


**DETECTING STICKY COSTS IN IRAQI INDUSTRIAL COMPANIES AN EMPIRICAL
STUDY OF A SAMPLE OF IRAQI COMPANIES REGISTERED ON IRAQ STOCK
EXCHANGE**

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ARTICLE INFO	ABSTRACT
<p>Article history:</p> <p>Received 27 January 2023</p> <p>Accepted 23 March 2023</p>	<p>Purpose: This research aims to reveal the sticky costs in Iraqi joint stock companies.</p> <p>Theoretical framework: Sticky costs refer to the costs that increase with the increase in revenues by a greater amount than their decrease in exchange for a similar decrease in revenues. To manage cost, it is important to understand and know the behavior of cost.</p> <p>Design/methodology/approach: This research uses inductive and descriptive analytical methods that is commonly used in applied and field studies on accounting and management issues, as well as in literature and empirical studies to verify research proposals. This study adopted multiple logarithmic linear regression analysis estimated by ordinary least squares (OLS) to examine asymmetrical behavior of selling costs, general and administrative costs, and costs of goods sold individually and collectively (total costs) for a sample (101) of published lists of Iraqi joint stock companies registered in Iraqi Stock Exchange for the period 2010-2019.</p> <p>Findings: The results showed that sticky behavior of selling and general and administrative costs and their components is a common phenomenon in cost behavior of Iraqi joint stock companies during the study period, while costs of goods sold, and total costs are not. The latter may have been showing anti-sticky behavior.</p> <p>Research, Practical & Social implications: Our work contrasts the conventional model of cost behaviour, in which costs move proportionately with changes in activity, with an alternative model, in which sticky costs emerge. This is because managers consciously shift the resources devoted to activities.</p> <p>Originality/value: The sticky cost research that has been done in relation to the initial sticky cost research, particularly in industrialised nations like the UAS, Uk, and Canada, is the main emphasis of this study. Future research will take into account how sticky research is developing in any other nations, which could expand our understanding of sticky cost research as a whole.</p>
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**DETECTANDO CUSTOS RÍGIDOS EM EMPRESAS INDUSTRIAIS IRAQUIANAS UM ESTUDO
EMPÍRICO DE UMA AMOSTRA DE EMPRESAS IRAQUIANAS REGISTRADAS NA BOLSA DE
VALORES DO IRAQUE**

RESUMO

Objetivo: Esta pesquisa tem como objetivo revelar os custos fixos nas sociedades anônimas iraquianas.

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Referencial teórico: Os custos fixos referem-se aos custos que aumentam com o aumento das receitas em um valor maior do que sua diminuição em troca de uma diminuição semelhante nas receitas. Para gerenciar custos, é importante entender e conhecer o comportamento dos custos.

Desenho/metodologia/abordagem: Esta pesquisa utiliza métodos analíticos indutivos e descritivos que são comumente usados em estudos aplicados e de campo sobre questões contábeis e gerenciais, bem como em estudos de literatura e empíricos para verificar propostas de pesquisa. Este estudo adotou análise de regressão linear logarítmica múltipla estimada por mínimos quadrados ordinários (OLS) para examinar o comportamento assimétrico dos custos de venda, custos gerais e administrativos e custos dos produtos vendidos individual e coletivamente (custos totais) para uma amostra (101) de listas publicadas das sociedades por ações iraquianas registradas na Bolsa de Valores do Iraque para o período 2010-2019.

Resultados: Os resultados mostraram que o comportamento rígido dos custos de vendas, gerais e administrativos e seus componentes é um fenômeno comum no comportamento dos custos das sociedades anônimas iraquianas durante o período do estudo, enquanto os custos dos produtos vendidos e os custos totais não são. O último pode ter mostrado um comportamento antiaderente.

Pesquisa, implicações práticas e sociais: Nosso trabalho contrasta o modelo convencional de comportamento dos custos, no qual os custos se movem proporcionalmente com as mudanças na atividade, com um modelo alternativo, no qual emergem custos fixos. Isso ocorre porque os gerentes deslocam conscientemente os recursos destinados às atividades.

Originalidade/valor: A pesquisa de custos fixos que foi feita em relação à pesquisa inicial de custos fixos, particularmente em nações industrializadas como UAS, Reino Unido e Canadá, é a principal ênfase deste estudo. Pesquisas futuras levarão em consideração como a pesquisa persistente está se desenvolvendo em qualquer outra nação, o que poderia expandir nossa compreensão da pesquisa de custos persistentes como um todo.

Palavras-chave: Custos Pegajosos, Vendas, Custos Gerais e Administrativos, Custo das Mercadorias Vendidas.

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Conclusiones: Os resultados mostraram que o comportamento rígido dos custos de vendas, gerais e administrativos e seus componentes é um fenômeno comum no comportamento dos custos das sociedades anônimas iraquianas durante o período do estudo, enquanto os custos dos produtos vendidos e os custos totais não são. O último pode ter mostrado um comportamento antiaderente.

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INTRODUCTION

Much of management accountants' work in planning, oversight, and performance evaluation relates to the study of behavior of different cost items and understanding the behavior of costs (Abass et al., 2022; Flayyih et al., 2022). Dealing with them in cost and

management accounting literature is an essential element in academic and professional study in light of increasing competition in local and international markets (Al Mashkoor, 2022).

According to the traditional model of cost behavior, costs are linked to the level of activity, without considering how administrative intervention affects resource adjustment, as long as these adjustments are within resource capacity range (Lusiana, 2020). Percentage leads to a similar increase or decrease in variable costs, while fixed costs remain at a certain level regardless of changes in activity (Huong, 2018). According to this traditional behavior, there is a linear and mechanical relationship between costs, especially variable, and sales in event of increased or decreased activity (Noreen, 1991). Traditional cost and cost accounting systems based on activities assume that indirect costs are commensurate with the levels of activity represented by distribution basis for those costs (Noreen & Soderstrom, 1994).

