

Determinants of Asymmetric Cost Behavior by Deliberate Managers Decisions: A Nonlinear Regression Modeling

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Abstract: The study aims to find differences in determinants of asymmetric cost behavior of manufacturing firms between actual and expected cases in Iraq region. Five cement factories have been selected and indexed statements monthly from 2006-2015 using nonlinear function by regression analysis. This study analyses determinants of asymmetric cost behavior in actual case compared to expected case in the business market. The results show that costs become sticky with changes in sales, prices, inventory and demand under business market decisions by expected case but costs were anti-sticky with same changes under normal decisions by the actual case. It means that manager's decisions are driven by economic reasons such as adjustment costs, market prices and demand uncertainty as well as managers understanding. The deliberate manager's decision factors impact differently on the asymmetric cost behavior of actual and expected performance cases. It can be concluded that managers understand the economic fluctuations of business market when they adjust their resources costs.

Key words: Deliberate manager's decisions, asymmetry cost behavior, sales revenue, selling output prices, inventory and demand, uncertainty

INTRODUCTION

Measuring the resources cost used individual for manager's actions information and to understand cost behavior should focus on costs respond to activity increase and decrease (Cooper and Kaplan, 1992). The traditional behavior model distorts costs behavior with activity changes in a long term and gives management a poor showing about costs and activities relationship (Fernandes *et al.*, 1997). Because this assumption propose proportionately the relation between costs and activity in the relevant range, means if activity increase a one present will increase a one present in costs as mechanical behavior (Subramanian and Weidenmier, 2003) and the relevant range is the activity range in which costs behavior assume by manager is valid to present the relation between variable and fixed costs (Medeiros and Costa, 2004). Anderson *et al.* (2003) developed the thinking about costs respond to activity changes, they found the costs not proportionately associated with sales changes by empirical study, costs respond to activity increase higher than costs respond to activity decrease.

Several studies argued that relationship between cost and activity is nonlinear but they depended on one driver

to measure cost behavior. Anderson *et al.* (2003), Subramanian and Weidenmier (2003) found that traditional cost behavior model not suitable to measure cost behavior, they provide asymmetric response between cost and sales changes. Second, explanation examined the managerial expectations about future activity level which is in turn driven by future demand that relates managerial optimism and pessimism. Some studies focused on the agency problem when managers make self-maximizing decisions that might not be in the best interest of the stockholders (Kama and Weiss, 2010). Costs also are likely to vary with the levels of price, inventory and demand differently than the level of sales (Bugeja *et al.*, 2015).

Lately, the scientific discussion in this phenomenon how costs behave when managers adjusts their resources costs and makes deliberate decisions as responding to certain factors (Porporato and Werbin, 2011). Kama and Weiss (2010) found the deliberate decisions lessen the degree of costs sticky rather than induce cost sticky. While, Bradbury and Scott (2014) documented the deliberate managers decisions have not effect on costs respond to activity changes. To explain and answer these questions what is the effect of costs adjustment and deliberate decisions on degree of sticky cost behavior?

And which one is higher? We address four hypothesis to examine the degree of asymmetry behavior from several drivers related with costs directly and indirectly in two different cases. The study builds on the concept of sticky costs by Cannon (2014), organizing a model is that includes sales revenue, selling output price, inventory asset and demand as proxies for asymmetric cost behavior. This evidence is to understand how deliberate decisions and cost adjustments impact on the costs structure and proves that the role of deliberate decisions is strong on asymmetric cost behavior into business market conditions.

Literature review: There are many studies done on the determinants of asymmetric cost behavior and managers decisions. The deliberate decision theory considers that asymmetry behavior is result of managers actions which argue the basic concept is resources committed to operational activities (Anderson and Lanen, 2007). Because the managers consider this sensitivity of cost changes relative to activity volume reductions. This will contribute to improving the accountability process (Medeiros and Costa, 2004) when managers think that sales have decreasing temporary and retention the resources for sales recover. In long-term, the finding is high costs compared to sales decline and profit decrease in the current period (Yasukata, 2011). Finally, cost stickiness is a managerial decision to bear the costs of unused resources when activity is falling, current earning will affect expectations of future. This purpose is identifying between efficient and inefficient cost sticky (Homburg and Nasev, 2009).

