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RESEARCH ARTICLE

# The Effect of Cost Stickiness on Peer-Based Valuation in Tehran Stock Exchange

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ABSTRACT

This study investigates the effect of cost stickiness, a form of asymmetric cost behavior, on the accuracy of peer-based valuation models. Using 1,356 firm-year observations from companies listed on the Tehran Stock Exchange between 2014 and 2023, we measure cost stickiness with the Weiss (2010) approach and evaluate valuation errors across EBIT, EBT, and net income multiples. Fixed-effects panel regressions with robust standard errors are applied to control for firm-specific heterogeneity. The results show that cost stickiness has a positive and significant impact on valuation errors in all specifications. Firms with higher sticky costs are systematically undervalued, as suppressed earnings bias multiples downward without reflecting true market value. Profitability, firm size, and sales growth reduce valuation errors, while leverage exerts weaker or negative effects. By extending prior evidence from developed markets to an inflationary emerging economy, this study identifies cost stickiness as a systematic driver of mispricing in peer-based models, with important implications for analysts, managers, and regulators.

## Introduction

Understanding the determinants of firm value and accurately estimating that value is of fundamental importance for decision-makers and capital market participants. One of the common approaches in this regard is peer-based valuation (An et al., 2010). In equity markets, this approach compares the financial metrics and performance of a focal firm with those of similar firms operating in the same industry or sector, based on the assumption that such firms share comparable financial characteristics and face similar market conditions. Accordingly, the value of the focal firm is assessed relative to its peers.

Prior research has devoted considerable attention to improving the accuracy of peer-based valuation and has emphasized the importance of comparability between a firm and its peer group. For example, Lie & Lie (2002) and Bhojraj & Lee (2002) recommend incorporating fundamental value drivers when selecting peers. Young & Zeng (2015) focus on the role of accounting comparability among peer firms, and Choi et al. (2019) show that accounting comparability enhances the extent to which firm-specific information is reflected in stock prices.

While peer-based valuation offers notable advantages, it is nonetheless built on assumptions that may, in practice, be influenced by market developments or industry shifts. Hence, investors and analysts should complement quantitative valuation models with qualitative analyses.

The primary value drivers—which ultimately shape economic comparability—are risk, growth, and profitability. Prior studies indicate that these drivers are significantly affected by cost management decisions, particularly in relation to risk and profitability. Recent evidence further suggests that the link between growth and profitability is conditional on firms' cost structures. Lefebvre (2024) shows that under conditions of pronounced cost stickiness, growth can become a strategic liability by depressing short-term profitability during downturns, thereby reducing comparability across peers. However, the question of whether peer-based valuation should explicitly incorporate a firm's cost structure, and more specifically its cost management strategies, has not been directly addressed in the literature. This question forms the starting point of the present study.

This research draws on the literature on cost asymmetry (cost stickiness) to distinguish between different types of managerial cost-related decisions. Unlike the traditional cost model in accounting—which assumes that variable costs (but not fixed costs) change proportionally with activity levels—empirical evidence shows that costs tend to increase more during periods of activity expansion than they decrease during comparable activity contractions (Anderson et al., 2003). This phenomenon challenges the linear view of the relationship between variable costs and output levels and has two important implications for this study: (1) managers actively and deliberately make cost management decisions—such as maintaining unused capacity during sales declines; and (2) these decisions vary across firms, reflecting heterogeneous cost management strategies.

The higher the degree of cost stickiness—often driven by the cost of idle capacity—the greater the temporary reduction in current income measures such as EBIT or net income, thereby limiting the ability of earnings to reflect a firm's true economic value. Consequently, firms that are otherwise similar may appear dissimilar in terms of profitability (or vice versa), and ignoring such differences in peer-based

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valuation inevitably leads to valuation bias. Moreover, cost stickiness can signal managerial optimism about a firm's prospects; thus, disregarding it diminishes economic comparability.

Accordingly, this study investigates how differences in cost behavior between a focal firm and its peers—specifically, differences in the level of cost stickiness—affect bias in peer-based valuation estimates. The theoretical argument is that cost stickiness both reduces earnings-based value measures and impairs economic comparability. The main hypothesis is that the greater the cost stickiness of a firm relative to its peers, the lower its peer-based estimated value will be compared with its actual market value. Cost stickiness is measured using the Weiss (2010) metric, and valuation bias is calculated by comparing estimated market values (based on multiple valuation models) with observed market values (Kaplan & Ruback, 1995).

This study contributes to both theory and practice in several ways. First, the expected findings align with prior literature emphasizing the role of economic logic—particularly managers' expectations of future sales—in understanding and evaluating cost stickiness (Anderson et al., 2003; Anderson et al., 2007; Banker et al., 2014). This is important because prior work (e.g., Banker & Byzalov, 2014; Chen et al., 2012) argues that cost stickiness may arise either from value-oriented resource planning or from non-value-oriented incentives (agency- or behavior-driven). Following Weiss (2010) and Silge and Wöhrmann (2021), this study examines whether capital market participants make use of the intrinsic signals embedded in cost stickiness to evaluate managers' sales expectations and potential underlying drivers.

Second, the findings extend the scope of prior research on peer-based valuation (Bhojraj & Lee, 2002; Lie & Lie, 2002; Liu et al., 2002; Young & Zeng, 2015). While earlier studies generally demonstrate that selecting peers based on fundamental value drivers improves valuation accuracy, this study highlights the relevance of cost-related information in enhancing such valuations. In contrast to Young & Zeng (2015), who focus on accounting comparability and multiple pricing performance, this paper shows how differences in cost strategies influence economic comparability and, consequently, pricing multiples. Furthermore, whereas the prior literature typically asserts that greater comparability improves peer-based valuation estimates, this study offers a directional prediction on how differences in cost stickiness affect estimated firm values.

A large body of peer-based valuation research—despite its emphasis on risk, growth, and profitability—has largely overlooked cost stickiness as an integral component of economic comparability. This omission can produce substantial bias in value estimates, especially when earnings-based measures are used. This study makes three key contributions: (1) it explicitly integrates cost stickiness from the managerial accounting literature into peer-based valuation frameworks, identifying two channels of influence (direct effects on value metrics and indirect effects via comparability and multiples); (2) it offers a directional and testable prediction of how differences in cost stickiness between a focal firm and its peers bias valuation results; and (3) it applies this framework in the context of the Iranian capital market, providing contextual evidence particularly useful for valuing private firms lacking observable market prices.

The remainder of this paper is organized as follows. The next section presents the theoretical background and research hypothesis, followed by the research methodology. The empirical findings are then discussed, and the final section provides conclusions and implications.

## Theoretical Framework and Literature Review

Peer-based valuation has become a cornerstone of equity valuation in both practice and research (An et al., 2010). It relies on valuation multiples that relate market value to financial indicators—such as earnings, book value, or cash flow—to approximate firm value. This approach is widely used across diverse applications: pricing initial public offerings (Paleari et al., 2014; Ritter & Welch, 2002), forming the basis of analyst reports and recommendations (Damodaran, 2006), generating investment strategies for asset managers, and providing fairness opinions in corporate transactions (DeAngelo & DeAngelo, 1990). Prior studies demonstrate that, under specific conditions, peer-based valuations can approach the precision of discounted cash flow (DCF) methods (Kaplan & Ruback, 1995; Berkman et al., 2000; Liu et al., 2002).

