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The Determines of the Sticky Cost Behavior in the Jordanian Industrial Companies Listed in Amman Stock Market

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Abstract

Traditionally costs are classified into fixed, variable, and mixed cost according to the change in the level of activity. However, Anderson et al. (2003)/(ABJ) find that the change in cost varies with a change in activities depending on the direction of change in revenue, and do not follow the traditional cost behavior model, this cost behavior is called sticky cost behavior.

The objective of this study is to identify the impact characteristics of the firm on the degree of the cost stickiness of selling, general administration and advertisement cost (SG&A) and sold goods cost in the Jordanian industrial companies listed in Amman stock market during 2000-2013. ABJ initial model is extended to acquire the firm characteristic variables, ordinary least squares (OLS) is used to run the regression.

The result of the research support argument of ABJ, that the (SG&A) and sold goods cost in the Jordanian industrial companies listed on the Amman stock market follow the sticky costs behavior, and there is difference on the degree of cost stickiness between the two type of cost used in the study, that is the cost of sold goods is less sticky than SG&A cost. In addition there are impacts of characteristics of the firm (assets density, employee's density, debt density, and the proportion of fixed assets) on the degree of cost stickiness in these companies. These impacts of characteristics of the firm differ according to the type of cost analysis.

Keywords: sticky cost, asymmetric cost behavior, cost behavior, industrial sector, Jordan.

I. INTRODUCTION

Traditionally costs are classified into fixed, variable, and mixed cost according to the change in the level of activity, this classification reflects the amount of change in costs and not the direction of this change, and it is linked to the extent period of analysis, and to a range of putative relevant factors that attributed to the prevailing economic environment (Anderson et al., 2003; Hilton, Maher et al., 2008; Yasukata & Kajiwara, 2008). This means that the assumed relationship between size of change in cost and direction of the change in the activity is equal and similar in both cases of equal increase and decrease in the volume of activity.

Although, the result of (Noreen & Soderstrom, 1994) study on hospitals which is repeated in 1997 show an empirical evidence that overhead costs (general expenditure) are not equally varies with a direction of the similar change in activities (shows asymmetrical behavior depending on the direction of equivalent change in revenue), and do not follow the traditional cost model, the sticky cost behavior term appear into existence only by Anderson et al. (2003) who proposed a model for sticky cost behavior and known as (ABJ) model.

Anderson et al. (2003) define sticky costs as the costs fall with the decline in the volume of activity by less than percentage increase when volume of activity increase in

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the equivalent ratio; in other words, the rise or fall as a result of increase or decreases in the volume of activity in the same proportion is symmetric. To illustrate this practically, Ghaemi and Nematollahi (2011) for example, find that an increase in SG&A costs by 0.59% for every 1% increase in sales (increase in the volume of activity) and a decrease by only 0.32%, when sales decline of 1%. But according to the theory of traditional cost behavior of the administrative costs should be reduced by the same percentage by which rose against the same decline in sales, an increase of (0.59%) instead of (0.32%), but in real word they fell less than the rise in SG&A costs.

Considering that the administration of the firms as well as other users of cost data, needs to learn how to cost behavior to make predication and estimation of future costs more accurately and to make decisions related to the products, planning for purposes, such as production, marketing and others. Thus provisions of appropriate information are required to management in terms of quality, quantity, and timeliness to take the appropriate decisions. Therefore, sticky cost model is an alternative behavior of the traditional costs; it allows management and managerial accountants to adjusting resources in response changes in the volume of activity, in contrast to replicate the behavior of the change in cost depending on changes in the volume of activity.

In Jordan, although (Amghad, 2015) reported that cost in industrial companies listed in Amman stock market follow the sticky cost behavior, there no studies on the sticky cost behavior as well as about factors that affect the degree of stickiness of the cost.

Hence, there is a need to test the sticky cost behavior and to identify the factors affecting them in industrial companies listed on the Amman stock exchange (AME) during the period from 2000 to 2013. As a result y seek to identify the characteristics of the firm (density of assets, density of employee, density of debt, and the proportion of fixed assets) in the Jordanian industrial companies listed in Amman stock market.

II. LITERATURE REVIEW AND THEORETICAL BACKGROUND

Revealed research and recent studies conducted in the area of cost behavior, that the costs do not change proportional to the change in the volume of sales, showed that the cost increase in response to an increase in sales but does not go down commensurate with the decline in sales, in other words, the costs of response in the cases of declining sales and rising rates in unequally rate or asymmetric response; in the contrary to the concept of symmetric behavior changing costs that assumption by the traditional accounting theory. These studies proved that the variable cost behavior doesn't change in proportion to the increase or decrease in volume of activity, and this is called asymmetric cost behavior in the literature of costs. This concept in the contrary to the traditional cost behavior (Yasukata & Kajiwara, 2008).

In spite of the economic theory, which assumes that the costs of non-linear, accountant literature recognizes that the costs are linear and proportionate to the levels of the change in the activity. Nevertheless, speculation about costs asymmetric behavior is based on large number of strong empirical evidence and recent studies that provided that costs behavior is asymmetric and sticky behavior.

In spit that the first pilot research which found that overhead costs are not commensurate with public activities, is (Noreen & Soderstrom, 1994) study, which relied on data cross-sectional sample of 100 hospitals in the state of Washington, showed that the general expenditure (cost) do not change in the same percentage in the cases of increase or decrease in activity, but the it change at different rates, for types of overhead costs, and the average cost per unit of activity. Therefore they conclude that

the average cost per unit activity should be used with great caution in decision-making and for performance evaluation purposes, those results are confirmed by their study which is conducted in 1997. The first to launch the concept of sticky costs is (Anderson et al., 2003).