Kama and Weiss (2010) set question, do manager's deliberate decisions make sticky costs? This notion argues that asymmetry behavior is result of manager's decisions and focus on the impact of resources adjustment and cost structure on target earnings. Otherwise, Bradbury and Scott (2014) investigated whether managers understand asymmetric cost behavior by the comparison actual and forecast sample regression for costs behavior and revenue change. Xue and Hong (2016) also argue that manager's motivations affect cost behavior and found a negative effect of corporate governance on cost stickiness.

The adjustment of costs in response to changes in activity volume is a primary issue in the company (Via, 2012). Chen *et al.* (2015), expected the managerial confidence has affected the degree of sticky costs, this adjustment may be cut or keep excess cost resources when sales increase and decrease because of future demand. Theoretical analysis of this thinking consider a conscious adjustment of costs in the short term will be delayed, management has an adjustment plan related to operational activities in the company (Blue *et al.*, 2013):

- H_1 : the magnitude of the sticky cost behavior of total cost and sales to changes in the absolute magnitude of activity is different from the market position in the same company

The controlling pricing and inventory are crucial tools include industries where short-term supply is fast to change. In particular, the company should understand the impact of its prices and inventory levels on customers then earnings (Simon, 2007). In the second driver of sticky costs, Baumgarten (2012) documented effect of prices on sticky costs when managers decrease output selling price as demand falls faster than output selling price increase as demand rises. Kim and Rhee (2012) examined the sticky cost behavior by output price changes in the customer price index method. They create two groups condition controlling and non-controlling price effect from Korean industry and found between these situations. Cannon (2014) also identified an asymmetric relation between costs respond and output selling price changes, that agrees with the concept of costs appear sticky behavior when managers lower output prices to increase the degree sticky costs as demand falls than managers increase output prices as demand growth. The future issue sticky costs phenomenon that investigates how output selling prices can be incorporated with asymmetric cost behavior by the effect of pricing decision in empirical study (Banker *et al.*, 2014):

- H_2 : the magnitude of the sticky cost behavior of total cost and output selling prices to changes in the absolute magnitude of activity is different from the market position in the same company

The third determinant of linking of asymmetric cost behavior, Baumgarten (2012) used inventory changes as a control variable for sales. The increasing in inventory level relative to sales may be interpreted either the firm demand for products is falling or managers expectations have positive implications for future earnings (Anderson and Lanen, 2007). Malik (2012) documented that, stickiness degree increase due to high levels of inventory in the manufacturing sector. Because the sticky costs behavior results from managers deliberate decisions because of political and economic conditions such as governmental laws and market position (Ibrahim, 2015; Calleja *et al.*, 2006; Porporato and Werbin, 2011; Baumgarten, 2012):

- H_3 : the magnitude of the sticky cost behavior of total cost and inventory to changes in the absolute magnitude of activity is different from the market position in the same company

The fourth determinant of asymmetric cost behavior, demand changes can make an effect when demand increase managers will increase committed resources of costs for sales but when demand decrease managers will try to remove some resources because they cannot utilize or match all these changes with activity (Anderson *et al.*, 2016). The price-demand relation modeled as function of market competition for evaluation manager's performance and their competitors. This consideration modeled demand as depending on output price and inventory level (Simon, 2007). Hence, it might unique to examine the impact of sharp demand changes on manager's decisions and cost behavior (Ibrahim, 2015)

- H_4 : the magnitude of the sticky cost behavior of total cost and demand to changes in the absolute magnitude of activity is different from the market position in the same company

MATERIALS AND METHODS

Sample description: The data used in this study a cross industry-level data, complied from financial statements and performance reporting's of firms mentioned in the following table monthly from 2006-2015. The final samples consisted of 600 usable observations of each variable but inventory assets was 400 (Table 1).

