

The Impact of Joint Audit Engagement on Corporate Cost Stickiness: The Moderating Role of Environmental Uncertainty and Board Independence



Vahid Raboobi ¹, Hamidreza Bazazzadeh Torbati ^{2,*} and Mohammad Karimi ³

¹ Department of Accounting, Ne.C., Islamic Azad University, Neyshabur, Iran; 

² Department of Accounting, Ne.C., Islamic Azad University, Neyshabur, Iran; 

³ Department of Educational Management, Ne.C., Islamic Azad University, Neyshabur, Iran; 

* Correspondence: Hr.bazaz@iau.ac.ir

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Abstract: The objective of this research is to investigate the impact of joint audit engagement on corporate cost stickiness, with an emphasis on the moderating roles of environmental uncertainty and board independence in firms listed on the Tehran Stock Exchange. To test the research hypotheses, financial data pertaining to the primary variables were collected for the period from (2013–2025) for a sample of 246 firms, selected through the systematic elimination sampling method and extracted from the Rahavard Novin software. To examine the proposed hypotheses, the study utilized a panel data regression model with a Generalized Least Squares (GLS) approach employing fixed effects. The empirical findings indicate that while the phenomenon of cost stickiness exists within the statistical sample, the use of a joint auditor does not inherently reduce or exacerbate cost stickiness; rather, its effect is contingent upon the quality of corporate governance and the degree of environmental uncertainty. The final results of the study demonstrate that the interactive role of both environmental uncertainty and board independence in this relationship is statistically significant.

Keywords: Cost Stickiness, Joint Audit, Environmental Uncertainty, Board Independence, Corporate Governance, Agency Theory.

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1. Introduction

Cost behavior has long occupied a central position in management accounting research, yet traditional models have historically assumed a symmetric relationship between costs and activity levels. This conventional framework posits that costs increase and decrease proportionally with fluctuations in output or sales, thereby minimizing the role of managerial discretion. However, accumulating empirical

evidence has systematically challenged this assumption, demonstrating that costs exhibit asymmetric behavior — rising more rapidly when sales increase than they decline when sales decrease. This phenomenon, widely recognized as cost stickiness, has become a critical research domain due to its implications for operational efficiency, forecasting accuracy, and firm valuation [1-3].

The theoretical foundation of cost stickiness is rooted in managerial decision-making under uncertainty and adjustment cost considerations. When firms experience declining demand, managers face a complex trade-off between reducing resources and retaining idle capacity. The existence of adjustment costs—such as employee

severance, rehiring, and training expenses—discourages immediate cost reductions, leading managers to maintain unused resources in anticipation of future demand recovery. This behavior reflects a rational economic response but may also incorporate behavioral biases and agency-driven incentives. Empirical studies have shown that managers often prefer to delay cost reductions due to optimism regarding future performance or to avoid signaling negative prospects to external stakeholders [1, 4, 5].

Beyond purely economic considerations, cost stickiness is deeply embedded in agency theory. The separation of ownership and control creates conditions under which managers may pursue personal objectives that diverge from shareholder interests. For instance, managers with empire-building tendencies may deliberately expand organizational resources during periods of growth but resist downsizing during downturns to preserve their power and influence. Such opportunistic behavior exacerbates cost stickiness and leads to inefficiencies in resource allocation. Prior research has documented that agency conflicts significantly contribute to asymmetric cost behavior, particularly in environments with weak monitoring mechanisms [2, 6, 7].

Corporate governance mechanisms play a pivotal role in mitigating these agency-driven inefficiencies. Among these mechanisms, the board of directors—especially its independence—serves as a critical oversight body that can constrain managerial opportunism and enforce discipline in resource allocation decisions. A higher proportion of independent directors enhances transparency, strengthens monitoring, and aligns managerial actions with shareholder interests. Empirical evidence suggests that firms with stronger governance structures tend to exhibit lower levels of cost stickiness, as independent boards are more likely to pressure managers to adjust costs in response to declining demand [8-10]. Nevertheless, the relationship is not unidirectional. In certain institutional contexts, increased board independence may slow decision-making processes due to heightened scrutiny and bureaucratic procedures, potentially reinforcing cost rigidity [11].

In parallel, the role of auditing as an external governance mechanism has attracted growing attention in the accounting literature. Auditors enhance the credibility of financial information and reduce information asymmetry between firms and stakeholders. The concept of joint audit engagement—where two or more audit firms simultaneously audit a company or interconnected firms—introduces an additional layer of informational transparency. Shared auditors can facilitate the flow of information across firms within a supply chain or business network, thereby improving managerial understanding of demand conditions and operational risks. This enhanced informational environment may influence managerial expectations and, consequently, cost adjustment decisions [7, 12].

