



An-Najah National University
Faculty of Graduate Studies

**THE INTENSITY OF THE ASYMMETRIC COST BEHAVIOR
IN INDUSTRIAL COMPANIES LISTED ON THE AMMAN
STOCK EXCHANGE (ASE) AND ITS IMPACT ON THE
EARNING PER SHARE**

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**This Thesis is Submitted in Partial Fulfillment of the Requirements for the Degree of
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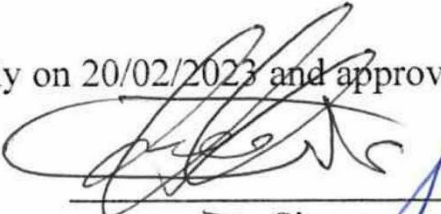
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Dedication

To The Person Who Provided Me With Giving, Strength And Glory... My Dear Father

To The Person Who Provided Me With Love, Tenderness, Giving And Loyalty....My
Dear Mother.

To My Support, My Consolation, My Joy, And My Medal... My Dear Brothers.

To The Giving Hands That Spared No Effort In Reaching Me. To My Professors At An-Najah University, Each With His Name And Surname. I Especially Mention Dr. Moez Abu Alia, Who I Was Proud To Be The Main Supervisor Of This Thesis Of Mine.

To The Defenders Of The Country's Soil And Dignity, Who Have Sacrificed Their
Lives On The Path Of Steadfastness And Sacrifice.

To all of them I dedicate my research.

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I also would like to convey my sincere gratitude and appreciation, with all love and loyalty, to my dear father, this great man who guided me in every step I took, stood by my side, supported me with unparalleled support, and gave me advice and guidance from the beginning of the research until its completion. I also owe abundant thanks and gratitude to my dear mother, whose tongue did not stop praying for me for success day and night, and who has always been encouraging and urging me to move forward in finishing the chapters of this study. And I do not forget to thank my beloved brothers who were with me in their hearts throughout my research work until it was completed with the grace and grace of God.

Researcher: Muhannad Dmaid

Declaration

I, the undersigned, declare that I submitted the thesis entitled:

**THE INTENSITY OF THE ASYMMETRIC COST BEHAVIOR IN
INDUSTRIAL COMPANIES LISTED ON THE AMMAN STOCK EXCHANGE
(ASE) AND ITS IMPACT ON THE EARNING PER SHARE**

I declare that the work provided in this thesis, unless otherwise referenced, is the researcher's work, and has not been submitted elsewhere for any other degree or qualification.

Student's Name: Muhannad Khayri Khaled Demaidi

Signature:



Date: 20/02/2023

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Abstract

The term "sticky cost" pertains to the disproportionate cost response to changes in activity. Specifically, it denotes a situation where the decline in cost due to a reduction in volume of activity is less than the increase in cost resulting from an equivalent increase in activity. Given this definition of the sticky cost phenomenon, the objective of the study is to examine the extent of asymmetric cost behavior in failed and non-failed industrial companies listed on the Amman Stock Exchange during the 2013-2019 period, specifically regarding Selling General and Administrative Cost (SG&A), Cost of Goods Sold (COGS), and Total Cost (TC). Additionally, the study analyzes the impact of asymmetric cost behavior on Earning Per Share (EPS) and highlighted the adverse effect of COGS on EPS.

The study utilized an empirical regression model and the Breusch-Pagan Test to analyze panel data. The results showed that the pooled OLS method was the most suitable for the study. Two models were used to examine asymmetric cost behavior and its impact on earnings per share (EPS).

The study revealed prevalent asymmetric cost behavior in Jordanian industrial firms, particularly in SG&A costs. However, only the non-failing group showed asymmetric (Anti-sticky) cost behavior in COGS. This highlights the importance of managerial decision-making when adjusting costs in response to changes in activity levels.

Further analysis of individual industrial sectors revealed variations in cost behavior and showed deviations from the results obtained when the sectors were studied as a single sample. It is found that the inclusion of sticky and anti-sticky costs in the analysis had a significant impact on the Earning Per Share (EPS) in various Industrial sectors. These

findings emphasize the importance of revising analytical and forecasting models in managerial accounting, cost accounting, and financial accounting to incorporate the influence of sticky and anti-sticky cost behavior.

Keywords: asymmetric cost behavior, cost stickiness, anti-stickiness, earnings forecasting, costs adjustment, optimism, pessimism.

CHAPTER 1

General Framework

1.1 Introduction

In traditional cost accounting analysis, it is commonly accepted that the behavior of the Selling, General & Administrative (SG&A) costs is symmetrical. This implies that the percentage change in cost is equal to the equivalent change (increase/decrease) in revenue (CHEN et al., 2012; Ibrahim, 2018; Weiss, 2010). However, this assumption has recently been questioned by several researchers, as cost behavior may be asymmetric in certain circumstances and situations (Anderson et al., 2003; He et al., 2010; Ibrahim & Ezat, 2017). Asymmetric cost behavior refers to the unequal response of costs following changes in activity, where the rate of change in costs concerning activity volume in the forward direction is not symmetrical with that in the backward direction. This behavior is attributed to the judicious or enlightened decisions taken by managers under specific conditions (Abu-Serdaneh, 2014; Kama & Weiss, 2013). Specifically, SG&A costs appear to be sticky, as firms' managers deliberately adjust work resources following changes in sales (Anderson et al., 2003; He et al., 2010; Lee et al., 2020).

As sales volume changes, costs exhibit asymmetric behavior, with costs rising by a greater amount than they decline following changes in activity. This phenomenon is referred to as cost stickiness or sticky cost behavior (Anderson et al., 2003). Numerous studies have sought to understand the reasons for this asymmetric behavior, including research by Anderson et al., (2003); Banker & Chen, (2006); CHEN et al., (2012); KAMA & WEISS, (2013); Stimolo & Porporato, (2019); Weiss, (2010).

According to the basic principles of variable cost behavior, costs should change in proportion to changes in activity, as defined by Activity-Based Costing (ABC). However, Anderson et al., (2003) suggests that this behavior is due to managers' asymmetric handling of economic events. As a result, addressing sticky or anti-sticky cost behavior requires tracking the adjustment of labor resource costs in response to changes in demand, in addition to identifying any unused resources available in the current period if demand decreases (Chen et al., 2019).

Cost behavior plays a crucial role in management decision-making, particularly in relation to selling activities, which are categorized as fixed cost decisions. These decisions can significantly impact sales growth and ultimately, profits. Given this, contemporary thought highlights the importance of obtaining relevant information to identify patterns in cost behavior. It is widely assumed that changes in the costs of sales have a direct impact on a company's performance and competitiveness (Abu-Serdaneh, 2014; Alenezi, 2020) .

The present study aims to examine the effect of sticky costs on company performance. Specifically, the study assesses the degree of cost stickiness and its impact on both financially failed and non-failed companies to identify and compare this phenomenon between the two types of companies.

1.2 Problem Statement

Over the last few decades, the accounting field has seen the emergence of a new concept known as the theory of cost asymmetry, which challenges the traditional assumption in accounting literature that variable costs exhibit a symmetrical relationship with the volume of activity. This non-linear relationship was first highlighted by Anderson et al., (2003).

Since then, researchers have studied the determinants of asymmetric cost behavior and the economic implications of cost stickiness, particularly in developed countries (e.g., Bugeja et al., 2015; CHEN et al., 2012). However, there is a lack of sufficient research evidence regarding the theory of cost asymmetry in developing countries, where the findings differ from those reported in developed countries (e.g., Abu-Serdaneh, 2014; Ibrahim, 2018; Ibrahim & Ezat, 2017).

The theory of cost asymmetry has been largely neglected in studies focusing on developing countries. To address this gap, this study examines the effect of the intensity of asymmetric cost behavior on the earnings per share (EPS) of Jordanian companies. Specifically, the study compares failed and non-failed companies, which is a research question that remains unanswered even in developed countries. To gain a deeper understanding of how asymmetric cost behavior impacts EPS, the sample is divided into individual industrial sectors and analyzed separately for each sector. This approach can

provide more nuanced insights into the relationship between asymmetric cost behavior and EPS in specific industries.

In the context of corporate financial crises, managerial decisions related to costs are often influenced by managerial optimism or pessimism. To better understand the relationship between these factors and sticky costs, this study examines cost behavior in the context of such crises. Previous research has shown anti-sticky behavior in companies from developing countries, including Ibrahim & Ezat, (2017) and Ibrahim, (2018) in Egypt, and Abu-Serdaneh, (2014) in Jordan. Recent evidence has also questioned the validity of the traditional theory of cost behavior, which assumes symmetric behavior of costs in response to changes in activity volume. This study contributes to this debate by providing additional evidence of the importance of considering asymmetric cost behavior in the development of analytical and predictive models. Doing so can help to reduce the margin of error in predictions, as demonstrated by previous studies such as Ciftci et al., (2016), Banker et al., (2016), and Banker & Chen, (2006).

Here's a summary of the study's main and sub-questions:

The study aims to answer the following main questions:

1. Do Jordanian industrial companies exhibit sticky cost behavior for different cost elements, including SG&A, COGS, and TC?
2. How does asymmetric cost behavior differ between non-failed and failed Jordanian industrial companies?

Question 2 leads to two sub-questions:

- A. What is the level of sticky cost intensity in non-failed Jordanian industrial companies?
- B. What is the level of sticky cost intensity in failed Jordanian industrial companies?

The study also aims to answer the following question:

3. Does asymmetric cost behavior affect the earnings per share of Jordanian industrial companies for each of the cost elements (SG&A, COGS, and TC)?

1.3 Objectives

In summary, the objective of this study is twofold: to examine the impact of asymmetric cost behavior on the earnings per share of Jordanian industrial companies and to compare

the sticky behavior of costs between non-failed and failed companies. The study is seen as a preliminary step towards future research on the role of cost stickiness in financial failure, where the behavior of costs in Non-failed and Failed companies needs to be determined. Furthermore, this study contributes to the international literature on the impact of asymmetric cost behavior on earnings per share.

1.4 Importance of Study

The research on cost stickiness is limited, especially in developing countries. Developing countries have different circumstances from those prevailing in the developed countries (Abu Alia et al., 2022; Alia & AbuSarees, 2023; Alia & Awwad, 2020; Alia & Barham, 2020) . These circumstances are among the determinants of accounting traditions (Alia & Branson, 2011; Alia & Mardawi, 2021; Alia, 2010). Therefore, this study is important in enriching our knowledge and understanding of this concept in such underdeveloped contexts. Additionally, existing studies on sticky costs have produced mixed results, with some documenting sticky behavior while others documenting anti-sticky behavior, contradicting the basic concept of sticky costs.

This study also highlights the need to revisit some aspects of managerial accounting and cost accounting, as current cost analysis techniques assume a linear association that has been questioned by recent studies. Reconstructing these techniques and mathematical approaches based on the non-linear hypothesis is necessary to address this issue. Financial analysts' expectations of profits can be misleading when they rely on the assumption of symmetric cost analysis and ignore the effect of sticky behavior of costs on financial earnings expectations.

The study's significance lies in highlighting the deficiencies of previous techniques and approaches of cost analysis that assume symmetric behavior of costs, and guiding researchers to reformulate cost analytical systems based on the non-linear relationship. By measuring the dimensions of the sticky cost behavior and its impact on Earnings Per Share (EPS) for the entire study sample, this research moves one step forward towards the asymmetrical approach of cost analysis in predicting and measuring the role of cost stickiness in financial failure.

1.5 Study Hypothesis

Based on the literature review and study questions presented above, the following hypotheses were developed for question 1, specifically regarding the three cost elements (SG&A, COGS, and TC):

H1: Jordanian industrial companies show sticky cost behavior for SG&A costs.

H2: Jordanian industrial companies show anti-sticky cost behavior for COGS costs.

H3: Jordanian industrial companies show sticky cost behavior for TC.

From question No.2, the following hypotheses directly emerge in terms of the three cost elements (SG&A, COGS and TC):

H4: Failed Jordanian industrial companies show anti-sticky cost behavior for SG&A costs.

H5: Failed Jordanian industrial companies show anti-sticky cost behavior for COGS costs.

H6: Failed Jordanian industrial companies show anti-sticky cost behavior for TC.

H7: Non-Failed Jordanian industrial companies show sticky cost behavior for SG&A costs.

H8: Non-Failed Jordanian industrial companies show sticky cost behavior for COGS costs.

H9: Non-Failed Jordanian industrial companies show sticky cost behavior for TC.

Sub-questions A and B are expected to directly reflect the effect of asymmetric cost intensity on failed and non-failed companies. Therefore, no specific hypotheses will be developed for these sub-questions. The study aims to analyze the differences in sticky cost intensity between these two groups of companies, based on empirical evidence.

From question No.3, the following hypotheses directly emerge in terms of the three cost elements (SG&A, COGS and TC):

H10: Cost stickiness negatively influences earning per share of Jordanian industrial companies for each of the costs (SG&A, COGS, and TC).

H11. Cost Anti-stickiness positively influences earning per share of Jordanian industrial companies for each of the costs (SG&A, COGS, and TC).

CHAPTER 2

Literature Review

2.1. Empirical evidence on asymmetric cost behavior (cost stickiness)

Historically, firms have assigned operational costs such as Selling, General and Administrative (SG&A) expenses to each product/service using the volume-driven method (Cooper & Kaplan, 1988; Miller & Vollmann, 1985). This approach has limitations, however, and Activity-Based Costing (ABC) was developed by Cooper & Kaplan, (1992) to achieve more accurate allocation of resources based on organizational activities. Nevertheless, allocating costs using ABC may lead to overestimation of overhead, as the system assumes that costs are linearly proportional to the volume of activity. Early empirical studies by Noreen et al., (1994; Noreen & Soderstrom, (1997) analyzed whether overhead costs (SG&A) are proportional to activities or not, while the concept of sticky costs was first introduced by Malcom, (1991) and (Mak & Rousch, (1994) in their investigation of the implications of activity-based cost reversal in flexible budgets. To avoid misleading managers who rely on current reports to make important decisions in the future, applied studies have developed new models to explain different cost behaviors, based on assumptions about the costs of adjusting resources and deliberate managerial actions. For example, Anderson et al., (2003) built on existing theory to propose a model for flexible budgets that depend on the cost engine to change traditional methods of analyzing public expenditures.

Accountants typically assume that variable costs increase linearly with volume, but economists propose a non-linear relationship (Rayburn, 1993) . Cooper & Kaplan. Robert S, (1999) found that overhead costs do not change linearly with activity volume. In fact, the proportion of variable costs in hospitals' general expenses is modest, meaning that costs increase by a greater amount in response to increased activity volume than they decrease in response to decreased volume. This suggests that costing systems such as ABC may overestimate overhead costs for decision-making purposes. Banker et al., (2014) discuss cost asymmetry, which posits that cost behavior is not always linear and is instead influenced by resource adjustment costs and managerial decisions. As a result, there are various types of cost behavior, including "sticky" and "anti-sticky" costs in

addition to traditional "fixed" and "variable" costs. This phenomenon is observed globally (Banker, Byzalov, & Plehn-Dujowich, 2014) .

Kama & Weiss, (2013) discovered that management incentives, such as meeting profit targets or avoiding losses, affect the degree of cost stickiness. When revenues decline, managers may be motivated to reduce resources to meet their goals, which reduces the degree of cost stickiness rather than increasing it. Somers & Casal, (2009) argued that the asymmetric relationship between variables is more practical to assume than a linear relationship. This aligns with cost stickiness theory, which has been the subject of many critiques of traditional cost behavior (Kama & Weiss, 2013; Somers & Casal, 2009) .

The study of cost behavior in accounting literature is crucial to comprehend cost and management accounting. The conventional model of cost behavior known as Activity-Based Cost (ABC) theory divides costs into fixed costs that remain unchanged with changes in activity volume and variable costs that fluctuate in proportion to the size of activity. The (ABC) system must fulfill the condition of proportionality for effective decision-making (Noreen, 1991) . Recent studies in cost accounting indicate that cost behavior is not symmetrical, as previously believed. The sticky behavior of costs, also known as asymmetric behavior, suggests that selling, general, and administrative costs (SG&A) increase at a higher percentage than the percentage decrease in revenue. This resistance to decrease is due to the sticky nature of the costs when the volume of activity decreases. Studies by Anderson et al., (2003) , He et al., (2010), and de Medeiros & Costa, (2004) highlight the sticky behavior of costs.

Anderson et al., (2003) conducted a crucial study on the asymmetric behavior of SG&A costs. They found that SG&A costs increased by 0.55% when sales increased by 1%, whereas SG&A costs decreased by only 0.35% when sales dropped by 1%. This finding led researchers to investigate the underlying causes of this behavior. According to the basic concept of variable cost behavior, costs should behave similarly, in line with the logic of cost accounting (ABC). Asymmetric behavior may occur due to unbalanced reactions and responses of managers to economic events, according to Anderson et al., (2003).

According to He et al., (2010), management intentionally adjusts business resources to changes in the volume of activity, which is why SG&A expenses appear to be constant.

When the volume of activity increases, costs also rise, but when it decreases, management may be hesitant to reduce costs, such as the cost of assets or labor. This hesitation may be due to the uncertainty that managers face regarding the continuity of sales. If there is a possibility that the decline in sales is temporary, it is unlikely that management will reduce the number of employees or assets. As a result, the company will temporarily bear the recession costs, hoping that the decrease in sales will not continue, and the activity may return to its previous level. This strategy will help the company avoid paying employees' end of service fees, as highlighted by Dierynck et al., (2012; Kama & Weiss, (2013) and Banker et al., (2013) .

It is worth discussing the motivations behind cost stickiness. According to agency theory, management may sometimes act selfishly and prioritize their own interests over those of the company to avoid criticism from shareholders and senior managers (Jensen & Meckling, 1976) . However, a study by He et al., (2010) failed to identify the effect of agency theory on cost behavior in Japan, where firms have significant debts and rights in other firms, making them more attentive to monitoring management performance to avoid agency problems. This result is inconsistent with Anderson's (2003) findings in the US, where sticky cost behavior was observed, indicating a weak control over US company management behavior (He et al., 2010) .

To elaborate further, the study by Dalla Via & Perego, (2014) aimed to investigate whether sticky cost behavior exists in different types of costs in the manufacturing industry. The study was conducted on a sample of 63 Italian manufacturing companies over a period of five years (2006-2010). The findings of the study suggested that while operating costs and labor costs exhibited sticky cost behavior, SG&A and COGS showed anti-sticky cost behavior. The researchers argued that this difference in behavior could be due to the differences in the nature of these costs, where SG&A and COGS are more directly related to the volume of production and are therefore more responsive to changes in activity levels. On the other hand, operating costs and labor costs are more fixed in nature and are less responsive to changes in activity levels, resulting in their sticky cost behavior.

Cheng et al., (2018) conducted a study on Chinese companies and compared their SG&A (Selling, General and Administrative) costs. The study analyzed firms of different sizes -

large, medium, and small- and found significant results. In particular, they documented that SG&A costs in large companies exhibited sticky behavior, while medium and small companies showed anti-sticky behavior. Specifically, when sales increased by 1%, SG&A costs rose by 0.55% for medium and small companies, but decreased by 0.57% for large companies.

Sticky cost behavior has been found in various sectors and countries. de Villiers et al., (2013) confirmed the presence of sticky cost in audit service fees, while Habib & Huang, (2019) found it in charities. Interestingly, their study revealed that large charities exhibited sticky behavior, while small charities showed an anti-sticky pattern. Similarly, Wu et al., (2020) found that public schools' operating costs also demonstrated sticky cost behavior.

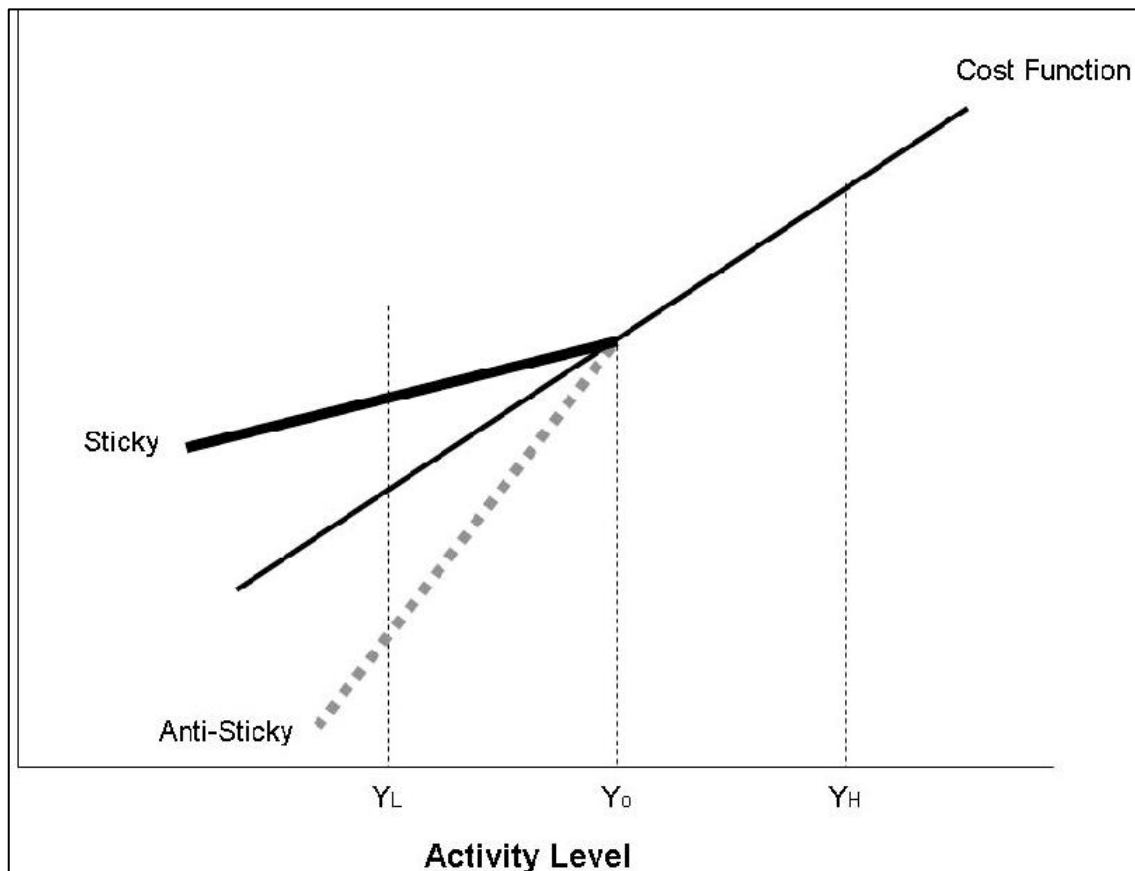
Governance quality appears to play a crucial role in determining the degree of cost stickiness. Bugeja et al., (2015) and Chen et al., (2012) found that high-quality governance reduces the level of cost stickiness in developed countries. On the other hand, Ibrahim and Ezat's (2017) and Ibrahim's (2018) studies conducted in Egypt showed anti-stickiness behavior in developing countries after applying the governance code. While most studies have focused on developed countries, there is a scarcity of evidence on developing countries, which challenges the global results regarding the theory of cost asymmetry.