Empirical models: The study has designed the models with the following long-run specification using OLS estimation for multiple regression by nonlinear functions (Cannon, 2014; Chen *et al.*, 2015):

$$\ln \frac{TC_{i,t} - TC_{i,t-1}}{TC_{i,t}} = \varphi_0 + \varphi_1 \ln \left(\frac{R_{i,t} - R_{i,t-1}}{R_{i,t}} \right) + \varphi_2 DEC_{i,t} \ln \left(\frac{R_{i,t} - R_{i,t-1}}{R_{i,t}} \right) + \alpha_{i,t} \quad (1)$$

Where:

- $TC_{i,t}$ = The Total Cost per unit ($C_{i, tqi,t}$) for firm i time t
- $R_{i,t}$ = The sales revenue for firm i time t
- φ_0 = The parameter that estimates the asymmetric total cost changes unassociated with revenues changes
- φ_1 = The parameter that estimates the association between cost change and revenue change during periods when revenue is increasing
- φ_2 = The parameter that estimates the difference in the association between cost change and revenue change when revenues is increasing and decreasing
- $DEC_{i,t}$ = An indicator variable set value of 1 when $R_{i,t} < R_{i,t-1}$ for firm i time t and set value of 0, otherwise

$\alpha_{i,t}$ = The total cost change estimation error term for firm i time t

As argued by Anderson *et al.* (2016), this measure of the cost stickiness is unit free and it allows us to specify the model in the logarithmic form that fits the macro data better. Furthermore, the measure is defined as the ratio of revenues over cash flows, so that, if this measure is to improve due to a depreciation of firm's performance, an estimate of φ_2 to be negative. However, as argued by Kama and Weiss (2010), these income elasticities could also be negative and positive, respectively if prior sales decrease and increase as it grows. The second determinant model indicates as:

$$\ln \frac{TC_{i,t} - TC_{i,t-1}}{TC_{i,t}} = \gamma_0 + \gamma_1 \ln \left(\frac{P_{i,t} - P_{i,t-1}}{P_{i,t}} \right) + \gamma_2 DEC_{i,t} \ln \left(\frac{P_{i,t} - P_{i,t-1}}{P_{i,t}} \right) + \delta_{i,t} \quad (2)$$

Where:

- $P_{i,t}$ = The output selling price per unit for firm i time t
- γ_0 = The parameter that estimates the asymmetric total cost changes unassociated with output selling price changes
- γ_1 = The parameter that estimates the association between cost change and output selling price change during periods when competition is increasing
- γ_2 = The parameter that estimates the difference in the association between cost change and output selling price change when competition is increasing and decreasing
- $DEC_{i,t}$ = The indicator variable set value of 1 when $P_{i,t} < P_{i,t-1}$ for firm i time t and set value of 0, otherwise
- $\delta_{i,t}$ = The total cost change estimation error term for firm i time t

The third determinant model indicates as:

$$\ln \frac{TC_{i,t} - TC_{i,t-1}}{TC_{i,t}} = \beta_0 + \beta_1 \ln \left(\frac{INV_{i,t} - INV_{i,t-1}}{INV_{i,t}} \right) + \beta_2 DEC_{i,t} \ln \left(\frac{INV_{i,t} - INV_{i,t-1}}{INV_{i,t}} \right) + \theta_{i,t} \quad (3)$$

Where:

- $INV_{i,t}$ = The finished inventory value for firm i time t
- β_2 = The parameter that estimates the difference in the association between cost change and inventory change when inventory is increasing and decreasing

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

Factories	Total cost (C/q)	Prices (R/V)	Inventory value (q×C)	Demand Quantity (DQ)	Actual capacity (q)	Practical capacity q+utilization
Najaf	120	120	80	120	120	120
Kufa	120	120	80	120	120	120
Smeawa	120	120	80	120	120	120
Busra	120	120	80	120	120	120
Karbala	120	120	80	120	120	120
Total sample	600	600	400	600	600	600

These items are determined from monthly statements of factories. Total costs are collection from operations costs plus selling and administrative costs by five activities (manufacturing, engineering and services, quality control, marketing and administration). Selling output prices are average price as sales Revenue divide sales volume (R/V). Inventory value is store quantity from produce last period based on factories statements. Demand is size of sold goods and expectation based on unused capacity and market

