Competitive Prices and Asymmetric Cost Behavior for Iraqi Firms: Capacity Utilization as a Moderator

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Abstract

Prior literature on asymmetric cost behavior mainly focuses on internal factors. While information knowledge considers that managers should use both internal and external factors when making strategic cost decisions. In this study, the purpose is to provide an alternative examination that investigates the relationship between asymmetric cost behavior and competitive price as an external competition factor. The results find that cost stickiness is pronounced for firms in an industry competition with managerial optimism, whereas cost anti-stickiness is pronounced for firms in an industry competition with managerial pessimism when managers like to utilize their resources. The findings suggest that the asymmetric cost behavior is affected by competitive price as an external competition factor as well as internal factors, stressing the importance of using cost stickiness model specification to gain insights about managers' pricing decisions.[4] [5]

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Keywords: Asymmetric cost behavior, Competitive prices, Cost stickiness, Industry Competition, Capacity utilization, Iraq.

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1. Introduction

In the critical business environment, competition is an important issue to complete evidence of asymmetric cost behavior theory. The Underlying traditional cost behavior theory is based on the activity level that associates changes linearly and proportionately (Nematollahi, 2013). Several studies have documented an asymmetric behavior between costs and resources from various perspectives as well(Weidenmier and Subramaniam, 2003, Ibrahim, 2015, Jang et al., 2016). The "asymmetry" as sticky or anti-stick costs is the variances between the level of costs to changes in activity rise and the level of costs to changes in activity fall(Weidenmier and Subramaniam, 2003). Cost stickiness refers to the asymmetric cost behavior where the increase in costs associated with an increase in activity is higher than the decrease in costs associated with an equivalent decrease in activity(Anderson et al., 2003). However, The asymmetric cost behavior in investigating the consequences of cost stickiness on actual and forecast earnings may lower cost-stickiness and make a good acquisition for corporate control in the market(Jang et al., 2016). Many studies argued that the relationship between cost and activity is not linear, but they focused on internal determinants for cost stickiness.

Managerial opportunism and optimism are the main reasons that make an asymmetric cost behavior(Kama and Weiss, 2013, Banker et al., 2014, Chen et al., 2015a), managerial opportunism due to agency problems because the base of incentives to grow the firm to keep unutilized resources for power, prestige, private interest, and compensation when Managers make self-maximizing decisions that might not be in the best interest of the stockholders (Chen et al., 2012, Banker et al., 2014, Qin et al., 2015). At the same time, managerial optimism results in the expectation of an increase in future sales. Managers may intentionally invest in certain committed resources in order to keep up with an increase in sales. In addition, when managers face uncertainty option about future sales change, they may intentionally delay reducing committed resources and their expectations about future demand increases; managers can minimize adjustment costs by keeping committed resources, which is in turn driven by future demand that relates to managerial optimism and pessimism (Banker et al., 2014, Chen et al., 2015a, Rouxelin et al., 2015).

Prior studies have mainly used internal factors to explain asymmetric cost behavior, which is often perceived as the main cost driver. For example, Cooper and Kaplan (1988)show that internal factors such as labor hours, machine hours, production volume, and product complexity act as cost drivers. Moreover, strategic cost decisions are disciplined by internal mechanisms such as corporate governance(Chen et al., 2012). While cost management is usually affected by the structural characteristics of the industry, it is necessary to examine whether external industry factors can explain the asymmetric cost behavior and answer the question that, is an asymmetric cost behavior affected by competitive prices? A few studies investigate the relationship between asymmetric cost behavior and external factors. The Gross domestic product (GDP) and Employment protection legislation (EPL) have influenced on asymmetric cost behavior(Anderson et al., 2003, Banker et al., 2013). Ibrahim (2015) shows the relationship between economic growth and cost stickiness that prosperity and recession periods have affected an asymmetric cost behavior that costs are stickiness and anti-stickiness. However, there is little evidence of the association between asymmetric cost behavior and competition factors. Cheung et al. (2016) provide highlight that cost stickiness is associated with competition factors by product differentiation, entry costs, and market size. Findings argue that asymmetric cost behavior is affected by external factors as well as internal factors. Suggesting that this external factor is a direct determinant of the asymmetric cost behavior. Because competition factors are among the important issues in managerial decisions, managerial incentives and understanding are affected by the level of market competition. Therefore, we directly expect competition factors to impact the decisions made by managers

with respect to costs. Costs also are likely to vary with the levels of price and demand differently than the level of sales(Bugeja et al., 2015, Al-Dmour et al., 2020).

Lately, studies suggest that competition includes multi-dimensional factors such as product substitutability, market size, entry costs, demand size, and market price (Simon, 2007, Fabra and García, 2015, Karuna, 2007). Since managers' pricing decisions may change with the level of competition, the current study uses competitive price to examine the association between competition and asymmetric cost behavior. Competitive price (or market price) may influence cost stickiness. Higher competition leads to a low-profit margin. Managers in these firms may not cut costs aggressively when sales decline but instead keep committed resources, maintaining competitive advantages. Firms with higher competition may also incur higher adjustment costs when sales decrease. Consequently, it is difficult to reduce costs significantly when sales decline. Therefore, we hypothesize that costs are sticky for firms in an industry with higher competition by the price change. When managers are pessimistic about the future of sales, those costs are anti-sticky. Our empirical findings are consistent with the hypotheses. Results show that cost stickiness is pronounced for firms in an industry competition with managerial optimism, whereas cost anti-stickiness is pronounced for firms in an industry competition with managerial pessimism. Overall, findings suggest that asymmetric cost behavior is affected by competitive price as an external competition factor.