In general, raising awareness of cost behavior is critical for accountants and managers alike, as diagnosing cost behavior leads to cost management oversight and enables managers to reduce costs, increase effectiveness of corporate resource management, and thus achieve corporate operational and management efficiency from a cost point of view (Yao, 2018). To predict future costs and profits by meeting their needs for required information to complete their planning, evaluation and decision-making tasks appropriate to success of companies (Zulfiati et al, 2019; Nikkeh et al., 2022).

Proportional hypothesis has faced a major challenge in recent years, and this hypothesis is no longer acceptable in cost accounting and management accounting literature (Dalla & Perego, 2014; Saeed et al., 2022). Cost management literature has shown that changes in some cost elements depend not only on changes in level of activity, but also depends on the downward or upward trend of change as well, which is called asymmetric cost behavior in relation to volume of activity (Gavalas & Syriopoulos, 2019). When costs decrease less than they do against activity changes decrease or rise by a similar amount called sticky cost, while opposite behavior decreases, costs are more than high against activity changes and are called anti-sticky cost (Priantana & Sayuthi, 2020; Nikkeh et al., 2022). This complicates the use of cost models in administrative accountant's work, which requires the accountant to know the conduct of each cost item when carrying out his or her duties, as pre-understanding the behavior of each cost element would help develop decision-making processes and is an important step in improving cost analysis (Al-khoury et al., 2022; Yazarkan et al, 2022). Many experimental studies, beginning in the first decade of this century, have documented the behavior of some cost items to decrease by a lower rate when activity decreases compared to the same rate (Ibrahim et al.,

2021). Others have documented that some costs, especially when full energy is used, decrease when activity decreases more than when activity increases by the same amount (Ozkaya, 2021).

The rest of the research is organized as follows: Section 2 focuses on theoretical framework, including a literature review of problems of the traditional model of cost behavior's shortcoming and justifications of contemporary model of cost behavior, and addressing the most important factors that explain the sticky behavior of costs, including search model. Section 3 focuses on an empirical study to show cost behavior with the changes in level of sales of Iraqi joint stock companies registered on stock market. Section 4 includes the research limitations and future studies. Finally, the study concludes with a statement of the most important conclusions reached.

The problem this study focuses on is highlighted in cost behavior statement of joint stock companies listed on Iraqi Stock Exchange. Hence, the problem of searching is determined by answering the following question:

Do some cost elements that appear in financial lists of joint stock companies listed on the Iraqi Stock Exchange have asymmetric behavior in relation to changes in level of sales?

The importance of this new way of thinking about cost behavior is reflected in explicit recognition of asymmetric behavior of certain cost elements, rather than automatic and automated change that follows changes in volume of activity as in traditional entry. In theory, this study contributes to expanding the understanding about cost management and behavior as a new research area in management accounting and cost accounting. This study also contributes to financial accounting since this research serves as a topic recently addressed in the first decade of this century in accounting field literature. In practice, the importance of cost behavior for directors of Iraqi joint stock companies highlights what costs represent as main determinant of profits, as insights about cost behavior can make an important contribution to predicting future costs and profit quality and discovering the amount of administrative interventions in that behavior in order to make good decisions.

This study seeks to reveal asymmetric behavior of some cost items separately and collectively by examining 101 published financial statements of Iraqi industrial companies listed on the Iraqi Stock Exchange for the period 2010-2019 (Flayyih and Khiari 2022). A mathematical model used to demonstrate asymmetric cost behavior (ABJ) has been adopted. With the adoption of logarithmic regression through Ordinary Least Squares (OLS), results of statistical analysis showed that selling costs (SC) increased (0.94%) when sales increased (1%), and they also decreased (0.22%) when sales decreased (1%). General and administrative costs

(GAC) also increased by 0.576% and decreased by 0.18% against similar changes in sales increase and decline. The increase of selling, general, and administrative costs (SGA) by 0.839% and its decrease by 0.29% when sales increase and decrease by 1% accordingly refers to the sticky behavior of the items of costs. Costs of the goods sold (CGS) and total costs (TC) did not exhibit sticky behavior during the study period.

LITERATURE REVIEW

Cost Behavior and Its Importance

Cost behavior refers to the relationship between costs and activity, a model that establishes a cost response to changes in activity volume, or how costs are associated with activity level changes (Hansen & Mowen, 2007; Ismail, 2022). The behavior of costs is determined in relation to activity expressed in units sold, working hours, distance in kilometers. In order to achieve appropriate control over business costs, cost behavior should be known. Cost behavior affects many economic decisions (Krisnadewi & Soewarn, 2020:125), and understanding this behavior provides valuable information for management decision-making in area of planning, cost control, performance evaluation, profit forecasting, and pricing of services and products (Horngren et al: 2015:54). Knowledge about cost behavior is also important for administrators and accountants alike, as recognition and control of cost behavior attract the attention of management accountants in order to provide appropriate and timely information. It is also one of the factors influencing the accuracy of forecasts (Ibrahim & Ezat, 2017:16). Cost analysis is one of the most important principles of cost management, and understanding its behavior is one of the most important elements in administrative accounting (Novak & Popesko, 2014: 91).

Some caution against ignoring understanding behavior of costs in different costs because these decision-related costs will be exaggerated, leading to bad and even catastrophic decisions (Norren & Soderstroam, 1997:89). In general, there are many methods used by management accountants that depend mainly on cost behavior, such as cost deviation analysis, cost-size-profit analysis, break-even point, flexible planning budgets, and short-term decision-making.