In Jordanian companies, Abu-Serdaneh, (2014) found that SG&A costs exhibited symmetrical behavior, while COGS costs showed anti-sticky behavior. These findings are unique and distinct from previous studies conducted in both developing and developed countries. Meanwhile, (Ntounis & Vlismas, (2021) found that financial distress has a negative relationship with cost stickiness intensity in European and American companies. During a financial crisis, management is forced to reduce costs, which can reduce the level of cost stickiness. However, this relationship has not been studied in developing countries.

To provide a clear visual representation of the definitions of sticky, anti-sticky, and symmetric cost behaviors, Figure (1) presents these concepts graphically.

Figure (1)

Sticky and anti-sticky costs according to (Weiss, 2010)



2.2. Sticky Cost Behavior Determinants

Ibrahim et al., (2022) conducted a systematic review of a large number of articles published between 1994 and 2020 on the topic of cost asymmetry. The selection criteria ensured that only the best scientific journals in cost asymmetry theory were included. The review paper was used as a reference to identify relevant studies and to clarify the determinants of sticky cost.

2.2.1. Corporate governance, management control mechanisms, and ownership structure

Sticky cost behavior varies across economic and social environments, as confirmed in studies on this topic. Calleja et al., (2006) found evidence of sticky costs in France, Germany, the UK, and the US, but to varying degrees based on each country's regulations and laws. Notably, the study revealed that the UK and the US had lower levels of cost stickiness than the other countries. The striking finding was that the countries with the lowest cost stickiness had corporate governance laws that emphasized maximizing

shareholder value and the role of capital markets in achieving this goal. In contrast, France and Germany's corporate governance laws did not impose the same burden on capital markets regarding shareholders' interests, resulting in higher levels of cost stickiness in these countries.

Chen et al., (2012) conducted a study to investigate the impact of corporate governance on the relationship between agency problems and SG&A behavior. According to agency theory, managers prioritize their own interests over those of the company, leading them to resist adjusting business resources when activity decreases to avoid downsizing the company and achieving agency objectives. This behavior results in the sticky behavior of costs. Among the study's findings, the most significant conclusion was that there is a strong positive relationship between cost stickiness and agency problems, particularly in weaker corporate governance environments. Conversely, strong corporate governance can mitigate the impact of agency problems on sticky cost behavior of SG&A.

Bugeja et al., (2015) conducted a study in Australia, and their findings were consistent with those of Chen et al., (2012) . Companies with strong governance can reduce agency costs, and their sticky costs were less prominent than those with weak governance. However, the sticky cost phenomenon increased when firms adopted IFRS, regardless of their governance strength.

Xue & Hong, (2016) conducted a study in China to investigate the impact of earnings management on expense stickiness. Their findings revealed that there was a significant expense stickiness in the sample that did not exhibit signs of earnings management, in contrast to the sample that did. When the expenses were further divided into various subsections, the managers focused on reducing general expenses to control their expenses. Additionally, the study discovered that good governance had a significant impact on reducing expense stickiness. The study concluded that the combined effect of earnings management and corporate governance was associated with less cost stickiness (Xue & Hong, 2016) .

Recent evidence on the cost asymmetry theory suggests that research findings differ in the context of emerging economies. To explore the impact of corporate governance on cost stickiness in Egyptian firms from 2004 to 2011, Ibrahim & Ezat, (2017) conducted a study using a group of cost components, including Selling, General, and Administrative

costs (SG&A) and Cost of Goods Sold (COGS), individually and jointly using Total Cost (TC). The study examined the effects before and after the implementation of the Corporate Governance code in Egypt in 2007. The results revealed that sticky costs were common in Egyptian firms. However, the study's surprising finding was that the nature of the behavior of SG&A costs changed before and after the application of the Corporate Governance code. These costs were sticky before the code and turned anti-sticky after its implementation. The study also found that the application of the code affected the degree of stickiness of both CGS and TC costs.

Ibrahim, (2018) conducted a study to investigate the impact of corporate governance on asymmetric cost behavior, with a focus on the stickiness of COGS. The study found that COGS increased by 1.05% but decreased by 0.85% for a change of activity by 1%, indicating that costs do not act linearly. The study also examined the dual role of board characteristics in determining asymmetric cost behavior, with more stickiness observed in the cost for entities with higher executive to non-executive ratios. However, this finding contradicted the studies of Bugeja et al., (2015) and Chen et al., (2012). The study also found that during periods of decline in successive sales, higher economic growth, and higher institutional ownership, the cost stickiness was lower, which supported the findings of Chen et al., (2012) and Ibrahim, (2018) .

In another study, Prabowo et al., (2018) explored the impact of state ownership on labor cost stickiness. The study found that state-owned firms have higher labor costs due to the state's interference in administrative decisions regarding employment for socio-political reasons. During periods of recession, politicians focus on retaining workers rather than speeding up the workforce, whereas during economic recovery, they focus on hiring more employees to reduce unemployment rates. Therefore, state-owned firms exhibit greater stickiness in labor costs compared to private firms (Prabowo et al., 2018) .

Hall, (2016) noted that in a recession and lower demand, managers of public banks reduce labor costs to increase profits, while managers of private banks cut labor costs to comply with regulations. This suggests that the impact of public and private ownership on labor cost management differs, and the approach to dealing with these costs may also vary depending on ownership type.

Chung et al., (2019) explored the impact of institutional ownership, which is considered as one of the mechanisms of governance and control, on cost stickiness. Their findings indicated that institutional investors can decrease cost stickiness in the long run, leading to better market and accounting performance over time.

2.2.2. Uncertainty, risks, managerial pessimism, and negative prior sales changes

Scholars have debated how risk and uncertainty conditions impact managers' decisions to re-adjust resources, which, in turn, affect cost behavior. Under conditions of uncertainty about future demand levels, managers may be reluctant to adjust resources in response to changes in activity levels, resulting in asymmetric cost behavior that may be either sticky or anti-sticky. Studies by Dierynck et al., (2012), Kama & Weiss, (2013), Banker et al., (2013), He et al., (2010), and Anderson et al., (2003) suggest that in situations where demand is insured to decrease in the future, resources costs are adjusted downward, leading to reduced cost stickiness.

Lee et al., (2020) conducted a study to investigate the impact of political uncertainty on cost stickiness during the election period and post-election period. The findings revealed that the election period is associated with higher political uncertainty, which results in an increase in sticky costs due to management's reluctance to adjust slack resource costs. Conversely, the post-election period is associated with lower political uncertainty, leading to a decrease in sticky costs as management adjusts resource costs more readily. This study provides further evidence that risk and uncertainty conditions play a significant role in determining cost behavior.

In 2014, Banker and colleagues conducted a study that investigated how demand uncertainty is linked to cost behavior. The study found that managers are often hesitant to decrease resources when there is a decrease in activity, leading companies to prefer a more inflexible cost structure that features higher fixed costs and lower variable costs. This preference stems from the expectation of a subsequent increase in demand in the short term, which results in cost behavior that is difficult to change (Banker, Byzalov, & Plehn-Dujowich, 2014).

Li & Zheng, (2020) conducted a study that examined how rollover risks and resource adjustment decisions are affected by circumstances other than uncertainty. The study

found that when faced with rollover risks, managers tend to decrease resources when there is a change in the volume of activity, resulting in a reduction in cost stickiness. Furthermore, the effect of rollover risks on cost stickiness was found to be more pronounced in companies that have higher financial constraints and lower financing sources. Chen et al., (2019) suggest that managers who are pessimistic tend to exhibit anti-sticky behavior, as they tend to have a higher degree of stagnant resources and low adjustment costs. In contrast, optimistic managers tend to exhibit cost stickiness, as their optimism leads to a reluctance to modify resources. Therefore, anti-sticky behavior is linked to a high degree of stagnant resources, low adjustment costs, and pessimistic management expectations.

Ntounis & Vlismas, (2021) suggest that financial distress can reduce managerial optimism about the future and increase the burden of maintaining idle resources, leading to less severe asymmetry in SG&A, cost of goods sold, and operating expenses costs. This is because, in times of financial distress, companies are more hesitant to bear the costs associated with stagnant labor resources, leading to a reduction in costs and lower cost stickiness. The negative relationship between financial distress and cost inconsistency is primarily driven by this reluctance to bear costs in the face of a financial crisis. As a result, costs are reduced, leading to lower levels of cost stickiness.

According to Ntounis & Vlismas, (2021) , empirical evidence suggests that there is a negative relationship between the level of financial distress and the intensity of cost asymmetry. As financial distress advances, the cost of maintaining stagnant resource capacity increases while the intensity of managerial optimism in forecasting future sales revenue decreases. As a result, financial distress reduces the severity of cost asymmetry in three key cost components: selling, general and administrative (SG&A) expenses, cost of goods sold, and operating expenses.

(Banker, Byzalov, & Plehn-Dujowich, 2014) , investigated the impact of prior sales changes on cost stickiness, and found that a decrease in past sales influences managers' expectations of future sales changes. This fosters managerial pessimism, increasing the likelihood of future sales declines following previous sales declines, and resulting in anti-sticky cost behavior for selling, general and administrative (SG&A) costs, cost of goods sold (COGS), research and development costs, and other SG&A expenses.

Ciftci & Zoubi, (2019) also investigated the impact of past sales changes on cost stickiness in a sample from the United States. The study found that a decrease in past sales can lead to small decreases in current sales, which in turn leads to anti-sticky behavior. However, if the current changes in sales are significant, this can reduce anti-sticky behavior.

Conclusions regarding the first set of hypotheses can be drawn based on the findings of past studies on sticky costs as follows:

Asymmetric cost behavior arises when managers adjust business resources in response to changes in activity volume, particularly under conditions of uncertainty, risk, and prior sales. To prevent losses resulting from maintaining stagnant resources and bearing their costs, managers often engage in anti-sticky behavior by reducing sticky costs through resource modifications. This is achieved by directly adjusting costs downwards in response to changes in activity.

The philosophy of cost asymmetry theory, as supported by previous research, enables the formulation of basic hypotheses for the entire sample without the need for division into groups based on the cost asymmetry phenomenon for each of sales, general, and administrative expenses (SG&A), cost of goods sold (COGS), and total costs (TC).

H1: Jordanian industrial companies show Sticky Cost Behavior for SG&A costs.

H2: Jordanian industrial companies show Anti-Sticky Cost Behavior for COGS costs.

H3: Jordanian industrial companies show Sticky Cost Behavior for TC.

The present study indicates that Failed Jordanian companies exhibit anti-sticky cost behavior similar to that of the sample, which can be attributed to financial distress, a successive decline in sales, and administrative pessimism. This similarity in conditions implies that the Failed companies are likely to exhibit anti-sticky cost behavior, consistent with the findings of prior research, across individual costs such as sales, general, and administrative expenses (SG&A), cost of goods sold (COGS), and total costs (TC).

Accordingly, the second set of hypotheses of the study is:

H4: Failed Jordanian industrial companies show Anti-Sticky Cost Behavior for (SG&A) costs.

H5: Failed Jordanian industrial companies show Anti-Sticky Cost Behavior for (COGS) costs.

H6: Failed Jordanian industrial companies show Anti-Sticky Cost Behavior for (TC).

2.2.3. Earnings targets, managerial incentives, growth expectations, and positive prior sales changes

Silge & Wöhrmann, (2021) found that future growth expectations increase the confidence of administrative decisions regarding future demand and positively affect the degree of cost stickiness over the long run. However, the effect of future management expectations on sticky costs may vary depending on the presence of constraints, such as resource adjustment costs and unused resource constraints. Chen et al., (2019) argue that the effect of management expectations on sticky costs is greater when stagnant resources and resource adjustment costs are high, while low stagnant resources and adjustment costs lead to no effect of future expectations on asymmetric costs. Overall, the relationship between future expectations and cost stickiness is complex and may depend on several factors.

The argument presented by Anderson et al., (2003) suggests that managers may be hesitant to adjust resource costs when there are changes in activity volume, leading to the phenomenon of sticky costs. This may be due to the fact that managers do not anticipate that the decline in activity volume will continue. However, the influence of managerial incentives may play a role in determining cost behavior. Dierynck et al., (2012) investigated whether market pressure to achieve a certain level of zero earnings will affect decisions related to resource adjustment in response to changes in demand. When cost savings are not feasible and zero earnings targets are not met or exceeded, managers may choose to reduce resource costs in response to changes in activity, resulting in reduced stickiness of costs.

According to Dierynck et al., (2012), companies that have high profitability may be reluctant to dismiss employees in times of decreased activity in order to maintain their reputation, but they may opt to reduce working hours instead. Conversely, smaller companies may find it less costly to let go of some employees in such situations. Kama & Weiss, (2013) conducted a study that supports the notion that profit incentives influence managers' decisions to reduce stickiness by adjusting resources in order to meet

profit targets and avoid losses. This results in a lower degree of stickiness when there is a decrease in activity volume, leading to near-symmetric cost behavior, which is more likely to occur when there is a low degree of stickiness. The desire to achieve profit goals drives managers to reduce increased resource costs when activity volume increases, but when activity volume decreases, resource costs can be significantly reduced.

Banker et al., (2014) conducted research to determine the impact of changes in past sales on cost stickiness, and their findings provided further evidence of the factors that contribute to asymmetric cost behavior. They discovered that an increase in prior sales changes affects managers' expectations of future sales changes, which can lead to cost stickiness for various costs such as SG&A costs, COGS, cost of R&D, and other SG&A costs. This is due to the possibility of increasing future sales based on the previous increase in sales. Similarly, Ciftci & Zoubi, (2019) examined the effect of past sales changes on stickiness using a sample of firms in the United States. Their results indicated that an increase in prior sales leads to a slight increase in current sales, which subsequently leads to an increase in cost stickiness. However, if the current changes in sales are significant, it can result in a reduction of cost stickiness.

Based on the findings of previous research, the third set of hypotheses can be formulated as follows: Asymmetric cost behavior is contingent on managers' adjustment of business resources in response to changes in activity volume, which may be influenced by various factors, including but not limited to uncertainty, managerial optimism, prior sales, and growth expectations.

Therefore, if there have been previous increases in sales and management holds an optimistic outlook regarding demand and anticipates future growth, managers may not feel compelled to adjust resources accordingly. This, in turn, could lead to stagnant resources and an increase in sticky costs.

In the context of the present study, there appears to be similarity in the conditions that lead to sticky cost behavior between the sample of Failed Jordanian companies and the sample of Non-Failed companies in terms of uncertainty, managerial optimism, prior sales increases, and growth expectations. These factors may compel managers to keep work resources stagnant rather than adjusting them according to changes in activity volume. Therefore, it is reasonable to expect that the sticky cost behavior of Non-Failed

Jordanian companies will align with the findings of previous studies for individual costs such as SG&A, COGS, and TC.

Based on the above, the third set of hypotheses of the study is:

H7: Failed Jordanian industrial companies show Sticky cost behavior for (SG&A) costs.

H8: Failed Jordanian industrial companies show Anti-Sticky cost behavior for (COGS) costs.

H9: Failed Jordanian industrial companies show Sticky cost behavior for (TC).

2.2.4. Economic consequences of the cost stickiness

According to Ciftci & Salama, (2018), sticky costs can have negative economic consequences as managers may fail to consider cost stickiness in their expectations about future earnings, leading to errors in profit forecasts and potentially harming the credibility of managers. This finding is consistent with the study by Han et al., (2019). In addition, the relationship between cost stickiness and management of profit expectations is likely to be stronger when resource adjustment costs are higher.

The economic consequences of sticky costs are also in line with the predictions of Weiss, (2010) regarding the impact of sticky costs on financial analysts' earnings expectations. The study found that financial analysts do not consider cost stickiness in their analyses, implying that companies with sticky costs may be less willing to face sudden announcements of profits due to their low profit margin during the period of sticky costs.

In their research, Ciftci et al., (2016) and Banker et al., (2016) both argued that failing to account for cost variability and stickiness in financial forecasting models can result in significant systematic prediction errors, leading to distorted and inaccurate results. Similarly, Banker & Chen, (2006) found that the model based on cost stickiness is the most accurate in predicting future profits. More recently, Tang et al., (2022) conducted the first peer-reviewed study on the impact of sticky costs on stock price crashes and found a negative correlation between the two. Overall, these studies highlight the importance of considering cost stickiness when conducting financial analysis and modeling to avoid biased results and better predict future profits and stock price movements.

In light of the previous controversy, we propose two new hypotheses. The tenth hypothesis suggests that financial analysts' failure to consider the non-linear relationship between variable costs and volume of activity during financial analysis can lead to unexpected errors due to the misleading linear relationship. Moreover, the negative impact of cost stickiness on stock price crash, as highlighted by Tang et al., (2022), further supports the expectation of a negative impact of cost stickiness on the profitability of Jordanian companies, based on previous studies.

Conversely, the eleventh hypothesis proposes a positive impact of anti-sticky behavior on the profitability of Jordanian companies. As there is an inverse relationship between the determinants of sticky costs and those of anti-sticky costs, this topic has not yet been explored and warrants further investigation.

Accordingly, the tenth and eleventh hypotheses are:

H10: Cost stickiness negatively influences future performance of Jordanian industrial companies for each of the costs (SG&A, COGS, and TC).

H11. Cost Anti-stickiness positively influences future performance of Jordanian industrial companies for each of the costs (SG&A, COGS, and TC).

CHAPTER 3

Materials and Methods

3.1 Methodology

The methodology is a fundamental aspect of any scientific research as it determines the most suitable way to carry out statistical analysis. As this research investigates the behavior of a new phenomenon with changing extents, it is exploratory in nature. The behavior of costs follows a pattern that varies according to circumstances affecting the facility, which can differ from one environment to another in each country. Therefore, it is crucial to investigate this behavior and study the relationships between the variables contributing to the occurrence of asymmetric cost behavior. To determine these interrelationships and later explore the phenomenon, quantitative data will be utilized through a common mathematical model that has been used in other research. The data will be rectified from extreme values through a winsorized procedure, as recommended by Banker et al., (2016), Han et al., (2019), and Sun et al., (2019) , whereby very high and very low values will be dropped. All continuous regression variables will be winsorized at 1% top and 1% bottom of observations.

This study is empirical and utilizes a panel data approach. According to Brooks, (2008) , the panel data approach combines time series and cross-sectional data to provide a comprehensive analysis. In the current study, the information will be presented as follows:

- The first type of data used in this study is cross-sectional data, which pertains to the study variables and includes certain characteristics of Jordanian companies to examine the phenomenon of sticky costs. The sample for this study includes 40 industrial companies listed on the Amman Stock Exchange.
- The second type of data used in this study is time series data, which examines the extent of the concentration of the phenomenon of sticky costs over time. The time series for the study sample consists of seven years, from 2013-2019.

To determine the appropriate regression analysis method for this study, a Breusch-Pagan LaGrange multiplier test was conducted. If the results of the test suggest a random effects

approach, then the panel data method must be used, and either fixed effects estimation or random effects estimation will be applied (Brooks, 2008) .

The study's suitable model was selected following the implementation of the Breusch-Pagan LaGrange multiplier test. In case the random effect regression was indicated by the Breusch-Pagan LaGrange multiplier test, the Hausman test will be conducted to determine whether fixed or random effects should be used. Additionally, the STATA software was used to carry out the regressions. To ensure the accuracy of the regression model, a heteroscedasticity test was conducted for each hypothesis, and any issues were addressed through the use of robust regression methods.

Pooled OLS regressions have been utilized in several studies to examine specific characteristics of the chosen sample, without taking into account the time component (Anderson et al., 2003; Banker & Chen, 2006; Chen et al., 2012; Kama & Weiss, 2013; Stimolo & Porporato, 2019; Weiss, 2010; Anderson et al., 2015) . On the other hand, in the fixed effects model, the parameters of the model remain constant and are not random variables. As a result, each group represents its own fixed quantity. Conversely, in the random effects model, the parameters of the model are random variables (Wooldridge, 2009) .