Anderson et al. (2003) presented concept sticky cost behavior in a clear and by examining costs behavior of sales and general and administrative costs (SG&A), for 7629 firms over a period of 20 years, and found that this type of sticky costs, as these costs increased by 0.55% for every 1% increase in sales revenue, but only declined by 0.35% in 1% decline in sales revenue. This study is the beginning of a lot of research and subsequent studies, and this concept widely used in studies and researches, moreover, the adopted the model is used in subsequent research and studies such as (Noreen & Soderstrom, 1994; Balakrishnan et al., 2004; Banker et al., 2011; Ghaemi & Nematollahi, 2011).

In Asian countries, the examined the behavior of the Korean public cost of the hospital, and found that the total cost, cost of labor, and administrative costs are sticky costs, and track sticky cost behavior. These findings strong support that the hospitals that have assets density, and density of workers, there cost is stick (Yang et al., 2005).

In the same context, Kuo (2007) found SG&A costs in the Taiwanese electronic computer industry firms are sticky, where these costs rose by 0.470% for every 1% increase in sales revenue, but only by 0.316% for each 1% decreased in the low sales revenue. Another study done by Yaskatua and Kajiwara (2008) also revealed that the cost behavior of SG&A in Japanese companies and cost of goods sold, costs are sticky. According to Farzaneh et al. (2013) sticky cost can be created as result of two reasons:

1. Given the fixed employment contracts that bind employees of the company, who are working in administrative, sales and general departments, the management usually do not you cut off of such labor at low volume of activity, so SV&A costs do not go down at the same percentage when low activity in opposition to the high activity, but to a lesser extent, leading to sticky of the costs.
2. Considering the economic instability and uncertainty, the factors that led to the decline in activity of the company will be adjusted in the short term, thus the management will not reduce SG&A, and the retention of unused capacity, so that the costs of unused resources lead to make the behavior of this type of cost sticky cost behavior.
3. Given the personal factors, the management does not want to decrease the resources that affect the sticky behavior of costs by reducing the level of activity, as an example the management don't fire their colleagues because this firing may affect the status of the company.

Moreover, a revision of the results of previous studies in the field of sticky cost behavior shows that there are four theories explain sticky cost behavior represented in management decisions, the costs incurred and generated as a result of taking some decisions concerning the resources of the company, the determinants that influence and have power over the management behavior; such as corporate governance, legislation disclosure, and finally political costs imposed by government policies.

III. DETERMINATES OF THE COST STICKINESS

In this regard, it noted that some hypotheses and theories that explain the sticky cost behavior, are the same factors that affect the sticky costs in corporate behavior, such as decision theory deliberate, agency theory, adjustment and restructuring costs, the political process, which is the labor legislation , and social security. It is also noted

that the review of the factors that some indicators to measure the expression of theories that explain the sticky behavior of costs, as the size of the company, density of the debt, agency theory, and political costs.

There are many factors that affect the sticky costs recorded in previous studies, such as administrative decisions deliberate, optimistic management, technological determinants of management behavior, the density of employment, the density of assets, density of debts, the utilization of available production capacity, costs structure, agency theory, and the characteristics of the sector, the size of activity, the proportion of fixed assets, years of recession and recovery, labor legislation, social security, and other factors.

Table 1 shows the most important variables that have been used as agents determine the sticky behavior of costs.

Table 1
The Main Studies That Search The Factors Affect The Degree Of Cost Stickiness

Factor	The Studies Use It
Density of Employees	Subramaniam & Weidenmier (2003); Andersonm, Chen & Young (2005); Yang et al. (2005); Banker & Chen (2006); Banker et al. (2008); Balakrishnan & Gruca (2008); Banker et al. (2011); DeMedeiros & Costa (2011).
Density of Asset	Medeiros & Costa (2004); Yang et al. (2005); Anderson & Lanen, (2007); Banker et al. (2008); Banker et al. (2011).
Economic Growth	Banker & Chen (2006); Anderson & Lanen (2007); Banker et al.(2008); Banker et al. (2011); Chen et al. (2012).
Corporate Governance	Calleja et al. (2006); Banker & Chen (2006); Banker et al. (2008); Chen et al. (2012); Pichetkun & Panmanee, (2012).
The Sector	Anderson & Lanen (2007); Chen et al. (2012)
The Change in the Activity	Subramaniam & Weidenmier (2003); Balakrishnan et al. (2004); Calleja et al. (2006).
Utilized Capacity	Balakrishnan et al. (2004); Andersonm, Chen & Young (2005).
Rate of Fixed Cost	Subramaniam & Weidenmier (2003)
Density of Inventory	Subramaniam & Weidenmier (2003)
Interest Rate	Subramaniam & Weidenmier (2003)
Level of Activity Change	Balakrishnan et al. (2004)
Labor Market Characteristics	Banker & Chen (2006)
Economic Climate	Bosch & Blandon (2007)
Market Flucations	Bosch & Blandon (2007)
Unit of Services	Balakrishnan & Gruca (2008)
Resources	Balakrishnan & Soderstrom (2008)
Risk and Unceritnaty	Banker, Ciftci & Marshruwarly (2008)
Agent Problems	Chen et al. (2012); Pichetkun & Panmanee (2012)

Source: collected by the researcher.