The accuracy of peer-based models depends critically on methodological design. Earnings-based multiples consistently outperform those anchored in cash flow or book value (Liu et al., 2002). Precision is further enhanced when extraordinary items are excluded (Young & Zeng, 2015). The choice of aggregation method also matters: using harmonic means or medians improves valuation accuracy compared with arithmetic averages (Schreiner & Spremann, 2007). These refinements reflect attempts to mitigate the sensitivity of peer-based models to outliers and cross-sectional heterogeneity.

The theoretical foundation rests on the "law of one price," which holds that identical assets should trade at identical values in efficient markets (Baker & Ruback, 1999). Translating this principle into equity valuation requires identifying peers that are sufficiently comparable to the target firm. In practice, however, perfect substitutes are rare. Analysts often rely on industry classification to identify peers, but research highlights the superiority of peer groups defined by fundamental drivers—risk, growth, and profitability—over those based solely on industry membership (Bhojraj & Lee, 2002; Lie & Lie, 2002). Moreover, accounting comparability plays an important role: firms reporting under similar standards or policies produce more reliable multiples (Young & Zeng, 2015). Empirical evidence further suggests that valuation accuracy is highest when industries are characterized by stable growth and homogeneous profitability (Roosenboom & Thomas, 2007).

Despite its theoretical appeal, peer-based valuation faces practical challenges. Comparability is compromised when firms differ in cost structures, investment intensity, or managerial strategies. For instance, digital transformation and technology adoption alter cost commitments, reshaping the structure of earnings and thus influencing valuation multiples (Hui et al., 2024; Du et al., 2025). Such differences mean that industry classification alone is an imperfect proxy for comparability. Recent methodological advances have attempted to address these limitations. For example, Geertsema and Lu (2023) shows that machine learning can improve peer selection by capturing complex nonlinear relationships among value drivers. Nevertheless, even sophisticated approaches may overlook accounting-specific phenomena, such as cost stickiness, that systematically bias earnings-based anchors.

In summary, peer-based valuation is conceptually straightforward yet empirically fragile. Its performance hinges on the comparability of peers and the reliability of earnings-based metrics. Understanding factors that systematically distort these inputs is thus critical for advancing both research and practice. One such factor is asymmetric cost behavior.

The literature on asymmetric cost behavior, or cost stickiness, begins with Anderson et al. (2003), who provided evidence that SG&A costs rise by 0.55% for every 1% increase in sales, but fall by only 0.35% for every 1% decrease. This asymmetry challenges the traditional cost model, which assumes that variable costs move proportionally with activity levels. The key insight is that costs increase more rapidly during expansions than they decrease during contractions.

Cost stickiness is generally explained by managerial resource adjustment decisions. When sales decline, managers may delay cutting resources, retaining idle capacity in anticipation of recovery. This behavior reflects a trade-off: downsizing reduces short-term costs but incurs adjustment and future restoration expenses. Conversely, retaining capacity sustains short-term costs but preserves flexibility for subsequent growth. Anderson et al. (2003, 2007) show that stickiness arises when managers defer downward adjustments more than they accelerate upward adjustments, embedding asymmetry into cost structures.

Scholars distinguish between value-oriented drivers and non-value-oriented drivers of stickiness. The first reflects rational economic planning: managers retain resources to maximize long-term value, given adjustment costs and uncertain demand (Balakrishnan et al., 2014; Weiss, 2010). The second reflects opportunistic or behavioral motives, such as managerial empire building, inertia, or career concerns (Banker et al., 2018). Debate continues as to which driver dominates, though evidence suggests both mechanisms coexist.

Beyond its determinants, research has increasingly examined the consequences of cost stickiness. Banker and Chen (2006) show that models distinguishing between cost variability and stickiness improve forecasts of future returns. Anderson et al. (2007) find that increased SG&A costs during downturns can signal managerial confidence in future performance, especially when such increases are intentional (Baumgarten et al., 2010). Other studies highlight risks: stickiness increases earnings volatility and reduces forecast accuracy (Weiss, 2010; Ciftci et al., 2016), raises credit risk (Homburg et al., 2018), and correlates with labor market outcomes, such as lower unemployment (Rouxelin et al., 2018).

Recent contributions extend these findings. Fahmy and Mohamed (2025) show that cost stickiness reduces investment efficiency in low-transparency environments, but that high-quality reporting can mitigate this effect. Hui et al. (2024) demonstrate that digital transformation both amplifies fixed cost commitments (increasing stickiness) and enhances long-term recovery potential. Du et al. (2025) link agency problems to exaggerated resource retention, reducing operational flexibility. A comprehensive review by Ibrahim et al. (2022) synthesizes 80 studies, classifying the literature into determinants, consequences, and measurement. Importantly, they identify gaps, particularly the lack of research in emerging markets, under inflationary regimes, and in contexts with weak transparency.

Overall, the literature suggests a dual interpretation of cost stickiness: while it suppresses contemporaneous earnings, it can convey positive information about managerial expectations. This complexity creates challenges for valuation models, which typically treat depressed earnings as a negative outcome without recognizing their potential forward-looking implications.

The integration of these two streams—peer-based valuation and cost stickiness—is relatively recent. The mechanism through which cost stickiness distorts peer-based valuation operates through direct and indirect channels.

- Direct effect through value drivers: Cost stickiness depresses earnings, lowering the firm's value indicator (e.g., EBIT or NI). Peer-based models, which multiply this depressed indicator by a peer-group multiple, produce a systematically undervalued estimate. Unless the market fully discounts the earnings decline, the result is a valuation bias.
- Indirect effect through peer comparability: Differences in cost stickiness distort comparability. A target with stickier costs appears less profitable relative to peers, reducing its estimated value multiple. This effect arises not only with earnings-based drivers but potentially with sales-based measures, as cost asymmetry influences perceived risk and growth potential.

Economic reasoning suggests that cost stickiness is often rational. Retaining capacity during downturns avoids costly downsizing and restores flexibility when demand recovers. Accordingly, lower current profitability may reflect strategic investment rather than inefficiency. Empirical evidence confirms that stickiness is higher when managers expect temporary downturns (Anderson et al., 2003) or hold optimistic outlooks (Banker et al., 2014). Thus, cost stickiness can serve as a positive signal.

The capital market appears to incorporate this signal at least partially. Investors do not uniformly discount valuations in response to stickiness, instead interpreting it as managerial optimism (Silge & Wöhrmann, 2021). By contrast, peer-based models apply multiples mechanically to earnings, embedding the negative effect while ignoring the positive implications. This divergence generates systematic undervaluation of sticky-cost firms.