This study contributes to the literature in the following. First, we document the association between asymmetric cost behavior and external competition factor by prices. Different from prior studies that attempt to examine the association between external factors and asymmetric cost behavior using Employment protection legislation, Economic growth, Product differentiation, Market size, and Entry costs(Calleja et al., 2006, Banker et al., 2013, Ibrahim, 2015, Cheung et al., 2016). Second, our study is the first one that explains how competition may affect cost stickiness for the evaluation of managerial understanding. Although prior studies have examined other factors such as GDP growth, Asset and employee intensity, ours are the first that relies on a comprehensive set of competition measures derived from economic theories. Using the competition measure by market price changes, we provide evidence of how managers develop and understand cost management in response to the external competitive environment. Finally, this study suggests that the role of a manager's pricing decisions is decisive in asymmetry behavior in the cost structure.

Meanwhile, the remainder of this study is divided into six sections as. Section 2 presents a literature review and hypotheses development. Section 3 describes the research methodology. Section 4 presents the empirical results. Section 5 is a discussion of our findings. The implications of price changes are set out in section 6. Section 7 discusses the conclusion of this article.

2. Literature review and hypotheses development

2.1 Resources Adjustment costs and asymmetric cost behavior

Recently, research has been conducted on the adjustment cost of resources from asymmetry behavior on competition factors. Measuring the resources cost used by individual managers' actions information and understanding cost behavior should focus on costs to respond to activity increase and decrease (Cooper and Kaplan, 1992). The traditional behavior model distorts costs behavior with activity changes in the long term and gives management a poor showing about costs and activity's relationship (Fernandes et al., 1997). Because this assumption proposes the relation between costs and activity in the relevant range proportionately, it means if activity increases, one unit of activity in the present will increase

present costs as mechanical behavior (Weidenmier and Subramaniam, 2003). The relevant range is the activity range in which cost behavior assumed by a manager is valid to present the relation between variable and fixed costs (De Medeiros and Costa, 2004, Vedernikova et al., 2020). The traditional model of fixed and variable costs proposes a mechanical relation between cost and resource change in the relevant range. The increase and decrease are equal.

Many studies note the differences between the level of costs and activity rise changes or fall, that means the costs rise with activity increase a higher than they fall with a decrease of this cost behavior called "asymmetry" as sticky, anti-stick costs(Labro and Soderstrom, 2010) Typically, asymmetry behavior has two facets; they are cost stickiness and cost anti-stickiness. First, one is, defined as costs decreasing by less than 1% when the volume of output decrease by 1%, while they are increasing higher than the percentage of change when volume increase. And the second one is the inverse of the first. Although a model of Anderson et al. (2003) has been accepted in accounting research and presented the methodology and findings of their model that guess costs respond asymmetrically to sales changes only because of costs adjustment delay, it also has been challenged in recent research about factors of this phenomenon and its results. Asymmetry behavior studies have suggested that several factors lead to sticky cost behavior when costs adjust asymmetrically, for example, demand, market size, price, product differentiation and others (Porporato and Werbin, 2011, Cheung et al., 2016). Overall, these studies show that production and market functions can drive asymmetric cost behavior.

The above studies on the determinants of cost stickiness mainly focus on internal factors within the firm. However, the evidence on the relation between external factors and asymmetric cost behavior is limited (Cheung et al., 2016). Banker et al. (2013) Considered the employment protection regulations as an external factor and showed a positive association between the strictness of the country level and the stickiness behavior of cost. While in an inefficient perspective of management, cost stickiness likely is a negative impact on future performance because activities are expected to decline as decreasing (Homburg and Nasev, 2009). That depends on managers' decisions to manage the utilized resources and whether they can do it or not. As a result, the asymmetry behavior level between management and outside investors, and competitors will increase if managers understand and prepare plans based on industry position; they can associate costs decrease to activity decline, and reverse. Cost stickiness is that observed when sales are decreasing will certainty bring about profits decline in periods(Yasukata, 2011). From above, we aim to examine competitive price as as external factor that affects asymmetric cost behavior. We rely on competition factors derived from economic theories to examine whether the competitive price is associated with cost stickiness. The study supports readers to understand which dimensions of market competition affect asymmetric cost behavior by managerial decisions.

2.3 Costs to market prices in Competitive environment

Pricing behavior is a tool for firms to do with how they compete with each other as well as their need to respond to the environment within which they compete. The pricing decision is a key one for customers, perceived value and profitability, as well as playing a part in brand identity(Maharaj, 2013). Managers' decisions aim to manage the utilized resources, whether they can do it or not. As a result, the asymmetry behavior level between management and outside investors and competitors will increase. If managers understand and prepare plans based on industry position, they can associate costs decrease with activity decline and the reverse. Cost stickiness is that observed when demand decreases will certainly bring about a profit decline in periods (Yasukata, 2011). Pricing has affected competition. Both price increases and decreases are observed in competitors' pricing behavior that pushes competitors

made selective price changes to invidious product lines (Uusitalo and Rökman, 2007, Chen et al., 2015b). Therefore, the pricing decision affects managerial practices and impacts profits.