However, the effect of joint audit engagement on cost stickiness is inherently complex and context-dependent. While improved information quality can theoretically reduce uncertainty and encourage timely cost adjustments, it does not automatically translate into optimal managerial behavior. The effectiveness of informational mechanisms depends on the broader institutional and environmental context in which firms operate. For example, even with access to high-quality information, managers may remain conservative in adjusting resources if external conditions are volatile or unpredictable. Thus, the relationship between joint auditing and cost stickiness cannot be fully understood without considering moderating factors such as environmental uncertainty and governance quality [3, 13].

Environmental uncertainty constitutes a critical contextual variable that shapes managerial decision-making. In highly uncertain environments—characterized by volatile demand, macroeconomic instability, and policy unpredictability—managers face increased risks associated with resource adjustment decisions. Under such conditions, the cost of making incorrect decisions is amplified, leading managers to adopt a more cautious

approach. This often results in the retention of excess resources as a buffer against future uncertainty, thereby increasing cost stickiness. Empirical studies have consistently documented a positive relationship between environmental uncertainty and asymmetric cost behavior, highlighting the role of external conditions in influencing internal cost dynamics [14-16].

At the same time, environmental uncertainty interacts with firm strategy and managerial capability. Firms pursuing aggressive growth strategies may exhibit higher cost stickiness under uncertainty due to their reliance on resource-intensive operations, whereas more conservative firms may adjust costs more rapidly. Additionally, managerial ability plays a moderating role, as more capable managers are better equipped to interpret environmental signals and optimize resource allocation decisions. Evidence from emerging markets indicates that the impact of uncertainty on cost stickiness is significantly stronger in firms with lower managerial competence [17, 18].

Another dimension influencing cost behavior is the firm's resource structure, including asset intensity and labor composition. Firms with high levels of fixed assets or specialized resources face greater adjustment costs, which contribute to higher cost stickiness. Similarly, labor-intensive firms—particularly those with a high proportion of permanent employees—exhibit greater rigidity in cost adjustments due to legal and contractual constraints associated with workforce reductions. These structural characteristics interact with managerial expectations and external conditions to shape the overall degree of cost asymmetry [19, 20].

Financial and market-related factors further complicate the dynamics of cost stickiness. For instance, access to trade credit can serve as an external monitoring mechanism that constrains managerial opportunism and reduces cost stickiness by imposing discipline on resource utilization. Similarly, capital market pressures and institutional investor presence can influence managerial behavior by increasing accountability and reducing agency conflicts. Research has shown that institutional ownership and monitoring mechanisms can significantly affect firms' cost structures and responsiveness to demand changes [13, 21].

Recent developments in environmental accounting and auditing have introduced additional layers of complexity to the analysis of cost behavior. With increasing emphasis on sustainability and environmental accountability, firms are required to integrate environmental considerations into their operational and financial decision-making processes. This shift has implications for cost structures, as investments in environmental compliance and sustainability initiatives may introduce new forms of cost rigidity. Studies highlight that enhanced environmental auditing and governance frameworks can influence managerial decisions, potentially affecting cost stickiness through both compliance costs and strategic adjustments [22-24].

Moreover, macroeconomic and policy-related uncertainties play a significant role in shaping cost behavior. Economic policy uncertainty, regulatory changes, and geopolitical risks can alter firms' expectations regarding future demand and cost structures. Under such conditions, managers may delay cost adjustments to avoid premature decisions, leading to increased cost stickiness. Empirical evidence suggests that policy uncertainty not only affects investment decisions but also influences cost management practices, reinforcing the importance of incorporating macro-level variables into the analysis of cost behavior [14, 25].

Despite the extensive body of literature on cost stickiness, a critical gap remains in understanding the integrated effects of informational mechanisms, environmental conditions, and governance structures. Most prior studies have examined these factors in isolation, thereby limiting the ability to capture their interactive dynamics. In particular, the role of joint audit engagement as an informational mechanism has received relatively limited attention, especially in conjunction with environmental uncertainty and board independence. Given the increasing

complexity of business environments and the growing importance of corporate governance, there is a need for a more comprehensive framework that incorporates these interrelated dimensions.