Costs in cost accounting literature are divided into fixed and variable costs depending on their relationship to activity, which is known as cost structure (Oberholzer & Ziemerink, 2004:182). Fixed costs remain constant, at least in short term, and do not change with changes in level of activity within a given range, while variable costs change uniformly and

proportionately with changes in activity (Wild & Shaw, 2010:169). Traditional cost systems thus assume a short-term linear relationship between activity and variable costs and behave similar to increased or decreased activity (Maher et al., 2008:142).

In order for level of activity to be useful in analyzing cost behavior, cost changes should be linked only to the level of activity (Banker et al, 2008), referred to as activity index, through which it explains changes in cost behavior (Weygandt et al., 2010: 204). There are three conditions that make cost accounting systems provide accurate and appropriate decision-making information. First is to tab costs to cost pools of each complex associated with measurable activity. Second is to change the cost of each complex by a fully direct percentage as activity changes. Third is to possibly load all the activities for the products so that the decision to stop manufacturing a product is offset by the deletion of all activities associated with that product (Noreen, 1991:164). Proportional function hypothesis is stronger and clearer than linear function hypothesis to describe cost change. For example, the decision to reduce total activity (X%) leads to a reduction (X%) in costs associated with activity, and these assumptions are at the heart of all traditional cost systems (Noreen & Soderstrom, 1994:256). Accordingly, the magnitude of change in costs depends solely on the extent to which the level of activity has changed, regardless of increasing or decreasing trend of change (Cheung et al., 2018:218).

Research about cost management literature over the past two decades has challenged the basic premise that cost behavior is symmetrical to increase and decrease in level of activity. Some do not always believe in the hypothesis of linear relationship of sloughing of some cost elements (Yazarkan et al, 2022:76), while others claim that linear relationship is not consistent with many indirect costs. Assumptions that support traditional model of cost behavior are inconsistent with the way some cost elements actually go (Callaja et al., 2006:127). Accordingly, trend of change in level of activity plays no role in traditional model of cost behavior (Banker at al., 2008). Cooper & Kaplan (1998:247) believes that some costs rise further with the increase in volume of cost wave compared to the decrease when the volume decreases. Others add that traditional model ignores the role of administrative decisions in cost behavior as well (Cohen et al., 2017:447).

For example, SGA have been subjected to numerous studies that have shown asymmetric behavior, with these elements increasing more with increased activity compared to a similar decrease in activity, which has been called sticky costs (Anderson et al., 2003:48). Others stated that if some cost elements behaved differently, rate of increase in costs consistent

with increased volume of activity represented by sales would be lower than decline in those elements, with a similar decrease in volume of activity called anti-sticky costs (Weiss, 2010:1442). Pilot studies not only examined SGA cost behavior but also extended many cost items, including operating cost, CGS, business costs, advertising, research and development, and total costs.

According to a pilot study, Anderson, Banken & Janakirman (2003) were first to present that cost changes, particularly SGA costs, depend not only on the amount of activity change but also on the trend of upward or downward changes in activity.

Contemporary model of cost-saving is treated as a result of managers' decisions that delay the reduction of resources to achieve specific purposes, not as a result of a regular automatic response depending on activity changes as in traditional model (Banker et al., 2018: 188). Because of this role of managers in modifying resources allocated to activities, the said cost behavior model can be characterized by strategic behavior (Balakrishnan & Gruca, 2008:994), a new way of thinking about cost behavior and a more accurate model than the traditional cost-tab-based model (Banker & Byzolor, 2014:43), and sticky behavior of costs is considered to be variable and consistent (Banker & Byzolor, 2014:43). This is an indicator of a company's management skills in dealing with market uptrends and downtrends, which in turn affect the company's performance (Zanella et al., 2015:6520).

In summary, asymmetric cost behavior can be defined as a pattern of a cost behavior where costs respond because volume of activity is more or less reduced than it responds to increased activity volume by the same amount, and therefore cost changes do not occur automatically as in traditional pattern of cost behavior. Cost behavior takes two forms depending on activity changes; hence, if the reduction in cost level by a lower percentage than decrease in level of activity is called sticky behavior, then the opposite occurrence is called anti-sticky behavior. Table 1 shows a comparison between traditional and contemporary approaches of cost behavior.

Table 1 Comparison between traditional and contemporary approaches to cost behavior

No.	Paragraph	Traditional behavior	Contemporary behavior
1.	Type of cost's change	Fit and symmetry with change of activity	Disproportionate or asymmetry to activity changes
2.	Cost's change response	Mechanical response	Justified and intended response
3.	Factor influencing cost's change	Volume of activity only	Size and direction of activity together
4.	Period affecting cost's change	Current period	Past, present, and future period
5.	Magnitude of change in costs	Equal to amount of increase with decrease	Uneven increase with decline
6.	Manager's impact on resource change	No role for managers in changing resources	A clear role for managers in changing resources

Source: Prepared by the authors (2022).

Some believe that some elements of cost may appear lumpy, which means that resources allocated cannot be added or reduced in small amounts or with sufficient speed in response to small changes in activity. This cluster in costs may lead to untenable or excess energy, but it does not lead to sticky behavior of costs (Anderson et al., 2003:49). On other hand, not all costs are expected to exhibit non-similar behavior with volume of activity in all circumstances, and degree of stickiness varies systematically depending on cost items, companies, industries, and even countries (Priantana & Sayuthi, 2020:117).