Recent evidence underscores this tension. Kreilkamp et al. (2021) show that U.S. firms with higher cost stickiness are undervalued in peer-based models relative to market assessments. Their study highlights cost stickiness as a comparability wedge that traditional peer-based approaches fail to capture. Yet their analysis is limited to a developed-market context.

The literature on peer-based valuation emphasizes comparability across risk, growth, and profitability (Bhojraj & Lee, 2002; Young & Zeng, 2015). The cost stickiness literature emphasizes asymmetric cost behavior as both a challenge to profitability measurement and a forward-looking signal (Anderson et al., 2003; Weiss, 2010). However, the intersection of these literatures remains underexplored. Only a handful of recent studies, most notably Kreilkamp et al. (2021), explicitly analyze how cost stickiness biases peer-based valuation.

Significant gaps remain. First, little evidence exists from emerging markets, where inflationary pressures, exchange-rate volatility, and weaker informational environments exacerbate the consequences of cost asymmetry. Second, prior studies focus primarily on developed contexts with relatively stable accounting and governance structures. Third, little is known about how cost stickiness interacts with peer selection, accounting comparability, and valuation accuracy under high macroeconomic uncertainty.

This study addresses these gaps by investigating the role of cost stickiness in peer-based valuation in Iran, an inflationary emerging market. This setting provides an important test of generalizability, given its structural rigidities, macroeconomic volatility, and limited transparency. By doing so, the research makes two key contributions:

1. Theoretical contribution: It identifies cost stickiness as a structural comparability wedge in peer-based valuation, integrating managerial accounting insights into valuation literature.
2. Empirical contribution: It quantifies the valuation bias associated with cost stickiness across different earnings anchors (EBIT, EBT, NI), revealing which multiples are more resilient to distortions in an emerging market.

By bridging these two streams, the study contributes to a deeper understanding of how accounting properties interact with valuation practices. In doing so, it responds directly to calls in the literature (Ibrahim et al., 2022) for more research in emerging economies and under inflationary regimes.

## Research Hypothesis

This study investigates a single main hypothesis:
The greater the cost stickiness of a firm relative to its peer group, the lower its peer-based estimated value will be compared to its actual market value, resulting in a higher valuation bias.

## Research Methodology

### Data Collection and Sample Selection

The data for this study were obtained from audited financial statements and accompanying notes, market information from the Tehran Stock Exchange (TSE) trading platform via the Rahavard Novin software, and processed using Excel, Python, and R for variable computation, data analysis, and hypothesis testing, respectively.
The research population consists of firms listed on the TSE during the period 2014–2023 (1393–1402 in the Iranian calendar) that meet the following criteria:

1. Listed on the TSE before 2014;
2. Not classified as investment companies, banks, insurance firms, or leasing companies, due to their fundamentally different operational nature;
3. Fiscal year ending on March 20 (end of Esfand in the Iranian calendar);
4. Not bankrupt or delisted during the study period;
5. No change in fiscal year during the study period;
6. Exclusion of observations where cost and sales changes move in opposite directions;
7. Exclusion of observations with missing STICKY variable values;
8. Exclusion of loss-making firms, as peer-based valuations derived from net income would otherwise yield negative firm values;
9. Exclusion of firms with fewer than five peers in their peer group (Kreilkamp et al., 2021);
10. Winsorization of all continuous variables at the 5% level, replacing values above the 95th percentile with the 95th percentile value and values below the 5th percentile with the 5th percentile value, to mitigate the impact of potential outliers.

After applying these filters, the final sample comprises 149 firms, yielding 1,356 firm-year observations. This study is applied in nature and employs a correlational research design. The theoretical framework and literature review are based on deductive and inductive reasoning, while data collection was conducted using archival sources, online databases, and scholarly articles. The empirical analysis and hypothesis testing were performed using inductive methods to determine whether the research hypothesis could be supported.

### Measurement and Estimation of Valuation Bias

To measure cost stickiness, this study employs a firm-level direct metric proposed by Weiss (2010). This measure captures cost stickiness as the difference in the slope of the cost function between periods of increasing and decreasing activity, as specified in Equation (1).

$$STICKY_{i,t}=\ln\left(\frac{\Delta COSTS}{\Delta SALES}\right)_{i,\underline{\tau}}-\ln\left(\frac{\Delta COSTS}{\Delta SALES}\right)_{i,\overline{\tau}} \quad \text{Equation (1)}$$

where $\underline{\tau}$ denotes the most recent financial period for firm iii in which both sales and costs declined, and $\overline{\tau}$ represents the most recent financial period in which both sales and costs increased. The variables in this equation are computed according to Equations (2) and (3).

$$\Delta SALES_{i,t}= SALES_{i,t}- SALES_{i,t-1} \quad \text{Equation (2)}$$

$$\Delta COSTS_{i,t}=\left(SALES_{i,t}-EARNINGS_{i,t}\right)- \left(SALES_{i,t-1}-EARNINGS_{i,t-1}\right) \quad \text{Equation (3)}$$

Costs are defined as the difference between sales and net income (before extraordinary items). This approach removes potential biases from managerial differences in cost classification (Anderson & Lanen, 2007). Furthermore, the logarithmic and relative formulation facilitates cross-firm comparisons and addresses potential heteroscedasticity issues (Anderson et al., 2003; Weiss, 2010). As in Weiss (2010), observations where costs and sales move in opposite directions are excluded. If costs are sticky, they decrease less during sales declines than they increase during equivalent sales growth, resulting in a negative $STICKY_{i,t}$ . Hence, more negative values indicate greater cost stickiness.

Following Equation (1), the difference between the most recent cost reduction rate during a sales decline and the most recent cost increase rate during sales growth is taken as the stickiness measure. The latest increase (or decrease) refers to the current and three preceding semiannual periods. Because quarterly financial data in Iran are often unaudited or incomplete, all calculations are based on audited annual and semiannual data.

Given Iran's high inflation, relatively few firms experience absolute cost decreases. Therefore, before applying the Weiss model, all sales and cost figures are deflated using the annual inflation index published by the Statistical Center of Iran.

Valuation multiples are computed based on three alternative value drivers: earnings before interest and taxes (EBIT), earnings before taxes (EBT), and net income after taxes (NI). Under the peer-based valuation approach, the estimated market value $\widehat{MV}_{j,t}$ of the target firm j at time t is obtained by multiplying the median multiple of the peer group $\overline{m}_{j,t}$ by the corresponding value indicator of the target firm $Ind_{j,t}$ , as shown in Equation (5).