3.2 Data Collection:

The research focuses on Jordanian companies listed on the Amman Stock Exchange (ASE), specifically those in the industrial sector. The study includes all 40 companies listed under the industry sector as reported by the exchange. The data for the study covers the period from 2013 to 2019, based on the availability of information from the Amman Stock Exchange.

The period from 2013 to 2019 was selected as it provides the largest amount of data without any missing information, making it an ideal timeframe for the study. The total number of observations for the research is 280, which may seem small in comparison to previous studies. However, this can be attributed to the limited number of companies and data availability. Nevertheless, the number of observations is comparable to similar studies conducted by Bradbury & Scott, (2018) in New Zealand, Zhang et al., (2019) in the USA, and Balakrishnan & Gruca, (2008) in Canada.

3.3 Population and Sample

The Amman Stock Exchange (ASE) was established in March 1999 as a non-profit organization authorized to function as a regulated securities trading platform in Jordan. In February 2017, the ASE was transformed into a publicly held government-owned company under the name "The Amman Stock Exchange Company". The primary objective of the ASE is to create a conducive environment that promotes equity in trading securities, fair market practices, and enhances the knowledge and awareness of financial market investors. To achieve this objective, the ASE has established rules and regulations that guide its management and ensure best practices. The ASE comprises companies from various sectors, including industry, services, and financial services, as outlined in Table (1) that displays the distribution of Jordanian companies according to their sector in the ASE (ASE Website, 2020) .

Table (1)

Distribution of Companies in the Amman Stock Exchange

Sectors	Number of companies
Industry	72
Services	58
Financial	113
Total	243

% of Industrial companies=30%.

Source: (ASE Website, 2020).

3.3.1 Industrial Sector in Jordan

The Jordanian economy is a free market economy that is influenced by market forces, and its economic policies are primarily driven by the private sector, which makes it vulnerable to external events occurring in neighboring countries. Additionally, migration to Jordan has a negative impact on the economy. In recent decades, the Jordanian economy has experienced growth, which began in 1999 after implementing economic reforms such as opening up the commercial system and privatizing state-owned companies. The economic growth in the past decades has been characterized by fluctuations in the industrial sector, including changes in cost structures and their behavior, as well as changes in the number of workers in this sector. Therefore, this economic environment is ideal for studying cost stickiness, as demonstrated by previous research Magheed, (2016) . This study focuses

on a sample of 40 industrial companies out of the 72 listed on the Amman Stock Exchange from 2013 to 2019.

3.4 Statistical Analysis Methods

To fulfill the study objectives, several regression models and ordinary least squares analyses (including Fixed, Random effect, and Pooled OLS regressions) were utilized. The financial status of companies was determined using the Altman (1968) model's Z-Score, which separates companies into Failed and Non-Failed categories. The Z-Score is a suitable indicator of bankruptcy risk (Habib et al., 2020) , and is calculated using the following formula:

$$\mathbf{Z\text{-core}} = 1.2F1 + 1.4F2 + 3.3F3 + 0.6F4 + 1.0F5$$

Where:

F1 is a liquidity measure to the ratio of working capital (WC) to total assets (ASSETS),

F2 is a cumulative profitability proxy and is measured as the ratio of retained earnings (R_EARN) to total assets (ASSETS),

F3 represents an operating efficiency without tax and leverage factors and measured by the ratio of EBIT (EBIT) to total assets (ASSETS),

F4 represents the ratio of market value of equity (MVE) to total liabilities (LIABILITIES), and

F5 is an asset turnover ratio which is captured as sales revenue (S) scaled by total assets (ASSETS).

A Z-Score below 1.8 indicates financial distress for the company, while a score above 2.67 indicates financial health. Scores between 1.81 and 2.66 are considered to be in a grey area. MS Excel was utilized to categorize companies as Failed or Non-Failed using the Altman model. Companies in the financial health and grey area categories were considered Non-Failed, while those in financial distress were classified as Failed.

The study aims to investigate the phenomenon of asymmetric cost behavior in Jordanian industrial companies and its impact on Earnings per share. The study analyzes the

potential existence of sticky or anti-sticky cost behavior and estimates its effects using models commonly used in prior research. The first phase involves measuring the intensity of cost asymmetry separately for Failed and Non-Failed companies by dividing the sample into two groups. To determine the signal and coefficient values of independent variables in Model (1) below, pooled OLS regressions are applied to each group. However, to study the characteristics of Failed and Non-Failed firms as one sample, tests are conducted for the entire sample (Failed and Non-Failed) using Fixed, Random effect, and Pooled OLS.

In the second phase of the study, the impact of sticky costs and anti-sticky costs on the Earnings per share of firms is estimated using Model 2 (Fixed, Random effect, and Pooled OLS), which is commonly used in prior research.

3.4.1 Measurement of variables

Two models are used to measure and analyze the variables as illustrated below:

Model (1):

The study's primary variables include Sales, SG&A, COGS, and TC. Sales is an independent variable, while the dependent variables consist of SG&A (Selling, General and Administrative costs), COGS (Cost of Goods Sold), and TC (COGS+SG&A). The data required for these variables was obtained from the financial statements of Jordanian industrial companies available on the ASE website and the companies' websites. These variables indicate the cost behavior and their causal relationship with sales. Table (2) provides a summary of these variables, their type (dependent/independent), and their definitions.

Table (2)

Variable definitions

Variable	Definition	References
Sales (independent)	Sales amount from the income statement	Anderson et al. (2003), Bradbury and Scott (2018), Balakrishnan and Gruca (2008).
SG&A (dependent)	Selling, General and Administrative costs from the income statement	
COGS (dependent)	Cost of Goods Sold from the income statement	
TC (dependent)	COGS+SG&A	

The structure of the model:

The model utilized in this study to evaluate the response of costs to changes in net sales and to distinguish periods of revenue growth or decline was developed by Anderson et al. (2003). The mathematical expression of Model 1 is presented below:

$$\log\left[\frac{Cost_{i,t}}{Cost_{i,t-1}}\right] = \beta_0 + \beta_1 \log\left[\frac{Rev_{i,t}}{Rev_{i,t-1}}\right] + \beta_2 * Dec_{Dummy} * \log\left[\frac{Rev_{i,t}}{Rev_{i,t-1}}\right] + \varepsilon_{i,t} \quad (1)$$

Where:

Cost: means (SG&A, COGS, and TC).

Rev: Revenue.

β_0 , β_1 , β_2 : Coefficients.

Dec_{dummy}: Dummy variable that takes value zero or one based on revenues increase or decrease.

ε : Error coefficient.

According to Anderson et al., (2003), since companies differ in performance and size, the log-linear specification provides a more effective comparison of variables among firms and reduces the likelihood of cross-sectional heteroscedasticity.

The dummy variable (β_2) takes values of either zero or one, depending on how revenue changes in two successive periods. If revenue in the current period is lower than that in the previous period, the variable takes on a value of one. Otherwise, it takes on a value of zero. β_1 represents the coefficient that measures the percentage increase in costs with respect to a 1% increase in revenue when β_2 equals zero. The sum of β_1 and β_2 measures the percent decline in volume of cost against a 1% drop in revenue when revenue decreases.

Hypothesis H1 for asymmetric cost behavior (cost stickiness) is conditional on β_1 being greater than zero and β_2 being less than zero. When there is traditional behavior in terms of fixed and variable costs, changes in cost are symmetrical, and β_2 is equal to zero. The anti-sticky cost behavior occurs when $(\beta_1 + \beta_2)$ is greater than β_1 , indicating that the costs decrease by an amount greater than the amount of the increase. This behavior has

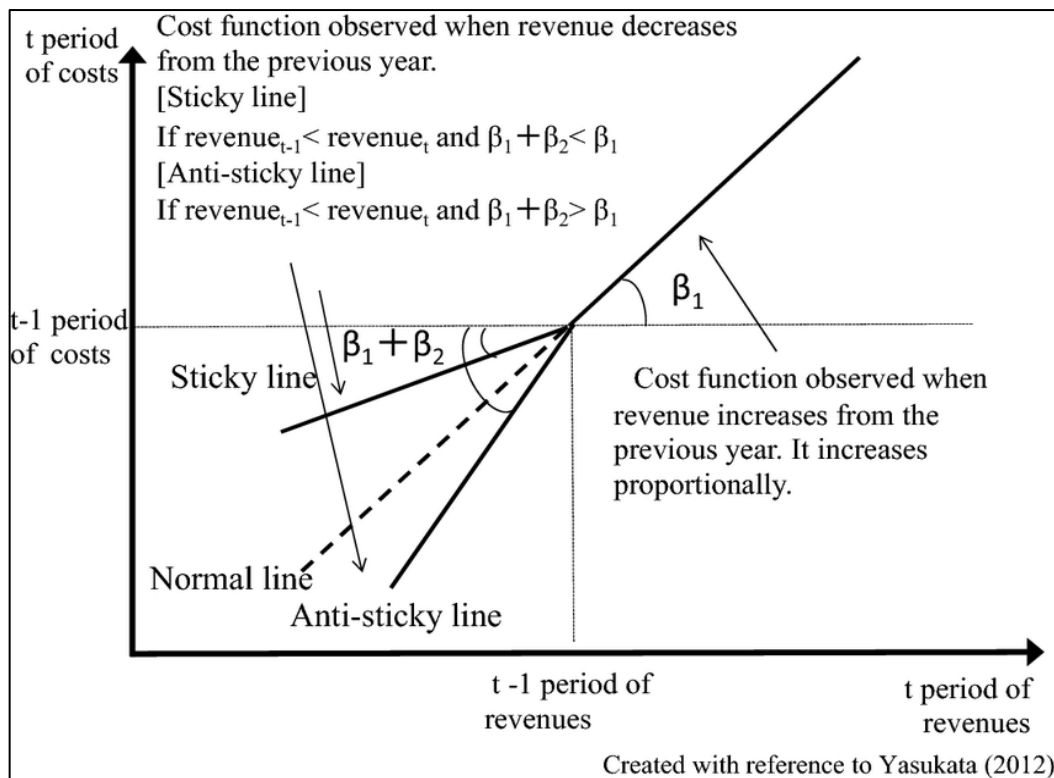
been previously identified in the literature by Cheng et al., (2018); Ciftci & Zoubi, (2019); and Habib & Huang, (2019) .

Several studies conducted in various countries have used the cost stickiness model developed by Anderson et al., (2003), including studies by Xue & Hong, (2016) in China, Ibrahim & Ezat, (2017) in Egypt, Abu-Serdaneh, (2014) in Jordan, Dierynck et al., (2012) in Belgium, Dalla Via & Perego, (2014) in Italy, Hall, (2016) in the USA, and Prabowo et al., (2018) in 22 European countries. The model has also been used in studies examining operating costs more generally, such as Calleja et al., (2006), Kama & Weiss, (2013), Bugeja et al., (2015), Holzhacker et al., (2015), Bradbury & Scott, (2018), and Lee et al., (2020) .

Furthermore, the model has been employed in studies investigating TC, such as those by Subramaniam & Watson, (2016) and Ibrahim & Ezat, (2017). In Figure (2) Yasukata, (2012) provides a visual representation of sticky costs and anti-sticky costs in contrast to symmetrical cost behavior.

Figure (2)

Graphical representation of sticky costs and anti-sticky costs against symmetrical cost behavior created by (Yasukata, 2012) .



To test for the existence of asymmetric cost behavior, as proposed by Anderson et al., (2003) , the slope of the cost line when there is an increase in the volume of activity is compared to the slope of the cost line when there is a decrease in the volume of activity. This is expected to result in different slopes, which contradicts the traditional assumption of symmetrical cost behavior.

To determine whether asymmetric cost behavior exists, the slope of the cost line when the volume of activity increases is compared to the slope of the cost line when the volume of activity decreases. This is achieved by analyzing the β_1 and $\beta_1+\beta_2$ coefficients obtained from statistical results. If $(\beta_1+\beta_2)$ equals β_1 , then cost behavior is symmetric with respect to changes in volume of activity. However, if $(\beta_1+\beta_2)$ is less than β_1 , then cost stickiness is present. On the other hand, if $(\beta_1+\beta_2)$ is greater than β_1 , then an anti-sticky cost behavior is present. These criteria were established by Anderson et al., (2003) and have been applied in numerous studies examining cost behavior in various countries and industries.

The degree of cost stickiness measures the extent of asymmetry and is calculated by dividing the cost decrease coefficient ($\beta_1 + \beta_2$) by the cost increase coefficient (β_1), as introduced by Stimolo & Porporato, (2019). This calculation is shown below:

Degree of cost stickiness= $(\beta_1 + \beta_2) / \beta_1$.

Model (2):

This model measures the phenomenon of asymmetric cost behavior as an independent variable along with other control variables and the dependent variable. The data needed for this model was obtained from the annual reports of the sample companies, including information such as **net sales, SG&A expenses, total assets, total liability, earnings per share (EPS) and share price**. The model includes the following variables:

- **The dependent variable:** -**EPS** was calculated as a ratio of EPS/share price in year t , and it is the future changes in a ratio of EPS to share price in year t ,
- **The Independent variable:** Stickiness is the independent variable that that was calculated using the following formula:

$$(\text{Costs/Sales})_{it} - (\text{Cost/Sales})_{it-1}$$

Control variables:

In Model (2), three control variables were utilized, namely PEPS, Leverage, and Size. PEPS denotes the ratio of EPS to share price in the previous year (t-1). Leverage, measured as the ratio of total liability to total assets in the previous year (t-1), and Size, computed as the logarithm of total assets in the prior year (t-1), were also taken into account. Table (3) displays the variables integrated into the model, along with their respective types and definitions.

Table (3)

Variable definitions

Variable	Definition	References
EPS (dependent)	Current Earnings Per Share (EPS/share price in year t)	Warganegara and Tamara, (2014)
PEPS (Control variable)	Past Earnings Per Share (EPS/share price in year t-1)	
Leverage (Control variable)	$\frac{total\ liability\ in\ year\ t - 1}{Total\ assets\ in\ year\ t - 1}$	
Firm size (Control variable)	log of total assets in year t-1	
Stickiness (independent)	$(Cost/Sales)_{it} - (Cost/Sales)_{it-1}$	

Where (**Cost**) stands for (SG&A, COGS, and TC).

The structure of the model:

Banker & Chen, (2006) developed Model (2) to incorporate varying cost behavior in periods of revenue increase or decrease, aiming to enhance profitability forecasting. The mathematical expression for Model (2) is presented below:

$$EPS_{i,t} = \beta_0 + \beta_1 Size_{i,t-1} + \beta_2 Lev_{i,t-1} + \beta_3 EPS_{i,t-1} + \beta_4 sticky_{i,t-1} + \epsilon_{i,t} \quad (2)$$

Where:

$$COST\ STICKY_{Cost(i,t)} = \left[\frac{Cost\ i,t}{Sales\ i,t} - \frac{Cost\ i,t-1}{Sales\ i,t-1} \right] * D_{i,t}^{Sales} * D_{i,t}^{Cost} \quad (3)$$

sticky_{i,t} : stickiness of selling, general, and administrative expenses of firm i in year t,

$\left[\frac{Cost\ i,t}{Sales\ i,t} \right]$: ratio of SG&A costs to sales of firm i in year t,

$D_{i,t}^{Sales}$: dummy variable for sales,

It takes value 1 if $\left[\frac{Sales_{i,t}}{Sales_{i,t-1}} \right] < 1$, or 0 otherwise,

$D_{i,t}^{Cost}$: dummy variable for Sticky Cost.

It takes value 1 if $\left[\frac{Cost_{i,t}}{Sales_{i,t}} - \frac{Cost_{i,t-1}}{Sales_{i,t-1}} \right] > 0$, or 0 otherwise.

Anti-Sticky measurement:

In order to account for Anti-Sticky cost behavior, the direction of the (<) symbol in the dummy variable for cost must be reversed. This is necessary to capture periods in which costs exhibit anti-stickiness, that is, when sales decrease and costs decrease by a larger proportion than the sales decrease.

$D_{i,t}^{Cost}$: dummy variable for anti-sticky cost.

It takes value 1 if $\left[\frac{Cost_{i,t}}{Sales_{i,t}} - \frac{Cost_{i,t-1}}{Sales_{i,t-1}} \right] < 0$, or 0 otherwise.

Anderson et al., (2007) defined the SG&A ratio as the difference between the current and the lagged SG&A costs to sales ratio:

$$SG\&A \text{ Ratio} = \left[\frac{SG\&A_{i,t}}{Sales_{i,t}} - \frac{SG\&A_{i,t-1}}{Sales_{i,t-1}} \right] \quad (4)$$

Both sticky costs and anti-sticky costs require a reduction in sales to be measured accurately. However, the proportion of SG&A costs changes in opposite directions for the two cases. In the case of sticky costs, the SG&A ratio increases, whereas in the case of anti-sticky costs, it decreases. Thus, a positive SG&A ratio indicates cost stickiness, while a negative SG&A ratio indicates anti-sticky costs, as stated by Homburg & Nasev, (2008).

According to Homburg & Nasev, (2008) , a high value of the stickiness coefficient suggests that a firm has strong cost stickiness, while a very weak coefficient indicates zero cost stickiness in the sticky model. The equation used to compute cost stickiness is derived from the model developed by Tulcanaza Prieto et al., (2019) and Homburg & Nasev, (2008) . The analysis of costs/sales in sticky cost behavior is regarded as a quantitative measure of stickiness.

CHAPTER 4

Results and Discussion

This chapter provides an overview of the study's descriptive statistics, including a discussion of the correlation test and regression analysis results.

4.1 Descriptive Statistics

This section of the study presents the descriptive statistics of the variables related to the first and second models. The study sample includes 40 industrial companies out of 72 listed on the Amman Stock Exchange between the years 2013 and 2019. Table (4) presents the descriptive statistics for Model (1) represented by equation (1) above. Tables (5) and (6) present the descriptive statistics for the Failed and Non-Failed groups of the study sample, respectively. Table 4.4 provides the descriptive statistics for all study variables involved in Model (2) represented by equations 2 and 3 above. The descriptive statistics include the mean, standard deviation, median, minimum, and maximum values for each variable.

Table (4) presents the descriptive statistics of all study variables involved in Model (1) for the period from 2013 to 2019, covering 280 observations of 40 industrial companies listed on the Amman Stock Exchange. The mean, median, maximum, and minimum values of the variables are within reasonable ranges. Moreover, the standard deviation values indicate that the data is not widely dispersed. The means and medians for all variables are close to zero, indicating that there is no significant bias towards positive or negative values.

Negative values in descriptive statistics are a sign of the possibility of existence of stickiness in costs, since the model captures the intervals when revenue encounters successive decrease.

Overall, the descriptive statistics suggest that the data is suitable for further analysis using regression models.

Table (4)*Overall Descriptive analysis*

Variable	Mean	Median	Min	Max	SD
SGA	-0.004	0.000	-0.437	0.406	0.105
COGS	-0.030	-0.014	-0.627	0.352	0.137
TC	-0.026	-0.013	-0.463	0.314	0.117
REV	-0.038	-0.013	-0.649	0.554	0.162
DecREV	-0.073	-0.013	-0.649	0.000	0.124
Obs	280	280	280	280	280

Looking at the data in Table (4) above, we can see that all variables have negative means, medians, and maximum values, indicating that on average, the values of these variables are below zero. This suggests that the companies in the sample may have experienced losses or lower revenues in the period studied. The minimum values of SGA, COGS, TC, and REV are all negative, which indicates that there were some companies with very low values for these variables, potentially indicating financial difficulties or distress.

Overall, this data suggests that the companies in the sample may have experienced financial challenges during the period studied, particularly in terms of revenues and cost-related variables.

Table (5) presents the descriptive statistics of all study variables involved in Model (1) for the Failed Group of industrial companies listed on the Amman Stock Exchange. The table provides results for the period from 2013 to 2019, covering 104 observations. The data shows reasonable values for mean, median, maximum, and minimum for all variables. Additionally, the standard deviation readings are slightly higher than those in Table (4), indicating that the data is slightly more dispersed. The mean and median values in Table (5) below are generally lower than those in Table (4), indicating that the Failed Group of industrial companies experienced lower performance than the overall sample. The following is a more detailed description of data presented in Table (5).

- SGA: The mean SGA is negative (-0.039), indicating that on average, selling, general and administrative expenses are less than the total revenue. The median SGA is also negative (-0.013), indicating that the distribution is skewed to the left. The range of SGA values is from -0.699 to 0.422, with a standard deviation of 0.134. This indicates that the values are relatively close to the mean.

- COGS: The mean COGS is also negative (-0.085), indicating that on average, cost of goods sold is less than the total revenue. The median COGS is also negative (-0.053), indicating that the distribution is skewed to the left. The range of COGS values is from -1.041 to 0.371, with a standard deviation of 0.196. This indicates that the values are relatively spread out from the mean.
- TC: The mean TC is negative (-0.074), indicating that on average, total costs are less than the total revenue. The median TC is also negative (-0.050), indicating that the distribution is skewed to the left. The range of TC values is from -0.739 to 0.222, with a standard deviation of 0.158. This indicates that the values are relatively close to the mean.
- REV: The mean REV is negative (-0.113), indicating that on average, the total revenue is less than zero. The median REV is also negative (-0.080), indicating that the distribution is skewed to the left. The range of REV values is from -0.974 to 0.757, with a standard deviation of 0.232. This indicates that the values are relatively spread out from the mean.
- DecREV: The mean DecREV is negative (-0.144), indicating that on average, the decrease in revenue is less than zero. The median DecREV is also negative (-0.080), indicating that the distribution is skewed to the left. The range of DecREV values is from -0.974 to 0, with a standard deviation of 0.191. This indicates that the values are relatively spread out from the mean.