Sticky behavior occurs for economic and behavioral reasons. Cannon (2014) believes there are three cases of asymmetric cost behavior. First is the retention of untapped resources if demand for product declines, while new energy is added when demand rises. Second is the asymmetric adjustment of selling price in the event of idle energy usage of lower demand by reducing selling price in order to increase sales volume, while managers add new resources rather than raise selling price when demand for product rises. Third is the adjustment of resources, where costs occur when managers add more cost by increasing resources when product demand is higher than retained when demand declines. According to Farzaneh et al. (2013:88), hiring permanent employees in selling department and public administrations makes it difficult to terminate their services when activity is temporarily reduced, and economic instability in short term reduces the demand for goods and services; hence, the company's management maintains untapped energy in those departments. In hope of removing the factors that cause decline in company's activities, as well as personal considerations of managers in departments referred to towards dismissal of their colleagues because this affects their position in company all this results in sticky of selling and administrative costs. Anderson et al. (2007:7) cites three reasons for cost stickiness. First is the ratio of fixed part to variable part of cost line, higher fixed part of cost and lower sales, greater share of unit sold from that cost. Second is the

failure of cost control. Third is the desire of managers to retain resources during economic downturn for reasons related to agency theory.

Uy (2011: 28) adds that if variable part of cost item is the largest and there is a decrease in demand, managers and economically motivated managers decide to trade between retaining or reducing resources and rebuilding them again in light of their expectations of future demand, the amount of uncertainty, and whenever decision toward resource retention appears to stickiness of cost line.

Asymmetric cost behavior is a global phenomenon. In various economic sectors, evidence that supports asymmetric cost behavior has been provided, with numerous pilot studies from Anderson et al., (2003).

Using Anderson (2003) model, Farzaneh et al. (2013) studied CGS and SGA as well as extent to which stickiness of those costs was affected when sales declined in the previous year. Using a financial list of (1, 484) companies listed on Tehran Stock Exchange for period 2001-2010, their study showed that CGS was not sticky against sales changes, while SGA showed less sticky behavior.

Abu-Serdaneh (2014) studied whether SGA, CGS, SC, and administrative expenses (AC) show sticky or anti-sticky behavior in 62 Jordanian industrial companies for the period 2008-2012. The results of his study were that CGS and SC showed counter-behavior, while SGA and AC showed similar behavior in relation to sales. Bugeja (2015) provided evidence that cost stickiness is a prominent phenomenon in cost behavior after a sample study of large (10, 528) Australian company financial statements for the period 1990-2010. The study found that cost stickiness was prominent in the manufacturing and services sector and the cost stickiness was not statistically moral in the sector of construction and retail.

Xu and his colleagues (2015) aimed to examine the extent to which there is a stickiness in TC, OC, SC, and GAC based on the accounting data of Chinese industrial companies (1192) for the period 2008-2011. They found that TC, OC, and GAC showed sticky behavior, while SC exhibited counter-behavior. Also, they found that stickiness of costs was reflected in the subsequent period and the decrease was not statistically clear in the long run.

Subramaniam & Watson (2016) studied whether SGA and CGS behavior differed in four of the main economic sectors (industrial, commercial, financial and service) in sample of (9592) U.S. companies for the period 1997-2000. The results of their study indicated that the costs studied showed sticky behavior in industrial companies, while the same costs showed less stickiness behavior in commercial companies. For financial and service companies, the costs

studied showed some of the sticky behavior. Ibrahim & Ezat (2017) provided applied evidence of asymmetric behavior of SGA, CGS, and TC in 11 Egyptian corporate economic sectors for the period 2004-2011. The results of the study showed asymmetric behavior of the three types of costs referred to in their study.

Cohen et al. (2017) conducted a study in government sector units, represented by a sample of Greek local municipalities for the period 2002-2008, with the adoption (1852) of a view to studying cost behavior whether it was sticky or counter-productive. Walid (2021) aimed to find out whether SGA and/or CGS are engaged in sticky behavior with changes in sales level in 12 Saudi companies for the period 2010-2019. The results of his study showed that SGA did not behave stickiness against changes in sales, while CGS took a sticky behavior. On the other hand, results showed statistical evidence supported by a sticky behavior. CGS is stronger than SGA for Saudi companies. Results presented from previous studies show indecisiveness about type of cost and nature of its behavior, which justifies search for discovery of cost behavior for types common in lists of Iraqi companies, as well as study of cost items individually and collectively.

The hypotheses adopted by the research and research sample, their statistical descriptions, and data analyzed statistically to obtain deductions that support research hypotheses or not will be presented. Hypotheses of the research can be formulated in light of their problem and review literature of subject as follows:

H1: Some cost items in published financial statements of Iraqi joint stock companies listed on stock market show stickiness behavior, and this hypothesis is analyzed with the following sub-hypotheses:

H1a: SC shown in published financial statements of Iraqi listed joint stock companies shows sticky behavior.

H1b: GAC shown in published financial statements of Iraqi listed joint stock companies shows sticky behavior.

H1c: SGA appears in published financial statements of Iraqi listed joint stock companies in a sticky manner.

H1d: CGS appears in published financial statements of Iraqi listed joint stock companies in a sticky manner.

H1e: TC appears in published financial statements of Iraqi listed joint stock companies in a sticky manner.

H2: Stickiness of cost items are reversed in published financial statements of Iraqi joint stock companies listed on stock market as sales continue to decline in successive periods. This hypothesis has the following sub- hypotheses:

H2a: Stickiness of SC, if found in financial statements of Iraqi joint stock companies listed, reverses in successive periods of declining sales.

H2b: Stickiness of GAC, if found in financial statements of Iraqi joint stock companies listed, reverses in successive periods of declining sales.