Peer groups are identified according to industry classifications provided by the Tehran Stock Exchange. To aggregate the market values $MV_{i,t}$and value indicators $Ind_{i,t}$ of the i=1,…,n peer group firms at the end of quarter t into a single peer group multiple $\overline{m}_{j,t}$ the median is used, as expressed in Equation (4). This choice mitigates the influence of outliers and enhances robustness. The calculation of the peer group multiple excludes the target firm itself to prevent mechanical bias.

$$\overline{m}_{j,t}=\text{Median}(m_{i,t}) \qquad \text{Equation (4)}$$

$$\widehat{MV}_{j,t}=\overline{m}_{j,t}\times Ind_{i,t} \qquad \text{Equation (5)}$$

To quantify the downward bias in peer-based valuation predicted by the study's hypothesis, the estimated market values are compared with the actual market values of the target firms, where the latter are computed as the share price multiplied by the number of shares outstanding. The relative logarithmic valuation error, $e_{j,t}^{rel}$ , is then calculated for each firm j at time t according to Equation (6).

$$e_{j,t}^{rel}=\ln\left(\frac{\widehat{MV}_{j,t}}{MV_{j,t}}\right)=\ln\left(\widehat{MV}_{j,t}\right)-\ln(MV_{i,t}) \qquad \text{Equation (6)}$$

To identify the effect of differences in cost stickiness on the valuation bias, a set of control variables is applied. If perfect twins for the target firm were available, target firms and peer group firms would not differ, and hence the valuation error would be zero (Bhojraj & Lee, 2002). Since perfect twins rarely exist and market imperfections are common, we explain the valuation error by differences between target firms and their peer groups. Therefore, the control variables are not analyzed per se; instead, the difference is calculated for each variable between the target firm and the median value of the peer group firms, as defined in Equation (7):

$$\Delta=\text{target value - peer group value} \qquad \text{Equation (7)}$$

**Control Variables**

In line with Damodaran (2006) and Henschke & Homburg (2009), valuation multiples are considered to be a function of risk, growth, and profitability, implying that these drivers affect the valuation bias. Target firms with higher profitability and higher growth expectations relative to their peers are expected to be undervalued, whereas target firms with higher risk are expected to be overvalued (Kreilkamp et al., 2021).

Risk is controlled for using the differences in firm size (ΔSIZE) and leverage (ΔLEVERAGE) between the target firm and its peer group. Following Francis et al. (2004), firm size is measured as the natural logarithm of total assets. Since firm size is often used as a proxy for risk (smaller firms are considered riskier), a negative relationship is expected between ΔSIZE and the relative valuation error. In contrast, firms with higher leverage are generally perceived as riskier and should trade at lower valuation multiples; thus, a positive relationship is expected between ΔLEVERAGE and the valuation error. Leverage is measured as the ratio of long-term debt to the book value of equity.

To control for profitability, the difference in return on assets (ΔROA) is included between the target firms and their corresponding peer groups. ROA is calculated as net income divided by total assets, with higher ROA indicating greater profitability. Since the capital market views higher profitability favorably, a negative relationship is expected between ΔROA and the valuation error.

Growth is also controlled for using the difference in sales growth (ΔSGROWTH), calculated as the percentage change in sales in period t compared with sales in the same period one year earlier (t−2). In line with Bhojraj and Lee (2002), Firms with higher sales growth are expected relative to their peers to trade at higher multiples, implying a negative relationship between ΔSGROWTH and the valuation error.

Importantly, Cost variability ($\Delta COSTVAR_{i,t}$) is controlled for to isolate the effect of cost stickiness from other cost-related influences. Cost variability, which also reflects a firm's operating leverage, is calculated as the change in EBIT between period t−1 and period t divided by the corresponding change in sales.

Finally, Peer group size (PGSIZE) is included as an additional control, expecting that larger peer groups reduce valuation error by providing more robust multiple estimates.

**Econometric Model and Estimation Strategy**

To empirically test the research hypothesis, panel data estimation techniques are applied, exploiting both the cross-sectional and temporal dimensions of the dataset to enhance the efficiency and robustness of parameter estimates. Potential endogeneity concerns arising from unobserved, time-invariant firm-specific characteristics—factors that could bias the estimated relationship between cost stickiness and valuation errors—are addressed by incorporating firm-fixed and time-fixed effects into the regression specifications. This dual-effects framework isolates the impact of changes in cost stickiness from confounding structural heterogeneity across firms and macroeconomic shocks across periods. All models are estimated with cluster-robust standard errors at the firm level to accommodate heteroskedasticity and within-firm serial correlation, ensuring valid statistical inference even in the presence of correlated disturbances. Finally, by comparing specifications across alternative value proxies (EBITDA, EBIT, and NI), the analysis ensures that results are not driven by the specific choice of performance metric, thereby reinforcing their generalizability.

The empirical design involves three regression models, each distinguished by the value indicator used in the computation of the valuation error: earnings before interest and taxes (EBIT), earnings before taxes (EBT), and net income after taxes (NI).

: model

$$e^{rel}_{j,t}=\gamma_0+\gamma_1\Delta PG\_STICKY_{j,t}+\gamma_2\Delta COSTVAR_{j,t}+\gamma_3\Delta SIZE_{j,t}+\gamma_4\Delta LEVERAGE_{j,t}$$
$$+\gamma_5\Delta ROA_{j,t}+\gamma_6\Delta SGROWTH_{j,t}+\gamma_7 PGSIZE_{j,t}+\text{Time Fixed Effects}$$
$$+\text{ Firm Fixed Effects}+\varepsilon_{j,t}$$

The dependent variable, $e^{rel}_{j,t}$, represents the relative valuation error, defined as the natural logarithmic difference between the estimated market value and the observed market value of target firm j in year t.

The primary explanatory variable, $\Delta STICKY_{j,t}$, captures the difference in cost stickiness between the target firm and the median cost stickiness of its peer group. A negative (positive) value of $\Delta STICKY_{j,t}$ indicates that the target firm exhibits a higher (lower) degree of cost stickiness than its peers. Consistent with the research hypothesis, the coefficient $\gamma_1 > 0$ is expected to be positive if greater cost stickiness relative to peers is associated with higher downward bias in peer-based valuations.

Each regression model is estimated separately for the three valuation multiples, resulting in three corresponding measures of relative valuation error ($e_1$, $e_2$, and $e_3$). The estimation results from these models are reported and analyzed in the subsequent section.

## Empirical Results

### Descriptive Statistics

Table 1 reports the descriptive statistics of the primary variables. Market value (MV) averages IRR 42,418,874 million, with a median of 13,409,806 million and a wide range from 4,196,130 million to 295,243,500 million. This striking dispersion illustrates the structural heterogeneity of firms listed on the Tehran Stock Exchange, consistent with the heterogeneous-firm view in emerging markets, and is further amplified by Iran's inflationary and exchange-rate environment, which inflates nominal values and reduces comparability across firms. Profitability measures also show substantial variation: EBIT averages 3,017,353 million IRR, EBT averages 2,800,389 million IRR, and NI averages 2,545,032 million IRR, each with minimum values close to 100,000 and maximums exceeding 20,000,000. Valuation multiples, computed on an annual basis, have median values of 8.01 for m1, 9.28 for m2, and 10.36 for m3, implying that firms are generally priced between 8 and 10 times their earnings. By contrast, all other variables—including cost stickiness and controls—are measured semi-annually, ensuring consistency across regression estimations.