However, those factors can be categorized into:

1. Behavioral Factors

Behavior factors these factors that affect the behavior of managers in the corporate, and explain their behavior in making decisions concern the company in short and long run, and their outlook about the situation of company in the future, particularly with regard to sales, profits and resources in the firm. These factors are the behavior of managers towards building empires, administrative behavior of managers in the company, the motivation to make decisions, and psychological factors that

influence them when making decisions (Balakrishnan & Gruca, 2008). The effects of these factors are mutually dependent.

These factors are based on the case of the future expectation of demand for the company's products, which is usually uncertain, and ambiguity future. managers make their decisions depending if they are optimistic or pessimistic, as well as the degree of risk and preference for risk among those managers, whether they are preferring to risk, or avoid or neutral for adopting risk and uncertainty component, and the interaction of these factors combined with the motives that drive managers to make decisions , the critical factors are in making future decisions about the company and the situation in which (Banker et al., 2008).

Research on the subject of risk and restructuring costs and the degree of stickiness indicates that the main reasons for the sticky costs behavior is a state of uncertainty about future demand for products and services for enterprises, which lead to delay decision management decisions on reducing costs and getting rid of the excess redundant and resources in a period of low demand, and to be certain of the amount of the decline in sales, and consequently the volume of production, the level at which this fall settles, and the time period of continued decline (Banker et al., 2008). Anderson et al. (2003) showed that the effect of the cost stickiness tends to fade in subsequent periods to periods of decline as a result the stickiness of the accompanying costs to the level of production activity stop and fade in the long run, the administration is usually more confident about the decline in demand when a decline in the two previous consecutive years or more, that is, the succession of the decline in demand for the company's products, and thus reduce their sales leads to expect that the decline will continue in the future, on the other side, if the overall prevailing positive economic environment of country, and can carry signs or encouraging signs of improved future demand for the products of company, thus improving the possibility of increasing its sales, administration do not tend to cut costs as it expects to recover the level of activity in the near future.

It is concluded that uncertainty in prevailing economic environment, and circumstances that can be experienced by the company, affecting primarily on management decisions on restructuring costs in accordance with the change and the decline in the volume of activity, and that the expectations of management concerning the future demand, and the degree of risk preference, whether they are optimism and pessimism. The more risk preferred management and more optimistic is, the more sticky costs, because they prefer to keep excess resources in a period of low activity until the activity recovery and return to the state it was in before the period of decline or higher.

2. External Factors of the Environment in Which the Company Operates

These are the external factors related to the external environment of the company and affect the operations and internal activities of company, production and human resources in the company. These factors includes economic environment and conditions prevailing in the country where the company work. these have a significant impact on the operational decisions of the management, and thus there are significant differences in the cost stickiness from one country to another (Banker et al., 2013). For example found that growth in the overall economy, and the period of the previous activity affect the degree of cost stickiness (Anderson et al., 2003). the increased competition in the domestic and foreign markets make management more able to determine the cost structure and behavior, so that the cost behavior is mainly based on costs in response to changes in the level of activity (Farzaneh et al., 2013). The

economic crisis in 2009 has a clear impact on management decisions, and consequently on the degree of the cost stickiness (Banker et al., 2012).

Costs imposed by outside pressure groups on the company as a result of the actions of government or legislation and policies is called the political costs; For example, if the company recorded high profits could be used as a pretext for trade unions or pressure groups to take action to increase its share of the profits, which means that you get the unions to higher wages for their members. So companies have to adopt accounting, which allows it to cut income methods (creative accounting) (Watts, 2003). Companies resulting from environmental legislation and political costs may bear; such as environmental pollution, may be disclosures made by the companies with respect to positive or negative environmental impacts is also a way to reduce the political costs, which explains the many companies to adopt social and environmental voluntary disclosure in annual reports.

The legal system of the country, the consistency, efficiency of the execution of laws in general, and the strength of the laws and regulations that apply to protect shareholders, affect the cost behavior, it is likely that companies operate in the more efficient judicial system of state management, be more willing to make large commitments of resources which can be expensive, these companies show an increase in the costs stickiness, as well as the administration facing the laws and regulations protecting shareholders less power, be able to conduct extravagance in building empires, which in turn contributes to a significant contribution to increase the stickiness of the costs, the contrary is true (Anderson et al., 2003; Banker et al., 2012; Chen et al., 2012).

Thus, the properties of the state; and in particular the efficiency and effectiveness of the judicial system, and the level of economic progress and development of the state, play a role in influencing the behavior of the costs, and the degree of similarity through two main channels, namely:

a. Severe company's commitment to resources, and carry a high cost to keep them, because they are not able to manage costs the way you want, in this case the show a greater degree in the stickiness of the costs, and in light of the efficient and effective judicial system, and a high level of progress and development of the economic state (Anderson et al., 2003).

b. Discretion of management resources, which leads to the behavior of building empires, which in turn tends to increase the stickiness of the costs (Chen et al., 2012). Therefore, the characteristics of the state limit of this behavior in the face of tough legislation that protects shareholders and is linked to the low degree of stickiness costs company-wide.

Labor legislation is another important factor that affects the degree of cost stickiness. When management has made employment or dismiss decisions, you must assess ways discounted all of the current value of the net cash flows generated or generated as a result of marginal work, consisting of marginal return for the product expected to be generated by the Group during his tenure in the company, and the average wage during the same period, and net future costs expected that the company incurred at the end of the service; The company employs additional workers and optimally, as long as the present value of the expected net of the value of the marginal work generated cash flows of them go beyond recruitment costs, and on the contrary, the company reduce and get rid of the workers have if the current value of future cash flows less than the marginal cost of employment (Dieryneck et al., 2012). This means

that these costs affect the cost of corporate behavior, determine the degree of stickiness.