Table (5)

Descriptive analysis for Failed Group-Model (1)

Variable	Mean	Median	Min	Max	SD
SGA	-0.039	-0.013	-0.699	0.422	0.134
COGS	-0.085	-0.053	-1.041	0.371	0.196
TC	-0.074	-0.050	-0.739	0.222	0.158
REV	-0.113	-0.080	-0.974	0.757	0.232
DecREV	-0.144	-0.080	-0.974	0.000	0.191
Obs	104	104	104	104	104

The descriptive statistics of all study variables involved in Model (1) for the period from 2013 to 2019 with 176 observations of Non-Failed Group of the sampled industrial companies listed on the Amman Stock Exchange are presented in Table (6) below. The Table indicates that the results of the descriptive statistics exhibit reasonable data for

mean, median, maximum and minimum values, and the standard deviation readings show close ratios, which suggests that the data is not dispersed.

However, in contrast to the readings of descriptive statistics of the sample as a whole and the sample of Failed group, most values of the descriptive statistics for Non-Failed group are positive, which could be explained by the absence of financial distress or financial failure during this period according to the Altman model. The mean values for all variables are positive, indicating that on average, the values are above zero. The median values for COGS, TC, and DecREV are negative, indicating that half of the values for these variables are below zero, and the standard deviation values range from 0.053 to 0.106, with lower values indicating less variability in the data.

Table (6)

Descriptive analysis for Non-Failed Group-Model (1)

Variable	Mean	Median	Min	Max	SD
SGA	0.016	0.010	-0.213	0.406	0.086
COGS	0.001	-0.007	-0.231	0.352	0.091
TC	0.002	-0.005	-0.200	0.314	0.085
REV	0.004	0.000	-0.242	0.554	0.106
DecREV	-0.033	-0.001	-0.242	0.000	0.053
Obs	176	176	176	176	176

Based on Table (6) above, detailed statistical description of the variables of Model (1) for Non-Failed companies is presented below:

- **SGA:** The variable is continuous with a mean of 0.016 and a median of 0.010. The minimum value is -0.213 and the maximum value is 0.406, indicating a wide range of values. The standard deviation is 0.086, suggesting moderate variability.
- **COGS:** The variable is continuous with a mean of 0.001 and a median of -0.007. The minimum value is -0.231 and the maximum value is 0.352, indicating a wide range of values. The standard deviation is 0.091, suggesting moderate variability.
- **TC:** The variable is continuous with a mean of 0.002 and a median of -0.005. The minimum value is -0.200 and the maximum value is 0.314, indicating a wide range of values. The standard deviation is 0.085, suggesting moderate variability.
- **REV:** The variable is continuous with a mean of 0.004 and a median of 0.000. The minimum value is -0.242 and the maximum value is 0.554, indicating a wide range of

values. The standard deviation is 0.106, suggesting a relatively high degree of variability.

- Dec-REV: The variable is continuous with a mean of -0.033 and a median of -0.001. The minimum value is -0.242 and the maximum value is 0.000. The negative mean suggests that, on average, the variable decreased over time. The standard deviation is 0.053, indicating relatively low variability.

The data presented in Table (7) summarizes the descriptive statistics of all study variables used in Model (2), which examines the impact of sticky and anti-sticky costs on Earnings per share (EPS) from 2013 to 2019, with 280 observations of 40 industrial companies listed on the Amman Stock Exchange. The results of the descriptive statistics are reasonable for the mean, median, maximum and minimum values, with standard deviation readings indicating that the data is not dispersed. The percentages of the standard deviation are similar, implying that the data has similar variability.

Table (7)

Overall Descriptive analysis for-Model (2)

Variable	Mean	Median	Min	Max	SD
NEPS	-0.082	0.024	-1.735	0.179	0.291
Sticky (TC)	0.078	0.000	0.000	2.611	0.299
Anti-Sticky (TC)	-0.007	0.000	-0.167	0.000	0.024
Sticky (SG&A)	0.046	0.000	0.000	1.655	0.194
Anti-Sticky (SG&A)	-0.002	0.000	-0.072	0.000	0.010
Sticky (COGS)	0.036	0.000	0.000	0.770	0.106
Anti-Sticky (COGS)	-0.012	0.000	-0.274	0.000	0.038
PEPS	-0.052	0.026	-1.234	0.205	0.224
Leverage	0.396	0.346	0.041	1.155	0.245
Firm-size	7.445	7.328	6.563	9.055	0.547
Obs	280	280	280	280	280

As presented in Table (7) above, the mean and median values for NEPS are negative, indicating that, on average, the companies in the sample experienced a decline in net earnings per share. The standard deviation for NEPS is relatively high, suggesting significant variability in the net earnings per share of the companies in the sample.

The mean values for Sticky (TC), Sticky (SG&A), and Sticky (COGS) are positive, while the mean values for Anti-Sticky (TC), Anti-Sticky (SG&A), and Anti-Sticky (COGS) are negative. This indicates that the companies in the sample generally experienced an

increase in costs that are difficult to adjust (sticky costs) and a decrease in costs that are easy to adjust (anti-sticky costs). The maximum value for Sticky (TC) is considerably higher than for other variables, suggesting that some companies have high levels of sticky costs.

The mean and median values for PEPS are negative, indicating that, on average, the companies in the sample experienced a decline in earnings per share. The standard deviation for PEPS is relatively high, suggesting significant variability in the earnings per share of the companies in the sample.

The mean value for Leverage is 0.396, indicating that, on average, the companies in the sample are moderately leveraged. The median value is 0.346, which is lower than the mean value, suggesting that some companies in the sample have high levels of leverage. The standard deviation for Leverage is relatively high, indicating significant variability in the leverage ratios of the companies in the sample.

The mean and median values for Firm-size are relatively high, indicating that, on average, the companies in the sample are relatively large. The standard deviation for Firm-size is relatively low, indicating that the size of the companies in the sample is relatively similar.

4.2. Correlation Matrix

To test for multicollinearity between independent variables, Pearson correlation analysis is used. Strong multicollinearity can distort the results of regression analysis and may require dropping one of the correlated variables Hair et al., (2010) . Tables (8), (9), and (10) present the results of Pearson correlation analysis for SG&A, COGS, and TC costs, respectively. These tables show the inter-relationships between the independent variables within each cost category.

Table (8)

Correlations matrix (SG&A) -Model (2)

	NEPS	Sticky	Anti-Sticky	PEPS	Leverage	Firm-size
NEPS	1					
Sticky	-0.2169*	1				
Anti-Sticky	0.078	0.0495	1			
PEPS	0.6252*	-0.2749*	0.0744	1		
Leverage	-0.4348*	0.2762*	-0.0209	-0.5100*	1	
Firm-size	0.023	-0.1733*	-0.0584	0.0593	0.0118	1

Star (*) (.01)

Table (9)*Correlations matrix (COGS) -Model (2)*

	NEPS	Sticky	Anti-Sticky	PEPS	Leverage	Firm-size
NEPS	1					
Sticky	-0.4370*	1				
Anti-Sticky	-0.003	0.1024	1			
PEPS	0.6252*	-0.4266*	-0.0658	1		
Leverage	-0.4348*	0.3380*	0.0022	-0.5100*	1	
Firm-size	0.023	-0.0925	0.1318	0.0593	0.0118	1

Star (*) (.01)

Table (10)*Pearson correlations analysis (TC) -Model (2)*

	NEPS	Sticky	Anti-Sticky	PEPS	Leverage	Firm-size
	1					
Sticky	-0.3018*	1				
Anti-Sticky	-0.0079	0.0796	1			
PEPS	0.6252*	-0.3431*	-0.0993	1		
Leverage	-0.4348*	0.3108*	0.0639	-0.5100*	1	
Firm-size	0.023	-0.1464	0.0698	0.0593	0.0118	1

Star (*) (.01)

Based on the results presented in Tables (8), (9), and (10) above of Pearson's correlation analysis for SG&A, COGS, and TC, the correlation percentages displayed are all less than 80%, indicating that multicollinearity between the independent variables is not a significant issue for any of the cost types. As a result of these tests, regression analysis can be conducted to test the study's hypothesis for SG&A, COGS, and TC (Hair et al., 2010) .

4.3. Regression Analysis

Researchers have employed various statistical methods, including Fixed effects, Random effects, and Pooled OLS, to investigate and analyze the phenomenon of asymmetric costs in prior studies Anderson et al., (2003); Cheng et al., (2018); Xue & Hong, (2016); Xu & Sim, (2017); Ibrahim, (2018); Ibrahim & Ezat, (2017).

In statistical analysis, choosing the appropriate method of regression is crucial to obtain reliable and accurate results. The Breusch-Pagan LaGrange multiplier test is a commonly used test to determine which method of regression is most suitable for the data. It is used to test for heteroscedasticity, which is the unequal variance of error terms across

observations. If the test result suggests the presence of heteroscedasticity, the random effects regression is considered the appropriate method. However, if the test result indicates homoscedasticity, then the fixed effects regression is typically used. In the case where the Breusch-Pagan LaGrange multiplier test suggests the random effect regression, the Hausman test is applied to decide between fixed and random effects regression. The Hausman test is used to determine whether the random effects model is more appropriate than the fixed effects model for the given data (Brooks, 2008) .

In this particular study, the appropriate regression method was determined using the Breusch-Pagan LaGrange multiplier test. The test result indicated that the Pooled OLS regression is the most appropriate method for conducting analysis since the test result was found to be higher than the significance level of 0.05. To perform the regression analysis, the STATA software was utilized, which is a popular statistical software package commonly used in the field of econometrics (Wooldridge, 2009) .

4.3.1. Regression Results for Model (1)-The Existence of Asymmetric Cost Behavior

After conducting the Breusch-Pagan LaGrange multiplier test, it was found that the Pooled OLS regression was appropriate for analyzing cost elements (SG&A, COGS, and TC). However, before conducting the Breusch-Pagan LaGrange multiplier test, fixed effects and random effects regression analysis was conducted and results are shown in Appendix (A).

The Researcher in this study utilized Model (1), as described in equation (1) in section 3.3, to perform multiple regressions on different types of cost (SG&A, COGS, and TC) to investigate cost asymmetry in Jordanian industrial companies. The sample size consisted of 280 observations between the years 2013-2019. The outcomes, including β_0 , β_1 , and β_2 along with other statistical measures, are reported in Table (11) –see Appendix (H)-.

Table (11) display the regression results for the pooled OLS model used to estimate the coefficients for SG&A, COGS, and TC. The coefficients and p-values are presented for each independent variable: β_0 , β_1 (Rev), and β_2 (DecRev). The sum of β_1 and β_2 is also included. The p-value for the Prob > F test is given, as well as the R-squared and Mean

VIF values. The Breusch-Pagan test resulted in a value of 1 for all independent variables, indicating homoscedasticity. The number of observations used in the analysis was 280.

Case I: Cost behavior of (SG&A)

As for (SG&A) cost element, values of (β_1) and (β_2) are statistically significant with R^2 value equal to (19%), and ($\beta_1=0.401$) at the level of statistical significance (0.000), which represents the amount of increase in the costs when the volume of activity increases by 1%. Moreover, ($\beta_2=-0.183$) at a level of statistical significance (0.071), and ($\beta_1+\beta_2=0.217<0.401$), where ($\beta_1+\beta_2=0.217$) represents the amount of decrease in the volume of costs when the volume of activity decreases by 1%.

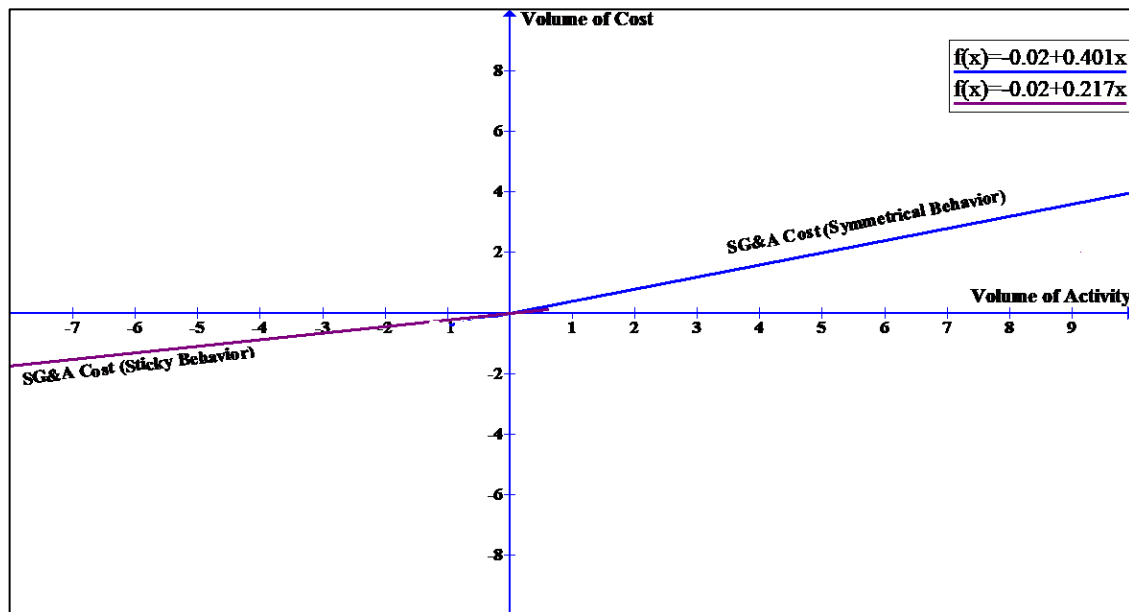
The R^2 value of 19% indicates that the independent variables explain a relatively small portion of the variation in the dependent variable. The mean VIF value of 4.83 suggests that there is no serious multicollinearity issue in the regression. On the other hand, the Breusch-Pagan test has a value of 1, which means that there is no evidence of heteroscedasticity in the model.

The above results indicate that SG&A costs in Jordanian industrial companies exhibit characteristics of being a sticky and asymmetric cost. Figure (3), which utilizes the actual values of β_0 , β_1 , and β_2 from Table (11), provides a graphical representation of SG&A sticky cost in Jordanian industrial companies. The change in slopes of lines for SG&A (symmetrical) and SG&A (sticky) in Figure (3) confirms that the percentage decrease of cost volume is less than the percentage decrease in activity volume.

These results suggest that managers of Jordanian industrial companies do not adjust labor resources when activity volume decreases, while most of the variable costs (SG&A) remain unchanged. As a result, sticky costs are prevalent during periods of economic recession. These findings align with previous studies conducted by Anderson et al., (2003), Xue & Hong, (2016), Xu & Sim, (2017), Cheng et al., (2018), Ibrahim & Ezat, (2017), and Ibrahim, (2018).

Figure (3)

(SG&A) sticky cost behavior of Jordanian Industrial Companies.



Based on the above discussion and results, **the first hypothesis is accepted.**

H1: Jordanian industrial companies show a Sticky Cost Behavior for SG&A costs.

Case II: Cost behavior of (COGS)

The results provided in Table (11) of a Pooled OLS regression analysis for the variable COGS showed the coefficients (β_0 , β_1 , β_2) and their corresponding p-values indicating the impact of the independent variables on the dependent variable. The results show that β_0 has a coefficient of 0.002 and a p-value of 0.693, which suggests that it is not a statistically significant predictor of COGS. β_1 has a coefficient of 0.687 and a p-value of 0.000, indicating a statistically significant positive relationship between COGS and revenue.

Similarly, β_2 has a coefficient of 0.084 and a p-value of 0.491, suggesting that it is not a significant predictor of COGS and predicting that COGS costs follow the symmetric traditional behavior suggesting that managers in the Jordanian industrial companies increase and decrease (COGS) costs symmetrically when the volume of activity increase or decrease. However, the positive sign of β_2 mathematically still implies a non-significant Anti-Sticky behavior. The R^2 value of 77% suggests that the model explains a large portion of the variance in COGS. The mean VIF value of 4.83 suggests that there is

no significant multicollinearity issue among the independent variables and the Breusch–Pagan test statistic of 1 suggests that there is no significant heteroscedasticity issue.

The present study's findings are in line with those of previous studies, such as Dalla Via & Perego, (2014), who found a significant value of β_1 (0.86) and an insignificant value of β_2 (0.090). Similarly, Abu-Serdaneh, (2014) found similar results in Jordan between 2008 and 2012, with a statistically significant β_1 (0.357) and a statistically non-significant β_2 (0.048) for SG&A. However, Abu-Serdaneh's study on COGS costs showed statistically significant results for both β_1 (0.741) and β_2 (0.182), indicating an anti-sticky behavior.

On the other hand, Magheed, (2016) study in Jordan, covering the period from 2000 to 2013, produced different results. Magheed's study found significant values for both β_1 and β_2 for SG&A, with readings of 0.613 and -0.086, respectively, indicating a sticky cost behavior. Similarly, the results for COGS were statistically significant for both β_1 (0.734) and β_2 (-0.068), reflecting a sticky COGS behavior.

Based on the analysis and discussion, it can be concluded that the cost stickiness of COGS costs cannot be documented as some of the (β_2) values in the study were not statistically significant.

Thus, the second hypothesis is rejected and (COGS) costs behavior is considered symmetrical.

H2: Jordanian industrial companies reflect Anti-Sticky Cost Behavior for COGS costs.

Case III: Cost behavior of (TC)

The results of regression analysis on the total cost (TC) showed that the intercept coefficient (β_0) is -0.004 with a p-value of 0.71, which indicates that the intercept is not statistically significant. The slope coefficient (β_1) is 0.64 with a p-value of 0.000, which suggests that there is a statistically significant linear relationship between the TC and the independent variable. The coefficient for the dummy variable (β_2) is -0.046 with a p-value of 0.733, which is not statistically significant suggesting symmetric (non-sticky) TC behavior in the Jordanian industrial companies.

On the other hand, the R^2 value is 71%, which indicates that 71% of the variation in the TC can be explained by the independent variables. The mean VIF is 4.83, which suggests a moderate degree of multicollinearity and the Breusch–Pagan test has a value of 1, indicating that the data has homoscedasticity.

According to the previous findings, the managers of Jordanian companies reduce TC in a symmetrical manner when the volume of activity declines, which results in symmetric TC behavior. This conclusion aligns with the results of Weidenmier & Subramaniam's, (2003) study in merchandising firms, where they found a statistically significant value of ($\beta_1=0.9621$) and a non-significant value of ($\beta_2=-0.0118$).

Thus, the third hypothesis is rejected and the behavior of (TC) is considered symmetrical.
H3: Jordanian industrial companies reflect a Sticky Cost Behavior for TC.

4.3.2 Additional Analysis-Multiple Industrial Sectors

In order to gain a deeper understanding of asymmetric cost behavior and identify dominant sectors that reflect this behavior, the sample was divided into multiple sectors. Specifically, the focus was on sectors that demonstrated significant statistical results. The sample was divided into eight distinct sectors, namely: Chemical Industries, Electrical Industries, Engineering and Construction, Food and Beverages, Mining and Extraction Industries, Pharmaceutical and Medical Industries, Textiles, Leathers and Clothing, and Tobacco and Cigarettes. The analysis was conducted on each sector separately utilizing Pooled OLS method, and results for all sectors were shown in Appendix (B).

According to results presented in Appendix (B), it is observed that the Electrical Industries, Mining and Extraction Industries, and Textile, Leathers and Clothing sectors demonstrated significant coefficients for β_1 and β_2 . Therefore, attention has been directed towards cost components that showed both β_1 and β_2 as statistically significant. The subsequent discussion will elaborate on the regression outcomes for cost components that exhibited asymmetric cost behavior in these sectors.

Electrical Industries:

In this sector both COGS and TC Costs reflected asymmetric cost behavior in terms of β_1 and β_2 being both statistically significant. The detailed regression analysis and results discussion directly follows.

For COGS:

Appendix (B) presents regression results indicating a significant relationship between the dependent variable COGS and the independent variables. The intercept coefficient ($\beta_0 = -0.037$) is negative but not statistically significant, suggesting that the predicted COGS value when all independent variables are zero is unreliable. The coefficient for the independent variable Rev ($\beta_1 = 1.577$) is positive and significant, indicating a positive relationship between COGS and revenue. A one-unit increase in revenue is associated with a ($\beta_1 = 1.577$) unit increase in COGS.

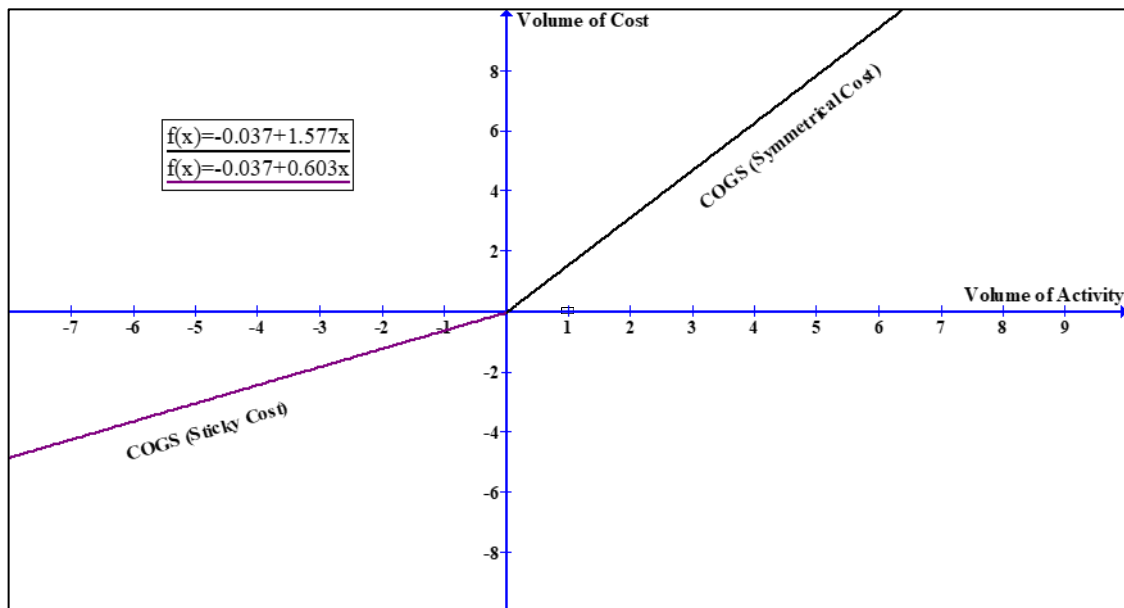
However, the coefficient for the independent variable DecRev ($\beta_2 = -0.973$) is negative and significant, suggesting a negative relationship between COGS and the decline in revenue. This means that the sum of coefficients ($\beta_1 + \beta_2 = 0.603 < 1.577$) is positive, implying that COGS is sticky in the Electrical Industries sector.