Caskey (2015) presented an operational question: can we examine the relation between competition decisions and resource adjustment costs? In particular, the company should understand the impact of its prices on customers and then earnings (Simon, 2007). Baumgarten (2012)documents the effect of prices on sticky costs when managers decrease the output selling price as demand falls faster than the output selling price increase as demand rises. Kim and Rhee (2012)examine the sticky cost behavior by output price changes in the customer price index method. Cannon (2014) identifies an asymmetric relation between cost response and output selling price changes that agrees with the concept that costs appear to have sticky behavior when managers lower output prices to increase the degree of sticky costs as demand falls than managers increase output prices as demand growth. The future issue sticky costs phenomenon investigates how output selling prices can be incorporated with asymmetric cost behavior by the effect of pricing decisions in an empirical study (Banker et al., 2014). Cheung et al. (2016) show that cost stickiness has associated with market competition factors by product differentiation, entry cost, and market size. They shed light on how external competition factors affect cost management(Bhattacharyya et al., 2020).

Overall, the above literature suggests that competition affects managerial decision-making and performance evaluation. Therefore, we expect that competition may affect the stickiness behavior of cost directly by competitive price as an external factor that explains the difference level between market competition and managers' understanding. We argue to present our hypotheses for examining this association.

2.4 Hypotheses development

Perfectly, firms that compete in a competitive market tend to have a lower profit. Managers aggressively may need to cut costs when sales decline to avoid demand fall and loss. By contrast, firms in an industry with low prices exhibit increased production capacity. Managers of these firms may have more discretionary resources. When sales decline, managers aggressively may not cut costs but may keep Research and Development costs, maintaining the company's competitive advantages (Banker et al., 2014, Cannon, 2014, Ibrahim, 2015, Cheung et al., 2016). Therefore, we hypothesize that costs respond asymmetrically to price changes, and there are differences due to deliberate decisions through the interaction of capacity utilization, as follows in the alternative form:

H1. For firms in an industry with high competition, the price change asymmetrically affects cost behavior.

This description shows that the change in cost increases comparative to output selling price change is greater than the change in cost decrease comparative to output selling price change as direct effects.

Next, we examine the interactive effects of capacity utilization on the degree of cost asymmetry. Managers consider that resource adjustment costs are likely to occur when sales revenues increase in the future. Capacity utilization is defined as the percentage actual to design capacity or the percentage of usage resources to total resources(Nyaoga et al., 2015). Capacity utilization plays a significant role in determining the extent of stickiness. It may therefore be an important omitted variable in cross-sectional studies of cost behavior (Balakrishnan et al.,

2004). Economic growth negatively affects the trade openness index in the long run, but the trade openness index is positively associated with economic growth in the short run, which explains why economic fluctuations have a nonlinear path during periods(Hye and Lau, 2015, Ibrahim, 2015). This description shows that price change interacts with capacity utilization to predict cost response for reflecting anti-stickiness and stickiness, respectively, as indirect effects. Therefore, we present the second hypothesis as follows:

H2. Capacity utilization moderates the impact of price change on cost behavior, and the degree of cost anti-stickiness is pronounced.

3. Research Methodology

3.1 Sample description

We empirically evaluated the data of five industrial firms from 1 January 2006 to 31 December 2015. Observations were from Iraq country. We collected the data about the values of variables, and the final samples consisted monthly of 600 usable observations of each variable. We calculated all changes using the financial and performance statements across periods as indexes of total costs, sales volumes and output selling price using a nonlinear multiple regression analysis functions.

Table 1. Initial data of cement produce from Iraqi industry for 2006 - 2015.

Number	Factory	Total cost. C/q	Prices .R/V	Inventory value. q*C	Demand quantity. DQ	Actual capacity. q	Practical capacity. q+utilization
1	Najaf	120	120	64	120	120	120
2	Kufa	120	120	64	120	120	120
3	Smeawa	120	120	64	120	120	120
3	Busra	120	120	64	120	120	120
5	Karbala	120	120	64	120	120	120
	Total sample	600	600	320	600	600	600

These items are determined from monthly statements of factories. Total costs are collected from operations costs plus selling and administrative costs by five activities (manufacturing, engineering & services, quality control, marketing, and administration).output prices are average prices as sales revenue divided by sales volume (R/V). Inventory value is stored quantity from produced last period based on factories statements. Demand is the size of sold goods and expectations based on unused capacity and market.

3.2 Data analysis techniques

Augmented Dickey-Fuller test (ADF) was performed to get stationarity for empirical variables. The Cointegration Johansen technique was used to examine the validity of the relationship among total cost, competitive price and capacity utilization in the proposed model for hypotheses testing in Eviews 7. Nonlinear regression analysis was conducted to evaluate the study hypotheses in SPSS 20. The interactive effect of capacity utilization was tested by using Balakrishnan et al. (2004), and Banker et al. (2014) multiple moderated regression.