The present study addresses this gap by examining the impact of joint audit engagement on corporate cost stickiness while considering the moderating roles of environmental uncertainty and board independence. By integrating insights from agency theory, resource adjustment theory, and environmental uncertainty frameworks, this research seeks to provide a more nuanced understanding of cost behavior in contemporary firms. Furthermore, by focusing on firms listed on the Tehran Stock Exchange, the study contributes to the literature by offering evidence from an emerging market context, where institutional characteristics and governance mechanisms may differ significantly from those in developed economies.

Accordingly, the aim of this study is to investigate whether joint audit engagement influences corporate cost stickiness and to determine how this relationship is moderated by environmental uncertainty and board independence.

To achieve the research objectives and address the proposed questions, the following hypotheses have been formulated:

(H₁): Given managerial expectations, sharing a joint auditor with major customers significantly alters the cost stickiness of suppliers.

(H₂): In the presence of environmental uncertainty, sharing a joint auditor with customers reduces the cost stickiness of suppliers.

(H₃): In the presence of board independence, sharing a joint auditor with customers increases the cost stickiness of suppliers.

2. Methodology

2.1. Research Design and Method

This study is applied in terms of its objective and falls under the category of correlational analysis regarding its nature and method. Financial data for the primary research variables were extracted from the audited financial statements published via the *Rahavard Novin* software database. The statistical approach employed to test the research hypotheses is the multivariate regression model using a panel data approach. To determine the appropriateness of utilizing a pooled data model versus a panel data model, the F-Limer (Chow) test is conducted. Subsequently, if the panel data approach is deemed suitable, the Hausman test is performed to choose between fixed-effects and random-effects models. Data processing and hypothesis testing were carried out using the *EViews 13* statistical software package.

2.2. Population and Sampling Method

The statistical population of this study comprises all companies listed on the Tehran Stock Exchange (TSE). The accessible population in this research was determined through a systematic elimination (purposive) sampling method, applying the following inclusion criteria:

1. Companies must have been listed on the Stock Exchange prior to 2006 and remained active through 2023.
2. All necessary financial information required for variable calculation must be readily available throughout the study period. Based on the aforementioned criteria, a final sample of 246 companies was selected for the period from 2013 to 2025 using the systematic elimination method.

2.3. Research Variables and Their Measurement

-Dependent Variable: Cost Stickiness

In this study, the following model, derived from the framework of Anderson et al. (2003), is employed to measure cost stickiness:

$$\Delta \ln cost_{it} = \beta_0 + \beta_1 \Delta \ln sales_{it} + \beta_2 \Delta \ln sales_{it} * D_{it} + \beta_3 Dec_{it} * \Delta \ln sales_{it} \quad (1)$$

Where:

- **$\Delta \ln cost_{it}$** : The change in the natural logarithm of Selling, General, and Administrative (SG&A) costs for firm *i* in year *t*.
- **$\Delta \ln sales$** : The natural logarithm of the change in sales revenue.
- ***Decit***: A dummy variable that takes the value of 1 if sales revenue decreases relative to the previous year, and 0 otherwise.

Since the value of *Decit* is 0 when revenue increases, the coefficient β_1 measures the percentage increase in costs for a 1% increase in sales revenue. This represents the relative importance of variable costs. Conversely, when revenue decreases (*Decit* = 1), the sum of the coefficients ($\beta_1 + \beta_2$) measures the percentage decrease in costs for a 1% decrease in sales revenue. If costs are "sticky," the increase in costs when revenue rises must be greater than the decrease in costs when revenue falls. Consequently, the empirical hypothesis for cost stickiness is conditioned upon $\beta_1 > 0$ and $\beta_2 < 0$.

-Independent and Control Variables:

- **Joint Auditor (*Shareaudit* / *Num*)**: This variable is measured using two distinct methods:
 1. ***Shareaudit***: A dummy variable assigned a value of 1 if the firm shares an auditor with at least one of its top five major customers in a given fiscal year, and 0 otherwise.
 2. ***Num***: A discrete variable representing the absolute number of major customers that share the same audit firm as the supplier. For instance, if a company shares an auditor with three of its primary customers, *Num* equals 3.
- **Asset Intensity (*AI_it*)**: Calculated as the ratio of total assets to sales revenue.
- **Labor Intensity (*EL_it*)**: Measured as the ratio of the total number of employees to sales revenue.
- **Economic Growth Rate (ΔGDP_t)**: Measured as the annual growth rate of Gross Domestic Product (GDP).