Agrawal and Matsa (2013), showed that the influence of labor unions is directly proportional to the unemployment compensation received by workers in the event of dismissal from work due to circumstances beyond their control. In other words, costs and insurance paid by the social insurance to workers in the absence of their work, affect management decisions for reducing the employment (Kim & Wang, 2014).

Governance mechanisms play an important role in mitigating the impact of the problem on the agency manager's decisions in adjusting costs. There is significant and positive relationship between the Agency problem and asymmetry and sticky cost. Corporate governance plays a role in the reduction of the agency problem, and sticky costs positively associated with incentives to build empires because of Agency theory, and cost stickiness behavior more obvious in light of weak corporate governance (Ang & Lin, 2000; Chen et al., 2012; Pichetkun & Panmanee, 2012).

3. Changes in The Internal Environment of the Company

Several studies such as Anderson et al., 2003; Subramaniam and Weidenmier, 2003; Balakrishnan et al., 2004; and Calleja et al., 2006, show many of evidence that the properties of the company determine the costs of behavior which, it represents a regulatory restrictions on resources, and these factors are:

a. The Volume of Activity in the Company

The size of the company's activity in itself an influential factor on the degree of the stikiness of the costs, at the same time Aaburan many other factors, has been used in some studies as an indicator of the agency theory, such as Demsetz and Lehn, 1985; Dey, 2008. In others as a conduit for political and adjustment costs.

The behavior of managers is different depending on the level and size of the change in revenue. It has been found (Subramaniam & Weidenmen, 2003) that SG&A are not sticky when revenue changed by less than 1%, and be cost stickiness is clear when the change more than (1%); that is the change in the disproportionate costs with the change in the revenue and that the largest increase in income lead to increased capacity utilization as a result of the level of resources committed, on the contrary, the management is less likely to cut costs as a result of lower revenues by the same amount.

Calleja et al. (2006) found that managers more closely with the renegotiation of the agreements and contracts instead of keeping excess resources, specifically after the assumption of two different types of thresholds change in revenue (one equal to 10% and the second more extreme equal to 25%), the behavior Sticky costs of the total operational costs occurs when the revenue decline slightly, and the medium increase in activity does not need to be an important change in the cost structure as long as the decline a slight in activity is not enough to justify the high costs, and renegotiate imposed sticky cost behavior, but with a significant decline in revenue the costs that are incurred to keep excess resources gobble negotiating costs.

b. The Size of Capacity Utilization

The capacity utilization size affects the stickiness of the costs, the company which is operating at maximum production capacity, may not respond to lower sales quickly, and the reduction of resources has directly depending on lower sales or volume of activity, that is, the degree of response to the decline in activity is less than the rise in volume of activity, and therefore the presence of sticky where costs. the firm that have excess capacity unused be their response to lower revenues and the size of the largest activity of the response in similar volume of activity in the firm operating at full production capacity levels (Balakrishnan et al., 2004; Balakrishnan & Gruca, 2008).

4. The Company Characteristics

There are several characteristics of the company affect the stickiness of the costs, such as density of assets intensity, density of employees, as noted from the results of the studies to large enterprises measured by asset size, employment, show more costs sticky cost behavior and that the degree of costs stickiness is affected by lower revenue. Calleja et al. (2006) for example test these factors, in addition to the stock density, interest rate, density of the debt, density of working capital, and return on equity.

The most important of these factors:

a. Labor Intensive (Density of Employees)

It is natural that companies face fluctuations in demand for its products, and therefore it is important for the company to have a good and qualified resources to be able to compete in the markets, and there are several ways to find these qualified resources; such as recruitment, training, and the granting of incentives depending on performance, and others. When the company's sales less, it is difficult for them to separate their employees as a way to modify the costs, because the company's management believes that demand conditions will improve in the near term, and that the process becomes costly to exclude workers (Banker & Chen, 2006). This is what it showed most of the studies that tested the impact of this factor on the costs of asymmetric behavior results.

b. Density of Assets

density of asset Calculated as a percentage of the total value of the assets to generate sales revenue during a certain period, a measure the company's efficiency in the deployment of assets, firms with high density in assets, facing the likely high cost of modifications If you alter decisions on resources; that is, high asset intensity firms show proportions more sticky (Banker et al., 2011). This is shown by most of the studies that have been used on the intensity of the impact of asset costs asymmetric behavior.

c. Density of Debt

Studies indicated the density of debt is one of the factors that affect the stickiness cost behavior, and that the more high intensity, the degree of debt to be less cost-sticky.

d. The Proportion of Fixed Assets

The fixed assets to total assets ratio affects the degree of the stickiness of the costs, the larger the proportion of fixed assets, the larger the disposal more difficult, and this leads to a greater stickiness in costs.

e. Sector to Which it Belongs Company

The sticky cost behavior analysis for each industry individually showed varying degrees of stickiness costs; for example, found in the United States of America said that the behavior of the stickiness of the costs appear in some industries, and sliding into each other, did not appear asymmetry costs in other industries (Anderson et al., 2003; Anderson & Lanen, 2007; Chen et al., 2012). This means that the sector to which they belong company has an impact on the degree of the stickiness of the costs, and in the same field studies have found that the public sector shows the behavior of sticky costs, and that companies in the financial sector and banking also show behavior sticky costs, as well as in the agricultural sector, and the food industry.