Turning to explanatory variables, cost stickiness (STICKY) averages 0.119, with a median of 0.048, and ranges from –0.347 to 2.254. This wide distribution reflects asymmetric cost adjustments and underscores the relevance of stickiness as a driver of firm heterogeneity. Leverage (LEVERAGE) averages 0.151, indicating relatively low reliance on debt financing. Firm size (SIZE) averages 15.691 (log assets), while ROA averages 0.104, reflecting modest profitability. Sales growth (SGROWTH) has a mean of 0.520, with negative values (–0.135) for some firms, consistent with contraction in revenues during economic downturns. Together, these variables capture diverse financial and operational conditions, in line with agency theory and resource-adjustment perspectives on firm behavior.

Table 2 presents the descriptive statistics of the final regression variables. All three valuation errors are negative on average, with means of –0.846 for e1, –0.921 for e2, and –0.927 for e3. This indicates that peer-based valuation models systematically overestimate firm values relative to observed market prices. Notably, e1 exhibits the smallest mean bias (–0.846) and variance (SD = 0.254), suggesting that EBIT-based multiples yield more precise and stable benchmarks than EBT- or NI-based approaches. Theoretically, this aligns with the argument that EBIT, being unaffected by tax regimes and capital structure, offers a cleaner measure of operating performance.

Most importantly, the variable of interest, ΔPG_STICKY, averages 0.022 with a median of 0.005 but spans a wide range from –0.508 to 2.143. This dispersion provides the empirical foundation for testing the hypothesis that cost stickiness contributes to systematic valuation errors. Firms with more pronounced asymmetries in cost behavior are expected to deviate more strongly from peer-based benchmarks. Other control variables behave as anticipated: ΔLEVERAGE averages 0.063, ΔSIZE 0.009, and ΔROA 0.007, all close to zero but with meaningful dispersion, ensuring that alternative explanations for valuation errors are accounted for. ΔCOSTVAR and ΔSGROWTH also show variability, reflecting heterogeneity in cost structures and revenue dynamics. Peer group size (PGSIZE) averages 11.9, with a range from 5 to 19, ensuring sufficient variation across industries.

In sum, the descriptive evidence emphasizes three insights. First, Iranian firms display substantial heterogeneity in scale and performance, magnified by macroeconomic volatility. Second, EBIT-based multiples consistently generate less biased valuation estimates than EBT or NI-based multiples, supporting their theoretical superiority as benchmarks. Third, and most critically, the wide variation in cost stickiness provides the empirical basis for testing the central hypothesis that asymmetric cost behavior systematically drives valuation errors in peer-based models.

**Table 1.** Descriptive Statistics of the Primary Research Variables

| Variable | Mean | Median | 1st Qu. | 3rd Qu. | Min | Max | Std. Dev. |
|---|---|---|---|---|---|---|---|
| MV (million IRR) | 42,418,874 | 13,409,806 | 75,212,733 | 745,286 | 4,196,130 | 33,604,500 | 295,243,500 |
| EBIT (million IRR) | 3,017,353 | 602,923 | 5,787,845 | 26,236 | 162,639 | 2,388,711 | 22,420,594 |
| EBT (million IRR) | 2,800,389 | 515,992 | 5,665,927 | 11,880 | 109,519 | 1,982,220 | 22,351,414 |
| NI (million IRR) | 2,545,032 | 431,427 | 5,187,213 | 10,507 | 91,928 | 1,750,322 | 20,205,300 |
| m1 | 9.380 | 8.011 | 4.985 | 3.824 | 5.868 | 11.411 | 23.644 |
| m2 | 11.791 | 9.276 | 6.814 | 4.624 | 6.990 | 13.836 | 28.991 |
| m3 | 13.640 | 10.363 | 8.108 | 5.260 | 7.800 | 16.283 | 35.008 |
| STICKY | 0.119 | 0.048 | 0.995 | -2.008 | -0.347 | 0.584 | 2.254 |
| LEVERAGE | 0.151 | 0.068 | 0.195 | 0.002 | 0.031 | 0.170 | 0.733 |
| SIZE | 15.691 | 15.470 | 1.505 | 13.305 | 14.573 | 16.611 | 18.896 |
| ROA | 0.104 | 0.083 | 0.081 | 0.005 | 0.037 | 0.156 | 0.288 |
| COSTVAR | 0.311 | 0.302 | 0.729 | -1.550 | 0.023 | 0.639 | 1.905 |
| SGROWTH | 0.520 | 0.428 | 0.469 | -0.135 | 0.174 | 0.774 | 1.670 |

Source: Research findings

**Table 2.** Descriptive Statistics of the Final Research Variables

| Variable | Mean | Median | 1st Qu. | 3rd Qu. | Min | Max | Std. Dev. |
|---|---|---|---|---|---|---|---|
| e1 | -0.846 | -0.729 | 0.731 | -2.504 | -1.254 | -0.319 | 0.254 |
| e2 | -0.921 | -0.734 | 0.912 | -3.102 | -1.365 | -0.269 | 0.384 |
| e3 | -0.927 | -0.755 | 0.944 | -3.161 | -1.394 | -0.270 | 0.452 |
| ΔPG_STICKY | 0.022 | 0.005 | 1.000 | -2.025 | -0.508 | 0.544 | 2.143 |
| ΔLEVERAGE | 0.063 | -0.002 | 0.192 | -0.150 | -0.041 | 0.087 | 0.631 |
| ΔSIZE | 0.009 | -0.017 | 1.193 | -2.188 | -0.700 | 0.711 | 2.411 |
| ΔROA | 0.007 | 0.000 | 0.066 | -0.107 | -0.036 | 0.046 | 0.144 |
| ΔCOSTVAR | -0.017 | -0.009 | 0.737 | -1.915 | -0.282 | 0.325 | 1.509 |
| ΔSGROWTH | 0.041 | 0.003 | 0.396 | -0.615 | -0.216 | 0.243 | 0.977 |
| PGSIZE | 11.926 | 13 | 3.789 | 5 | 9 | 15 | 19 |

Source: Research findings

**Correlation Analysis**

Correlation analysis captures the strength and direction of association between two variables, with coefficients ranging from –1 to +1. A coefficient closer to +1 (–1) indicates a stronger positive (negative) association, though it does not imply causality. Figure 1 presents the Pearson correlation matrix of the key variables in this study. Numerical values are displayed only for statistically significant correlations at the 5% level, while insignificant relationships are left blank to avoid over-interpretation. The intensity and sign of the correlation are further visualized through the color scale (blue for positive and red for negative). This approach highlights the structure of meaningful interdependencies while filtering out noise.