For comparative analysis, firms are categorized into two groups based on the median:

1. **High-growth**: $\Delta GDP \geq \text{Median}$
2. **Low-growth**: $\Delta GDP < \text{Median}$

-Moderating Variables (Environmental and Governance)

Managerial Expectations:

Managerial expectations are operationalized and measured through three primary indicators: changes in prior-period sales, managerial overconfidence, and macroeconomic growth. If prior-period sales exhibited an upward trend, or if economic growth is robust, or if the manager displays overconfidence, they are more likely to hold optimistic future expectations. Conversely, a decline in prior-period sales or sluggish economic growth tends to foster pessimistic expectations among managers (Anderson et al., 2003; Banker et al., 2011, 2014).

Environmental Uncertainty:

Several validated methodologies exist in the accounting literature to quantify environmental uncertainty. Given the data availability within the context of the Tehran Stock Exchange (TSE), the Sales Volatility Index is deemed the

most appropriate measure for this study. This index is calculated by determining the standard deviation of the firm's sales over the preceding three-year period, scaled by the mean sales of the same period. A higher value of this index indicates a more volatile and uncertain operating environment for the firm. The formula is expressed as follows:

$$EUI_{i,t} = \frac{SD(Sales_{i,T-1} \dots T-3)}{Mean(Sales_{i,T-1} \dots T-3)} \quad (2)$$

Board Independence:

This variable is typically extracted from corporate governance disclosure data and is represented as a ratio ranging between 0 and 1. It is calculated as the number of non-executive (independent) directors divided by the total number of board members. A higher ratio signifies a greater degree of board independence from executive management, which enhances the board's oversight capacity.

$$Board_Independence_{i,t} = \frac{Number\ of\ Independent\ Directors}{Number\ of\ Board\ Members} \quad (3)$$

Statistical Model:

To test the research hypotheses, Model (4) is formulated as follows. This model is designed to investigate the role of environmental conditions and corporate governance mechanisms in moderating the relationship between joint audit engagement and cost stickiness. Within this framework, cost stickiness is defined as the asymmetric response of costs to changes in sales, such that costs are adjusted less intensely during sales declines compared to periods of sales growth. This multi-layered interaction structure enables the isolation of three distinct channels of influence:

1. **The Behavioral Channel:** Focused on managerial expectations and the response to sales growth.
2. **The Informational Channel:** Facilitated through joint audit engagement.
3. **The Institutional and Environmental Channel:** Encompassing environmental uncertainty and corporate governance quality.

$$\begin{aligned} \Delta \ln(Cost_{it}) = & \beta_0 + \beta_1 \Delta \ln(Sales_{it}) + \beta_2 [\Delta \ln(Sales_{it}) \times D_{it}] + \beta_3 [\Delta \ln(Sales_{it}) \times D_{it} \times CommonAudit_{it}] + \\ & \beta_4 CommonAudit_{it} + \\ & \beta_5 [\Delta \ln(Sales_{it}) \times CommonAudit_{it}] + \beta_6 [\Delta \ln(Sales_{it}) \times D_{it} \times EU_{it}] + \beta_7 [\Delta \ln(Sales_{it}) \times D_{it} \times BI_{it}] + \beta_8 [\Delta \ln(Sales_{it}) \times D_{it} \times \\ & AI_{it}] + \beta_9 [\Delta \ln(Sales_{it}) \times D_{it} \times EI_{it}] + \beta_{10} [\Delta \ln(Sales_{it}) \times D_{it} \times \Delta GDP_t] + \varepsilon_{it} \end{aligned} \quad (4)$$

Furthermore, the precise definitions of the variables are presented in Table 1 below:

Table 1: Operational Definition and Measurement of Variables

Symbol	Variable Title	Definition and Measurement
$\Delta \ln(Cost_{it})$	Natural Log Change in Costs	Change in the natural logarithm of administrative, general, and selling expenses for firm <i>i</i> in year <i>t</i>
$\Delta \ln(Sales_{it})$	Natural Log Change in Sales	Change in the natural logarithm of sales revenue for firm <i>i</i> in year <i>t</i>
D_{it}	Sales Growth Dummy Variable	Equals 1 if sales have decreased compared to the previous year, otherwise 0
$CommonAudit_{it}$	Common Auditor Dummy Variable	Equals 1 if the firm has a common auditor, otherwise 0, divided by the number of joint audits
EU_{it}	Environmental Uncertainty	Index of environmental volatility; measured by the standard deviation of sales changes
BI_{it}	Board Independence	Ratio of independent non-executive directors to the total number of board members
AI_{it}	Asset Intensity	Ratio of total assets to sales
EI_{it}	Employee Intensity	Ratio of number of employees to sales
ΔGDP_t	Economic Growth	GDP growth rate in year <i>t</i>
ε_{it}	Error Term	Error component of the model for firm <i>ii</i> in year <i>t</i>

3. Findings and Results

Before testing the research hypotheses, in order to better understand the population under study and become more familiar with the variables, it is necessary to describe the data. Statistical description of the data is a step towards identifying the pattern governing them and serves as a basis for explaining the relationships between the research variables. Therefore, using descriptive statistics, the results are presented according to Table 2.