3.3 Procedures

In order to estimate the relationship between competitive pricing and the asymmetric cost behavior across industrial firms, we obtain financial data about price and demand from marketing and planning departments and estimate competitive prices based on demand by three levels (high, medium and low). The company's goal is to improve market share in the competitive environment; the demand of the company is determined monthly, the output selling price set by market conditions change and coverage of cost. Our sample period covers from 2006 to 2015. We have selected the output selling price of three competitive products (Pakistani, Kuwait and Iranian) and collected the average selling price for each competitor. The

data set of competitive price was based on the three levels of competitors' price compared from demand change "demand increase = high competitive price, demand normal = medium competitive price, demand decrease= low competitive price" (Wu, 2012, Laksmana and Yang, 2014). Thus, valid items remained suitable for the analysis. Data were transformed to change-log for the proposed models by computing variables in SPSS 20. A previous study reported the usefulness and importance of unused capacity level when compared to available and usage capacity (Cooper and Kaplan, 1992) as follows in the equation:

Available capacity = usage capacity+ unused capacity (1)

Where: available capacity is the practical capacity that is determined by management, usage capacity is achieved capacity during business periods, and unused capacity is failure capacity to access efficiency level.

In addition, a review of the theory of asymmetric cost behavior leads us to conclude that physical output data is the response to managerial practice. We investigate to assume a lag of months as the most appropriate time interval our different data collections(rather than years). To determine the stationary of months series should separate each measurement time in our study, we followed MacKinnon's, (1996) recommendation to rely on previous empirical literature to identify a unit root in this regard.

To determine the capacity utilization level for statistical testing. The capacity utilization was computed for capacity measures of the unused and total capacity as in equation (2) below (Nyaoga et al., 2015):

$$\boldsymbol{qu} = \mathbf{1} - \left(\frac{\boldsymbol{unused\ capacity}}{\boldsymbol{total\ capacity}}\right) \textbf{(2)}$$

Where: qu is Capacity Utilization of selling cover rate. Unused capacity is when units cannot exceed effective capacity. Total capacity is the maximum units of output designed for the operation and facility other.

Finally, the magnitude of the direct effects is represented by the regression coefficients. The magnitude of the indirect effects is determined by multiplying the coefficients of the regression in the moderation equation(Baron and Kenny, 1986, Hayes, 2009).

3.4 Estimated models

We test the hypothesis by estimating the following regression modified from Balakrishnan et al. (2004), Cannon (2014) and Cheung et al. (2016) to investigate the existence or non-existence of cost behavior. The study adopts an examination of the direct and indirect effects of competitive price on asymmetric cost behavior by moderation analysis based on the approach of Baron and Kenny (1986), as they are illustrated below:

$$\ln \frac{\mathrm{TC_{i,t}}-\mathrm{TC_{i,t-1}}}{\mathrm{TC_{i,t-1}}} = \gamma_0 + \gamma_1 ln\left(\frac{\mathrm{CP_{i,t}}-\mathrm{CP_{i,t-1}}}{\mathrm{CP_{i,t-1}}}\right) + \gamma_2 DEC_{i,t} ln\left(\frac{\mathrm{CP_{i,t}}-\mathrm{CP_{i,t-1}}}{\mathrm{CP_{i,t-1}}}\right) + \delta_{i,t} \quad (3)$$

Where: TC i, t is the total cost per unit for firm i at time t. $\mathrm{P_{i,t}}$ is an output selling price based on demand per unit for firm i time t. $DEC_{i,t}$ is an indicator variable set to 1 if $\mathrm{P_{i,t}}<\mathrm{P_{i,t-1}}$ and set 0 otherwise. γ_0 is a parameter that estimates the asymmetric cost changes unassociated with output selling price changes.γ_1 is a parameter that estimates the association between cost change and output selling price increase.γ_2 is a parameter of "asymmetry measure" that estimates the difference in the association between cost change and output selling price during increasing and decreasing.$\delta_{i,t}$ is an error term for variability in cost behavior estimation for firm i time t.

The relationship between cost response and output prices changes based on demand competition is one method of competitive pricing. The model ignored the traditional pricing method on the actual price set by the cost-based pricing model. A negative γ_2 coefficient indicates that costs asymmetrically associate with competitive price changes to measure the

average percentage of decrease in costs for one present decrease in the competitive price. This finding provides an empirical test of hypothesis 3, which means output selling price determinate affects the degree of asymmetric costs behavior.

We adopt the interactive effect of capacity utilization on stickiness behavior of cost based on the model of Balakrishnan et al. (2004), as follows:

$$\ln\frac{\mathrm{TC_{i,t}}-\mathrm{TC_{i,t-1}}}{\mathrm{TC_{i,t-1}}}=\gamma_0+\gamma_1 ln\left(\frac{\mathrm{CP_{i,t}}-\mathrm{CP_{i,t-1}}}{\mathrm{CP_{i,t-1}}}\right)+\gamma_2 DEC_{i,t} ln\left(\frac{\mathrm{CP_{i,t}}-\mathrm{CP_{i,t-1}}}{\mathrm{CP_{i,t-1}}}\right)+\gamma_3 ln\left(\frac{\mathrm{qu_{i,t}}-\mathrm{qu_{i,t-1}}}{\mathrm{qu_{i,t-1}}}\right)+$$
$$\boldsymbol{\gamma_{42} DEC_{i,t} ln\left(\frac{CP_{i,t}-CP_{i,t-1}}{CP_{i,t-1}}\right)\times ln\left(\frac{qu_{i,t}-qu_{i,t-1}}{qu_{i,t}-1}\right)+\delta_{i,t}} \qquad (4)$$

Where: γ_3 is a moderating variable that estimates the association between total costs and selling capacity utilization changes. γ_4 is a critical value that estimates how capacity utilization moderates the association between cost behavior and competitive price, and all other variables were defined previously.