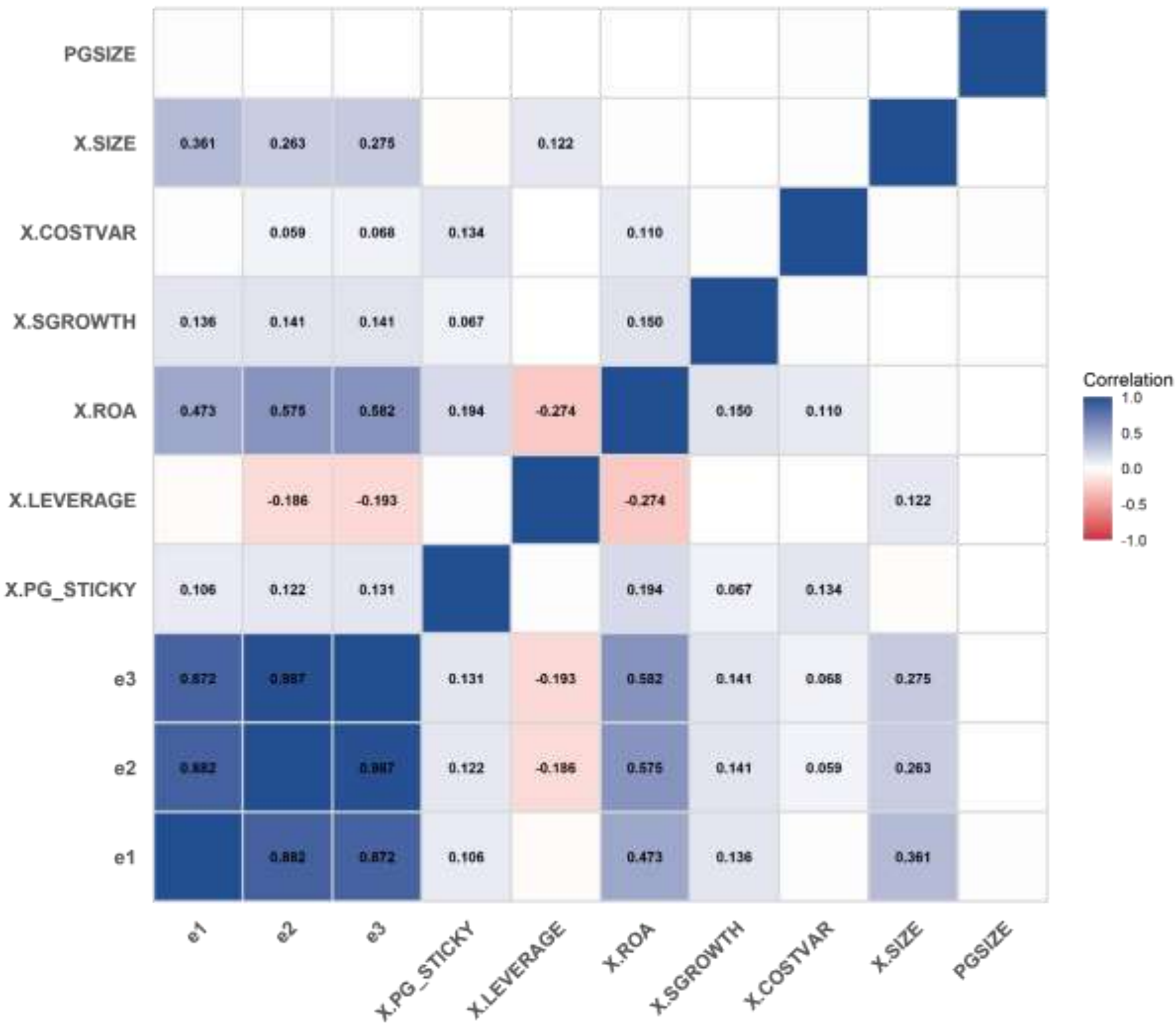


**Figure 1.** Correlation Structure among Variables Used in the Study
Source: Research findings

Three main insights emerge from the correlation patterns. First, the three measures of valuation error ($e_1$, $e_2$, and $e_3$) are highly and positively correlated with each other (coefficients exceeding 0.87), confirming that they capture related constructs of peer-based misvaluation. Among them, $e_2$ and $e_3$ are almost perfectly correlated (0.987), suggesting that EBT- and NI-based multiples generate very similar valuation biases, while $e_1$ (EBIT-based) remains strongly associated but slightly less correlated, consistent with its superior precision observed in descriptive statistics.

Second, cost stickiness (ΔPG_STICKY) shows weak but positive correlations with the valuation errors (0.106 with $e_1$; 0.122 with $e_2$; 0.131 with $e_3$), though not all are statistically significant. This pattern nonetheless aligns with the theoretical expectation that greater cost asymmetry may exacerbate mispricing in peer-based models. The fact that the associations are positive supports the conjecture that higher cost stickiness tends to worsen valuation errors by reducing the comparability of earnings across peers. This descriptive evidence thus provides an early signal consistent with the study's central hypothesis.

Third, the control variables display intuitive relationships. Firm profitability (ROA) is positively and significantly correlated with all valuation error measures (0.473 with $e_1$; 0.575 with $e_2$; 0.582 with $e_3$), suggesting that more profitable firms deviate more from peer benchmarks, possibly due to differential growth expectations or accounting conservatism. Firm size (SIZE) and peer group size (PGSIZE) also correlate positively with the valuation errors, albeit more modestly, consistent with larger or more complex firms being harder to benchmark accurately. In contrast, leverage (LEVERAGE) is negatively correlated with ROA (–0.274) and with the valuation errors (around –0.18 to –0.19), reinforcing the agency-theoretic view that higher leverage constrains profitability and affects valuation comparability.

In sum, the correlation analysis provides a clear and parsimonious overview of the interrelations among the study variables. It highlights the strong co-movement of valuation errors, the positive link between cost stickiness and misvaluation, and the role of profitability, size, and leverage in shaping cross-sectional variation. These patterns not only validate the empirical design but also build a direct bridge to the central hypothesis that cost asymmetries systematically drive valuation errors in peer-based models.

**Normality of Residuals**

One of the fundamental assumptions of the classical linear regression model is that residuals follow a normal distribution. Normality of residuals ensures the validity of inferential tests such as the F-test and t-tests, thereby increasing the reliability of parameter estimates. To examine this assumption, Q–Q (Quantile–Quantile) plots were generated for the standardized residuals of the three regression models corresponding to valuation errors $e_1$, $e_2$, and $e_3$.

The Q–Q plot compares the quantiles of the model residuals against those of the theoretical standard normal distribution. On the horizontal axis, the theoretical quantiles of the standard normal are displayed, while the vertical axis represents the quantiles of standardized residuals. If the residuals are normally distributed, the points should lie approximately on the 45-degree reference line (y = x). Deviations from this line would indicate departures from normality.