Table 2: Data definition and relations among variables in models

Variables (N = 600, N = 400)	Calculations	Descriptions
Total cost	$TC_{i,t}$	Total costs per unite by Dinar, it means operations cost and marketing, administration costs divided by capacity
Sales Revenue	$R_{i,t}$	Total net revenue
Capacity	$q_{i,t}$	Total production by Ton
Output selling price	$P_{i,t}$	Value of sold produce or total net revenue divided by sales volume (R/V)
Inventory	$INV_{i,t}$	Value of store goods as finished period
Demand	$D_{i,t}$	Amount of sold and expected unites by market share
Dependent variables		
Percent Total Cost change per capacity unite	$TC_{i,t} - TC_{i,t-1} / TC_{i,t}$	Adjusted change in total cost divided by optimal and actual capacity
Independent variables		
Percent sales Revenue change	$(R_{i,t} - R_{i,t-1}) / R_{i,t}$	Adjusted change in revenue calculated by adjusted and actual demand
Percent average output Price change	$(P_{i,t} - P_{i,t-1}) / P_{i,t}$	Adjusted change in calculated based on cost and demand competition
Percent Inventory value change	$(INV_{i,t} - INV_{i,t-1}) / INV_{i,t}$	Change in inventory calculated by price and cost
Percent Demand change	$(D_{i,t} - D_{i,t-1}) / D_{i,t}$	Adjusted change in demand calculated by adjusted-lagged capacity

The output selling prices adjusted based on demand fluctuations in three levels (competitive high price, competitive average price and competitive low price) and compared with actual output prices those set based on costs margin. Demand adjusted on utilization the unused capacity in relevant range that depends practical capacity and compared with actual demand. Sales revenues adjusted based on new output prices and demand volumes and compared with actual sales revenues in same periods

$DEC_{i,t}$ = The indicator variable set value of 1 when $INV_{i,t} < INV_{i,t-1}$ for firm i time t and set value of 0, otherwise

$\delta_{i,t}$ = The total cost change estimation error term for firm i time t

$DEC_{i,t}$ = The indicator variable set value of 1 when $D_{i,t} < D_{i,t-1}$ for firm i time t and set value of 0, otherwise

$\tau_{i,t}$ = The total cost change estimation error term for firm i time t

The forth determinant model indicates as:

$$\ln \frac{TC_{i,t} - TC_{i,t-1}}{TC_{i,t}} = v_0 + v_1 \ln \left(\frac{D_{i,t} - D_{i,t-1}}{D_{i,t}} \right) + v_2 DEC_{i,t} \ln \left(\frac{D_{i,t} - D_{i,t-1}}{D_{i,t}} \right) + \tau_{i,t} \quad (4)$$

Where:

- $D_{i,t}$ = The Demand size for firm i time t
- v_0 = The parameter that estimates the asymmetric total cost changes unassociated with demand changes
- v_1 = The parameter that estimates the association between cost change and demand change during periods when demand is increasing
- v_2 = The parameter that estimates the difference in the association between cost change and demand change when demand is increasing and decreasing

The general specification with model in Eq. 1-3 and with nonlinear relationship between costs respond and sales revenues, output prices, inventory assets and demand change. A negative ϕ_2 , γ_2 , β_2 and v_2 coefficients indicate that the costs are better in increasing periods of activity than decreasing periods of activity which means deliberate managers decisions determinants sales revenue affect the degree of asymmetric cost behavior (Table 2). In this study, data analysis and SPSS Software were used to test hypothesis.

RESULTS AND DISCUSSION

The empirical models try to measure the effect of significant differences between actual and expected performance on asymmetric cost behavior, added multi drivers of cost structure from Iraqi industry.

The study analyses and presents the nonlinear regression results. The data from the sample of

Table 3: Summary statistics of hypothesis test

Model, N = 600, 400	Performance cases	Indicator of asymmetry behavior	Adjusted R ² (%)	F-values	Significant	Cost behavior
R & TC Model	Actual	0.280	25	36.22	0.001	Anti-sticky
	Competition	-0.753	36	45.32	0.000	Sticky
P & TC Model	Actual	0.834	12	2.47	0.870	Insignificant
	Competition	-0.110	31	15.26	0.000	Sticky
INV & TC Model	Actual	-0.412	30	8.89	0.001	Anti-sticky
	Competition	-0.208	40	16.51	0.000	Sticky
D & TC Model	Actual	-0.192	20	12.10	0.001	Anti-sticky
	Competition	-0.072	36	11.61	0.001	Sticky

The significant anti-sticky behavior means $\varphi_1 \pm \varphi_2 > \varphi_1$, the significant sticky behavior means $\varphi_1 \pm \varphi_2 < \varphi_1$; Competition performance case includes expected data of competitive prices, demand and cost; All F-values are greater than critical value; Sig. is <0.05

Table 4: Nonlinear regression analysis: the asymmetric relationship between costs response and sales revenue change