To develop a concept of asymmetrical behavior about cost structure, the model tries to examine the indirect and direct effects of price changes on cost behavior by the moderator role of capacity utilization. We begin by considering multiple factors with activity level and change. Parameters estimatesγ_1,γ_2 and γ_4 measure total costs response to competitive price changes in equation (4). A positive of γ_4 coefficient indicates significant interactive effects of capacity utilization between total costs and competitive price changes that the fall and rise of total costs related to increase and decrease in competitive price within capacity utilization. Overall, this empirical model provides additional testing for the sticky cost phenomenon. The variable's definitions are presented in Table 2.

Table 2 variables definitions

Variable ,N=600	Calculation	Definition
$ln\left(\frac{\mathrm{P_{i,t}}-\mathrm{P_{i,t-1}}}{\mathrm{P_{i,t-1}}}\right)$	Percent average output price change.	Log-change in price by dinar. Value of sold produce calculated based on demand competition.
$\ln(\frac{\mathrm{TC_{i,t}}-\mathrm{TC_{i,t-1}}}{\mathrm{TC_{i,t-1}}})$	Percent total cost change	Log-change in total costs by dinar.Payments of all industrial, marketing and administration activities.
$ln\left(\frac{\mathrm{qu_{i,t}}-\mathrm{qu_{i,t-1}}}{\mathrm{qu_{i,t-1}}}\right)$	Percent sales utilization change.	Log-change in sales utilization by Ton. The percentage rate of each actual sales volume to demand.

The factories are in the middle and south of Iraq. The periods were determined from monthly statements of factories as stability periods. The Output selling prices are adjusted based on demand fluctuations in three levels (higher competitive price, average competitive price, and lower competitive price) collected from the planning department. Total costs are collected from five activities (manufacturing, engineering, quality control, marketing and administration. Capacity utilization is the percentage actual to design capacity.

4. Results

4.1. Preliminary analysis

Descriptive statistics from a sample for costs, prices, capacity utilization and their changes are presented in Table 3. The mean price is 128540 IQD (median 131000 IQD). The mean total cost is IQD 2131 million (median IQD 1433 million), and the mean capacity utilization is 56 percent (median 64 percent). On average, the magnitude of changes in total cost, price and capacity utilization, mean (median) price is 018 (0.000) percent. Total cost is 42 (13) percent and capacity utilization is 313.07(108) percent. Consistent with prior studies(Weidenmier and Subramaniam, 2003, Cannon, 2014).

Table 3. Description statistics

Variable	Mean	Standard Dev.	Median	Maximum	Minimum
costs	2131174860	1813379509	1433865019	9973095303	36103999
costs %	0.423	2.223	0.130	27.750	0.000
prices	128540	49574.9	131000	125000	80000
prices %	0.018	0.432	0.000	10.36	-0.90
capacity utilization	0.567	0.346	0.64	1.000	1.022
capacity utilization %	313.07	2996.62	0.108	37962.46	-0.999

All numbers of costs are reported in Iraqi dinar (IQD).

4.2. Test of unit root (stationarity)

The stationary variables to a model will introduce restricted cointegrating vectors is something that should be kept in mind in empirical work. That is, it is a good econometric practice to always include tests on the cointegrating vectors to establish whether relevant restrictions are rejected or not(Österholm and Hjalmarsson, 2007, Zanella et al., 2015). Table 4 presents the results of the Augmented Dickey-Fuller tests. All variables reject the null hypothesis of a unit root that the empirical variables are stationary. Then we test for cointegration by applying the Johansen technique in four separate models.

Describing the procedure for the test, we present a value of coefficients to each variable. As expected, all empirical variables were negative (δ_1 (0.137 = -0.939, p<001), and the results from the test for the existence or not of a unit root in the log levels of our variables. The statistical values are greater than the critical values rejecting the null hypothesis of a unit root. Therefore, all our variables are integrated(MacKinnon, 1996).

Table 4. Results of unit root from Augmented Dickey-Fuller Tests: stationary analysis of empirical variables during periods

Variable	Coefficient	Standard Error	Critical value	t-statistics (Prob.*)
$\ln\frac{\mathrm{TC_{i,t}}-\mathrm{TC_{i,t-1}}}{\mathrm{TC_{i,t-1}}}$	-0.939 (-)	0.137	(-2.874)	-6.816*** (0.000)
$\ln\left(\frac{\mathrm{CP_{i,t}}-\mathrm{CP_{i,t-1}}}{\mathrm{CP_{i,t-1}}}\right)$	-1.09 (-)	0.04	(-2.866)	-26.81*** (0.000)
$DEC_{i,t}ln\left(\frac{\mathrm{CP_{i,t}}-\mathrm{CP_{i,t-1}}}{\mathrm{CP_{i,t-1}}}\right)$	-1.05 (-)	0.04	(-2.866)	-25.69*** (0.000)
$ln\left(\frac{\mathrm{qu_{i,t}}-\mathrm{qu_{i,t-1}}}{\mathrm{qu_{i,t-1}}}\right)$	-0.72 (-)	0.14	(-2.866)	-5.05*** (0.000)
$DEC_{i,t}ln\left(\frac{\mathrm{CP_{i,t}}-\mathrm{CP_{i,t-1}}}{\mathrm{CP_{i,t-1}}}\right)\times ln\left(\frac{\mathrm{qu_{i,t}}-\mathrm{qu_{i,t-1}}}{\mathrm{qu_{i,t}}-1}\right)$	-1.007 (-)	0.04	(-2.866)	-24.61 (0.000)

Reject the null of non-stationarity at the 5% level. Significance indicates *, **, *** at the 1%, 5%, 10% levels, respectively.