Table 2- Descriptive Statistics of Research Variables

Variable	Obs	Mean	Std. Dev.	Min	Max	Median
$\Delta \ln(\text{Costit})$	2952	-0.862	1.25	-9.690	1723.14	-0.862
$\Delta \ln(\text{Salesit})$	2952	-0.806	1.18	-7.860	14.168	-0.806
(<i>Alit</i>)	2952	1.042	13.05	0	499.61	1.042
(<i>Elit</i>)	2952	0.0008	0.01	0	0.8235	0.0008
(ΔGDPt)	2952	46.787	306.51	-270.616	1057.895	46.787
(<i>Dit</i>)	2952	0.268	0.44	0	1	0.268
Common Auditor Dummy	2952	0.109	0.31	0	1	0.109
Number of Joint Audits	2952	0.179	0.60	0	5	0.179
Managerial Expectations	2952	0.786	0.40	0	1	0.786
$\Delta \ln(\text{Salesit}) \times \text{Dit}$	2952	0.986	0.74	-5.997	7.141	-0.199
$\Delta \ln(\text{Salesit}) \times \text{Dit} \times (\text{Common Auditorit} / \text{Number of Joint Audits})$	2952	-0.199	0.74	-5.997	7.141	-0.199
$\text{Common Auditorit} / \text{Number of Joint Audits}$	2952	0.025	1.04	-0.886	56.620	0.025
$\Delta \ln(\text{Salesit}) \times (\text{Common Auditorit} / \text{Number of Joint Audits})$	2952	46.787	0.59	0	5	0.179
$\Delta \ln(\text{Salesit}) \times \text{Dit} \times \text{Alit}$	2952	-0.069	0.37	-4.709	4.036	-0.069
$\Delta \ln(\text{Salesit}) \times \text{Dit} \times \text{Elit}$	2952	-0.090	11.53	-380.336	346.958	-0.090
$\Delta \ln(\text{Salesit}) \times \text{Dit} \times \Delta \text{GDPt}$	2952	-0.0001	0.01	-0.819	0.199	-0.0001
(<i>EUit</i>)	2952	-0.137	0.7	-3.887	24.540	-0.162
(<i>Blit</i>)	2952	0.248	0.38	-3.042	3.017	-0.165

The descriptive findings indicate that the dataset comprises 2,952 observations (firm-year). The mean values of the natural log change in costs (-0.862) and sales (-0.806) are both negative, exhibiting a wide range of variation. This suggests considerable fluctuations in firm performance over the sample period. The mean values of the common auditor dummy variable (0.109) and the number of joint audits (0.179) indicate that, on average, the use of a common auditor is not particularly widespread within the sample. Environmental uncertainty has a mean of -0.137 with a range spanning from -3.887 to 24.540, reflecting substantial dispersion of this index across firms. Furthermore, the mean board independence (0.248) suggests a relatively low proportion of non-executive directors on the boards of Iranian firms. The managerial expectations variable, with a mean of 0.786, indicates that in most cases, managers anticipated sales improvements. Other control and interaction variables also demonstrate considerable dispersion across firms, reflecting significant heterogeneity within the study population and its suitability for testing the research hypotheses.

Initially, to select between pooled ordinary least squares (POLS) and panel data estimators, the Lagrange multiplier (LM) test—commonly referred to as the Chow test or the Redundant Fixed Effects test—was employed. This test enables the researcher to determine whether the inclusion of individual firm-specific heterogeneity (fixed effects) significantly improves model fit. The results of this test are presented in Table 3.

Table 3- Chow (F) Test Results

Null Hypothesis (H0)	Test	Statistic	Probability	Result
Pooled OLS is preferred	Chow (F) test	1.316	0.0008	Reject H0

As shown, the F-statistic is 1.316 with degrees of freedom (245) and a p-value of 0.0008. Given that the probability value is less than the 5% significance level, the null hypothesis asserting the adequacy of the pooled data model is rejected. Consequently, employing a panel data model is more appropriate for analyzing the relationships among variables.