The R^2 value of 86% indicates a good fit, with the model explaining 86% of the variation in COGS. The Breusch and Pagan test shows no heteroscedasticity, meaning that the variance of the residuals is constant across the range of predicted values.

Below is Figure (4), which presents a graphical representation of the sticky COGS costs.

Figure (4)

(COGS) sticky cost behavior of Electrical Industries Sector.



For TC:

The regression results presented in appendix (B) for TC show the coefficients and p-values for a regression model with the dependent variable TC and three independent variables: a constant (β_0), a variable measuring revenue (β_1), and a variable measuring the decrease in revenue (β_2).

It is clear that the coefficient β_1 is 1.694, which suggests that a one-unit increase in revenue leads to a 1.694 unit increase in TC. On the other hand, the coefficient β_2 is -1.283, which suggests that a one-unit decrease in revenue leads to a 1.283 unit decrease in TC.

The combined effect of ($\beta_1 + \beta_2 = 0.411 < 1.694$) strongly suggests a sticky cost behavior of TC knowing that both β_1 & β_2 are statistically significant.

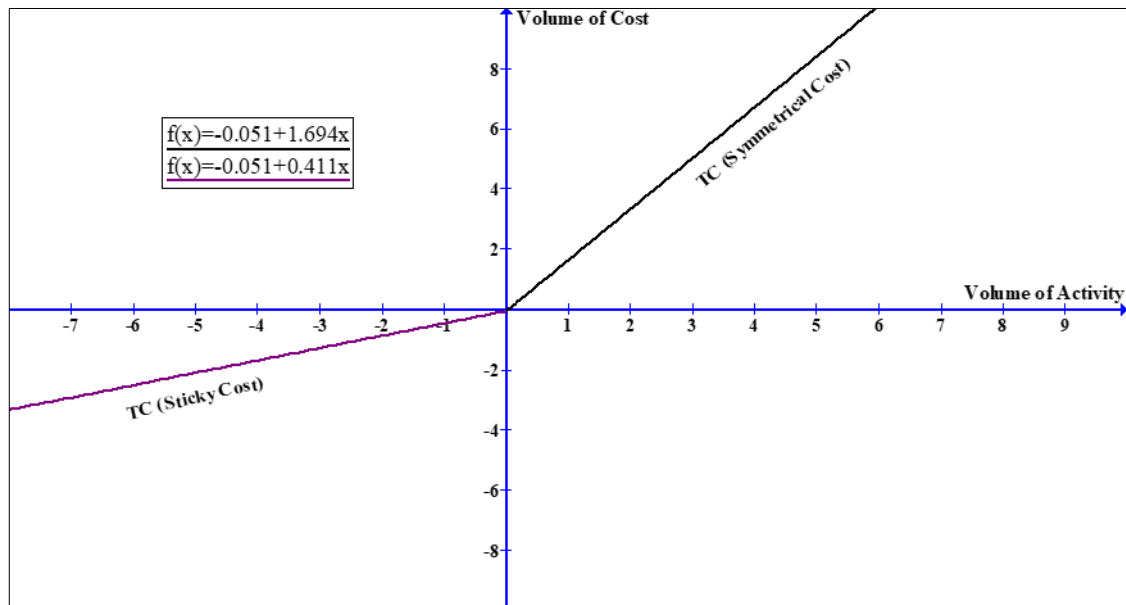
The p-values indicate the statistical significance of the coefficients. A p-value less than 0.05 is generally considered statistically significant, indicating that there is strong evidence that the coefficient is not equal to zero. In this case, all three coefficients are statistically significant, as their p-values are less than 0.05.

The R^2 value of 81% suggests that the independent variables explain 81% of the variation in the dependent variable TC. The Breusch and Pagan test with a value of 1 suggests that

there is no evidence of heteroscedasticity in the model. Below is Figure (5), which presents a graphical representation of the sticky TC costs.

Figure (5)

(TC) sticky cost behavior of Electrical Industries Sector.



Similarly, Pooled Estimation (OLS) method was used to analyze cost elements in various industrial sectors. The study results for those sectors which showed significant coefficients β_1 and β_2 , including the industry type and designation of cost element (Sticky or Anti-Sticky), are summarized in Table (12) –see Appendix (H)-. The table also includes the values for β_0 , β_1 , β_2 , $\beta_1 + \beta_2$, and R^2 .

Based on values of (β_0 , β_1 , β_2 and $\beta_1 + \beta_2$) tabulated above for Mining and Extraction Industries and Textiles, Leathers and Clothing industries, Figures (6), (7) and (8) below present a graphical representation of the Asymmetric costs (SG&A, COGS and TC) respectively.

Figure (6)

(SG&A) sticky cost behavior of Mining and Extraction Industries Sector.

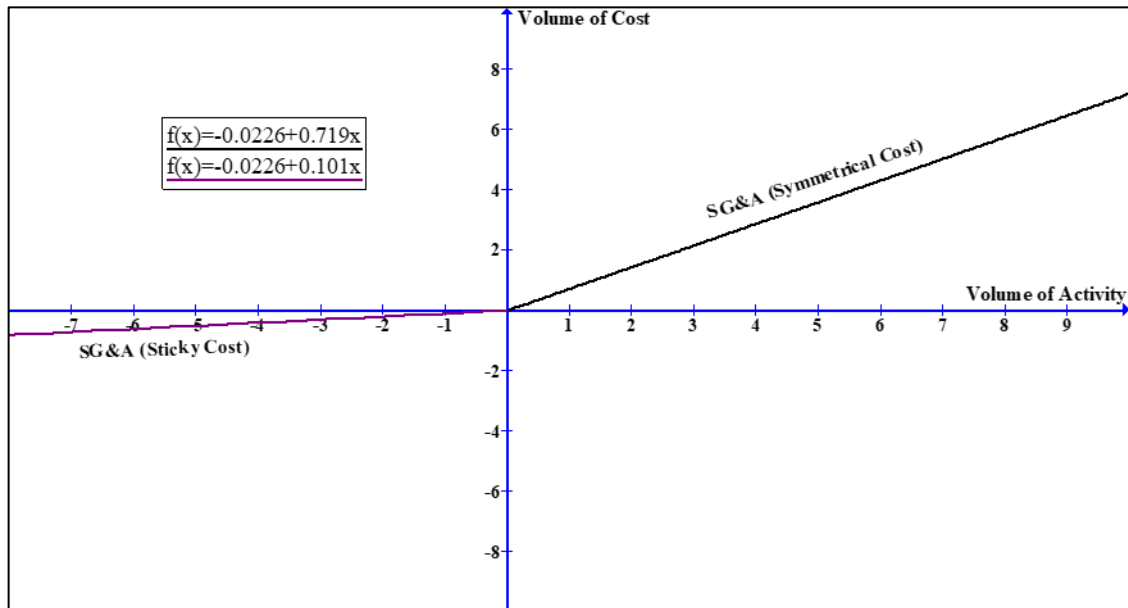


Figure (7)

(COGS) Anti-Sticky cost behavior of Textiles, Leathers and Clothing Sector.

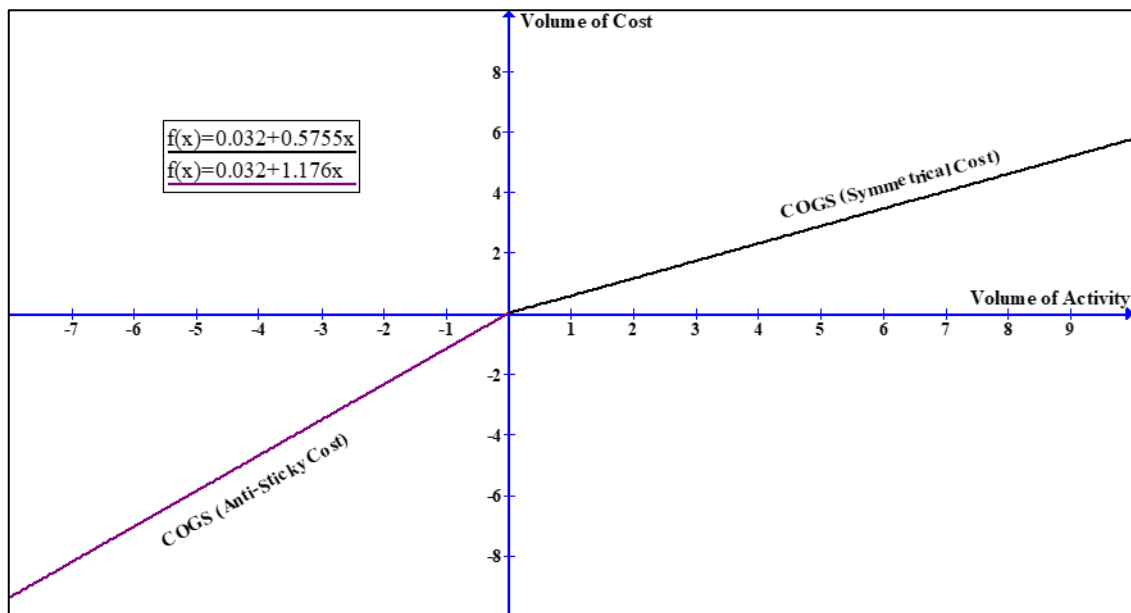
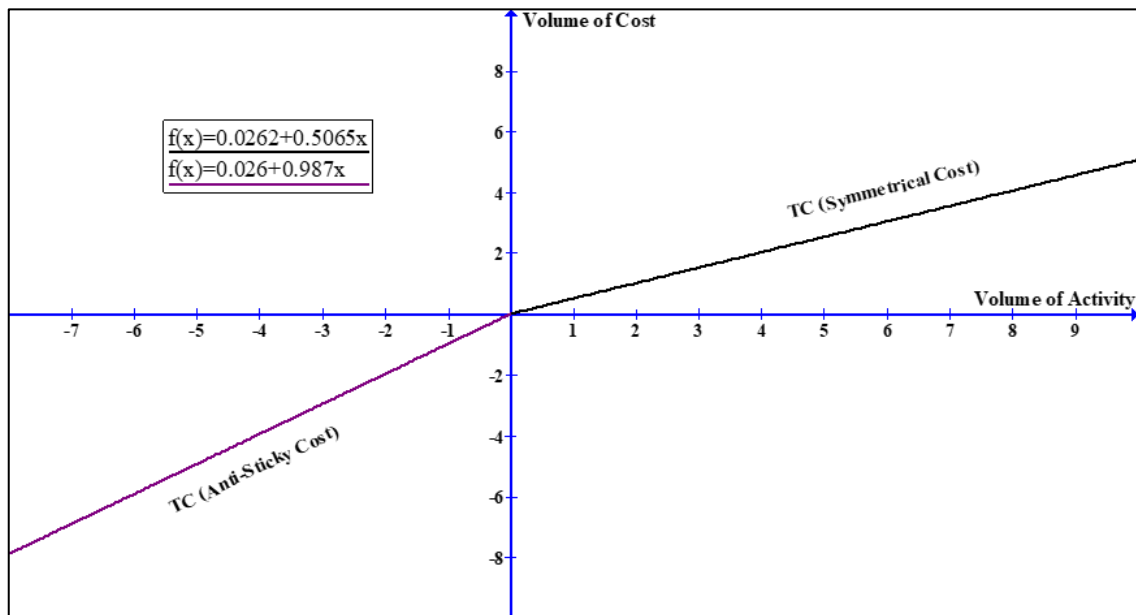


Figure (8)

(TC) Anti-Sticky cost behavior of Textiles, Leathers and Clothing Sector.



Upon dividing the sample into multiple sectors to identify the sectors that have a significant impact on the existence of asymmetric costs in Jordanian industrial firms, the results deviated from those obtained when the sample was studied as a whole. Some sectors showed the presence of asymmetric costs, while others did not. Additionally, some cost elements that demonstrated asymmetry in the overall sample did not exhibit it in this analysis, and vice versa.

4.3.3 Regression Results of Model (1)-Failed and Non-Failed Companies

In this section, the Pooled Estimation (OLS) method was used to analyze the failure and non-failure characteristics in the presence of cost asymmetry phenomenon. The Altman model was used to separate the sample into Failed and Non-Failed groups, and the regression results for SG&A, COGS, and TC costs were tabulated in Table (13) –see Appendix (H)-. The goal was to investigate the relationship between cost stickiness and Failed or Non-Failed firms for each cost type.

4.3.3.1 Failed Group

(SG&A) Costs Analysis:

In the case of (SG&A) costs, the regression analysis using the Pooled estimation (OLS) method was conducted on a sample of 104 observations. It is found that the intercept (β_0) coefficient is -0.026 with a p-value of 0.158, indicating that it is not statistically

significant at a 5% level of significance. The coefficient for the first independent variable (β_1) is 0.087 with a p-value of 0.569, also indicating that it is not statistically significant. Similarly, the coefficient for the second independent variable (β_2) is 0.026 with a p-value of 0.889, indicating that it is also not statistically significant. The probability of F-test of 0.168 is assumed to be high, and the R^2 value for the regression model is only 3%, indicating that the model explains a very small proportion of the variation in the dependent variable.

The fourth hypothesis is not supported by the results and therefore, it is rejected.

H4: Failed Jordanian industrial companies reflect Anti-Sticky Cost Behavior for (SG&A) costs.

(COGS) Costs Analysis:

The results of the regression analysis for the COGS variable indicates that the intercept β_0 has a coefficient of 0.014 with a p-value of 0.39, indicating that it is not statistically significant at the 5% level. However, the coefficient β_1 is 0.447***, with a p-value of 0.006, indicating a statistically significant relationship between COGS and the dependent variable. On the other hand, the coefficient β_2 is 0.336 with a p-value of 0.152, indicating that it is not statistically significant at the 5% level. The R^2 value for this model is 71%, which means that approximately 71% of the variance in the dependent variable can be explained by the independent variables.

Based on the above, the analysis did not confirm any significant relationship between failed firms and anti-sticky costs. It should be noted that although the coefficient value of β_2 was positive (0.335), indicating an anti-sticky behavior of costs, it was not statistically significant and could not be documented.

The fifth hypothesis is rejected based on the findings that failed companies do not exhibit a significant relationship with anti-sticky (symmetrical) costs.

H5: Failed Jordanian industrial companies show anti-sticky cost behavior for COGS costs.

(TC) Analysis:

The regression results for the Total Cost (TC) cost element for **Failed** group presented in Table (13), show that the intercept (β_0) has a coefficient of -0.003 and a p-value of 0.828, which is not statistically significant. The coefficient (β_1) of the independent variable (sales) is 0.371 and has a p-value of 0.024, indicating that it is statistically significant. However, the coefficient (β_2) of the Dec-Rev is 0.202 with a p-value of 0.359, which is not statistically significant. The R^2 value for this regression model is 61%, indicating that 61% of the variation in the dependent variable (TC) can be explained by the independent variables.

This suggests that there is no indication of stickiness in TC and that the behavior of this cost type in failed companies is symmetrical. As a result, there is no established link between failed companies and anti-sticky costs concerning the TC regression. It is worth noting that the positive value of β_2 at 0.202 reflects an anti-sticky cost behavior since $\beta_1 + \beta_2 > \beta_1$, but it is statistically insignificant and therefore cannot be substantiated.

Accordingly, the sixth hypothesis is not supported by the data and must be rejected.

H6: Failed Jordanian industrial companies reflect Anti-Sticky Cost Behavior for (TC).

4.3.3.2 Non-Failed Group

This section analyzes the non-failure characteristics and cost asymmetry phenomenon in Jordanian industrial companies using the Pooled Estimation (OLS) method. The sample consists of 176 observations. Results for the various cost elements (SG&A, COGS, and TC) are presented in Table (13), and the discussion of these results follows.

(SG&A) Costs Analysis:

In the case of (SG&A) costs, the results presented in Table (13) for **Non-Failed** group showed a statistically significant value of ($\beta_1=0.542$) and statistically not significant ($\beta_2=-0.182$) with ($R^2=36\%$), which implies that there is no evidence on Stickiness in SG&A costs for **Non-Failed** group and the cost behavior here is symmetrical. The R^2 value (0.36), indicates that the model explains 36% of the variation in SG&A costs by the independent variables.

The results indicate that there is no significant relationship between Non-Failed and the sticky cost of selling, general, and administrative expenses (SG&A). Although the negative sign of the coefficient β_2 suggests the presence of sticky cost behavior, this result is not statistically significant, and thus it cannot be considered reliable or conclusive.

The seventh hypothesis has been rejected as there was no evidence of a relationship between non-failure and sticky SG&A cost.

H7: Non-Failed Jordanian industrial companies reflect a sticky cost behavior for (SG&A) costs.

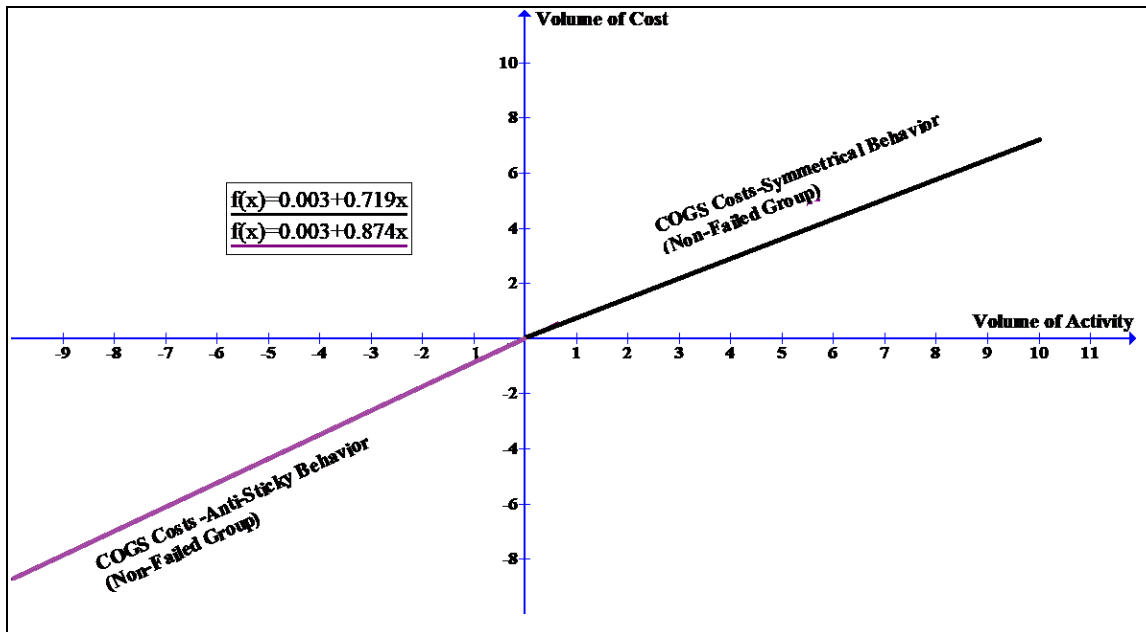
(COGS) Costs Analysis:

The regression analysis of Cost of Goods Sold (COGS) shows that both β_1 and β_2 coefficients are statistically significant. A positive sign of β_2 indicates that COGS cost is asymmetrical (anti-sticky), and there is a relationship between Non-Failure and anti-sticky (COGS) cost. Moreover, the $\beta_1 + \beta_2$ coefficient is greater than β_1 , which provides additional evidence of the anti-sticky behavior of cost. The R² value of 83% suggests that the model explains a high proportion of the variability in COGS costs.

The graph depicted in Figure (9) below, illustrates the sticky cost of Cost of Goods Sold (COGS) among Jordanian industrial firms, based on the real values of β_0 , β_1 , and β_2 obtained from Table (13).

Figure (9)

(COGS) Anti-sticky behavior of Non-Failed group.



The results obtained for (COGS) in the Non-Failed group suggest that Jordanian company managers tend to decrease costs at a higher percentage than the percentage of cost increase when the activity volume decreases, indicating the presence of asymmetric (Anti-sticky) cost behavior. This is supported by the statistically significant and positive value of β_2 in the analysis. These findings align with the results of previous studies conducted by Abu-Serdaneh, (2014) , Dalla Via & Perego, (2014), and (Cheng et al., 2018), providing further evidence for the presence of anti-sticky cost behavior in Jordanian industrial companies.

Therefore, the eighth hypothesis **is accepted**.

H8: Non-Failed Jordanian industrial companies have an Anti-Sticky cost behavior for (COGS) costs.