4.3. Cointegration tests among empirical variables

Multivariate results from the Johansen trace and maximum eigenvalue statistics on convergence and cointegration for the four empirical model variables are presented in Table 5. The theory of cointegration provides a natural setting for testing cross-variables relationships in permanent output movements(Asteriou et al., 2011). The two statistics for the test give full cointegrating vectors for study variables that explain there is a long relationship between total costs as the dependent variable, competitive price change, and capacity utilization as the independent variables. The Johansen trace and the maximum eigenvalue statistics reject the

null hypothesis, implies that there are cointegrating vectors at the 5% level for the entire four-model variables (r≥0, r≥1, r≥2, r≥ 3 and r≥4).

The results indicate that cointegration is accepted in all of the models variables in full estimates of the cointegrating vectors at the 5% level. This suggests evidence of long-run linkage between proposed model relationships and allows us to examine our hypotheses by multiple regression analysis in the next part.

Table 5. Results from Johansen Cointegration Tests for proposed variables in models

Model	Null	Eigenvalue	Trace Statistics	Max. Eigen. Stat.
$\ln\frac{TC_{i,t}-TC_{i,t-1}}{TC_{i,t-1}} = \gamma_0 + \gamma_1 ln\left(\frac{CP_{i,t}-CP_{i,t-1}}{CP_{i,t-1}}\right) + \gamma_2 DEC_{i,t} ln\left(\frac{CP_{i,t}-CP_{i,t-1}}{CP_{i,t-1}}\right) + \delta_{i,t}{}^{+}\,\omega_{i,t}$	None *	0.219	3.96** (0.046)	3.96** (0.046)
	At most 1 *	0.176	115.52*** (0.000)	115.42*** (0.000)
	At most 2 *	0.177	116.17*** (0.000)	116.17*** (0.000)
$\ln\frac{TC_{i,t}-TC_{i,t-1}}{TC_{i,t-1}} = \gamma_0 + \gamma_1 ln\left(\frac{CP_{i,t}-CP_{i,t-1}}{CP_{i,t-1}}\right) + \gamma_2 DEC_{i,t} ln\left(\frac{CP_{i,t}-CP_{i,t-1}}{CP_{i,t-1}}\right) + Ln\left(\frac{qu_{i,t}-qu_{i,t-1}}{qu_{i,t-1}}\right) + DEC_{i,t} ln\left(\frac{CP_{i,t}-CP_{i,t-1}}{CP_{i,t-1}}\right) \times ln\left(\frac{qu_{i,t}-qu_{i,t-1}}{qu_{i,t}-1}\right) + \delta_{i,t}$	None *	0.96	117.61*** (0.001)	55.94*** (0.000)
	At most 1 *	0.86	61.67*** (0.001)	31.99*** (0.001)
	At most 2 *	0.17	219.38*** (0.001)	114.81*** (0.001)
	At most 3 *	0.79	29.67*** (0.002)	25.14*** (0.007)
	At most 4 *	0.24	4.52** (0.033)	4.53*** (0.033)

Reject the null of no cointegration among empirical variables at the 5% level.

4.5 Hypotheses Testing Results

4.5.1 Evidence of cost stickiness: direct effects on costs response to competitive price changes
Results of regression analysis show the effect of competitive price change on asymmetric cost behavior (H1). Results show the models are significant as a whole (*F*-value 15.27, *p*-value <0.001), and reasonably explains the dependent variable (Adju.R^2 31 percent). All explanatory variables show the significant main effects. Their details are shown below in Table 6.
As Table 6 shows, prices change is asymmetrically and significantly related to stickiness behavior of costs with competition case, costs behavior is sticky (γ_1 >0, γ_2<0, p<0.01) and different from zero at the 1% (t-statistics -1.82), the adjusted R^2 is 31%. On average, costs increase 0.92% per 1% increase in prices change ($\gamma_{1)}$ and they decrease by 0.81% per 1% decrease in prices change ($\gamma_{1+}\_\gamma_2$); see model 1. The result shows a direct effect of competitive price change on cost behavior during increasing and decreasing periods. This finding estimates effect of competitive prices on asymmetric cost behavior as an external competition factor for cost stickiness. Thus, H1 is supported.

Table 6. Validation test of the sticky behavior: Nonlinear regressing analysis of relationships between competitive prices and cost change

Dependent variable = total cost (TC) Variable	Parameter	Parameter estimate	Standard Error	Parameter significance (t-statistics)
Intercept	γ_0	2.211 (?)	0.94	0.181 (1.34)
$ln\left(\frac{CP_{i,t}-CP_{i,t-1}}{CP_{i,t-1}}\right)$	γ_1	0.925 (+)	0.23	0.00*** (4.09)
	Asymmetry cost	**-0.11**	0.06	0.031**

$DEC_{i,tln}\left(\frac{\mathrm{CP_{i,t}}-\mathrm{CP_{i,t-1}}}{\mathrm{CP_{i,t-1}}}\right)$	γ_2	(-) 0.31	(-1.82)
Adjusted R²		15.267	
F-value		0.000	
Significant level			

The results present an asymmetric relationship between cost behavior and competitive price changes by nonlinear regression models. The sample consists of 600 factor-month observations between 2006 and 2015 from Iraqi cement industries. All t-statistics were calculated by using significant indicate *, **, *** at the 1%, 5%, 10% levels.