H2c: Stickiness of SGA, if found in financial statements of Iraqi joint stock companies listed, reverses in successive periods of declining sales.

H2d: Stickiness of CGS, if found in financial statements of Iraqi joint stock companies listed, reverses in successive periods of declining sales.

H2e: Stickiness of TC, if found in financial statements of Iraqi joint stock companies listed, reverses in successive periods of declining sales.

MATHMATIC MODEL

There are people who believe that sticky costs are not a new theory. Its description as a new model in 2003 motivated researchers to do numerous research in management accounting literature and quickly influenced this field of knowledge (Zanella et al., 2015: 6522). Most experimental studies on phenomenon of asymmetric cost behavior are based on basic model presented in research (Anderson, Banker & Janakiraman, 2003), which was named ABJ model, relative to the initials of the three researchers. Contrary to the traditional model of cost behavior, which states that the amount of current costs depends only on current actual volume of activity, asymmetric cost behavior model states that costs achieved in current period depend to some extent on costs achieved in previous period. Current level of activity and previous period's level of activity and costs affect costs achieved in current period (Balakrishnan & Gruca, 2008:994).

Equation 1 below shows the model used to measure how responsive costs line is to changes in activity as measured by sales for two consecutive periods. A measure of stickiness of SGA is commonly measured in applied research in subject literature with the following considerations: stickiness of this type of cost is clearer than any other item; this type is particularly interesting for managers, financial analysts and investors; and, a strong relationship between its behavior with changes in level of activity (Armanto et al., 2014:40). Moreover, this type of cost is very widely available, accounting for a large proportion of cost of business. It is

also included in most published financial statements of companies of all kinds and it has more important effects as compared to other types of cost items (Abu-Serdaneh, 2014:117).

MacArthur & Stranahan (1998:290) stated that the use of logarithmic function would improve determine coefficient (R^2) in interpreting cost behavior changes in model, reduce heterogeneity (to increase homogeneity) between variables measurement, and increase strength of model parameter coefficients. Yazarkan et al. (2022:79) believe that familiar logarithmic function is used in such models that facilitate estimation of changes in costs and sales as a percentage. Bradbury & Scott (2018) added that all variables in model are converted into logarithmic function in order to obtain best natural distribution of independent and dependent variables. Anderson et al. (2003) prefers to use logarithm in model, with the aim of providing economic explanations for coefficients in model and improving comparability of its variables given the variation in size of companies in sample of empirical studies.

$$\text{Log} [(Cost_{i,t}) / (Cost_{i,t-1})] = \beta_0 + \beta_1 \log [(Revenue_{i,t}) / (Revenue_{i,t-1})] + \beta_2 * D_{i,t} * \log [(Revenue_{i,t}) / (Revenue_{i,t-1})] + \varepsilon_{i,t} \dots \dots \dots (1)$$

Intercept (β_0) measures change in cost behavior away from activity changes, e.g., depending on changes in input prices (cost items), which implies that these prices are fixed over time.

($Cost_{i,t}$) and ($Cost_{i,t-1}$) represent any item of costs under consideration for two successive periods (t and t-1). ($Revenue_{i,t}$) and ($Revenue_{i,t-1}$) represent sales (t and t-1) for the current and prior periods, respectively.

With the aim of distinguishing periods in which there is a decrease in revenues from periods in which there is an increase in revenues, a fictitious variable ($D_{i,t}$ = Decrease Dummy) was included in the model, which takes correct one value if current year sales are lower than those of previous year while value takes zero if sales of current period are higher than the previous period.

Value of (β_1) measures the percentage increase in cost line as a result of increased activity by 1%. Value of (β_2) is an indicator of degree of asymmetry of cost response against activity changes. The total ($\beta_1 + \beta_2$) measures percentage for lower cost versus 1% decrease in activity (Uy, 2011: 27).

If change in costs is in response to equal decline and rise in revenue, then it is ($\beta_0, \beta_2 = 0$) and value ($\beta_1 = 1$), then costs are said to behave symmetrically, i.e., cost follows traditional

model of variable cost behavior (Magheed, 2016:72). Also, a value ($\beta_1 < 1$) may be possible if fixed assets are present in form (Anderson et al., 2003:52). In contrast, if variation in costs versus increased sales is greater than variation in costs versus decreased sales, then the said cost item is sticky. Hypothesis test of cost sticky behavior is determined by ($\beta_1 > 0$), as well as if and only if ($\beta_2 < 0$) and its statistically significant value. Accordingly, ($\beta_1 > \beta_1 + \beta_2$), but if ($\beta_1, \beta_2 > 0$) and ($\beta_1 < \beta_1 + \beta_2$), then it is said that the cost item in question behaves anti-sticky.

In essence, sum of ($\beta_1 + \beta_2$) determines the type of asymmetric behavior of costs. There are two cases in this behavior: if their sum is less than (β_1), cost item under study is called sticky cost, but if their sum is greater than (β_1), cost item is called anti-sticky cost.

Time element of contemporary model of cost behavior is taken into account through the idea that managers deliberately adjust resources in response to changes in activity volume, particularly when they are unsure about the change in demand (He et al., 2010). When activity declines, managers have two options: either reduce the resources in line with the level of activity and bear future adjustment costs once demand returns, or keep the resources and bear the burden of unused energy until demand is confirmed (Yazarkan et al., 2022: 77). Banker et al. (2011) considers that adjustment costs in the event of a decrease in activity are often greater than adjustment costs in light of high activity, making resource reduction costly in relation to their increase, which leads to a postponement of resource reductions. This delay leads to sticky cost between reduction of activity and decision to modify resources.