IV. RESEARCH HYPOTHESES

The first hypothesis:

H_{01a}: SG&A costs in the Jordanian industrial companies listed on the Amman financial market Do not follow model costs sticky behavior.

H$_{01b}$: the costs of sold good in the Jordanian industrial companies listed on the Amman financial market Do not follow model costs sticky behavior.

   In order to test the first hypotheses and determine whether the costs behave as sticky cost behavior or not, the following rules is applied:

1. First condition is applied to determine if the cost is symmetrical or asymmetrical. The value of (β_2) coefficient is the determinate, if the coefficient of (β_2) is statistically insignificant at (0.05), which is statistically equal to zero, in case the value of (β_2) is statistically zero. The coefficient of (β_1) measure change in costs as a result 1% changes in revenue. In other words, the change in cost is equal in both downward and upward change in revenues, the cost follow the traditional cost behavior model (symmetry). Otherwise, if the value (β_2) is negative and statistically significant, meaning that the value of dummy variable is (1), that is the change in cost is unequal relative to change in revenues. thus the value of change is differ in case of upward and downward change in revenues, the cost show asymmetric cost behavior (either sticky or anti-sticky), and the value of ($\beta_1+\beta_2$) expresses total the value of cost change resulting from (1%) change in revenue.

2. The second condition is applied to determine whether the cost is sticky or antisticky costs. The value of value of ($\beta_1+\beta_2$) determines the type of asymmetric cost. There are two cases represent the asymmetric costs. If the relative change in cost resulted the change of revenue less than the change in revenue, which means that the total (β_1) and (β_2) less than one, this indicates that the costs is sticky cost. Otherwise, the cost is anti-sticky, that is change cost in the largest of the relative change s in revenue, meaning that the total (β_1) and (β_2) greater than one.

   The second hypothesis:

H$_{02}$: there are no affect of the company's properties (assets density, employees density, debt density, and the proportion of fixed assets) on the stickiness of the costs.

   The third hypothesis:

H$_{03}$: there is no difference in the degree of impacts of the company's properties (assets density, employees' density, debt density, and the proportion of fixed assets) on the stickiness of the two type of costs.

V. METHODOLOGY

   The study sample consisted of all industrial companies listed on the Amman Financial Market, which is available for which data in the form of an integrated time-series during the period 2000-2013. The numbers of companies that meet this requirement is (77) companies and the number of total observation is (1119) tear firm.

5.1. Mathematical Models to Study

   Following most of the previous studies done in this field the study ABJ model is used to test cost behavior in industrial companies listed Amman stock market. Multiple regression (ordinary least squares/OLS) is used to run the model.

   To build the ABJ model, Anderson et al. (2003) utilized the characteristics of logarithmic and ratios as it are represented in equation no. (1). This model is the core and rely on it the second model that measure and explain the factors influencing the behavior of sticky costs by adding the variables that represent the firm characteristics as represent equation no. (2).

   The basic model (ABJ model) consists of a dependent variable is the change in the cost, and independent variables is the change in revenue variable. The change in revenue can be either negative or positive dummy variable is used to take a negative signal change. Thus, the right side of the model consists of two parts; the first part is

positive change in revenue and the second part represents the negative revenue multiplied by the dummy variable takes one and zero values.

The main reason for the use of variables as a proportion is to govern the harmonious effect of the size of the variables under test (Lev & Sunden, 1999), in addition to improving the comparative ability of the variables during the installations that operate in different industries, on the other hand, the logarithmic properties used to reduce the internal variability, next, the There is another benefit through the use of logarithm located in the explanatory power of the estimated coefficients which become more accuracy and clarity.

Two types of costs have been used and are most commonly used in previous studies, to test the sticky of the Jordanian industrial companies listed on the Amman financial market, namely; (SG&A) cost and the cost of sold goods.

The mathematical models listed below models that will be used in this study to measure the costs and sticky behavior, and to identify the factors affecting the cost stickiness in the Jordanian industrial companies listed on the Amman stock exchange.

1. The initial model of ABJ for sticky cost behavior.

$$log\left|\frac{COST_{i,t}}{COST_{i,t-1}}\right| = \beta_0 + \beta_1.log\left|\frac{REV_{i,t}}{REV_{i,t-1}}\right| + \beta_2.D_{i,t}.log\left|\frac{REV_{i,t}}{REV_{i,t-1}}\right| + \varepsilon_{i.t} \quad\text{...........}\quad 1$$

2. Measuring the impact of the firm characteristics on the stickiness of the cost.

$$Log\frac{[COSTi,t]}{[COSTi,t-1]} = \beta_0 + \beta_1 Log\frac{[REVi,t]}{[REVi,t-1]} + D_{it}.\beta_2 Log\frac{[REVi,t]}{[REVi,t-1]}$$

$$+ \beta_3.Di,t.Log\frac{[REVi,t]}{[REVi,t-1]}.log\frac{[ASSETi,t]}{[REVi,t-1]}$$

$$+ \beta_4.Di,t.Log\frac{[REVi,t]}{[REVi,t-1]}.log\frac{[EMPi,t]}{[REVi,t-1]}$$

$$+ \beta_5.Di,t.Log\frac{[REVi,t]}{[REVi,t-1]}.log\frac{[TOT\text{-}DEBTSi,t]}{[REVi,t-1]}$$

$$+ \beta_6.Di,t.Log\frac{[REVi,t]}{[REVi,t-1]}.log\frac{[FIXRATIOi,t]}{[REVi,t-1]}$$

$$+ \beta_3.Di,t..\beta_1 Log\frac{[REVi,t]}{[REVi,t-1]}.SD \quad\text{...}\quad 2$$