4.5.2 Moderation analysis: interactive effects of capacity utilization

Results of the moderation regression show the moderating effects of capacity utilization on the relationship between competitive prices and asymmetric cost behavior (H2). Results show the model is significant as a whole (F-value 53.74, *p*-value <0.01) and reasonably explains the dependent variable (Adju.R² 31.4), while the significant change in Adju.R2 is reported 0.4 percent, which proves moderation. Their details are shown below in Table 7.

In extension analysis, we estimated interactive models for extending the literature of asymmetric cost behavior by external variables using competitive price change. The estimates indicated significant anti-stickiness conditional on a prior price decrease with moderating effects of capacity utilization change ($\gamma 4$ >0), .suggesting is that capacity utilization has affected the degree of costs asymmetry on the competitive prices changes and cost behavior relationship. The result support H2.

Costs exhibited significant anti-stickiness within the interactive effects of capacity utilization ($\gamma 4$ = -0.05, ΔR² =0.007, t-statistics 2.32) and (φ_2 =-0.11, SE. =0.06, t-statistics -1.82) respectively, that explains high levels of capacity utilization decrease the degree of cost stickiness. On average, costs increase by 0.30% per 1% increase in competitive prices ($\gamma_{1)}$ and they decrease by 0.24% per 1% decrease in the interaction of competitive prices decrease with capacity utilization ($\gamma_{1+}\_\gamma_4$). Moreover, the corresponding coefficient $\gamma_{1>0,}\ \gamma_4$>0 and significant (γ_1 (0.16) =0.30, *p*-value< 0.01; γ_4 (0.03) =-0.053, *p*-value <0.05), the result indicates that perceived capacity utilization interacts with competitive prices changes to decrease stickiness behavior of costs, which manager's pricing decisions have affected cost structure, in support of the H2.

Table 7. Moderation effect of capacity utilization on the relationships between competitive prices and costs behavior

Effect of competitive price with capacity utilization on cost behavior Variable	Parameter	Parameter estimate	Standard Error	Parameter significance (t-statistics)
Intercept	γ_0	0.39 (?)	0.10	0.000 (3.71)
$\ln\left(\frac{\mathrm{CP_{i,t}}-\mathrm{CP_{i,t-1}}}{\mathrm{CP_{i,t-1}}}\right)$	γ_1	0.30 (+)	0.16	0.008*** (1.78)
$DEC_{i,t}ln\left(\frac{\mathrm{CP_{i,t}}-\mathrm{CP_{i,t-1}}}{\mathrm{CP_{i,t-1}}}\right)$ Asymmetry cost	γ_2	**-0.10** (-)	0.09	0.01*** (-1.11)
$ln\left(\frac{\mathrm{qu_{i,t}}-\mathrm{qu_{i,t-1}}}{\mathrm{qu_{i,t-1}}}\right)$	γ_3	0.80 (+)	0.24	0.098* (3.34)
$DEC_{i,t}ln\left(\frac{\mathrm{CP_{i,t}}-\mathrm{CP_{i,t-1}}}{\mathrm{CP_{i,t-1}}}\right)$ Asymmetry cost $\times ln\left(\frac{\mathrm{qu_{i,t}}-\mathrm{qu_{i,t-1}}}{\mathrm{qu_{i,t}}-1}\right)$	γ_4	**0.053** (+)	0.03	0.028** (2.32)
Adjusted R²		0.31		
ΔR²		0.004		
F-value		53.74		
Significant level		0.007		

The results show a model that explains how and when capacity utilization impacts cost behavior by nonlinear regression models. All t-statistics were calculated by using significant indicate *, **, *** at the 1%, 5%, 10% levels, respectively.

6. Discussion

What are the external factors that affect asymmetric cost behavior in the critical competition in the cement manufacturing sector in Iraq? The study examined output selling prices under market demand competition using nonlinear relationships. In this study, we extend the literature that shows the impact of external competition on strategic cost decisions about costs behavior. We conduct several empirical checks on the link between competitive pricing decisions and cost management. First, we examine whether our results hold when we use alternative measures of competition. Second, we examined whether pricing decisions affect cost behavior for manufacturing firms. Third, we explored how managers react when firms face different levels of product market competition under price and demand fluctuations for firm-specific earnings targets.