Companies do not reduce costs in response to lower revenues in short term; thus, sticky cost that is a result of administrative decisions to postpone resource reductions is evident until long-term demand declines and energy reductions become a reality. (Lusiana, 2020:217). Weiss (2010:1444) asserts that a decline in level of activity (sales) for two consecutive years or more is an incentive for managers to reduce allocated resources because they realize that low demand for goods and services is not temporary, they need to delete excess energy, and they therefore expect that cost behavior will be more similar in successive periods of declines.

In order to test the reduction of volume and its reversal in direction of stickiness of those costs in periods of successive revenue reductions, the following formula (Atasel et al., 2021:130) is used:

$$\text{Log} [(Cost_{i,t}) / (Cost_{i,t-1})] = \beta_0 + \beta_1 \log [(Revenue_{i,t}) / (Revenue_{i,t-1})] + \beta_2 * D_{i,t} * \log [(Revenue_{i,t}) / (Revenue_{i,t-1})] + \beta_3 \log [(Revenue_{i,t-1}) / (Revenue_{i,t-2})] + \beta_4 * D_{i,t-1} * \log [(Revenue_{i,t-1}) / (Revenue_{i,t-2})] + \varepsilon_{i,t} \dots \dots \dots (2)$$

Variable ($D_{i,t-1}$) takes value (1) if sales (t-1) are lower than sales (t-2) and otherwise value is (0). In addition to achieving general conditions for (β_2 & β_1) as in equation 1, postponement of resource adjustment in current period and its reflection (transformation) into anti-sticky behavior in subsequent period are achieved that (β_4 & β_3) are both positive and statistically significant and ($B_4 < |\beta_2|$) (Gavalas & Syriopoulos, 2019).

MATERIAL AND METHODOLOGY

Search Sample

Research sample consists of financial reports of Iraqi industrial companies listed on Iraqi Stock Exchange, where there are (101) reports for period 2010-2019. A number of financial statements that do not meet conditions of the sample were excluded, namely, that amounts of costs are not greater than revenues, the financial reports that do not disclose realized revenues, and those that include some extreme observations. The search sample consisted of (606) observations. Cost data (SC, GAC, SGA, CGS & TC), sales figures, and some other accounting and financial data were approved from those reports for the accounting periods referred to.

Table 3 includes descriptive statistics of research sample of selling and administrative costs as well as sales extracted from financial reports of Iraqi companies' sample research and period mentioned above. Average value of selling costs (1,385 million Iraqi dinars) constitutes an average of 6%, a median of 4%, and a standard deviation of 6.8% of the annual revenue amount of the research sample companies.

The arithmetic mean of general and administrative costs (760 million Iraqi dinars) has a mean of 4%, a median of 3%, and a standard deviation of 4% of sample companies' revenues. The average cost of SGA is 2077 million Iraqi dinars, which constitutes 4%, 3%, and 4.4% average, median and standard deviation percentage respectively of the annual revenues included in the published financial statements of the companies. Finally, average revenue amounted to 23387; 21947; 19594 million Iraqi dinars has a standard deviation of 74874; 66678; 60085 million Iraqi dinars for the periods (t; t-1; t-2), respectively.

Table (2) Metadata for search sample (amounts in millions of Iraqi dinars)

DESCRIPTIVE INFORMATION	SC	GAC	SGA	REVENUES		
				t	t-1	t-2
MEAN	1385	760	2077	23387	21947	19594
MEDIAN	47	395	444	1530	2444	2092
MODE	47	800	847	947	963	1458
Std. DEVIATION	5136	1211	6158	74874	66678	60085
MINIMUM	7	54	62	47	47	46
MAXIMUM	35023	8160	43183	415006	367746	331352

Source: Preparing research sample based on financial reports of companies.

RESULTS AND DISCUSSION

In this part, data collected from reports analyze financial statements of Iraqi companies listed on Iraqi Stock Exchange and test hypotheses adopted by research by adopting two models (1&2).

Fittingness of Model 1 to Test Cost Stickiness of Study Sample

Table 3 shows indicators that measure the appropriateness of Model 1 used to test stickiness of cost items under study and the extent to which the model is able to explain the relationship between variation of cost observations during the time period in question in response to activity changes represented by annual sales.

Table 3 Indicators of Suitability of Model 1 to Detect Cost Stickiness

	SC	GAC	SGA	CGS	TC
R	0.6421	0.5508	0.7633	0.5592	0.6357
R ²	0.4124	0.3034	0.5826	0.3127	0.4041
Adjusted R ²	0.4004	0.2892	0.5741	0.2987	0.3920
Standard Error	0.1270	0.1205	0.1032	0.2810	0.1834
Observation	101	101	101	101	101

Source: Preparing research based on outputs of SPSS program.

Correlation coefficient (R) measures the strength of linear relationship between activity changes and cost changes. Results presented in the table above show coefficients 0.64, 0.55, 0.76, 0.56, and 0.64 for cost items SC, GAC, SGA, CGS, and TC respectively during the period 2010-2019, which means activity changes represented by annual sales affect changes in cost items. Determination coefficient (R²) is measured ability of Model 1 to explain variation in cost changes in response to activity changes. Results in second row of Schedule 3 show that there are 41%, 30%, 58%, 31%, and 40% variation in SC, GAC, SGA, CGS, and TC respectively, as explained by percentages of change in annual sales. Results presented in the third row (Adjusted R²) of the table support the abovementioned conclusions.

Testing of the First Major Hypothesis

Table 4 shows test results of five sub-hypotheses of first main hypothesis on conduct of cost items sample study in response to activity changes represented by annual sales during the study period 2010-2019. The table under each cost item includes form parameters (β_0 , β_1 , β_2) as well as result of a test (T Stat) per parameter.

