decreases (β15 > 0) decrease it.

Model 12 is statistically significant (F = 8.510), but macroeconomic variable effects are statistically insignificant.

6. Discussion and Conclusions

The manufacturing sector, encompassing numerous sub-sectors and maintaining commercial relations with other sectors, is economically vital. Given its substantial economic contributions, manufacturing can be considered a leading sector. Effective planning and cost management are critical success factors for sector firms. As in all sectors, costs affect financial performance. Cost behavior related to activity changes also determines future financial performance. Understanding cost behavior is therefore important for managers, investors, and shareholders. Especially the managers who will make decisions on the company's behalf for the future of the company should know and predict the results of this behavior. Recent research indicates that the relationship between operating volume and cost is asymmetric (sticky) rather than linear as traditionally assumed.

This study examines the impact of macroeconomic uncertainties on cost stickiness using panel data analysis of 113 BIST-listed manufacturing companies from 2007 to 2022. To determine whether cost behavior is sticky across six cost elements, cost of sales, general administrative expenses, marketing/selling/distribution expenses, operating expenses, total costs, and employee numbers, we first estimate six models using the ABJ method (Models 1–6), then six additional models using the extended ABJ method (Models 7–12) to identify macroeconomic factors affecting stickiness. the stickiness of these cost elements. All estimations use robust standard errors to address potential assumption violations.

Results from the six ABJ models, established according to the ABJ method put forward by Anderson et al. (2003), indicate that cost stickiness holds for all cost elements except employee numbers, which exhibit anti-stickiness. It has been observed that cost stickiness characterizes both manufacturing and non-manufacturing functions of manufacturing companies. Stickiness is highest for general administrative expenses and lowest for cost of sales. This suggests that administrative costs are more difficult to control, reduce, or are not prioritized.

Cost of sales results indicate inflexible downward adjustment due to high adjustment costs from material usage, labor intensity, and inventory levels. This finding is consistent with Weidenmier and Subramaniam (2003), Çelik and Kök (2013), Subramaniam and Watson (2016), Öztürk and Zeren (2016), Karabayır (2019), Karadeniz et al. (2019), and Elden Ürgüp (2022), but diverges from Bengü and Fidancan (2020), Dalla Via and Perego (2014), Kaçar and Demirci (2022), and Nassirzadeh et al. (2013) who argue for traditional cost behavior.

General administrative expenses exhibit more pronounced cost stickiness. The prevalence of fixed expenses, personnel salaries, rent, and depreciation prevents proportional cost reduction during sales declines. These results align with Anderson et al. (2003), Elden Ürgüp (2022), Hacıhasanoğlu and Dalkılıç (2018), He et al. (2010), Karabayır (2019), Subramaniam and Watson (2016), and Yükçü and Özkaya (2011); however, they contradict Bengü and Fidancan (2020), Dalla Via and Perego (2014), and Zanella et al. (2015), who support traditional cost behavior.

Marketing, selling, and distribution expenses also exhibit asymmetric cost behavior. High fixed costs from logistics infrastructure, warehouses, distribution vehicles, and sales channels impede rapid reduction during demand contractions. These findings are compatible with Anderson et al. (2003), Elden Ürgüp (2022), He et al. (2010), Karabayır (2019), Subramaniam and Watson (2016), and Yükçü and Özkaya (2011) while differing from the findings of Bengü and Fidancan (2020), Dalla Via and Perego (2014), and Zanella et al. (2015).

Operating expenses, which include R&D, marketing, and general administrative expenses, also exhibit cost stickiness. The scope of non-production functions and the difficulty of reducing associated costs in the short term create asymmetric behavior. These results parallel Calleja et al. (2006), Yükçü and Özkaya (2011), but contrast with Dalla Via and Perego (2014) and Kaçar and Demirci (2022).

Finally, total costs also exhibit cost stickiness. Their asymmetrical response to sales changes reflects the combined effect of diverse cost components. These results are consistent with Weidenmeir and Subramaniam (2003), Subramaniam and Watson (2016), Pamplona et al. (2016), Ibrahim and Ezat (2017), and Maquiaveli et al. (2022).