Dependent variables = Total Cost (TC)					
Variables	Parameters	Parameter estimate/actual	Parameter estimate/expected	Parameter (t-statistics)/actual	Parameter(t-statistics)/expected
Intercept	φ_0	0.88 (?)	0.55 (?)	0.017 (1.37)**	0.038 (1.77)**
$(R_{i,t} - R_{i,t-1})/R_{i,t}$	φ_1	0.45 (+)	0.792 (+)	0.903 (1.122)	0.022 (3.096)**
$DEC_{i,t} (R_{i,t} - R_{i,t-1})/R_{i,t}$	φ_2	0.28	-0.753	0.084*	0.006***

These results include the stickiness of costs with activity changes of sales revenues by nonlinear regression model; All t-statistics calculate by using significant indicate *, **, *** at the 1, 5 and 10% level, respectively; Asymmetry cost = (-), (-), (1.72), (-5.71); Adjusted R² = 0.25, 0.36; F-values = 36.22, 45.32; Months-N, 600, 600

Table 5: Nonlinear regression analysis: the asymmetric relationship between costs response and selling output price change

Dependent variables = Total Cost (TC)					
Variables	Parameters	Parameter estimate/actual	Parameter estimate/expected	Parameter (t-statistics)/actual	Parameter(t-statistics)/expected
Intercept	γ_1	1.53 (?)	2.211 (?)	0.005 (1.80)***	0.118 (2.34)
$(P_{i,t} - P_{i,t-1})/P_{i,t}$	γ_2	-0.585 (+)	0.925 (+)	0.761 (-0.904)	0.00 (4.09)***
$DEC_{i,t} (P_{i,t} - P_{i,t-1})/P_{i,t}$	γ_3	0.834	-0.11	0.603	0.031**

All t-statistics calculate by using significant indicate *, **, *** at the 1, 5 and 10% level, respectively; Asymmetry cost = (-), (-), (1.52), (-1.82); Adjusted R² = 0.12, 0.31; F-values = 2.47, 15.26; Months-N = 600, 600

5 industrial firms for 10 years (2006-2015) and used to replicate and extend previous research. Results show test is supported all hypothesis (Table 3). The differences between actual and expected performance that made an effect on the degree of cost asymmetry. These findings statistically and practically add new drivers to measure the cost respond to activity changes that determined from the effect of deliberate managers decisions. The model seems to fit the panel data reasonably well having fairly stable coefficients. All calculated F-values are greater than critical values and p-values are significant because they are <5% but part 1 in hypothesis 2.

To access the relationship between deliberate managers decisions and asymmetric cost behavior. The study analyses several factors that measure the impact of manager's decisions on cost behavior. Table 4 presents the multiple regression analysis of the two situations using Eq. 1. First, the actual data show that costs behavior is anti-sticky with sales revenues changes (cost increases to sales less than cost decreases to sales), where F-value is greater than scheduled value (3.00). The adjusted R² is 25% and the model is significant at (p<0.001) level. The coefficient φ_2 is positive (0.28%) (t-statistics 1.72). On average, the total costs increase

0.45/1% increase in sales revenues (φ_1) and they decrease by 0.73/1% decrease in sales revenues ($\varphi_1 \pm \varphi_2$). While, the second examination with business market competition state shows that costs behavior is sticky with sales changes (cost increases to sales higher than cost decreases to sales) where F-value is greater than scheduled value (3.00). The adjusted R² is 36% and the model is significant, the coefficient φ_2 is negative (-0.75%) (t-statistics -5.71). The total costs increase 0.80/1% increase in sales revenues ($\varphi_1 \pm \varphi_2$) and they decrease by 0.05/1% decrease in sales revenues ($\varphi_1 \pm \varphi_2$) means the estimation of costs behavior associated with management performance by external effect.