Table 4 Regression Results of Cost Stickiness in Model 2

	SC		GAC		SGA		CGS		TC	
	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.
β_0	0.048 (2.373)	**	0.040 (2.087)	**	0.039 (2.404)	**	0.019 (0.500)	*	0.033 (1.329)	***
β_1	0.943 (5.135)	**	0.576 (3.528)	***	0.839 (6.007)	***	0.454 (3.818)	***	0.259 (3.341)	***
β_2	-0.717 (-3.285)	***	-0.392 (-2.035)	**	-0.543 (-3.295)	***	0.152 (0.698)	**	0.334 (2.334)	**
F	34.390	**	21.344	***	68.395	***	22.295	***	33.230	***

Source: Preparing research based on outputs of SPSS program. Figures shown in parentheses represent T Stat.

(*, **, ***) indicate statistically significant (10%, 5%, 1%), respectively.

Data in Table 4 show that SC in financial statements behave stickiness as ($\beta_1 = 0.94$) and ($\beta_2 = -0.717$) are both statistically significant and their total ($\beta_1 + \beta_2 = 0.22\%$), indicating that selling costs increase by ($\beta_1 = 0.94\%$) when activity increases by 1% and decreases by 0.22% when activity decreases 1%. Also, the table above shows that value ($F = 34.39$) and value (Sig.) are below the standard statistical value of 5%. Accordingly, two conditions required for a diagnosis of sticky SC are met. Therefore, proposed hypothesis is accepted, and selling costs in published financial statements of Iraqi joint stock companies list show sticky behavior.

Table 4 also shows the results of test on GAC behavior versus change in annual sales (1%). The table shows that value ($F = 21.34$) and value (Sig.) less than 1%, indicating that administrative costs are changing with the changes in volume of activity. Data also show that administrative costs behave stickiness as ($\beta_1 = 0.576$) as well as ($\beta_2 = -0.392$) are both statistically significant and their total ($\beta_1 + \beta_2 = 0.18$), which means that general and administrative costs increase by 0.57% when sales increase by 1%, while they decrease by only 0.18% when sales decline by 1%. Accordingly, two conditions required for a diagnosis of GAC are met. Based on the results in the table above, proposed hypothesis is accepted. GAC in published financial statements of listed Iraqi joint stock companies show sticky behavior.

Table 4 shows the results of third sub-hypothesis test for conduct SGA, as value ($F = 68.39$) and value (Sig.) are below the standard statistical value of 1%, which indicates that SGA changes with the changes in volume of activity. Data listed show that SGA is engaged in a

sticky behavior, reaching ($\beta_1 = 0.839$), which is ($\beta_1 > 0$) and ($\beta_2 < 0$) and its amount (-0.543), which are both statistically significant and ($\beta_1 > \beta_1 + \beta_2$) and their total (0.29). The above results indicate that SGA costs increase by approximately 0.84% when activity increases by 1%, while they decrease by approximately 0.29% when activity decreases by 1%. Hence, proposed hypothesis is accepted, as increase in those costs is not equal to a proportional amount to the decrease in them when the activity increases or decreases by a similar amount, and that decrease in sales is accompanied by a decrease in costs that is greater than the case of increase in sales. Accordingly, SGA appears in published financial statements of listed Iraqi joint stock companies with a sticky behavior. Based on the above results, it appears that the stickiness of GAC is greater than the stickiness of SC, which in turn is greater than the stickiness of SGA.

Results of fourth and fifth sub-hypothesis test in Table 4 show that both CGS and TC are positive ($\beta_2 > 0$) in both 0.152 and 0.334, respectively; hence, stickiness' basic condition did not meet the cost line in approved model, as increased sales were accompanied by increased costs are lower than decline in revenues. Based on the results shown in Table 4, proposed fourth and fifth hypotheses of the first main hypothesis are not accepted. Both CGS and TC in published financial statements of Iraqi joint stock companies listed on Iraqi Stock Exchange did not behave in a sticky way.

Fittingness of Model 2 to Test Study Sample Cost Behavior in Subsequent Periods

Table 5 shows indicators that measure appropriateness of Model 2 used to test behavior of cost items under study and extent to which the model is able to explain the relationship between variation of cost observations during the period under study in response to activity changes represented by annual sales in successive periods.

Table 5 Indicators Appropriate to Model Used to Detect Cost Behavior in Subsequent Period

	SC	GAC	SGA	CGS	TC
R	0.5596	0.5853	0.7843	0.5928	0.6802
R ²	0.3131	0.3427	0.6151	0.3514	0.4630
Adjusted R ²	0.2845	0.3153	0.5990	0.3244	0.4406
Standard Error	0.1210	0.1184	0.1001	0.2758	0.1760
Observation	101	101	101	101	101

Source: Preparing research based on outputs of SPSS program.

As mentioned earlier, correlation coefficient (R) measures the strength of linear relationship between activity changes and cost changes between two consecutive periods. Results presented in the table above show coefficient 0.56, 0.58, 0.78, 0.59, and 0.68 for SC, GAC, SGA, CGS and TC respectively during the period 2010-2019, which means that activity

changes represented by annual sales affect changes in cost items. Determination coefficient (R²) measures the model's ability to interpret cost variations in response to activity changes. Results in the second row of Table 5 show that percentage (31%, 34%, 61%, 35%, and 46%) of cost variation (SC, GAC, SGA, CGS, and TC) respectively is explained by percentages of change in annual sales.

Testing of the Second Key Hypothesis

Table 6 shows the test results of five sub-hypotheses of second main hypothesis on conduct of study sample cost items in response to activity changes represented by annual sales during the study period 2010-2019. The table under each cost item includes parameters (β_0 , β_1 , β_2 , β_3 & β_4) as well as test result (T Stat) per parameter.