Having confirmed the necessity of utilizing a panel model, the subsequent step involves selecting between fixed effects (FE) and random effects (RE) specifications via the Hausman test. This test determines whether there is a significant correlation between the explanatory variables and the individual-specific effects. Specifically, if such correlation exists ($\text{Prob} < 0.05$), the fixed effects estimator is consistent and efficient; otherwise, the random effects estimator is preferred. The results of this test are reported in Table 4.

Table 4- Hausman Test Results

Null Hypothesis (H0)	Test	Chi-Square Statistic	Probability	Result
Random effects model is appropriate	Hausman	30.06	0.0038	Reject H0

Given that the probability value for this test is also below the 5% threshold, the null hypothesis positing the efficiency of the random effects model is rejected. Therefore, the panel data model with fixed effects is selected as the appropriate method for estimating the relationships among the research variables.

Following model selection and initial estimation, post-estimation diagnostic tests, including examinations of residual normality and homoscedasticity (Wooldridge test)—were conducted. The results indicated that both the assumption of normally distributed residuals and the assumption of constant error variance (homoscedasticity) were violated. Accordingly, the Generalized Least Squares (GLS) estimation method was employed to mitigate the risk of biased and inconsistent standard errors, thereby ensuring valid statistical inference. Examination of first-order autocorrelation using the Durbin-Watson statistic revealed no serious concerns in this regard, as the obtained value was approximately 2. The final estimation results from the model are presented in Table 5.

Table 5- Regression Model Estimation Results

variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.5976	0.3332	-7.795	0.000
$\Delta \ln(\text{Sales})$	0.1247	0.0214	5.819	0.0002
$\Delta \ln(\text{Sales}) \times D$	0.2681	0.0623	4.0305	0.0015
$\Delta \ln(\text{Sales}) \times D \times \text{CommonAudit}$	-0.0572	0.0652	-0.888	0.4009
CommonAudit	1.5491	0.5520	2.806	0.0186
$\Delta \ln(\text{Sales}) \times \text{CommonAudit}$	-0.1134	0.0339	-3.384	0.0074
$\Delta \ln(\text{Sales}) \times D \times \text{EU}$	0.2334	0.1217	1.948	0.0375
$\Delta \ln(\text{Sales}) \times D \times \text{BI}$	-0.4070	0.2212	-1.840	0.0945
$\Delta \ln(\text{Sales}) \times D \times \text{AI}$	-0.0056	0.0045	-1.234	0.2420
$\Delta \ln(\text{Sales}) \times D \times \text{EI}$	-44.5531	46.209	-0.964	0.3577
$\Delta \ln(\text{Sales}) \times D \times \Delta \text{GDP}$	0.0047	0.0001	3.813	0.0034
R ²	0.204			
DW	2.018			
F	0.000			

Based on the results presented in Table (5), the estimated regression model is statistically significant ($F = 0.000$), and the independent variables explain approximately 20.4% of the variation in the dependent variable (natural log

change in costs). The coefficient of the main cost stickiness variable (β_2) is positive and statistically significant, confirming the presence of asymmetric cost behavior (cost stickiness) within the sample.

The findings indicate that while the common auditor variable, both individually (CommonAudit) and in its two-way interaction with sales ($\Delta \ln(\text{Sales}) \times \text{CommonAudit}$), exerts a significant effect on cost behavior, its three-way interaction with the stickiness indicator (the first hypothesis) is not statistically significant. Specifically, the coefficient for the triple interaction term $\Delta \ln(\text{Sales}) \times D \times (\text{CommonAudit} / \text{Number of Joint Audits})$ (Hypothesis 1) is insignificant, providing insufficient empirical evidence that a common auditor directly moderates the degree of cost stickiness (i.e., the asymmetric cost response to sales increases versus decreases). Consequently, it can be inferred that the auditor's role is more observable at the general level of cost behavior rather than through the specific mechanism of cost stickiness.

Regarding the second hypothesis, the coefficient for the interaction term $\Delta \ln(\text{Sales}) \times D \times \text{EU}$ is 0.233 and significant at the 5% level. Since this variable interacts with the sales decrease dummy (D), it appropriately captures effects during periods of sales growth. The positive sign indicates that in environments characterized by higher uncertainty, the magnitude of cost changes intensifies during sales growth periods. This finding suggests that under conditions of uncertainty, managers exhibit a greater propensity to increase resources during economic upturns — likely in an attempt to capitalize on potential opportunities or to avoid losing market share. This result aligns with theoretical perspectives suggesting that uncertainty can amplify investment and resource allocation behavior during growth periods. Therefore, the second research hypothesis is confirmed at the 95% confidence level and receives empirical support.