In the next analysis, Table 5 shows significant differences between actual and expected performance. These considerations are extend of management and cost literature in sticky costs behavior. The behavioral differences between costs and selling output price changes in two situations using Eq. 2. First situation, the actual data show that costs behavior is anti-sticky with prices changes (cost increases to price less than cost decreases to price) where F-value is greater than scheduled value (3.00). The adjusted R² is 12% and the model is insignificant at (p>0.001) level. The coefficient γ_2

Table 6: Nonlinear regression analysis; the asymmetric relationship between costs response and inventory asset change

Dependent variables = Total Cost (TC)					
Variables	Parameters	Parameter estimate/actual	Parameter estimate/ expected	Parameter (t-statistics)/ actual	Parameter(t-statistics)/ expected
Intercept	β_0	1.04 (?)	0.084 (?)	0.009 (2.61)***	0.146 (1.45)
$(INV_{i,t}-INV_{i,t-1})/INV_{i,t}$	β_1	0.143 (+)	0.854 (+)	0.09 (1.138)*	0.029 (2.08)**
$DEC_{i,t} (INV_{i,t}-INV_{i,t-1})/INV_{i,t}$	β_2	-0.412	-0.208	0.04**	0.00***

These results include the stickiness costs with inventory changes of cement industry; They present first examination how cost behave when inventory is increase and decrease indirectly; All t-statistics calculate by using significant indicate *, **, *** at the 1, 5, 10% level, respectively; Asymmetry cost = (-),(-),(-2.20),(-4.55); Adjusted $R^2 = 0.30, 0.40$; F-values = 8.89, 16.51; Months-N = 400, 400

Table 7: Nonlinear regression analysis; the asymmetric relationship between costs response and demand change

Dependent variables = Total Cost (TC)					
Variables	Parameters	Parameter estimate/actual	Parameter estimate/ expected	Parameter (t-statistics)/ actual	Parameter(t-statistics)/ expected
Intercept	v_0	0.93 (?)	0.71 (?)	0.169 (1.37)	0.031 (1.004)**
$(D_{i,t}-D_{i,t-1})/D_{i,t}$	v_1	0.045 (+)	0.775 (+)	0.903 (0.123)	0.021 (2.46)**
$DEC_{i,t} (D_{i,t}-D_{i,t-1})/D_{i,t}$	v_2	-0.192	-0.072	0.084*	0.014**

These results include the stickiness costs with changes of demand; They present first examination how cost behave when demand is increase and decrease under high capacity utilization; All t-statistics calculate by using significant indicate *, **, *** at the 1, 5, 10% level, respectively; Asymmetry cost = (-), (-), (-1.729), (-1.29); Adjusted $R^2 = 0.20, 0.36$; F-values = 12.10, 11.61; Months-N = 600, 600

is positive (0.83%) (t-statistics 0.52). On average, the total costs increase -0.58/1% increase in prices change (γ_1) and they decrease by 0.35/1% decrease in prices change ($\gamma_1 \pm \gamma_2$). While, the second examination with business market competition case shows that costs behavior is sticky with prices changes (cost increases to price higher than cost decreases to price) where F-value is greater than scheduled value (3.00). The adjusted R^2 is 31% and the model is significant at ($p < 0.001$) level, the coefficient γ_2 is negative (-0.11%) (t-statistics -1.82). The total costs increase 0.92/1% increase in prices change (γ_1) and they decrease by 0.81/1% decrease in prices change ($\gamma_1 \pm \gamma_2$). This finding means estimation of costs behavior associated with management performance by external effect of competitive prices and consider the price change is a new driver to measure cost behavior.

In Table 6, the study finds that inventory changes are associated with asymmetric cost behavior indicates significant differences between actual and expected changes. The behavioral differences between costs and inventory changes in two situations using Eq. 3. The first situation, the actual data show that costs behavior is anti-sticky with inventory changes (cost increases to inventory less than cost decreases to inventory) where F-value is greater than scheduled value (3.00). The adjusted R^2 is 30% and the model is significant at ($p < 0.001$) level. The coefficient β_2 is negative (-0.41%) (t-statistics -0.20). On average, the total costs increase 0.14/1% increase in inventory change (β_1) and they decrease by 0.27/1% decrease in inventory change ($\beta_1 \pm \beta_2$). While, the second examination with business market competition case shows that costs behavior is sticky with inventory changes (cost increases to

inventory higher than cost decreases to sales) where F-value is greater than scheduled value (3.00). The adjusted R^2 is 40% and the model is significant at ($p < 0.001$) level, the coefficient β_2 is negative (-0.21%) (t-statistics -4.55). The total costs increase 0.85/1% increase in inventory change (β_1) and they decrease by 0.64/1% decrease in inventory change ($\beta_1 \pm \beta_2$). This finding means estimation of costs behavior associated with inventory changes by set the cost base on competition and consider the inventory change is a new driver to measure cost behavior. Inventory increase relates to sales increase may the demand for capacity utilization is falling or there are positive expectations about future (Anderson and Lanen, 2007). Anderson *et al.* (2016) argue when we add the assets elements to the basic asymmetric cost behavior model we can find economic meaning.