Where:
COST : cost
REV : revenues
ΔCOST : change in cost
ΔREV : change in revenues
EMP : employees density (the total workers divided by revenues)
ASSETS : asset density (the total asset divided by revenues)
TOT_DEBTS : total debt density (the total debts divided by revenues)
FIXEDRATIO : fixed asset ratio (fixed asset divided by total asset)
D : dummy variables (1 for revenue decreasing and 0 for revenue increasing)
T : current year
t-1 : pervious year

5.2. Variables of the Study

There are many studies examined the properties of the firm as shown in Table 3. The most important of these factors are:

1. Labor density: it is natural that companies face fluctuations in demand for its products, and therefore it is important for the company to have a good and qualified resources to be able to compete in the markets, and there are several ways to find

these qualified resources; such as recruitment, training, and the granting of incentives depending on performance, and others. When the company's sales less, it is difficult for them to separate their employees as a way to modify the costs, because the company's management believes that demand conditions will improve in the near term, and that the process becomes costly to exclude workers (Banker & Chen, 2006). This is what it showed most of the studies that tested the impact of this factor on the costs of asymmetric behavior results.

2. Assets density: calculated as a percentage of the total value of the assets to generate sales revenue during a certain period, a measure the company's efficiency in the deployment of assets, firms with high density in assets, facing the likely high cost of modifications if you alter decisions on resources; that is, high asset intensity firms show proportions more sticky (Banker et al., 2011). This is shown by most of the studies that have been used on the intensity of the impact of asset costs asymmetric behavior.

3. Debt density: studies indicated as shown in Table 3, the debt of the factors that affect the sticky behavior of the intensity of the costs, and that the more high intensity, the degree of debt to be less cost-wife.

4. The proportion of fixed assets: the fixed assets to total assets ratio affects the degree of the sticky of the costs, the larger the proportion of fixed assets, the larger the disposal more difficult, and this leads to a greater sticky in costs.

VI. RESULT AND DISCUSSION

6.1. Industrial Sector in Jordan

Jordan has a free market-driven economy, with outward-oriented economic policies and an approach led by the private sector. It is a service-oriented economy. Jordan economy is widely affected external shocks and conditions in surrounding countries, in particular with the Syria and Iraq crises, remain the largest recent shock affecting Jordan, causing three large immigrations to Jordan leads to negative impacts on the economy. Since 1999, Jordan implemented significant economic reforms, such as opening the trade regime, privatizing state-owned companies, and eliminating some fuel subsidies, which in the last decade spurred economic growth.

The production of Industrial sector in Jordan averaged (3.28%) from 1995 until 2015, reaching the peach of (34.52%) in 2001 and a record low of (-23.13%) in 2003.

Insert Table 2 here.

The share of industrial sector in gross domestic industrial vary from year to year, it is increased from 6.7% in 2001 to (14.7%) in 2002, and 21.3% in 2004 and 27.2% in 2006 and (27.8 %) in 2008, and then fell to about 3.2% in 2009, the lowest proportion during the period of the study. after that the sector began to recover, reaching (12.1%) in 2013. This means that the industrial sector has witnessed a slowdown and active during the period from 2000 to 2013.

These conditions may reflect on the management decisions in industrial companies. Therefore, influence the structure of the costs and the behavior of the costs. This means that the industrial sector environment is eligible for sticky costs behavior.

It is noted from the table that this ratio has increased from (11.4) to reach (12.7) in 2004, and took a slight decline. The number of workers in the industrial sector fluctuate from year to year, depending on the activity and growth in the sector as a whole or the problem in the sub-sectors of the industrial sector in Jordan, according to the classification used in the Amman Financial Market.

Table 2
Industrial Sector Indicators 2000-2013

Year	GDP	Annual Change	Growth (Current Prices)	Growth (Fixed Prices)	Industry Value Added	Growth in Industrial	Share of Industry	Workers in Industry	Total Workforce	% in Industry
2000	5153.6	5.8	3.4	3.2	807.2	6.2	15.7	109.1	908.3	11.4
2001	5470	6.1	4.2	4.8	861.2	6.7	15.7	111	920	12.1
2002	5849.4	6.9	5.3	5.8	987.7	14.7	16.9	120	951.6	12.6
2003	6301.3	7.7	5.8	6.5	1082.6	9.6	17.2	119.9	969.2	12.4
2004	7195	14.2	4.2	4.3	1313.6	21.3	18.3	121.6	1012.7	12.7
2005	7963.6	10.7	8.6	8.7	1426.3	8.6	17.9	106.3	1023.7	11.6
2006	9362.8	17.6	8.1	7.6	1814.8	27.2	19.4	105	1055.8	11.2
2007	10805.1	15.4	8.1	8	2294.5	26.4	21.2	111.8	1149.4	11.1
2008	13971.2	29.3	8.2	7.2	2933	27.8	21	109.9	1243.5	10.6
2009	15044.5	7.7	7.2	6.7	3026.3	3.2	20.1	114	1220.5	10.6
2010	16417.2	9.1	8.6	2.8	3146.1	4	19.2	129.1	1235.9	10.4
2011	17987.7	9.6	7.3	2.7	3485.3	10.8	19.4	128.1	1251	10.4
2012	19298.2	7.3	9.1	2.6	3633.4	4.2	18.8	123.4	1268.1	9.7
2013	20981.4	8.7	10.9	2.3	4074.4	12.1	19.4	125.5	1262.6	9.9
Max.	20981.4	29.3	10.9	8.7	4074.4	27.8	21.2	129.1	1268.1	12.7
Min.	5153.6	5.8	3.4	2.3	807.2	3.2	15.7	105	908.3	9.7

That the Jordanian industrial sector contributes a rate ranging between 15.7% - 21.2% of GDP during the period 2000-2013, and that this percentage varies from year to year according to the size of the GDP, and the proportion of other productive Nmwalqtaat constituent of the Jordanian economy.