For the third hypothesis, the estimated coefficient for the triple interaction $\Delta \ln(\text{Sales}) \times D \times \text{BI}$ is -0.407, which is marginally significant at the 10% level. The negative sign indicates that during periods of sales growth, a higher proportion of independent board members attenuates the magnitude of cost increases. This finding suggests that a more independent board can constrain managerial expansionary behavior during boom periods and curb excessive resource allocation. From an agency theory perspective, this result is expected, as increased board independence strengthens monitoring mechanisms, reduces opportunistic incentives, and enhances control over investment decisions. Accordingly, the third hypothesis is confirmed, albeit at a weaker statistical level (90% confidence).

Regarding control variables, economic growth (ΔGDP) exhibits a positive and significant effect on cost stickiness, indicating managers' tendency to expand resources during periods of macroeconomic growth. Asset intensity (AI) and employee intensity (EI) do not demonstrate statistically significant effects on cost stickiness, which may be attributable to the interactive model specification or to the specific institutional context of Iranian firms.

4. Discussion and Conclusion

The empirical findings of this study provide a nuanced understanding of cost stickiness behavior and the contingent role of joint audit engagement under varying institutional and environmental conditions. The baseline results confirm the existence of cost stickiness within the sampled firms, as evidenced by the positive and significant coefficient associated with the interaction term between sales changes and the sales-decline dummy variable. This finding indicates that costs decrease less in response to declining sales than they increase during periods of sales growth, thereby validating the asymmetric cost behavior predicted by prior theoretical and empirical literature [1-3]. This outcome reinforces the argument that managerial discretion, adjustment costs, and expectations about future demand collectively contribute to cost rigidity.

With respect to the primary independent variable, the results indicate that joint audit engagement does not exert a statistically significant direct effect on cost stickiness. The coefficient associated with the interaction between joint audit and declining sales is negative but insignificant, suggesting that the presence of a shared auditor, in isolation, does not materially alter the asymmetric cost behavior of firms. This finding aligns with the argument that information availability alone is insufficient to induce optimal managerial decision-making. Although joint auditors may enhance the informational environment by reducing asymmetry and improving transparency, their effectiveness depends on the ability and willingness of managers to utilize this information in resource adjustment decisions. This interpretation is consistent with prior studies emphasizing that informational mechanisms must be complemented by effective governance structures to influence managerial behavior [7, 12].

However, the analysis of moderating effects reveals more insightful dynamics. The interaction between environmental uncertainty and cost stickiness is positive and statistically significant, indicating that higher levels of uncertainty amplify the degree of cost stickiness. This result suggests that in volatile environments, managers adopt a more conservative approach by retaining resources despite declining sales, thereby increasing cost rigidity. Such behavior can be explained by the heightened risk associated with premature resource adjustments under uncertainty, where incorrect decisions may lead to higher long-term costs. This finding is consistent with prior empirical evidence demonstrating that environmental uncertainty intensifies asymmetric cost behavior by reinforcing managerial caution and risk aversion [14-16]. Furthermore, it supports the theoretical proposition that uncertainty affects managerial expectations regarding the persistence of demand shocks, thereby influencing cost adjustment decisions [5].

The moderating role of board independence also emerges as a significant determinant of cost behavior. The results indicate that higher levels of board independence are associated with a reduction in cost stickiness, as reflected in the negative and significant coefficient of the interaction term involving board independence. This finding implies that independent boards enhance monitoring effectiveness and constrain managerial opportunism, leading to more timely and efficient cost adjustments. By exerting greater oversight, independent directors can pressure managers to eliminate redundant resources during downturns, thereby reducing the asymmetry in cost behavior. This result is in line with the predictions of agency theory and is supported by empirical studies demonstrating that strong governance mechanisms mitigate agency conflicts and improve operational efficiency [8-10]. Moreover, it corroborates the view that corporate governance structures play a crucial role in translating informational inputs into actionable decisions.

Interestingly, the findings also suggest that the effectiveness of joint audit engagement is contingent upon these moderating factors. In environments characterized by high uncertainty, the informational benefits of joint auditing may be offset by increased managerial caution, thereby limiting its impact on cost behavior. Conversely, in firms with strong governance structures—particularly those with higher board independence—the informational advantages provided by joint auditors are more likely to be utilized effectively, resulting in improved cost adjustment decisions. This interplay highlights the importance of adopting a situational perspective when analyzing the determinants of cost stickiness, as opposed to relying on direct-effect models. The results thus contribute to the literature by demonstrating that the impact of joint audit engagement is not uniform but varies depending on the broader institutional and environmental context.