(TC) Analysis:

Table (13) shows the results of a statistical analysis conducted on the relationship between total costs (TC) and changes in volume of activity for Non-failed Jordanian industrial companies. The analysis includes three coefficients: β_0 , β_1 , and β_2 .

The coefficient β_0 represents the intercept, which is the value of TC when the volume of activity is zero. The p-value associated with this coefficient is 0.45, indicating that it is

not statistically significant at the 5% level. The coefficient β_1 measures the percentage change in TC associated with a 1% change in volume of activity. It is statistically significant with a p-value of 0, indicating that it is unlikely to have occurred by chance. This suggests that there is a strong linear relationship between changes in volume of activity and TC.

Similarly, the coefficient ($\beta_2=0.121$) represents the stickiness (or anti-stickiness) of TC, which is the degree to which costs do not change as much as changes in volume of activity. The coefficient is positive, indicating that TC is anti-sticky, but it is not statistically significant with a p-value of 0.236. Therefore, there is not enough evidence to conclude that TC is anti-sticky.

The model's overall goodness of fit is indicated by an R-squared value of 83%, which means that 83% of the variability in TC can be explained by changes in the volume of activity.

Therefore, the ninth hypothesis is rejected.

H9: Non-Failed Jordanian industrial companies have a sticky cost behavior for (TC).

Concluding Section 4.3.3:

Based on the regression results for both Failed and Non-Failed groups, two key observations can be made. Firstly, a comparison of the coefficient (β_1) values for the three cost elements (SG&A costs, COGS, and TC) between the Failed and Non-Failed groups reveals that the (β_1) values for all cost elements in the Failed group are lower than those in the Non-Failed group. It is worth noting that the (β_1) coefficient in Model (1) represents the slope of the line that reflects the linear relationship between cost volume and activity volume (after dropping the non-significant (β_2) and its associated variable in Model (1)).

Mathematically speaking, a line with a greater slope indicates that there will be a higher percentage of increase or decrease in the dependent variable (in this case, the volume of cost) when there is a change in the independent variable (in this case, the volume of activity as shown in Model (1)). From a financial and managerial perspective, this demonstrates how managers react to changes in volume of activity by immediately reducing costs when there is a decrease.

Higher values of (β_1) in the Non-Failed group reveal pessimistic managers who are quick to take action against sudden changes in volume of activity, leading to short-term higher profitability and ultimately, non-failure or success. A summary of the different values of coefficient (β_1) for all cost elements in the Failed and Non-Failed groups can be found in the table below for easy comparison.

(β_1) for Failed Group			(β_1) for Non-Failed Group	
SG&A	0.087	<	SG&A	0.542
COGS	0.447	<	COGS	0.719
TC	0.371	<	TC	0.681

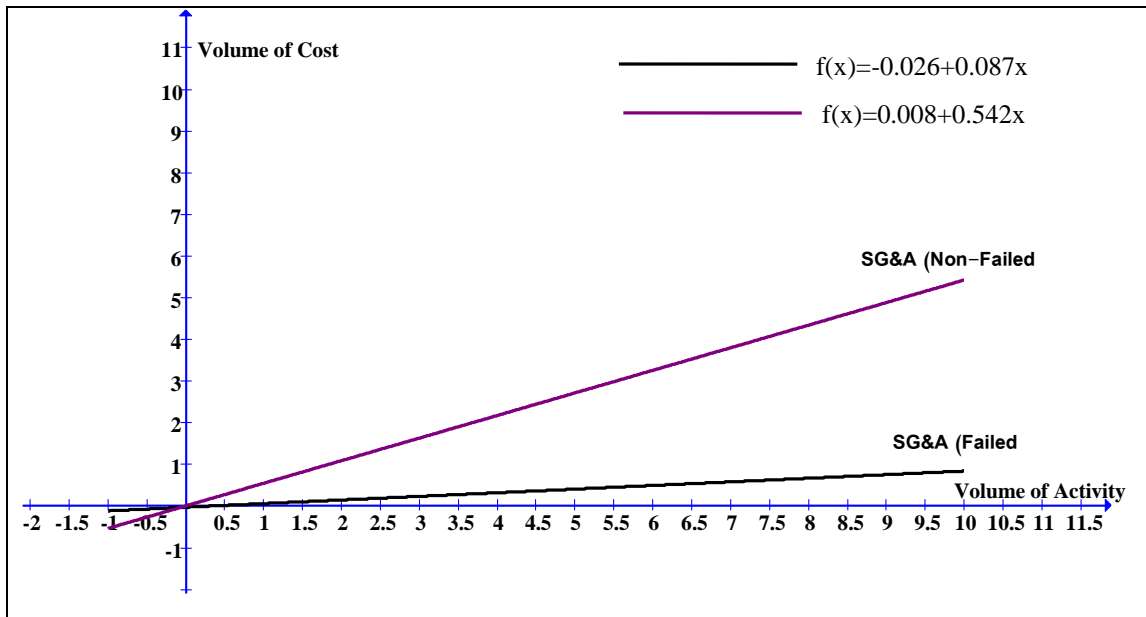
In contrast, the regression of (COGS) in the Non-Failed group yielded unexpected results. Both ($\beta_1=0.719$) and ($\beta_2 = 0.155$) were statistically significant, indicating the presence of another form of asymmetric cost behavior known as (Anti-stickiness). The (corrected) slope of the line correlating volume of cost with volume of activity was ($\beta_1+\beta_2$) = 0.874, which is higher than ($\beta_1=0.719$), suggesting that managers exhibit a more pessimistic behavior and reaction. In some cases, ($\beta_1+\beta_2$) can exceed 1.0 indicating a stronger Anti-sticky cost behavior.

Based on the above analysis, it can be concluded that Jordanian industrial companies may achieve higher profit margins by implementing excessive cost reduction measures. However, this approach can also make it difficult for managers to make critical decisions that could protect the company from failure during times of financial hardship or economic recession. Therefore, companies need to strike a balance between reducing costs and maintaining the financial health and sustainability of the organization in the long term.

Figures (10), (11+12) –see Appendix (I)- provide graphical representations of the linear equations ($\Delta\text{cost}=\beta_0+ \beta_1\Delta\text{Sales}$), which describe the behavior of SG&A, COGS, and TC and show higher line slopes for Non-Failed groups compared to slopes of Failed groups. The values of (β_0) and (β_1) are extracted from Table (13), and Δcost and ΔSales represent the scaled changes of cost and sales, respectively.

Figure (10)

(SG&A) costs of Failed group vs SG&A costs of Non-Failed group.



4.3.4 Results of Current Study Compared with Previous Studies

To facilitate comparison and highlight the significance of the current findings, the results demonstrating the presence of sticky cost behavior in Jordanian industrial companies are presented alongside the results of 19 previous studies conducted across various economic sectors in different countries.

Appendix (E) contains a table that compares the results of the current study on sticky cost behavior in Jordanian industrial companies with those of 19 previous studies conducted in various countries and economic fields. The purpose of this comparison is to emphasize the significance of the current findings and their relevance to the existing literature. The table provides insights into the cost behavior of companies across different periods of their financial history, highlighting the importance of understanding how managers behave in different economic circumstances and the challenges that companies face. Some of the previous studies suggest that cost behavior may exhibit stickiness in certain periods, but not in others, underscoring the need for further research in this area.

Figures (13), (14), and (15) serve the purpose of illustrating how the coefficients (β_1) and (β_2) in Model (1) can be utilized to gauge the level of symmetry or asymmetry in cost behavior, and to ascertain the deviation from conventional symmetric cost behavior. By applying the formula presented in section (3.3.1) i.e., $(\beta_1 + \beta_2)/\beta_1$, the results of (β_1) and

(β_2) obtained from the present study and previous studies (see Appendix (E)) were reinterpreted. The resulting values were then plotted in the following figures:

- Figure (13) –see Appendix (I)- shows the values of $(\beta_1 + \beta_2)/\beta_1$ for the current study and previous studies that examined SG&A costs. It can be observed that the values range from -0.77 to 0.86, with the current study falling within this range at 0.24. This indicates that the SG&A costs in the current study exhibit a moderate level of asymmetry, but less than the average level of asymmetry found in previous studies.
- Figure (14) –see Appendix (I)- displays the values of $(\beta_1 + \beta_2)/\beta_1$ for the current study and previous studies that investigated COGS costs. The values range from -2.48 to 0.64, with the current study at -0.11, indicating that the COGS costs in the current study exhibit a moderate level of asymmetry, but closer to symmetric behavior than the average level of asymmetry found in previous studies.
- Figure (15) –see Appendix (I)- shows the values of $(\beta_1 + \beta_2)/\beta_1$ for the current study and previous studies that analyzed TC costs. The values range from -0.59 to 2.48, with the current study at 0.74, indicating that the TC costs in the current study exhibit a moderate level of asymmetry, but higher than the average level of asymmetry found in previous studies.

The figures presented show that by using the coefficients (β_1) and (β_2), it is possible to quantify the extent of asymmetry in cost behavior and determine the degree to which it differ from traditional symmetric cost behavior. The results indicate that the degree of asymmetry in cost behavior varies across different types of costs and is influenced by a range of economic and managerial factors.

The histograms shown in Figures (13), (14) and 15) –see Appendix (I)- demonstrate the level of stickiness in cost behavior, calculated by $((\beta_1 + \beta_2)/\beta_1)$ formula for SG&A, COGS, and TC. A value of less than 1.0 indicates sticky cost behavior, while a value greater than 1.0 indicates anti-sticky cost behavior. Symmetric cost behavior exists when β_2 is close to or equal to zero, resulting in a value close to 1.0. The degree of asymmetry can be determined by how far the resulting value is from 1.0. The closer the value is to 1.0, the more symmetrical the cost behavior is, while the farther it is from 1.0, the more asymmetric the cost behavior is. Very sticky costs are those with a resulting value very close to zero, while strongly symmetrical costs are those with a resulting value very close

to one. In conclusion, β_2 is the driving force behind asymmetric cost behavior in Model (1) as long as it is statistically significant.

4.3.5 Economic Consequences of Cost Asymmetry-Model (2)-Entire Sample

The analysis of the economic implications of asymmetric cost behavior was conducted using Model (2), as presented in section 3.3, after performing the Breusch-Pagan LaGrange multiplier test which suggested the use of Pooled OLS regression. The sample size consisted of 280 observations from Jordanian industrial companies during the period of 2013-2019.

The primary objective of this study is to explore how sticky costs and anti-sticky costs influence EPS while controlling for different variables. The research outcomes will be compared with the findings of Warganegara & Tamara's, (2014) research. To the researcher knowledge, no previous research has examined the effect of anti-sticky costs on EPS. The regression results for Model (2) are presented in Table (14) –see Appendix (H)-. The regression results in Appendix (C) display the impact of Cost Asymmetry on (EPS) in both the Fixed Effects and Pooled OLS models (2), and were obtained prior to conducting the Breusch-Pagan LaGrange multiplier test, which indicated the suitability of using Pooled OLS regression.

Discussion of results in Table (14):

Case I: (SG&A)

The table reports the estimated coefficients (β_0 , β_1 , β_2 , β_3 , β_4 , and β_5) and their corresponding p-values for the cost element SG&A. The coefficient for the constant term (β_0) is 0.07, and it is not statistically significant (p-value = 0.702). The coefficient for Sticky cost (β_1) is -0.046, indicating that it has a negative effect on EPS. However, the coefficient is not statistically significant (p-value = 0.728).

On the other hand, the coefficient for Anti-Sticky cost (β_2) is 1.027, implying that it has a positive effect on EPS. However, like the Sticky cost, it is not statistically significant (p-value = 0.515). The coefficient for the control variable PEPS (β_3) is 0.698 and is highly statistically significant (p-value = 0). It suggests that PEPS has a positive impact on EPS.

The coefficient for the control variable Leverage (β_4) is (-0.179) and is highly statistically significant (p-value = 0.009). It implies that Leverage has a negative effect on EPS. The coefficient for the control variable Firm-size (β_5) is -0.006 and is not statistically significant (p-value = 0.823).

The table also presents statistical parameters such as Prob > F, R^2 , Mean VIF, Breusch-Pagan test, and the number of observations. The Prob > F value is 0, indicating that the model is statistically significant. The R^2 value is 41%, suggesting that the model explains 41% of the variation in EPS. The Mean VIF is 1.2, implying that there is no significant multicollinearity issue. The Breusch-Pagan test is 1, indicating that the model's residuals are homoscedastic.

The obtained results indicate that the coefficients (β_1) and (β_2) were not statistically significant, thus providing no evidence of the impact of cost stickiness and anti-stickiness on EPS.

The study's findings indicate that the coefficient (β_1) is negative, suggesting that cost stickiness has a negative impact on Earnings per Share (EPS) during economic downturns. Conversely, the coefficient (β_2) is positive, indicating a positive effect of cost anti-stickiness on EPS during economic downturns, as actual anti-sticky costs exhibit a rapid decline in costs. These findings are consistent with those of Warganegara & Tamara's, (2014) research on PEPS and Leverage.

Case II: (COGS)

In the given regression results, the intercept (β_0) coefficient is 0.148 with a p-value of 0.416, indicating that it is not statistically significant. The coefficient for sticky cost (β_1) is negative and statistically significant at the 5% level, with a coefficient value of -0.540. This suggests that during periods of economic recession, there is a negative effect of cost stickiness on earnings per share. On the other hand, the coefficient for anti-sticky cost (β_2) is positive but not statistically significant, with a coefficient value of 0.406 and a p-value of 0.327, indicating that the effect of anti-sticky cost on EPS during a recession period is inconclusive.

The coefficient for the control variable PEPS (β_3) is positive and highly statistically significant (p-value of 0.001), with a coefficient value of 0.630. This suggests that the

company's profitability has a positive effect on EPS during a recession period. Additionally, the coefficient for the control variable leverage (β_4) is negative and statistically significant at the 1% level, with a coefficient value of -0.143. This indicates that the company's debt level has a negative effect on EPS during a recession period. Finally, the coefficient for the control variable firm size (β_5) is negative but not statistically significant, with a coefficient value of -0.016 and a p-value of 0.519.

The regression model has a good fit, as indicated by the low probability value (p-value) of the F-test (0), and the R^2 value of 44%, which indicates that 44% of the variability in EPS can be explained by the independent variables in the model. The mean variance inflation factor (VIF) value of 1.25 indicates that there is no multicollinearity issue in the model. The Breusch-Pagan test indicates that there is no heteroscedasticity in the regression model.

Based on the provided results, the coefficient (β_1) is highly negative and statistically significant, indicating a strong effect of cost stickiness on EPS. This suggests that during economic downturns, the profit margin decreases due to the inability of companies to adjust their costs accordingly.

On the other hand, the coefficient (β_2) is positive but not statistically significant, indicating that the effect of cost anti-stickiness on EPS is unclear. However, it suggests that during periods of economic recession, actual anti-sticky costs may lead to a rapid decline in costs and have a positive impact on EPS.

According to the results presented above, the coefficient (β_1) is highly negative and statistically significant, indicating and documenting a strong impact of cost stickiness on EPS. This finding suggests that cost stickiness can significantly reduce the profit margin.

The results are consistent with the findings of the Warganegara & Tamara, (2014) study regarding the relationship between Sticky, PEPS, and Leverage.

Case III: (TC)

The above results presented in Table (14) for the cost element (TC), show the regression analysis conducted on the variables Sticky, Anti-Sticky, PEPS, Leverage, and Firm-size in relation to the dependent variable Earnings per Share (EPS). The intercept (β_0) has a

coefficient of 0.125 and a p-value of 0.481, indicating that the expected value of EPS when all other independent variables are equal to zero is 0.125. However, the p-value is not statistically significant at the 0.05 level, suggesting that there is not enough evidence to reject the null hypothesis that the coefficient is equal to zero.

The coefficient for Sticky (β_1) is -0.081 with a p-value of 0.403, indicating that there is a negative relationship between the Sticky variable and EPS, but it is not statistically significant at the 0.05 level. Therefore, there is not enough evidence to conclude that Sticky has a significant effect on EPS.

The coefficient for Anti-Sticky (β_2) is 0.762 with a p-value of 0.316, indicating that there is a positive relationship between the Anti-Sticky variable and EPS during periods of economic recession, since actual anti-sticky costs reflect a very rapid decline in costs. However, the p-value is not statistically significant at the 0.05 level, so we cannot conclude that Anti-Sticky has a significant effect on EPS. Similarly, the coefficient (β_3) for PEPS which is a control variable is 0.691 with a p-value of 0, indicating that there is a significant positive relationship between PEPS and EPS. This suggests that firms with higher levels of PEPS tend to have higher EPS values.

The coefficient for the control variable Leverage (β_4) is -0.167 with a p-value of 0.01, indicating that there is a significant negative relationship between Leverage and EPS. This implies that firms with higher levels of Leverage tend to have lower EPS values. On the other hand, the coefficient for Firm-size (β_5) is -0.012 with a p-value of 0.599, indicating that there is a negative relationship between Firm-size and EPS, but it is not statistically significant at the 0.05 level. Therefore, we cannot conclude that Firm-size has a significant effect on EPS.

The overall model is statistically significant, as indicated by the probability of F being equal to zero. The R^2 value is 42%, which indicates that the model explains 42% of the variance in EPS. The mean VIF value is 1.22, indicating that there is no significant multicollinearity among the independent variables. The Breusch-Pagan test result is 1, indicating that there is no evidence of heteroscedasticity.

To summarize, the analysis shows that Sticky and Anti-Sticky variables do not have a statistically significant impact on EPS. However, significant relationships were found

between EPS and the PEPS and Leverage variables. These findings are consistent with the results of the study conducted by Warganegara & Tamara, (2014), which also reported significant associations between PEPS and Leverage and EPS.

Based on the presented results, the Tenth hypothesis cannot be fully supported, except for the COGS item of costs, which demonstrated a significant statistical outcome. However, the SG&A and TC items did not indicate a statistically significant impact. Furthermore, the eleventh hypothesis was also rejected.

H10. The impact of cost stickiness on future firm profitability will be negative in Jordanian industrial companies for each of the costs (SG&A, COGS, and TC).

H11. The impact of anti-stickiness on future firm profitability will be positive in Jordanian industrial companies for each of the costs (SG&A, COGS, and TC).

Based on the presented results in Table (14), it can be concluded that the stickiness of costs has a negative effect on EPS, while Anti-sticky costs have a positive effect. This implies that these two types of costs have opposite effects on EPS, highlighting the importance of considering the asymmetry in cost behavior when forecasting EPS. Traditional forecasting models may lead to misleading results if financial analysts do not take this into account. Therefore, it is recommended to reformulate these models by incorporating variables that reflect the influence and impact of asymmetry in cost behavior, in order to minimize forecasting errors.

This has also been emphasized by Ciftci et al., (2016) where they confirmed that cost stickiness and cost variability by financial analysts in forecasting models, causes significant systematic errors prediction supporting the existence of negative consequences as a result of cost stickiness.

The same has also been said by Banker et al., (2016) where they tested the potential impact of sticky costs on the accuracy and estimates of conservatism models, and showed that conservatism models which didn't take cost stickiness into consideration, were biased and led to distorted and inaccurate results.

Banker & Chen, (2006) also compared several models that study the effect of sticky costs on future profits, and confirmed that the model based on cost stickiness is the most accurate in predicting future profits.

4.3.6 Economic Consequences of Cost Asymmetry-Model (2)-Multiple Sectors

To fully comprehend how cost asymmetry affects earnings per share (EPS) in Jordanian industrial companies, the study divided the sample into various sectors (as outlined in section 4.3.2, "Additional Analysis-Multiple Industrial Sectors") and investigated the impact of asymmetrical costs on EPS in sectors with asymmetric cost behavior (based on significance of Stick & Anti-Sticky independent variables in the model). In analyzing the individual sectors, the study utilized Model (2) and the Pooled OLS method. Additionally, the study incorporated a measure of asymmetric cost behavior developed by Homburg & Nasev, (2008). The findings of this analysis are presented in Table (15) –see Appendix (H)-, (Full regression results for all sectors are summarized in Appendix (D)).

Table (15) provides a summary of the statistical results for independent variables in sectors of Jordanian industrial companies that revealed significant characteristics of sticky or anti-sticky independent variables, with respect to their impact on earnings per share (EPS). The sample has been divided into different sectors, and for each sector, the impact of asymmetrical costs (sticky and anti-sticky costs) has been analyzed using Model (2) and the Pooled OLS method. The table lists the different sectors and their associated cost elements, variables, and statistical results for independent variables, including Sticky and Anti-Sticky costs, PEPS, leverage, and firm size.

For each sector, the statistical results for the independent variables are reported as regression coefficients (β_1 , β_2 , β_3 , β_4 , and β_5). The R^2 values, which represent the percentage of the variance in EPS explained by the model, are also reported for each sector. Additionally, the number of observations (No. of obs) for each sector is included in the table.

The results show that in some sectors, there is a significant positive or negative impact of cost asymmetry on EPS, while in others, the impact is not statistically significant (see Appendix (D)). For example, in the Electrical Industries sector, asymmetric SG&A costs have significant positive impact on EPS, while asymmetric COGS have a significant

positive impact of sticky variable on EPS, and a significant negative impact of anti-sticky variable on EPS. On the other hand, in the Engineering and Construction sector, asymmetric SG&A have a significant positive impact of anti-sticky variable on EPS.

Overall, the results suggest that the impact of cost asymmetry on EPS varies across sectors and depends on the specific cost elements and variables considered. The table provides a detailed description of these findings for each sector analyzed.

Table (16) –see Appendix (H)- provide an illustrative example of a detailed analysis conducted on the industrial sector (Tobacco and Cigarettes industry). The table displays the regression analysis results for the mentioned sectors, with a specific emphasis on cost components such as Sales, General, and Administrative Expenses (SG&A), Cost of Goods Sold (COGS), and Total Costs (TC). These results have been obtained from the Appendix (D) results for all sectors.