Results from the six extended ABJ models, established according to the extended ABJ method proposed by Banker et al. (2013), indicate that cost stickiness persists across all cost elements except employee numbers. Macroeconomic uncertainty (electoral and economic policy), firm-specific factors (asset and debt intensity, financial leverage, successive decreases), and macroeconomic factors (economic growth) differentially affect stickiness across cost elements. However, although the employee number model is statistically significant, most parameters are insignificant.

The finding that EPU increases cost of sales stickiness contradicts Jin and Wu (2021) but supports He et al. (2010), Yükçü and Özkaya (2011), and Li et al. (2020). Additionally, the finding that elections reduce the cost of sales stickiness contradicts Ola et al. (2018) and Lee et al. (2020).

The finding that EPU increases stickiness in general administrative expenses, operating expenses, and total costs is inconsistent with Jin and Wu (2021) but consistent with Li et al. (2020). The finding that elections reduce stickiness in general administrative expenses, operating expenses, marketing/selling/distribution expenses, and total costs also contradicts Ola et al. (2018) and Lee et al. (2020).

The effects of extended ABJ model variables on cost stickiness are as follows:

EPU increases stickiness in cost of sales, general administrative expenses, operating expenses, and total costs within the BIST manufacturing sector. This suggests that during uncertain periods, managers may delay cost adjustments due to unclear future expectations and unpredictable uncertainty duration. This aligns with research suggesting more rigid cost behavior during volatile periods.

Conversely, election years reduce stickiness across all major cost categories. This reflects managerial prudence: faced with potential post-election power transitions or contractionary policies, managers proactively reduce costs.

Economic growth increases stickiness in general administrative expenses and total costs but reduces it in operating expenses. During growth periods, managerial optimism and desire to avoid resource depletion increase stickiness, particularly in general administrative expenses. However, the inverse effect on operating expenses indicates that managers can adjust non-production costs more rapidly.

Asset intensity increases stickiness across all cost categories. This indicates that reliance on high adjustment-cost assets (inventory, labor, tangible fixed assets) impedes rapid cost reduction during demand contractions. Furthermore, high fixed asset proportions reinforce stickiness through maintenance, repair, and disposal costs.

Both debt intensity and financial leverage reduce stickiness across all major cost categories. Rising leverage creates fiscal discipline pressure from debt obligations and constrains free cash flow, incentivizing efficient cost management. Consequently, financial pressure accelerates cost adjustments, reducing stickiness.

Finally, successive sales decreases reduce stickiness in cost of sales, general administrative expenses, operating expenses, and total costs. Consecutive declines serve as a strong signal to managers that the drop in demand may be permanent. This perception prompts the divestment of slack resources and accelerates cost adjustments.

Considering the managerial and behavioral preferences of managers as well as the specific characteristics of companies, macroeconomic factors that differ according to each country and the uncertainties they create, many dynamic factors can be mentioned that cause companies to have sticky costs. Understanding cost stickiness causes is important for sustainable profitability. Based on these results, to reduce or eliminate potential negative effects, firms should incorporate macroeconomic and sectoral factors into sales and cost forecasts. Additionally, corporate governance mechanisms should monitor managerial behavior; maintain a balance between resource adjustment and retaining idle resources; recognize that resource retention or reduction affects profitability; and outsource high adjustment-cost assets when necessary. Managers should also consider macroeconomic and firm-level uncertainties when making cash flow decisions (receivables collection, debt payment, etc.).

Related to this issue, studies can be conducted in different sectors in the BIST, in sectors outside the BIST, where the data set is further expanded, and elections are also included separately, with an emphasis on sectoral differences and cross-country comparisons. This will provide more information on the subject and give a more thorough explanation of cost stickiness and the influence of macroeconomic variables and uncertainties on cost stickiness.

Declaration of Research and Publication Ethics
This study which does not require ethics committee approval and/or legal/specific permission complies with the research and publication ethics.

Researcher's Contribution Rate Statement
The authors declare that they have contributed equally to the article.

Declaration of Researcher's Conflict of Interest
There are no potential conflicts of interest in this study.

Declaration of Use of Generative Artificial Intelligence
During the preparation of this study, the author(s) used the DeepL Translator and DeepL Write tools to improve language and readability. After using these tools, the content was reviewed and edited as necessary; the author(s) assumed full responsibility for the content of the published article.

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