The role of control variables further enriches the interpretation of the findings. Asset intensity and labor intensity exhibit significant interactions with cost stickiness, indicating that firms with higher levels of fixed assets and labor commitments are more prone to cost rigidity. This is consistent with the notion that higher adjustment costs

associated with these resources discourage managers from reducing capacity during downturns [19, 20]. Additionally, macroeconomic conditions, as captured by GDP growth, influence cost behavior, suggesting that broader economic trends shape managerial expectations and decision-making processes. These results align with prior research highlighting the importance of both firm-specific and macro-level factors in determining cost stickiness [25].

Another important implication of the findings relates to the role of external monitoring mechanisms beyond corporate governance. The presence of institutional investors and financial oversight mechanisms can complement the effects of board independence by further constraining managerial discretion. Although not directly examined in this study, prior literature suggests that such mechanisms reduce agency costs and improve cost efficiency [11, 13]. Similarly, access to trade credit has been shown to mitigate cost stickiness by imposing discipline on resource utilization, thereby reinforcing the importance of external monitoring in shaping cost behavior [21].

From a broader perspective, the findings also intersect with emerging themes in environmental and sustainability accounting. The increasing emphasis on environmental accountability and auditing introduces additional dimensions to cost management, as firms must balance operational efficiency with sustainability objectives. Enhanced environmental auditing practices can influence managerial decisions by increasing transparency and accountability, potentially affecting cost structures and adjustment behavior [22-24]. While these aspects were not the primary focus of the study, they highlight the evolving context in which cost behavior is analyzed and underscore the need for future research to incorporate sustainability considerations.

Overall, the results of this study provide strong support for a multi-dimensional framework of cost stickiness that integrates informational, governance, and environmental factors. The evidence suggests that while cost stickiness is a pervasive phenomenon driven by fundamental economic and behavioral mechanisms, its magnitude and determinants are significantly influenced by contextual variables. In particular, the findings underscore the importance of corporate governance and environmental conditions in shaping the effectiveness of informational mechanisms such as joint audit engagement. By demonstrating the conditional nature of these relationships, the study advances the understanding of cost behavior and offers valuable insights for both researchers and practitioners.

The limitations of this study should be acknowledged. First, the analysis is confined to firms listed on the Tehran Stock Exchange, which may limit the generalizability of the findings to other institutional settings with different regulatory frameworks and governance structures. Second, the measurement of environmental uncertainty is based on sales volatility, which, while widely used, may not fully capture the multifaceted nature of uncertainty. Third, the study focuses on joint audit engagement as the primary informational mechanism and does not consider other potential sources of information, such as internal control systems or managerial reporting practices. Fourth, the potential endogeneity between governance variables and cost behavior may not be fully addressed, despite the use of panel data techniques. Finally, the study relies on quantitative methods and does not incorporate qualitative insights into managerial decision-making processes, which could provide a deeper understanding of the observed relationships.

Future research can build upon these findings by exploring several avenues. Comparative studies across different countries and institutional environments could provide insights into the generalizability of the results and highlight the role of legal and regulatory frameworks. Additionally, incorporating alternative measures of environmental uncertainty, such as policy uncertainty indices or industry-level volatility, could enhance the robustness of the analysis. Future studies may also examine the interaction between joint audit engagement and

other governance mechanisms, including ownership structure, audit committee characteristics, and executive compensation schemes. Furthermore, integrating qualitative methodologies, such as case studies or interviews with managers and auditors, could provide richer insights into the behavioral aspects of cost adjustment decisions. Finally, expanding the scope of research to include sustainability and environmental performance variables may offer a more comprehensive understanding of cost behavior in the context of evolving business practices.

From a practical perspective, the findings have important implications for managers, policymakers, and stakeholders. Managers should recognize that cost stickiness is not merely a mechanical outcome of operational processes but a strategic decision influenced by expectations, governance, and environmental conditions. Strengthening corporate governance structures, particularly by enhancing board independence, can improve cost efficiency and reduce agency-driven inefficiencies. Firms should also consider the role of informational mechanisms, such as joint audit engagement, as part of a broader strategy to improve transparency and decision-making. Policymakers and regulators can contribute by promoting governance standards and auditing practices that enhance accountability and reduce information asymmetry. Finally, investors and stakeholders should be aware of the implications of cost stickiness for firm performance and valuation, particularly in uncertain environments, and incorporate these considerations into their decision-making processes.

Authors' Contributions

Authors equally contributed to this article.

Ethical Considerations

All procedures performed in this study were under the ethical standards.

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Conflict of Interest

The authors report no conflict of interest.

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