The multiple regression analysis presented in Table (16) investigates the relationship between EPS (earnings per share) and a set of independent and control variables. The model includes two independent variables: Sticky, which measures the intensity of stickiness, and Anti-Sticky, which measures the intensity of anti-stickiness. Additionally, the model incorporates three control variables: PEPS, which measures the past EPS growth rate, Leverage, which measures the company's debt level, and Firm-size, which measures the size of the company.

The coefficient for the constant term (β_0) is -0.37, and the p-value is 0.329, suggesting that the constant term is not statistically significant, meaning that the intercept is not significantly different from zero.

To further interpret the results, the coefficients and p-values of the independent variables (Sticky and Anti-Sticky) can also be analyzed. The coefficient for Sticky (β_1) is (-0.539) with a p-value of 0.007, while the coefficient for Anti-Sticky (β_2) is 0.972 with a p-value of 0.041. The negative coefficient for Sticky suggests that as the stickiness intensity increases, EPS tends to decrease. Conversely, the positive coefficient for Anti-Sticky suggests that as the anti-stickiness intensity increases, EPS tends to increase.

The coefficient for the control variable PEPS (β_3) is 0.387, indicating that as the past EPS growth rate increases, EPS tends to increase as well. However, the p-value of 0.127

suggests that this relationship is not statistically significant. The coefficients for the control variables Leverage (β_4) and Firm-size (β_5) are -0.117 and 0.056, respectively, with corresponding p-values of 0.176 and 0.272, indicating that these variables are also not statistically significant in relation to the dependent variable EPS.

Additionally, the overall goodness-of-fit of the model can be assessed by looking at the R-squared value, which is 0.9546 in this case. This indicates that the model explains a significant portion of the variance in the dependent variable (EPS). However, the Breusch and Pagan test suggests that there may be some heteroscedasticity in the model, which means that the variance of the residuals may not be constant across all levels of the independent variables. Overall, these results suggest that the stickiness and anti-stickiness intensities have a significant relationship with EPS, while the control variables (PEPS, Leverage, and Firm-size) do not have statistically significant relationships with EPS in the industrial sector of tobacco and cigarettes.

On the other hand, Table (17) –see Appendix (H)- summarizes the results of the regression analysis conducted for the remaining industrial sectors of statistically significant coefficients for Sticky and Anti-Sticky as independent variables, besides Tobacco and Cigarettes, in terms of cost elements (SG&A, COGS and TC). The table provides an overview of the coefficients of the independent and control variables used in the analysis.

The regression analysis results presented in this section demonstrate that the relationships between the independent variables (sticky and anti-sticky) and control variables with the dependent variable (EPS) differ across industrial sectors and cost elements too. These findings are consistent with those presented in section 4.3.5, where the relationship between EPS and asymmetric costs was highlighted in the entire sample.

This finding emphasizes the importance of considering the asymmetry in cost behavior when predicting EPS. Neglecting this factor can lead to erroneous forecasting outcomes when utilizing conventional models. Financial analysts must, therefore, recognize this complexity and utilize appropriate techniques that account for asymmetric costs in addition to the traditional symmetric ones.

CHAPTER 5

Conclusions, research limitations and suggestions for further studies

5.1 Conclusions

The traditional classification of costs into fixed, variable, and mixed costs based on activity change has been challenged by Anderson et al., (2003), who introduced a model that demonstrates the variability of costs based on changes in activity volume and revenue direction. In this study, we adopt the model presented by Anderson et al., (2003) to investigate the degree of asymmetric cost behavior in Jordanian industrial companies listed on the Amman Stock Exchange from 2013 to 2019. Specifically, we focus on the cost items of SG&A, COGS, and TC. The sample is divided into two groups, financially Failed and Non-Failed companies, to explore the asymmetry of costs in both cases, as well as the sample as a whole. We examine the effect of asymmetric cost behavior, both sticky and non-sticky, on the return on share using two statistical methodologies, namely Panel data and Pooled (OLS). Our findings are summarized as follows:

- The regression results for the entire sample show that Jordanian companies do not adjust labor resources when the volume of activity decreases, resulting in sticky costs in periods of economic recession.
- Additionally, the results indicate that managers in these companies symmetrically adjust COGS costs when the volume of activity increases or decreases.
- For TC costs, the results show that managers symmetrically reduce costs when the volume of activity decreases, resulting in symmetric TC behavior.
- In the case of SG&A costs for the Failed group, the results show a statistically insignificant relationship between the group and stickiness, with $\beta_1=0.087$, $\beta_2=0.025$, and $R^2=3\%$. This implies that there is no evidence of stickiness in SG&A costs, and no relationship has been confirmed between the Failed group and stickiness in this case.
- The cost item (COGS) exhibited anti-sticky cost behavior in the Non-Failed group and was documented accordingly. However, for other cost items, asymmetric behavior was not observed due to the lack of statistical significance of the decrease in activity volume coefficient (β_2) for the dummy variable in Model (1), indicating that these costs follow the traditional model of cost behavior.

- Although no confirmed relationship was found between Failure of a group and symmetrical (COGS) costs, a positive but statistically insignificant value of ($\beta_2=0.336$) suggests an Anti-sticky behavior of cost.
- The managers in the Non-Failed group exhibited a higher and faster response in adjusting costs to changes in the volume of activity than those in the financial failure group, indicating their pessimism and fear of the future. In contrast, the situation of financial failure reflects a state of confusion and inability to make rational decisions in the event of economic recession or financial hardship, resulting in a slow and weak response to a downward change in activity volume.
- This study documented the effect of stickiness and anti-stickiness of costs on the return on share. While a negative impact of sticky costs in the COGS was found on (EPS), no statistical evidence was provided for the impact of stickiness or anti-stickiness of costs on the return on share for other cost items.
- High sticky costs are those costs with $(\beta_1 + \beta_2) / \beta_1$ very close to zero, and strongly symmetrical costs are those costs with $(\beta_1 + \beta_2) / \beta_1$ very close to one, implying that the driving mechanism of stickiness is (β_2) in Model (1).
- Upon dividing the sample into multiple sectors to identify the sectors that have a significant impact on the existence of asymmetric costs in Jordanian industrial firms, the results deviated from those obtained when the sample was studied as a whole. Some sectors showed the presence of asymmetric costs, while others did not. Additionally, some cost elements that demonstrated asymmetry in the overall sample did not exhibit it in this analysis, and vice versa.
- Upon dividing the study sample into multiple sectors, it became evident that relationships between the independent variables (sticky and anti-sticky) and control variables with the dependent variable (EPS) vary across industrial sectors and cost elements, which further emphasizes the importance of accounting for the asymmetry in cost behavior when forecasting EPS. Failure to do so could result in inaccurate forecasting outcomes when using traditional models. Financial analysts must, therefore, recognize this complexity and utilize appropriate techniques that account for asymmetric costs in addition to the traditional symmetric ones.

5.2 Limitations

The researcher wishes to highlight some limitations that restricted the scope of this study.

- The sample size available for this research is relatively small compared to previous studies that have documented asymmetric cost behavior.
- The industrial sector, in general, follows a unique approach to work where the cost structure differs from other sectors. Therefore, it is difficult to generalize the results.
- The study examined only a limited number of variables, and there may be other variables that play a role in the overall economic and financial process, which might affect cost behavior.
- The results may vary from one period to another due to the influence of cost behavior by the surrounding economic conditions. This is evident from the difference in the results of the current study from the results of previous studies conducted on the same sample.
- There are other cost stickiness measurement models apart from Model (2) that was adopted in this study, and each model has its own advantages.

5.3. Recommendations and Suggestions for Further Studies

- This study highlights the need for further research to explore the economic consequences of cost anti-stickiness and its impact on financial and managerial decision making. This research area still offers ample opportunities for future studies.
- Additionally, there is scope for research to examine the relationship between financial failure and asymmetric cost behavior, using a wider range of control variables and comparative analysis. Other research avenues include the development of cost and profit forecasting models and accounting conservatism models that incorporate sticky and anti-sticky costs, providing more accurate simulations of real-world scenarios.
- The study also recommends that financial statements should incorporate information about sticky and anti-sticky costs during specific periods. These cost behavior patterns have been documented in various studies and can provide valuable information to users of accounting information, such as investors and financial analysts, in making informed investment decisions.

List of Abbreviations

Abbreviation	Definition
ABC	Activity Based Costing
ASE	Amman Stock Exchange
COGS	Cost of Goods Sold
CVP	Cost Volume Profit
Dec	Decrease
EPS	Earnings Per Share
Max	Maximum
Min	Minimum
Obs	Observations
OLS	Ordinary Least Squares
PEPS	Past Earnings Per Share
Rev	Revenue
SD	Standard Deviation
SG&A	Selling, General & Administrative costs
TC	Total Costs

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Appendices

Appendix (A)

Fixed effects and random effects regression analysis.

		Panel data regressions with common coefficients Coefficient Estimates (SG&A , COGS , and TC) Model (1)									
		Fixed-effects	Fixed-effects					Pooled estimation (OLS)		Random-effects	
		SG&A	COGS	TC			SG&A	COGS	TC		
β_0	Coeff.	-0.008	0.002	-0.004	β_0	Coeff.	-0.002	0.002	-0.004		
	p-value	0.337	0.719	0.511		p-value	0.775	0.683	0.378		
(Rev) β_1	Coeff.	0.414***	0.670***	0.598***	(Rev) β_1	Coeff.	0.401***	0.688***	0.640***		
	p-value	0.000	0.000	0.000		p-value	0.000	0.000	0.000		
(DecRev) β_2	Coeff.	-0.274**	0.097	-0.019	(DecRev) β_2	Coeff.	-0.183*	0.084	-0.046		
	p-value	0.033	0.323	0.855		p-value	0.071	0.229	0.501		
$\beta_1+\beta_2$		0.140	0.767	0.579	$\beta_1+\beta_2$		0.217	0.772	0.594		
Prob > F		0.000	0.000	0.000	Prob > F		0.000	0.000	0.000		
R ²		18%	77%	71%	R ²		19%	77%	71%		
Hausman fe re		0.028	0.768	0.118	Hausman fe re		0.028	0.768	0.118		
Number of obs		280	280	280	Number of obs.		280	280	280		

Appendix (B)

Pooled (OLS) regression-Multiple sectors

Panel data regressions with common coefficients Coefficient Estimates (SG&A, COGS, and TC) Model (1)					
Pooled estimation (OLS)					
sectors			SG&A	COGS	TC
Chemical Industries	β_0	Coeff.	0.043	0.008	0.000
		p-value	0.14	0.482	0.994
	(Rev) β_1	Coeff.	-0.331	0.918 ***	0.803 ***
		p-value	0.436	0.000	0.002
	(DecRev) β_2	Coeff.	1.061	0.052	-0.035
		p-value	0.047	0.789	0.908
	$\beta_1 + \beta_2$		0.73	0.97	0.77
	Prob > F		0.0005	0	0
	R2		32%	91%	73%
	Breusch and Pagan test		1	1	1
Number of obs		42	42	42	
			SG&A	COGS	TC
Electrical Industries	β_0	Coeff.	-0.023	-0.037	-0.051
		p-value	0.235	0.023	0.012
	(Rev) β_1	Coeff.	0.340	1.577 ***	1.694 ***
		p-value	0.522	0.000	0.000
	(DecRev) β_2	Coeff.	-0.294	(-	(-1.283) ***
		p-value	0.6	0.004	0.003
	$\beta_1 + \beta_2$		0.046	0.603	0.41
	Prob > F		0.553	0.000	0.000
	R2		10%	86%	81%
	Breusch and Pagan test		1	1	1
Number of obs		14	14	14	
Engineering and Construction	β_0	Coeff.	-0.001	0.002	0.003
		p-value	0.901	0.764	0.707
	(Rev) β_1	Coeff.	0.485 *	1.194 ***	1.0527 ***
		p-value	0.066	0.000	0.000
	(DecRev) β_2	Coeff.	-0.202	-0.307	-0.219
		p-value	0.538	0.102	0.229
	$\beta_1 + \beta_2$		0.283	0.887	0.832
	Prob > F		0.005	0.000	0.000
	R2		28%	91%	90%
	Breusch and Pagan test		0.37	1	1
Number of obs		35	35	35	
Food and Beverages	β_0	Coeff.	0.0324	0.007	-0.001
		p-value	0.006	0.278	0.887
	(Rev) β_1	Coeff.	-0.051	0.934 ***	0.814 ***
		p-value	0.756	0.000	0.000
		Coeff.	0.631	0.044	0.201

	(DecRev)	p-value	0.307	0.818	0.26
	$\beta_1+\beta_2$		0.579	0.978	1.015
	Prob > F		0.545	0.000	0.000
	R2		9%	82%	82%
	Breusch and Pagan test		0.43	1	1
	Number of obs		49	49	49
Mining and Extraction Industries	β_0	Coeff.	-0.0226	0.004	-0.005
		p-value	0.102	0.628	0.613
	(Rev) β_1	Coeff.	0.719	0.702 ***	0.710 ***
		p-value	0.000	0.000	0.000
	(DecRev) β_2	Coeff.	(-0.618)	0.150	-0.067
		p-value	0.000	0.218	0.723
	$\beta_1+\beta_2$		0.101	0.851	0.642
	Prob > F		0.000	0.000	0.000
	R2		37%	81%	77%
	Breusch and Pagan test		1	1	1
Number of obs		70	70	70	
Pharmceutical and Medical Industries	β_0	Coeff.	-0.0266	-0.007	-0.019
		p-value	0.33	0.666	0.283
	(Rev) β_1	Coeff.	0.420	0.544 ***	0.508 ***
		p-value	0.011	0.000	0.000
	(DecRev) β_2	Coeff.	-0.302	-0.132	-0.220
		p-value	0.208	0.36	0.157
	$\beta_1+\beta_2$		0.118	0.412	0.287
	Prob > F		0.010	0.000	0.000
	R2		21%	69%	57%
	Breusch and Pagan test		0.180	1	1
Number of obs		42	42	42	
Textils, Leathers and Clothings	β_0	Coeff.	0.0139	0.032	0.026
		p-value	0.459	0.023	0.017
	(Rev) β_1	Coeff.	0.046	0.575 ***	0.506 ***
		p-value	0.689	0.001	0.000
	(DecRev) β_2	Coeff.	0.274	0.601 **	0.480 **
		p-value	0.602	0.041	0.036
	$\beta_1+\beta_2$		0.320	1.176	0.987
	Prob > F		0.548	0.000	0.000
	R2		10%	90%	92%
	Breusch and Pagan test		1	1	1
Number of obs		14	14	14	
Tobacco and Cigarettes	β_0	Coeff.	0.096	-0.034	-0.012
		p-value	0.228	0.496	0.572
	(Rev) β_1	Coeff.	-0.876	1.850 **	1.182 ***
		p-value	0.444	0.025	0.003
	(DecRev) β_2	Coeff.	1.248	-0.809	-0.403
		p-value	0.363	0.36	0.297
	$\beta_1+\beta_2$		0.371	1.04	0.779
Prob > F		0.483	0.000	0.000	

	R2	12%	90%	96%
	Breusch and Pagan test	1	1	1
	Number of obs	14	14	14

Appendix (C)

Regression results reflecting the effect of Cost Asymmetry on (EPS)-Fixed effects & Pooled OLS-Model (2).

			Panel data regressions with common coefficients								
			Coefficient Estimates (Sticky, Anti-Sticky, PEPS, Leverage, Firm-size)								
			Fixed-effects						Pooled estimation (OLS)		
			SG&A	COGS	TC				SG&A	COGS	TC
β_0	cons	Coeff. p-value	-1.382 0.248	-0.761 0.530	-1.213 0.310	β_0	cons	Coeff. p-value	0.070 0.702	0.148 0.416	0.125 0.481
β_1	Sticky	Coeff. p-value	-0.085 0.695	-0.641 0.178	-0.104 0.518	β_1	Sticky	Coeff. p-value	-0.046 0.728	-0.540 ** 0.041	-0.081 0.403
β_2	Anti-Sticky	Coeff. p-value	0.885 0.453	0.538 0.204	0.429 0.517	β_2	Anti-Sticky	Coeff. p-value	1.027 0.515	0.406 0.327	0.762 0.316
β_3	PEPS	Coeff. p-value	0.321 ** 0.028	0.281 * 0.056	0.318 ** 0.039	β_3	PEPS	Coeff. p-value	0.698 *** 0.000	0.630 *** 0.001	0.691 *** 0.000
β_4	Leverage	Coeff. p-value	-0.512 ** 0.025	-0.415 ** 0.048	-0.479 ** 0.037	β_4	Leverage	Coeff. p-value	-0.179 *** 0.009	-0.143 *** 0.013	-0.167 *** 0.010
β_5	Firm-size	Coeff. p-value	0.205 0.216	0.119 0.476	0.181 0.274	β_5	Firm-size	Coeff. p-value	-0.006 0.823	-0.016 0.519	-0.012 0.599
Prob > F			0.000	0.002	0.010	Prob > F			0.000	0.000	0.000
R ²			25%	33%	26%	R ²			41%	44%	42%
Hausman fe re			0.000	0.000	0.000	Hausman fe re			0.000	0.000	0.000
Number of obs			280	280	280	Number of obs			280	280	280

Appendix (D)
Summary of regression results for multiple sectors-Statistical significance

Sectors	Costs Element	variable					statistical significance	R ²	No. of obs
		Sticky	Anti-Sticky	PEPS	Leverage	Firm-size			
		β_1	β_2	β_3	β_4	β_5			
Chemical Industries	SG&A	0.235	-14.75	0.72 ***	0.035	0.182	not significant	48%	42
	COGS	-0.225	-2.17	0.594 ***	0.038	0.161	not significant	49%	
	Total Costs	0.133	-2.29	0.717 ***	-0.007	0.18	not significant	47%	
Electrical Industries	SG&A	2.694 *	39.41	0.584 *	-2.831 *	0.171	significant	76%	14
	COGS	1.418 **	-3.086 ***	0.716 **	-3.452 ***	0.098	significant	81%	
	Total Costs	-0.213	-2.78	0.176	-1.863	-0.241	not significant	49%	
Engineering and Construction	SG&A	-3.068	8.427 ***	0.437	-1.927 ***	0.263 **	significant	72%	35
	COGS	-0.976	1.252	0.567	-2.016 **	0.309 **	not significant	64%	
	Total Costs	-1.371	3.656 **	0.494	-2.007 ***	0.270 **	significant	70%	
Food and Beverages	SG&A	-0.013	0.065	0.355 ***	0.065	-0.102 *	not significant	39%	49
	COGS	0.838	-0.103	0.429 ***	0.086	-0.1057 **	not significant	42%	
	Total Costs	0.503	-0.091	0.396 ***	0.081	-0.105 **	not significant	41%	
Mining and Extraction Industries	SG&A	0.181 ***	-0.379	1.068***	-0.087	0.022	significant	53%	70
	COGS	-0.026	1.235 **	1.117	-0.055	-0.009	significant	55%	
	Total Costs	0.109 ***	2.135 **	1.115 ***	-0.105	0.009	significant	57%	
Pharmaceutical and Medical Industries	SG&A	-0.262	5.624 **	0.349	-0.447	-0.105	significant	60%	42
	COGS	-0.749 *	1.883	0.38	-0.293	-0.184 *	significant	65%	
	Total Costs	-0.206	omitted	0.358	-0.378	-0.141	not significant	60%	
Textiles, Leathers and Clothing	SG&A	-6.057	omitted	0.072	0.634	1.802	not significant	44%	14
	COGS	-14.751	-16.72	0.092	1.304	2.66	not significant	62%	
	Total Costs	-7.45	-80.253	-0.231	-0.188	1.243	not significant	61%	
Tobacco and Cigarettes	SG&A	0.2	omitted	1.276	-0.017	0.06	not significant	87%	14
	COGS	-1.109 **	0.29	0.458	-0.121	0.073	significant	94%	
	Total Costs	-0.539 ***	0.972 **	0.387	-0.117	0.056	significant	96%	

Appendix (E)

Comparison of the present findings with 19 studies conducted globally

Study	Costs studied	Sticky cost evidence		Degree of cost stickiness	Theory	State	Period
		% increase in cost for 1% increase in revenues	% decrease in cost for 1% decrease in revenues				
		(%)	(%)				
Current study, (2023)	SG&A	0.40	0.22	0.54	sticky	Jordan	2013-2019
Current study, (2023)-non-failed	COGS	0.72	0.87	1.22	anti-sticky	Jordan	2013-2019
Zhang et al., (2019)	SG&A	0.37	0.23	0.63	sticky	USA	2009–2017
Ibrahim, (2018)	COGS	1.05	0.85	0.81	sticky	Egypt	2008-2013
-Serdaneh, (2014)	COGS	0.74	0.92	1.25	anti-sticky	Jordan	2008-2012
Porporato & Werbin, (2012)	TC	0.55	0.13	0.24	sticky	Argentina	2005-2010
Ibrahim and Ezat (2017)	SG&A	0.35	0.17	0.49	sticky	Egypt	2004–2011
Ibrahim and Ezat (2017)	COGS	0.87	0.40	0.46	sticky	Egypt	2004–2011
Ibrahim and Ezat (2017)	TC	0.83	0.39	0.47	sticky	Egypt	2004–2011
Porporato and Werbin (2012)	TC	0.60	0.38	0.63	sticky	Argentina	2004-2009
Onesimo Uy, (2011)	SG&A	0.53	0.46	0.87	sticky	Philippines	2004-2008
Farzaneh et al., (2013)	SG&A	0.44	0.26	0.59	sticky	Iran	2001-2010
Magheed (2016)	COGS	0.61	0.53	0.86	sticky	Jordan	2000-2013
Magheed (2016)	SG&A	0.73	0.67	0.91	sticky	Jordan	2000-2013
Jiang et al., (2016)	SG&A	0.47	0.34	0.72	sticky	China	2000-2007
Via and Perego (2014)	COGS	1.02	1.09	1.07	anti-sticky	Italy	1999-2008
Via and Perego (2014)	SG&A	0.62	0.71	1.13	anti-sticky	Italy	1999-2008
Cheng et al, (2018)	COGS	0.55	0.57	1.04	anti-sticky	China	1999-2007