Table 6 Regression Results and Quality of Cost Behavior Model

	SC		GAC		SGA		CGS		TC	
	Coeff.	Sig	Coeff.	Sig	Coeff.	Sig	Coeff.	Sig.	Coeff.	Sig.
β_0	0.051 (2.052)	**	0.040 2.087	**	0.043 (1.991)	**	0.0623 (2.547)	**	0.067 (2.475)	**
β_1	0.579 (3.458)	***	0.460 2.737	***	0.845 (5.863)	***	0.5637 (4.432)	***	0.353 (4.373)	***
β_2	-0.385 (-2.950)	*	-0.427 -2.550	**	-0.548 (-3.225)	***	0.5268 (2.226)	**	0.454 (3.170)	***
β_3	0.438 (2.735)	**	0.385 1.980	*	0.579 (3.458)	***	0.4540 (3.170)	**	0.352 (2.998)	**
β_4	0.280 (2.200)	**	0.191 2.392	**	0.352 (2.856)	**	0.1953 (2.034)	**	0.193 (1.191)	*
F	10.942	***	12.512	***	33.540	***	13.004	***	20.691	***

Source: Preparing research based on outputs of SPSS program. Figures shown in parentheses represent. T-Stat., and (*, **, ***) indicates statistically significant (10%, 5%, 1%), respectively.

Data in Table 6 show that statistical value (F) of cost items studied was statistically significant, indicating of statistically significant model according to the second equation. Results presented in Table 6 show that estimated values of ($\beta_1 > 0$) and ($\beta_2 < 0$) and their total (0.19%, 0.03%, 0.30%) for cost items SC, GAC, and SGA respectively are supported to cost stickiness in current period as in function of No. 1.

Positive and statistically significant ($\beta_3 > 0$) value of SGA costs and their components (0.438, 0.385, 0.579) indicates a delay in adjusting those costs during a decrease in sales, and that postponement of decision to adjust resources is a reality. Also, ($\beta_4 > 0$; $\beta_4 < |\beta_2|$), which is equal to 0.280, 0.191, and 0.352 for SC, GAC, and SGA respectively with its positive and statistically significant value, indicates a reversal in cost stickiness in a period after sales decline. Two conditions (β_3 & β_4) required for a diagnosis of sticky behavior with sales

decrease in successive periods are met. Based on these results, the proposal that managers are currently postponing the decision to reduce resources until a reduction in sales is confirmed permanently, and that cost behavior is reflected accordingly in subsequent period. Therefore, first, second, and third hypotheses are accepted. Degree and direction of stickiness of SC, GAC, and SGA will reverse in published financial statements of Iraqi joint stock companies listed on stock market with continued declines in sales in successive periods. Results also support anti-sticky cost behavior of CGS and TC, where ($\beta_1, \beta_2, \beta_3$ & β_4) were positive and statistically significant. Therefore, the fourth and fifth null hypotheses of the second main hypothesis are not accepted.

CONCLUSION

In general, cost management literature shows two types of cost behavior with volume of activity. First is the mechanical behavior (traditional) between costs and volume of activity in case of ups or downs of activity. Second is asymmetric behavior (contemporary) of costs that are either sticky behavior, a pattern of cost behavior wherein costs decrease less than the amount they rise despite equal amount of decrease or rise in the volume of activity, or anti-sticky behavior, wherein costs may behave adversely against changes in volume of activity. Traditional cost behavior analysis reflects the amount of change in costs depending solely on changes in the volume of activity without taking into account the direction of change. It also focuses only on the current period, without taking into account previous periods, which means that the expected relationship between the amount of change in costs and the size of activity is equal and similar in increase and decline cases, thus becoming questionable to researchers that analysis of cost behavior should reflect both the amount and direction of change in the level of activity. Contemporary cost analysis takes into account criticisms of traditional analysis. The current study focused on detecting of sticky behavior of SGA, its components of SC, GAC, and CGS, and TC in Iraqi joint stock companies. The researchers found a strong support that SGA and its components exhibit a sticky behavior within the period of research sample, as SGA increased by 0.84% and decreased by 0.29% compared to an increase or decrease in sales per 1%. This behavior was mitigated and costs were less sticky when managers expect that decrease in sales is more permanent in period 2010-2019 approved in the study, as SGA increased by 0.58% and decreased by 30% compared to the increase and decrease in sales per 1%. SGA and TC exhibited anti-sticky behavior during the said period. The main results are consistent with many previous studies' results and the researchers' proposed hypotheses. However, level of

stickiness varies from one study to another. Accordingly, the researchers believe that managers of Iraqi joint stock companies should take this behavior into consideration when making various administrative decisions that are based on behavior of cost.

Relying on the data of published financial statements of companies in accordance with official form issued by Iraqi Federal Financial Supervisory Bureau, which presents data on cost of selling services and cost of general and administrative services separately; the researchers calculated algebraically to get the SGA, CSG, and TC

Selection of financial statements of Iraqi companies issued from the time period 2019-2010, with the aim of excluding potential impacts of global financial crisis for the period 2007-2009 on work of sample of Iraqi companies

Research samples can be expanded by adding other government or private economic sectors and examining factors affecting cost stickiness in future research.

The limitations of the research are were the weakness of the Iraqi industry after 2033, due to the security and economic conditions, which greatly affected the difficulty of obtaining information from factories that are still working in order to propose new applications for cost accounting. We suggestions to future work the following "The Role of Green Activity-Based Costing in achieving sustainability Development Sustainable Development: Evidence from Iraq"

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