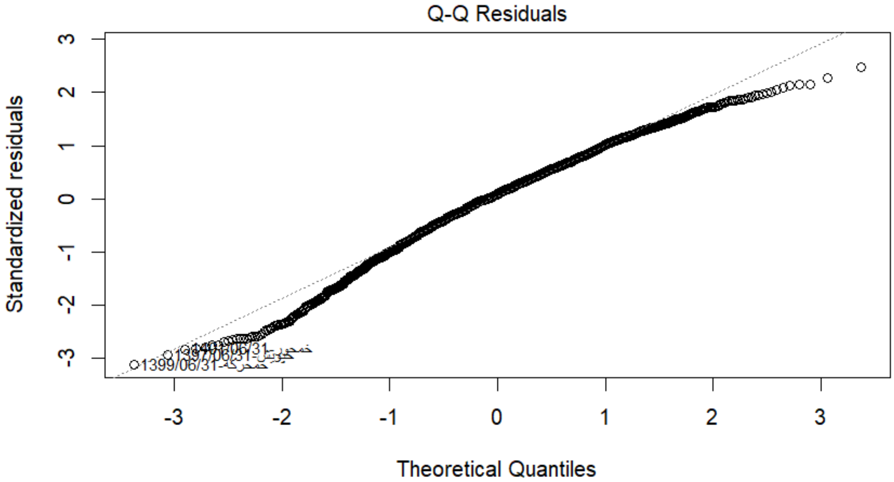


**Figure 2(a).** Q–Q Plot of Standardized Residuals for Model $e_1$
Source: Research findings

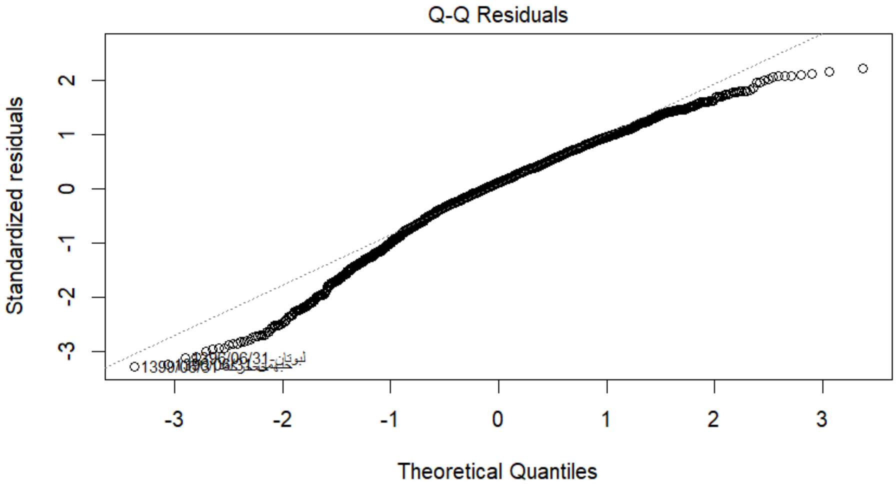


**Figure 2(b).** Q–Q Plot of Standardized Residuals for Model $e_2$
Source: Research findings

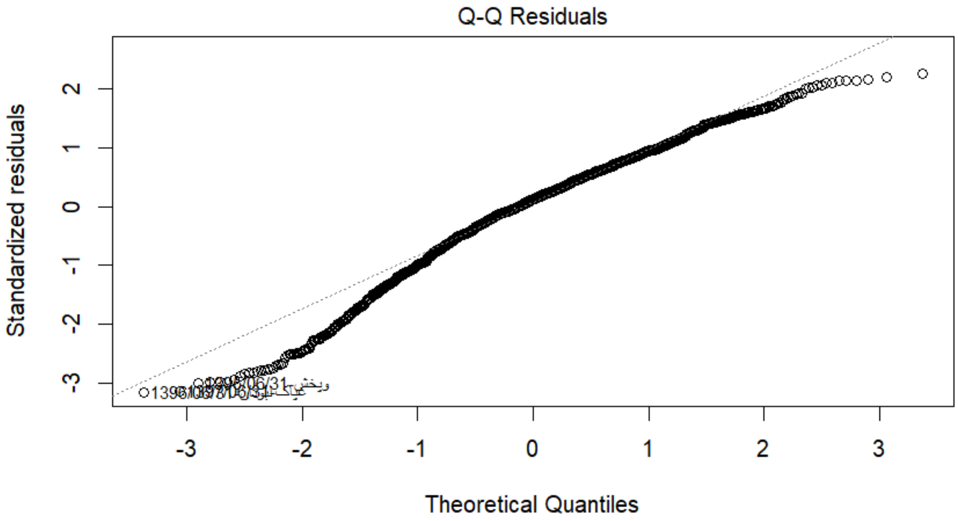


**Figure 2(c).** Q–Q Plot of Standardized Residuals for Model $e_3$
Source: Research findings

As shown in Figure 2(a) for model $e_1$, Figure 2(b) for model $e_2$, and Figure 2(c) for model $e_3$, the residuals for all three models align closely with the reference line, with only minor deviations in the extreme tails. This pattern suggests that the residuals approximate normality reasonably well. Consequently, the assumption of normally distributed residuals is not violated, and the inferential tests employed in the subsequent regression analysis can be considered statistically valid and reliable.

**Regression Results**

The hypothesis of this study examines whether cost stickiness (ΔPG_STICKY) has a significant effect on peer-based valuation errors. The regression results presented in Tables 3–5 provide strong and consistent support for this hypothesis across all three valuation multiples.

In the EBIT-based model (Table 3), ΔPG_STICKY is positive and statistically significant ($\beta = 0.0310$, $p = 0.0331$). This suggests that firms with higher cost stickiness, relative to their peers, are systematically undervalued when valuations are based on EBIT multiples. In the EBT-based specification (Table 4), the relationship strengthens further ($\beta = 0.0466$, $p = 0.0042$), while in the NI-based model (Table 5), ΔPG_STICKY remains positive and significant ($\beta = 0.0501$, $p = 0.0028$). The robustness of the results across three distinct performance benchmarks confirms that the effect is not an artifact of a particular earnings definition but rather a systematic valuation bias introduced by sticky costs.

The control variables reveal additional insights. Profitability (ΔROA) exerts a consistently strong positive and significant influence in all models, reflecting its fundamental role in valuation. Firm size (ΔSIZE) and sales growth (ΔSGROWTH) are also positively significant, highlighting that larger and growing firms tend to exhibit lower valuation errors. Leverage (ΔLEVERAGE) is insignificant in the EBIT-based model but negative and marginally significant in the EBT and NI specifications, consistent with the view that higher leverage increases risk and contributes to lower valuations. Cost variability (ΔCOSTVAR) remains negative but insignificant, indicating that short-term volatility in costs is less relevant for explaining peer-based errors once stickiness is controlled for. Peer group size (PGSIZE) shows weak significance at the 10% level in two models, suggesting that broader peer groups may provide marginal improvements in benchmarking precision.