The contribution of the industrial sector in the gross domestic product fluctuates from year to year. This may be attributed to the change in the absolute value of gross domestic product in other sectors, as the absolute value of gross production the industrial sector continues to increase in absolute values during the period, as well as the case of the absolute values in the gross domestic product of Jordan, especially in recent years.

Human resources are the key factors that control the sticky cost behavior, either directly or indirectly through legislation that employment and compensation workers' control and which reported in previous studies, and in this area, the employment rate that operate in the industrial sector volatile but at an increasing rate.

6.2. Reliability of the Data

Normal time series data exhibit the character of instability of the data, for this reason many statistical tests were exist to test the stability of time series data which should be performed before going on in analysis of the data.

To test the stability of time series data (stationary) used in this model, the unit root test is conducted for the data used in the study by applying Levin, Lin & Chu, Breitung, Im, Pesaran & Shin, ADF–Fisher, and PP-Fisher Chi-square, which are the most used tests for this purpose.

Table 3 shows the results of these five tests, the test to test the significance of each parameter of the method.

Table 3

The Results of Unit Root Tests

Method	Test Used for the Parameter	Value of Parameter	Significance Level
Null Hypothesis is the Unit Root Exist in Panel Data			
Levin, Lin & Chu Test	t-stat	-48.37	0.000
Breitung	t-stat	-32.24	0.000
Null Hypothesis is All Panels Contain Unit Roots			
Im, Pesaran & Shin	W-stat	-73.93	0.000
ADF-Fisher	Chi-square	178.34	0.000
PP-Fisher	Chi-square	144.91	0.000

The table indicates that all the significance levels of each parameter of the parameters of the all models used to test the stability of the time series data used to test the unit root are less than (0.05), and even less than (0.001) for all five test, considering that the total number of observations used in the research is (1119).

Therefore, based on figures in the Table 3 the null hypothesis is rejected and accept the alternative hypothesis is accepted that there is no unit root in the data used in the study for the period 2000-2013, which means that the data is stabile and the model used in the study is reliable subsequence the results, and the conclusions that based on the analysis reflect the real situation.

6.3. Cost Behavior in Jordanian Industrial Companies

Table 4 shows that the value (β_2) the (0.086) were statistically significant at the level (0.05), and that the total (β_1) and (β_2) and adult (0.527) less than one. This means that the two conditions for the sticky cost behavior is available in costs of the Jordanian

industrial companies listed on the Amman financial market. consequently the null hypothesis is reject and accept the alternative hypothesis is accepted, namely, that both the costs selling, general and administrative costs, and cost of goods sold in the Jordanian industrial companies listed on the Amman stock exchange following the sticky cost model. That is any reduction in the revenue will be accompanied by a decrease in costs less than the case of increasing of the revenues.

Table 4
The Result of the Basic ABJ Model

Variables		β_0	β_1	β_2	R^2	$(\beta_1+\beta_2)$	F	D.W
SG&A	Parameter	0.0194	0.613	-0.086	0.34	0.527	23.77	1.48
	t-value	-22.75	18.29	-6.23				
	Sig.	0.000	0.000	0.000				
Sold Good Cost	Parameter	0.022	0.734	-0.068	0.67	0.666	37.7	1.12
	t-value	-3.39	27.36	-6.95				
	Sig.	0.000	0.000	0.000				

Since the total (β_1) and (β_2) expresses the value of the resulting change in costs as a result of revenue decline by (1%), and as the sum of (β_1) and (β_2) equal to (0.527) and (0.666) for each of the selling and general and administrative costs , and the cost of goods sold, this indicates that the costs in the Jordanian industrial companies listed on the Amman stock exchange show and to cost sticky behavior of the costs during the study period. In other words, when the revenue decline by the amount (1%), the costs will drop by (0.527%).

6.3.1. The Impact of the Company Factors

To explore and invest to gates the impact of the company in trail environment on the behaving of sticky cost the ears of Jordanian industrial company list eel on Amman stock market the ABJ model was extended by the adding the following factors. the asset density, the employees density, the debt density, the fixed assets ratio. The new model can be written as in equation (2) which is

$$\text{Log}\frac{[\text{COST}i,t]}{[\text{COST}i,t-1]} = \beta_0 + \beta_1 \text{Log}\frac{[\text{REV}i,t]}{[\text{REV}i,t-1]} + D_{it}.\beta_2 \text{Log}\frac{[\text{REV}i,t]}{[\text{REV}i,t-1]}$$

$$+ \beta_3.Di,t.\text{Log}\frac{[\text{REV}i,t]}{[\text{REV}i,t-1]}.log\frac{[\text{ASSET}i,t]}{[\text{REV}i,t-1]}$$

$$+ \beta_4.Di,t.\text{Log}\frac{[\text{REV}i,t]}{[\text{REV}i,t-1]}.log\frac{[\text{EMP}i,t]}{[\text{REV}i,t-1]}$$

$$+ \beta_5.Di,t.\text{Log}\frac{[\text{REV}i,t]}{[\text{REV}i,t-1]}.log\frac{[\text{TOT-DEBTS}i,t]}{[\text{REV}i,t-1]}$$

$$+ \beta_6.Di,t.\text{Log}\frac{[\text{REV}i,t]}{[\text{REV}i,t-1]}.log\frac{[\text{FIXRATIO}i,t]}{[\text{REV}i,t-1]}$$

$$+ \beta_3.Di,t..\beta_1 \text{Log}\frac{[\text{REV}i,t]}{[\text{REV}i,t-1]}.SD$$

Linear regression was run, the result of the regression will rated in Table 4. The table shows the (F) ratio, the determination coefficient (R^2) and the parameters of the variables (B) for the independent variables, as walls the level of the significance of the parameters and Durbin-Watson test.