Wolman (1999) Evidence that the model of price changes can explain marginal cost changes as positive behavior between them. While Cannon (2014) find the output selling price is associated with sticky costs because cost increases higher than decreases to fall and rise in prices. Anderson et al. (2015) Argue that when managers add the assets elements to the basic asymmetric cost behavior model will generate an economic meaning. The research considers how managers understand the effect of price competition on operating performance using economic theory for cost and activity structure adjustment. We examined the impact of managers' pricing decisions on the degree of asymmetric cost behavior in the Iraqi cement industry by five factories from 2006 to 2015. This study tested two hypotheses related to the costs responding to changes in output selling prices and measured the differences in the degree of costs asymmetry when increases the output selling price as demand grows and managerial expectations are optimistic or decreased selling price as demand falls, and managerial expectations are optimistic or decrease selling price as demand falls expectations are pessimism. Findings support all hypotheses and are consistent with competitive prices that management faces lower price and fall demand to adjusting its resource costs. Finally, results show differences between the two cases that significantly argue price adjustments and competition are associated with asymmetric cost behavior. The evidence suggests that managers lower the output selling price faster than they increase the output selling price as demand fluctuates because this way supports marketing position on the market and helps managers to achieve profits in the long term. This suggestion shows that Iraqi firms always suffer from strong competitors in the market and need to manage pricing decisions quickly under hard situations.

Once the magnitude of a price increase or decrease has been determined, competitive pricing has to be implemented. The sales force has the key task of justifying, communicating, and implementing these price changes in addition to the responsibility of proactively discussing with headquarters the issue of any price alterations whenever necessary.

6.1 Implications of prices changes

Pricing decision is an interesting and well-known truth among executives with a sales background; instructions on recommended product use, positioning and price they might have received, managers in the head office cannot be sure that these instructions are actually followed. The main reason is that there are many temptations for attempting to win a sales order in an unorthodox way. In informal discussions with customers, sales managers might be tempted to suggest, for example, modern ways of using the product. At least, they might suggest to the customers that the recently implemented price increase is nothing else than headquarters' version of attempting to increase profits at the expense of customers and that if several large accounts refuse to sign any orders, the price change will be reversed in the next months(Hinterhuber, 2008). Sales personnel have the potential to fortify and destroy any

planned price changes. It is, therefore, vital to manage the sales force well. Several issues should be considered. First, involve sales executives in any pricing decisions: sales managers should truly feel that they are acting on nothing else than their fullest conviction. They need to have a full say in pricing and other marketing issues. Second, a fixed-price policy: encourages sales personnel to sell on value and not on price and generates flexibility in adapting prices to different types of customers and distribution channels. Third, reward sales personnel for profits and not sales: Sales personnel have to be rewarded for selling value. Accordingly, rewards should be linked to the margin generated and not to turn over. This point should then reflect product and account profitability. Fourth, involve sales personnel in the strategy process: Sales managers should be involved in the product-development process for feedback on product attributes and features; they can also help to identify customers those particularly able to sense market trends. Fifth, be creative with marketing strategies: creative marketing strategies are still easy and cheap to implement. Price and product bundling add value for the customer and offer the potential to stimulate sales.

Overall, Product pricing strategies have to be preceded by an understanding of the real sources of value for customers and their costs, which then will lead to appropriate positioning and pricing for profitability, market share and sales growth. Economic value analysis is a valuable tool even when products are relatively undifferentiated; Iraqi companies need to understand cost management and the effect of price and external factors, stressing the importance of using cost stickiness model specification to gain insights about managers' pricing decisions. .

7. Conclusion

Cannon (2014) empirically documents the impact of price change on asymmetric cost behavior as an internal factor that shows how activity affects the degree of cost stickiness. Many internal factors such as sales revenue, capacity, assets intensity and employee intensity are shown to affect the asymmetric cost behavior(Kama and Weiss, 2013, Dalla Via and Perego, 2014). Conversely, a strategic cost decision is influenced by external environmental factors might also contribute to asymmetric relations between cost and activity. Although competition is an important factor in the managerial decision-making process, the association between competition factors and asymmetric cost behavior is limited (Cheung et al., 2016). To fill this gap, the current study uses competitive prices motivated by economics theories to market demand-based pricing to examine whether pricing decisions affect cost structure and whether managers understand cost management through competition (Wu, 2012, Laksmana and Yang, 2014).

The study is based on a case study that was administered to Iraqi industry companies. This study relied partly on established measurements of asymmetric cost behavior, and partly on added new measurement drivers who do development for the theoretical framework for the phenomenon of cost asymmetry. Our findings suggest that competitive price is associated with asymmetric cost behavior. For firms in an industry with high competition or managerial optimism, the degree of cost stickiness is pronounced. This result suggests that higher adjustment costs and high competition may lead to an increase in the degree of sticky cost. Findings also find that for firms in an industry with managerial pessimism, the degree of cost anti-stickiness is pronounced. The result indicates that for firms in an industry with competition, managers consider that resource adjustment costs are likely to occur when sales revenues increase in the future. Furthermore, managers in this situation may have more incentives to cut committed resources as the corrective effect of market competition is more effective in these industries; therefore, when sales decline because of low prices in the industry

market, managers speed to cut costs. Totally the evidence suggests that asymmetric cost behavior is affected by competitive prices as external competition factors.

The study is the first research that analyzes the asymmetric cost behavior conditional on the competitive environment by output selling prices. We consider several dimensions of competition that can affect the stickiness behavior of costs; future research can confirm these from current research while including other competition factors. Further investigation of other external factors could be insightful. Our findings shed light on how managers react to external competition factors and develop cost management. In addition, the study has a few limitations that future research should endeavour to overcome. First, we have only examined one external factor of competition that we have not used for all possible determinants of cost stickiness. Second, data collection was limited to a specific area from one country, which could reduce the generalizability of the findings to other areas and industry categories. We believe that the results of this study show that competitive price is one of the main determinants of cost stickiness.

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