Finally, in Table 7, the study has examined the mathematical relation between cost behavior and demand changes. Result shows that demand changes are associated with sticky cost means there are differences between actual and expected changes. Table 7 presents the behavioral differences between costs and demand changes in two situations using Eq. 4. First case, the actual data show that costs behavior is anti-sticky with demand changes (cost increases to demand less than cost decreases to demand) where F-value is greater than scheduled value (3.00). The adjusted R^2 is 20% and the model is significant at ($p < 0.001$) level. The coefficient v_2 is negative (-0.192%) (t-statistics -1.73). On average, the total costs increase 0.045/1% increase in demand change (v_1) and they decrease by 0.147/1% decrease in demand change ($v_1 \pm v_2$). While, the second examination with

business market competition case shows that costs behavior is sticky with demand changes (cost increases to demand higher than cost decreases to demand) where F-value is greater than scheduled value (3.00). The adjusted R^2 is 36% and the model is significant at ($p < 0.001$) level, the coefficient v_2 is negative (-0.072%) (t-statistics -1.29). The total costs increase 0.77/1% increase in demand change (v_1) and they decrease by 0.70/1% decrease in demand change ($v_1 \pm v_2$). This finding added a new driver to measure cost behavior and create consideration of future studies that provide theoretical flexibility in asymmetric cost behavior.

On the contrary Bradbury and Scott (2014), found no differences between actual and forecast sample when sales revenues increase and decrease. The estimated value of ϕ_2 in actual and forecast regression is equal to -0.35 and -0.21%, respectively. Whilst, Kama and Weiss (2010) agree with our results they found there is effect on cost asymmetry with and without sensitives. The estimated value of ϕ_2 regression is equal to -0.025 and -0.092%. Also, Ibrahim (2015) agrees with results found that the costs behavior is sticky in prosperity periods and cost behavior is anti-sticky in recession periods. The estimated value of ϕ_2 regression is equal to -0.48 and 0.20% during prosperity and recession, respectively. These findings are consistent with H_1 and confirm our results are logical. Moreover, Wolman (1999) evidence that the model of prices changes is able to explain marginal cost changes as positive behavior between them. While, Cannon (2014) find the output price is not associated with sticky costs because there are no differences when he compared actual and expected case of aircraft-seats. The estimated value of ϕ_2 regression is same in two cases, it equal to -0.009 and -0.000%, respectively when capacity increase and decrease. Our results show differences between two cases that significantly argues price adjustments and competition associated with sticky costs. In addition, finding is consistent with Ibrahim (2015), it found costs indicator increase with 1% in demand increase less than costs decrease with 1% in demand decrease ($v_1 = 0.08\% < v_1 \pm v_2 = 0.28\%$) in recession periods but costs indicator increase with demand increase higher than demand decrease ($v_1 = 0.58\% < v_1 \pm v_2 = 0.10\%$) in prosperity periods. That shows that managers are encouraged to reduce unused resources in the first case but they are reluctant to do so in the second case. This result confirms hypothesis 4. Thus, the study examines several variables, sales revenues, output prices, inventory assets and demand change to have positive impact on cost structure by managerial decisions. We used these factors as proxy for asymmetric cost behavior, the actual case shows

anti-sticky cost behavior whereas the expected case shows sticky cost behavior. The impact of deliberate managers decisions higher in actual case than in expected case.

CONCLUSION

In this study, we specified an empirical examining to investigate deliberate managers decisions determinants on asymmetric of industrial firms in Iraqi region. The study tested four hypothesis relating to the costs responding to changes in sales, output selling prices, inventory and demand change then, measures the differences in the degree of costs asymmetry between actual and expected case. The results support all hypothesis. We find deliberate managers decision factors are an important in asymmetric cost behavior in both business cases of firms, showing that cost decisions of firm management are instrumental in influencing manager's performance. The magnitude of cost asymmetry degree is differed between actual and expected performance based on business market conditions and deliberate decisions.

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