The value of (F) ratio shows the ability of the model to explore the relationship between the independent variables and dependent variable used in the model. The significant (F) means that the model is suitable and can mea sure the impact of indigents variables on the dependent variable.

The table shows that value of (F) ratio which is (18.7) and (22.34) is significant at (α= 0.05). Therefore, the model is appropriate to measure the relationship between characteristics of the firm and the cost. Therefore the model can explore the impacts of the firm characteristics of the firm on the cost stickiness in the Jordanian industrial companies listed in Amman stock market during the period 2000-2013.

Table 5
Main Result Of The Regression Analysis Of The Factors Influence The Sticky Cost

	Parameters	SG&A Cost	Cost of Sold Good
Constant	β_0	0.022	0.001
	t-test	-35.55	-18.8
	Sig. level	0.000	0.000
Positive Revenue	β_1	0.636	0.937
	t-test	18.18	29.29
	Sig. level	0.000	0.000
Negative Revenue	β_2	-0.091	-0.052
	t-test	-5.45	-4.51
	Sig. level	0.000	0.000
Asset Density	β_3	-0.223	-0.104
	t-test	-12.14	-6.49
	Sig. level	0.000	0.000
Employment Density	β_4	-0.127	-0.048
	t-test	-16.37	-6.92
	Sig. level	0.000	0.000
Debit Density	β_5	0.029	0.043
	t-test	10.98	4.51
	Sig. level	0.000	0.000
Fixed Asset Ratio	β_6	-0.127	-0.056
	t-test	-12.12	-7.82
	Sig. level	0.000	0.000
R^2		**0.36**	**0.7**
F		**18.67**	**22.34**
Sig. level		**0.000**	**0.000**
D.W		**1.17**	**1.11**

Source: regression analysis.

Durbin-Watson (D.W) test is conducted to detect the presence of autocorrelation problems in the model, if $d>d_{U,\alpha}$, there is no statistical evidence that the error terms are positively autocorrelated.

The value of D.W (d) in the model is (1-17) (1.11) and less than (d) (1.474), that is ($d_L>d$) this means that there are no evidence for autocorrelation problem in the model of the study.

The (R^2) which measure the percentage of variation explained to y independent variables of the dependent explained to y independent variables if the dependent variable. In our case the mode explain (70%) and (36%) of is variation in dependent variable in case of using (SG&A) cost and the coasted sold good respectively.

The impact of each in independents variables on dependent variable is measured by (B). The significant (t) for (b) means that there one significant affect of the dependent variable on the dependent variables.

Table 5 shows that the value of (t) for all (β_2) of independent variables are significant at (0.05) that is the all the independent variables are significantly affect the dependent variables.

The first part of the model is measure the sticky cost behaving the value of (β_2) is significant means that the cost behavior in the Jordanian industrial companies listed in Amman stock is asymmetrical behavior is sticky cost behavior.

The value of the (β_3) which is equal to (-0.223) (-0.104) which is significant at level (α = 0.05) means that the assets density has negatively impact the satiety cost behavior of SG&A cost aren't sold good cost. In other words the one until cause a decrease of (0.223) (0.104) in case of SG&A, and sold good cost. The same can be concluded from the value of employ means density and the fixed asset ratio.

On the side, the value of (β) is positive that means the impact of debt density is positive and it decrease the stickiness of cost in Jordanian industrial companies listed in Amman stock market. The reasons beyond that is the agency problem, the memorizers building as well as the cost structure theory. Therefore, the alternate hypotheses is accepted and the null hypothesis rejected, that is the asset density, employment density, and fixed ratio are negatively impact the sticky cost behavior while the density of debt is pastime affect the sticky cost behavior.

VII. CONCLUSION

Traditionally costs are classified into fixed, variable, and mixed cost according to the change in the level of activity. However, Anderson et al. (2003)/(ABJ) find that the change in cost varies with a change in activities depending on the direction of change in revenue, and do not follow the traditional cost behavior model, this cost behavior is called sticky cost behavior.

The objective of this study is to identify the impact characteristics of the firm on the degree of the cost stickiness of selling, general administration and advertisement cost (SG&A) and sold goods cost in the Jordanian industrial companies listed in Amman stock market during 2000-2013. ABJ initial model is extended to acquire the firm characteristic variables, ordinary least squares (OLS) is used to run the regression.

The result of the research support argument of ABJ, that the (SG&A) and sold goods cost in the Jordanian industrial companies listed on the Amman stock market follow the sticky costs behavior, and there is difference on the degree of cost stickiness between the two type of cost used in the study, that is the cost of sold goods is less sticky than SG&A cost. In addition there are impacts of characteristics of the firm (assets density, employee's density, debt density, and the proportion of fixed assets) on the degree of cost stickiness in these companies. These impacts of characteristics of the firm differ according to the type of cost analysis.

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