**Table 3.** Regression results of the research model based on the first valuation multiple ($m_1$)

| Variable | Coefficient | Std. Error | t-value | P-value | Relationship & Significance (5%) |
|---|---|---|---|---|---|
| ΔPG_STICKY | 0.0310 | 0.0145 | 2.1338 | 0.0331 | Positive & Significant |
| ΔLEVERAGE | 0.1324 | 0.1442 | 0.9182 | 0.3587 | Positive (Not Significant) |
| ΔSIZE | 0.1918 | 0.0361 | 5.3075 | 0.0000 | Positive & Significant |
| ΔROA | 5.7467 | 0.3619 | 15.8780 | 0.0000 | Positive & Significant |
| ΔCOSTVAR | -0.0244 | 0.0164 | -1.4865 | 0.1374 | Negative (Not Significant) |
| ΔSGROWTH | 0.1325 | 0.0376 | 3.5225 | 0.0004 | Positive & Significant |
| PGSIZE | 0.0101 | 0.0082 | 1.2371 | 0.2163 | Positive (Not Significant) |
| Total Sum of Squares (TSS) | 376.37 | R-Squared | 0.35916 | F-statistic | 94.877 |
| Residual Sum of Squares (RSS) | 241.19 | Adjusted R-Squared | 0.26723 | P-value (F-statistic) | 0.00000 |

Source: Research findings

**Table 4.** Regression results of the research model based on the first valuation multiple ($m_2$)

| Variable | Coefficient | Std. Error | t-value | P-value | Relationship & Significance (5%) |
|---|---|---|---|---|---|
| ΔPG_STICKY | 0.0466 | 0.0162 | 2.8707 | 0.0042 | Positive & Significant |
| ΔLEVERAGE | -0.3294 | 0.1853 | -1.7776 | 0.0757 | Negative & Significant |
| ΔSIZE | 0.1247 | 0.0421 | 2.9578 | 0.0032 | Positive & Significant |
| ΔROA | 7.3334 | 0.4345 | 16.8786 | 0.0000 | Positive & Significant |
| ΔCOSTVAR | -0.0318 | 0.0197 | -1.6100 | 0.1077 | Negative (Not Significant) |
| ΔSGROWTH | 0.1636 | 0.0433 | 3.7796 | 0.0002 | Positive & Significant |
| PGSIZE | 0.0198 | 0.0108 | 1.8250 | 0.0683 | Positive & Significant (10%) |
| Total Sum of Squares (TSS) | 598.55 | R-Squared | 0.37233 | F-statistic | 100.42 |
| Residual Sum of Squares (RSS) | 375.69 | Adjusted R-Squared | 0.28229 | P-value (F-statistic) | 0.00000 |

Source: Research findings

**Table 5.** Regression results of the research model based on the first valuation multiple ($m_3$)

| Variable | Coefficient | Std. Error | t-value | P-value | Relationship & Significance (5%) |
|---|---|---|---|---|---|
| ΔPG_STICKY | 0.0501 | 0.0167 | 2.9936 | 0.0028 | Positive & Significant |
| ΔLEVERAGE | -0.3598 | 0.1991 | -1.8073 | 0.0710 | Negative & Significant (10%) |
| ΔSIZE | 0.1547 | 0.0422 | 3.6664 | 0.0003 | Positive & Significant |
| ΔROA | 7.6750 | 0.4325 | 17.7459 | 0.0000 | Positive & Significant |
| ΔCOSTVAR | -0.0228 | 0.0187 | -1.2202 | 0.2226 | Negative (Not Significant) |
| ΔSGROWTH | 0.1550 | 0.0426 | 3.6409 | 0.0003 | Positive & Significant |
| PGSIZE | 0.0182 | 0.0113 | 1.6135 | 0.1069 | Positive & Significant (10%) |
| Total Sum of Squares (TSS) | 627.36 | R-Squared | 0.38848 | F-statistic | 107.542 |
| Residual Sum of Squares (RSS) | 383.64 | Adjusted R-Squared | 0.30075 | P-value (F-statistic) | 0.00000 |

Source: Research findings

Beyond individual coefficients, the model diagnostics underscore the robustness of these findings. The adjusted R-squared values increase from 0.267 in the EBIT-based model to 0.282 in the EBT-based model and 0.301 in the NI-based specification, demonstrating that net income multiples capture the determinants of valuation errors most effectively. The corresponding R-squared values (0.359, 0.372, and 0.388) are consistent with prior valuation research, where moderate explanatory power is typical given the complexity of firm-specific factors and market inefficiencies. The F-statistics across the three models (94.877, 100.42, and 107.54) are large and highly significant ($p < 0.0001$), confirming the joint explanatory validity of the models. Importantly, the relatively moderate explanatory power reinforces the notion that cost stickiness is a key, but not the sole, determinant of valuation discrepancies, aligning with the theoretical expectation that multiple factors contribute to mispricing.

Taken together, these results provide compelling evidence that cost stickiness systematically biases peer-based valuation models by depressing contemporaneous earnings, which serve as the denominator in relative valuation multiples. Investors and analysts who fail to adjust for cost stickiness are therefore likely to undervalue firms with more rigid cost structures. These findings are consistent with those of Kreilkamp et al. (2021) in U.S. markets and extend their conclusions to the context of an emerging economy characterized by inflationary pressures and structural heterogeneity.

Overall, the results strongly support the hypothesis that cost stickiness significantly affects peer-based valuation errors. This has important implications for both practice and research: analysts should incorporate measures of asymmetric cost behavior into relative valuation models to improve accuracy, managers should disclose cost management strategies more transparently to mitigate undervaluation, and regulators could consider encouraging such disclosures to enhance market comparability and investor protection.

## Discussion and Conclusion

This study examines how asymmetric cost behavior—commonly referred to as cost stickiness—affects the accuracy of peer-based valuation models. Using data from firms listed on the Tehran Stock Exchange over 2014–2023, the findings demonstrate that firms with greater cost stickiness relative to their peers systematically experience larger valuation errors, primarily in the form of undervaluation when applying earnings-based multiples.

Three main insights emerge. First, sticky costs suppress current earnings due to unused capacity, which biases multiples downward and reduces the precision of peer-based models. Second, unlike mechanical peer-based estimates, capital market participants appear less inclined to discount firm value in response to cost stickiness, possibly viewing it as a forward-looking signal of managerial confidence or growth opportunities. Third, the results remain robust after controlling for profitability, growth, leverage, and peer group size, underscoring that cost stickiness is a systematic driver of valuation bias.

These findings extend Kreilkamp et al. (2021) by documenting, for the first time, that cost stickiness produces similar valuation biases in an inflationary emerging market. This explicit novelty highlights that the implications of cost stickiness are not confined to developed markets but may be amplified in settings with weaker informational efficiency and higher macroeconomic volatility.

The results carry important implications. Analysts and investors should integrate stickiness measures into valuation frameworks to improve accuracy. Managers can mitigate undervaluation by disclosing cost-management strategies and capacity policies. Regulators and policymakers are encouraged to mandate disclosure of cost structures to strengthen comparability and investor protection.

Despite these contributions, limitations remain. The reliance on Weiss's (2010) measure required excluding certain observations, and CPI-based deflators may not fully capture firm-specific inflation exposure. Semi-annual data also restricts granularity relative to quarterly analyses. Future research could explore the moderating role of governance, ownership, and macroeconomic shocks, or complement quantitative analysis with qualitative studies on managerial disclosure practices.

In sum, this study is the first to show that cost stickiness systematically biases peer-based valuation in an inflationary emerging economy. By making this contribution, it bridges cost behavior research with valuation literature and offers actionable insights for both practitioners and regulators.

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