Marques et al., (2014)	SG&A	0.56	0.45	0.80	sticky	Latin America	1995-2012
Richartz & Borgert, (2014)	COGS	0.96	0.92	0.96	sticky	Brazil	1994-2011
Medeiros and Costa (2004)	SG&A	0.59	0.32	0.54	sticky	Brazil	1986-2003
Subramaniam and Watson (2016)	TC	0.90	0.82	0.91	sticky	USA	1979-2002
Subramaniam and Watson (2016)	SG&A	0.71	0.55	0.78	sticky	USA	1979-2001
Subramaniam and Watson (2016)	COGS	0.97	0.93	0.96	sticky	USA	1979-2000
Anderson et al. (2003)	SG&A	0.55	0.35	0.64	sticky	USA	1979-1998
Costa & Habib, (2021)	COGS	0.98	0.97	0.99	sticky	USA	1977-2017
Costa & Habib, (2021)	SG&A	0.68	0.49	0.72	sticky	USA	1977-2017
Loy & Hartlieb, (2018)	SG&A	0.64	0.30	0.47	sticky	USA	1970-2014
Loy & Hartlieb, (2018)	COGS	0.90	0.89	0.99	sticky	USA	1970-2014

Appendix (F)

VIF Analysis for Model (1)

SG&A			
	SGA	REV	DecREV
SGA	1		
REV	0.4227*	1	
DecREV	0.3318*	0.8905*	1
star(*) (.01)			
SGA			
. vif			
Variable	VIF	1/VIF	
DecREV	4.83	0.207	
REV	4.83	0.207	
Mean VIF	4.83		
COGS			
	COGS	REV	DecREV
COGS	1		
REV	0.8771*	1	
DecREV	0.7969*	0.8905*	1
star(*) (.01)			
COGS			
Variable	VIF	1/VIF	
DecREV	4.83	0.207	
REV	4.83	0.207	
Mean VIF	4.83		
	TotalC~s	REV	DecREV
TotalCosts	1		
REV	0.8401*	1	
DecREV	0.7381*	0.8905*	1
star(*) (.01)			

TotalCosts			
Variable	VIF	1/VIF	
DecREV	4.83	0.207	
REV	4.83	0.207	
Mean VIF	4.83		

Appendix (G)

VIF Analysis for Model (2)

. Vif		
COGS		
Variable	VIF	1/VIF
PEPS	1.51	0.664
Leverage	1.39	0.717
Sticky	1.27	0.785
AntiSticky	1.04	0.965
Firmsize	1.04	0.966
Mean VIF	1.25	
SG&A		
. vif		
Variable	VIF	1/VIF
PEPS	1.4	0.713
Leverage	1.4	0.715
Sticky	1.15	0.869
Firmsize	1.04	0.961
AntiSticky	1.01	0.986
Mean VIF	1.20	
TotalCost		
. vif		
Variable	VIF	1/VIF
PEPS	1.43	0.698
Leverage	1.4	0.715
Sticky	1.2	0.837
Firmsize	1.03	0.966
AntiSticky	1.02	0.981
Mean VIF	1.22	

Appendix (H)

Tables

Table (11)

Panel data with common coefficients (SG&A, COGS, and TC) - Model (1)

Panel data regressions with common coefficients.				
Coefficient Estimates for (SG&A, COGS, And Total Costs)				
(Model I)				
		Pooled estimation (OLS)		
		SG&A	COGS	TC
β_0	Coefficient	-0.002	0.002	-0.004
	p-value	0.775	0.693	0.440
(Rev) β_1	Coefficient	0.401 ***	0.687 ***	0.640 ***
	p-value	0.000	0.000	0.000
(DecRev) β_2	Coefficient	-0.183 *	0.084	-0.046
	p-value	0.071	0.491	0.733
$\beta_1+\beta_2$		0.217	0.771	0.595
Prob > F		0.000	0.000	0.000
R ²		19%	77%	71%
Mean VIF		4.83	4.83	4.83
Breusch–Pagan test		1	1	1
Number of obs		280	280	280

(*), (**) and (***) mean Significant at 10, 5 and 1 percent levels, respectively

Table (12)

Sectors with significant coefficients β_1 and β_2

Panel data regressions with common Coefficients						
Pooled Estimation (OLS)						
Cost Element	Type of Industrial Sector					Cost Behavior
Mining and Extraction Industries						
	β_0	β_1	β_2	$\beta_1+\beta_2$	R ²	
SG&A	-0.0226	0.719	-0.618	0.101	37%	Sticky
Textiles, Leathers and Clothing						
COGS	0.032	0.575	0.601	1.176	90%	Anti-Sticky
TC	0.026	0.506	0.480	0.987	92%	Anti-Sticky

Table (13)

Regression results of Model (1)-Failed and Non-Failed Companies

Pooled data regressions (OLS) with common coefficients								
Coefficient Estimates (SG&A, COGS, and TC)								
Model (1)								
Failed Firms				Non-failed Firms				
SG&A	COGS	TC			SG&A	COGS	Total Costs	

β_0	Coefficient	-0.026	0.014	-0.003	β_0	Coefficient	0.008	0.003	0.003
	p-value	0.158	0.390	0.828		p-value	0.251	0.511	0.450
β_1	Coefficient	0.087	0.447***	0.371**	β_1	Coefficient	0.542***	0.719***	0.681***
	p-value	0.569	0.006	0.024		p-value	0.000	0.000	0.000
β_2	Coefficient	0.026	0.336	0.202	β_2	Coefficient	-0.182	0.155**	0.120
	p-value	0.889	0.152	0.359		p-value	0.302	0.047	0.236
$\beta_1+\beta_2$		0.113	0.783	0.573	$\beta_1+\beta_2$		0.360	0.874	0.801
Prob > F		0.168	0.000	0.000	Prob > F		0.000	0.000	0.000
R ²		3%	71%	61%	R ²		36%	83%	83%
Number of obs		104	104	104	Number of obs		176	176	176

(*), (**) and (***) mean Significant at 10, 5 and 1 percent levels, respectively

Table (14)

Regression results reflecting the effect of Cost Asymmetry on (EPS)

Table 12 : Panel data regressions with common coefficients					
Coefficient Estimates (Sticky, AntiSticky, PEPS, Leverage, Firmsize)					
(Model II)					
			Pooled estimation (OLS)		
			SG&A	COGS	Total Costs
β_0	cons	Coefficient	0.070	0.148	0.125
		p-value	0.702	0.416	0.481
β_1	Sticky	Coefficient	-0.046	(-0.540)**	-0.081
		p-value	0.728	0.041	0.403
β_2	AntiSticky	Coefficient	1.027	0.406	0.762
		p-value	0.515	0.327	0.316
β_3	PEPS	Coefficient	0.698 ***	0.630 ***	0.691 ***
		p-value	0.000	0.001	0.000
β_4	Leverage	Coefficient	(-0.179)***	(-0.143)***	(-0.167)***
		p-value	0.009	0.013	0.010
β_5	Firmsize	Coefficient	-0.006	-0.016	-0.012
		p-value	0.823	0.519	0.599
Prob > F			0.000	0.000	0.000
R ²			41%	44%	42%
Mean VIF			1.20	1.25	1.22
Breusch-Pagan test			1	1	1
Number of obs			280	280	280

(*), (**) and (***) mean Significant at 10, 5 and 1 percent levels, respectively

Table (15)

Regression results reflecting the effect of Cost Asymmetry of multiple sectors on (EPS)

Sectors	Costs Element	Independent Variable		Control Variables			statistical significance	R ²	N o. of obs
		Sticky	Anti-Sticky	PEPS	Leverage	Firm-size			
		β_1	β_2	β_3	β_4	β_5			
Electrical Industries	SG&A	2.694 *	39.41	0.584 *	-2.831 *	0.171	significant	76 %	14
	COGS	1.418 **	-3.086 ***	0.716 **	-3.452 ***	0.098	significant	81 %	
	Total Costs	-0.213	-2.78	0.176	-1.863	-0.241	not significant	49 %	
Engineering and Construction	SG&A	-3.068	8.427 ***	0.437	-1.927 ***	0.263 **	significant	72 %	35
	COGS	-0.976	1.252	0.567	-2.016 **	0.309 **	not significant	64 %	
	Total Costs	-1.371	3.656 **	0.494	-2.007 ***	0.270 **	significant	70 %	
Mining and Extraction Industries	SG&A	0.181 ***	-0.379	1.068* **	-0.087	0.022	significant	53 %	70
	COGS	-0.026	1.235 **	1.117	-0.055	-0.009	significant	55 %	
	Total Costs	0.109 ***	2.135 **	1.115 ***	-0.105	0.009	significant	57 %	
Pharmaceutical and Medical Industries	SG&A	-0.262	5.624 **	0.349	-0.447	-0.105	significant	60 %	42
	COGS	-0.749 *	1.883	0.38	-0.293	-0.184 *	significant	65 %	
	Total Costs	-0.206	omitted	0.358	-0.378	-0.141	not significant	60 %	
Tobacco and Cigarettes	SG&A	0.2	omitted	1.276	-0.017	0.06	not significant	87 %	14
	COGS	-1.109 **	0.29	0.458	-0.121	0.073	significant	94 %	
	Total Costs	-0.539 ***	0.972 **	0.387	-0.117	0.056	significant	96 %	

(*), (**) and (***) mean Significant at 10, 5 and 1 percent levels, respectively

Table (16)

Regression results reflecting the effect of Cost Asymmetry on (EPS) for Tobacco and Cigarettes industry

Panel data regressions with common coefficients						
Coefficient Estimates (Sticky, Anti-Sticky, PEPS, Leverage, Firm-size)						
Model (2)						
sectors	Pooled estimation (OLS)					
				types of costs		
				SG&A	COGS	TC
Chemical Industries	β_0	cons	Coefficient	-1.366	-1.223	-1.340
			p-value	0.120	0.16	0.133
	β_1	Sticky	Coefficient	0.235	-0.225	0.133
			p-value	0.195	0.513	0.443
	β_2	Anti-Sticky	Coefficient	-14.750	-2.165	-2.290
			p-value	0.722	0.222	0.562

	β_3	PEPS	Coefficient	0.720 ***	0.594 ***	0.717 ***
			p-value	0.000	0.002	0.000
	β_4	Leverage	Coefficient	0.035	0.038	-0.007
			p-value	0.805	0.787	0.960
	β_5	Firm-size	Coefficient	0.182	0.161	0.180
			p-value	0.122	0.167	0.132
	Prob > F			0.000	0.000	0.000
	R2			48%	49%	47%
	Breusch and Pagan test			1	1	1
	Number of obs			42	42	42
Electrical Industries	β_0	cons	Coefficient	-0.335	0.387	2.273
			p-value	0.774	0.717	0.209
	β_1	Sticky	Coefficient	2.694 *	1.418 **	-0.213
			p-value	0.063	0.035	0.651
	β_2	Anti-Sticky	Coefficient	39.407	(-3.086)***	-2.783
			p-value	0.33	0.003	0.336
	β_3	PEPS	Coefficient	0.584 *	0.716 **	0.176
			p-value	0.078	0.033	0.69
	β_4	Leverage	Coefficient	(-2.831)*	(-3.452)***	-1.863
			p-value	0.045	0.002	0.112
	β_5	Firm-size	Coefficient	0.171	0.0979	-0.241
			p-value	0.279	0.496	0.267
	Prob > F			0.021	0.009	0.279
	R2			76%	81%	49%
	Breusch and Pagan test			1	1	1
	Number of obs			14	14	14
Engineering and Construction	β_0	cons	Coefficient	(-1.291)*	(-1.629)*	(-1.31)*
			p-value	0.063	0.081	0.088
	β_1	Sticky	Coefficient	-3.068	-0.976	-1.371
			p-value	0.116	0.559	0.184
	β_2	Anti-Sticky	Coefficient	8.427 ***	1.252	3.656 **
			p-value	0.001	0.499	0.037
	β_3	PEPS	Coefficient	0.437	0.567	0.494
			p-value	0.101	0.157	0.113
	β_4	Leverage	Coefficient	(-1.927)***	(-2.016)**	(-2.007)***
			p-value	0.004	0.013	0.007
	β_5	Firm-size	Coefficient	0.263 **	0.309 **	0.27 **
			p-value	0.026	0.050	0.042
	Prob > F			0.005	0.073	0.038
	R2			71%	64%	70%
	Breusch and Pagan test			1	1	1
	Number of obs			35	35	35
Food and Beverages	β_0	cons	Coefficient	0.761 **	0.765 **	0.769 **
			p-value	0.043	0.027	0.034

	β_1	Sticky	Coefficient	-0.0126	0.838	0.5034
			p-value	0.981	0.117	0.207
	β_2	Anti-Sticky	Coefficient	0.0651	-0.103	-0.0913
			p-value	0.934	0.649	0.554
	β_3	PEPS	Coefficient	0.355 ***	0.429 ***	0.396 ***
			p-value	0.006	0.001	0.001
	β_4	Leverage	Coefficient	0.065	0.0857	0.081
			p-value	0.34	0.205	0.235
	β_5	Firm-size	Coefficient	(-0.102)*	(-0.1057)**	(-0.105)**
			p-value	0.059	0.038	0.046
	Prob > F			0.000	0.000	0.000
	R2			39%	42%	41%
	Breusch and Pagan test			1	0.137	1
Number of obs			49	49	49	
Mining and Extraction Industries	β_0	cons	Coefficient	-0.196	0.061	-0.065
			p-value	0.52	0.815	0.800
	β_1	Sticky	Coefficient	0.181 ***	-0.026	0.109 ***
			p-value	0.002	0.96	0.001
	β_2	Anti-Sticky	Coefficient	-0.379	1.235 **	2.135 **
			p-value	0.842	0.044	0.027
	β_3	PEPS	Coefficient	1.068***	1.117	1.115 ***
			p-value	0.000	0.000	0.000
	β_4	Leverage	Coefficient	-0.087	-0.055	-0.1052
			p-value	0.353	0.591	0.227
	β_5	Firm-size	Coefficient	0.022	-0.009	0.009
			p-value	0.558	0.801	0.780
	Prob > F			0.001	0.002	0.000
R2			53%	55%	57%	
Breusch and Pagan test			1	1	1	
Number of obs			70	70	70	
Pharmaceutical and Medical Industries	β_0	cons	Coefficient	0.938	1.47	1.157
			p-value	0.165	0.06	0.101
	β_1	Sticky	Coefficient	-0.262	(-0.749) *	-0.206
			p-value	0.379	0.059	0.236
	β_2	Anti-Sticky	Coefficient	5.624 **	1.883	omitted
			p-value	0.040	0.207	omitted
	β_3	PEPS	Coefficient	0.3492	0.380	0.358
			p-value	0.341	0.228	0.299
	β_4	Leverage	Coefficient	-0.447	-0.293	-0.378
			p-value	0.175	0.263	0.196
	β_5	Firm-size	Coefficient	-0.105	(-0.184) *	-0.1405
			p-value	0.291	0.098	0.169
	Prob > F			0.000	0.000	0.000

	R2			60%	65%	60%	
	Breusch and Pagan test			1	1	1	
	Number of obs			42	42	42	
Textiles, Leathers and Clothing	β_0	cons	Coefficient	-14.02	-20.76	-9.441	
			p-value	0.622	0.419	0.662	
	β_1	Sticky	Coefficient	-6.057	-14.751	-7.450	
			p-value	0.367	0.198	0.191	
	β_2	Anti-Sticky	Coefficient	omitted	-16.72	-80.253	
			p-value	omitted	0.483	0.469	
	β_3	PEPS	Coefficient	0.072	0.092	-0.231	
			p-value	0.931	0.909	0.741	
	β_4	Leverage	Coefficient	0.634	1.304	-0.188	
			p-value	0.851	0.668	0.942	
	β_5	Firm-size	Coefficient	1.802	2.66	1.243	
			p-value	0.616	0.412	0.649	
	Prob > F				0.231	.	.
	R2				44%	62%	60%
Breusch and Pagan test				1	1	1	
Number of obs				14	14	14	
Tobacco and Cigarettes	β_0	cons	Coefficient	-0.507	-0.519	-0.370	
			p-value	0.186	0.239	0.329	
	β_1	Sticky	Coefficient	0.2	(-1.109) **	(-0.539) ***	
			p-value	0.53	0.029	0.007	
	β_2	Anti-Sticky	Coefficient	omitted	0.290	0.972 **	
			p-value	omitted	0.353	0.041	
	β_3	PEPS	Coefficient	1.276	0.458	0.387	
			p-value	0.105	0.292	0.127	
	β_4	Leverage	Coefficient	-0.017	-0.121	-0.117	
			p-value	0.888	0.312	0.176	
	β_5	Firm-size	Coefficient	0.060	0.073	0.056	
			p-value	0.264	0.223	0.272	
	Prob > F				0.000	0.000	0.000
	R2				87%	93%	95%
Breusch and Pagan test				1	1	1	
Number of obs				14	14	14	

(*), (**) and (***) mean Significant at 10, 5 and 1 percent levels, respectively

Table (17)

Regression results reflecting the effect of significant Cost Asymmetry (sticky & anti-sticky) on (EPS) for remaining industries

Sectors	Costs Element	Independent Variable		Control Variables			R ²
		Sticky	Anti-Sticky	PEPS	Leverage	Firm-size	
		β_1	β_2	β_3	β_4	β_5	
Electrical Industries	SG&A	2.694 *	39.41	0.584 *	-2.831 *	0.171	76%
	COGS	1.418 **	-3.086 ***	0.716 **	-3.452 ***	0.098	81%
Engineering and Construction	SG&A	-3.068	8.427 ***	0.437	-1.927 ***	0.263 **	72%
	TC	-1.371	3.656 **	0.494	-2.007 ***	0.270 **	70%
Mining and Extraction Industries	SG&A	0.181 ***	-0.379	1.068***	-0.087	0.022	53%
	COGS	-0.026	1.235 **	1.117	-0.055	-0.009	55%
	TC	0.109 ***	2.135 **	1.115 ***	-0.105	0.009	57%
Pharmaceutical and Medical Industries	SG&A	-0.262	5.624 **	0.349	-0.447	-0.105	60%
	COGS	-0.749 *	1.883	0.38	-0.293	-0.184 *	65%

(*), (**) and (***) mean Significant at 10, 5 and 1 percent levels, respectively

Appendix (I)

Figures

Figure (11)

(COGS) costs for Failed group vs (COGS) costs for Non-Failed group.

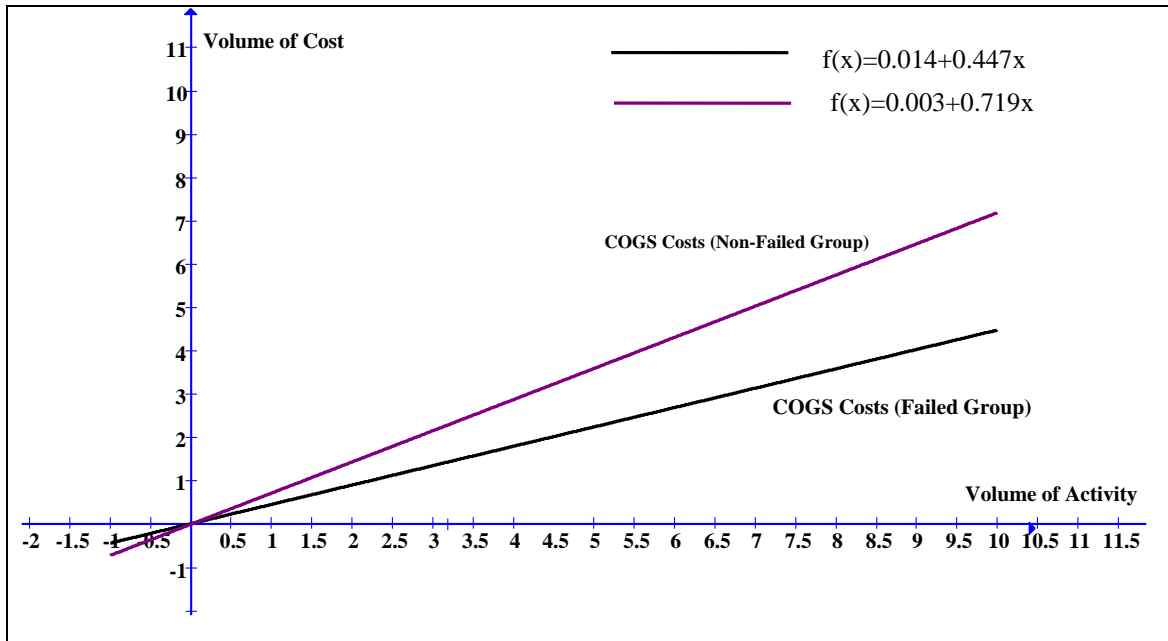


Figure (12)

(TC) for Failed group vs (TC) for Non-Failed group.

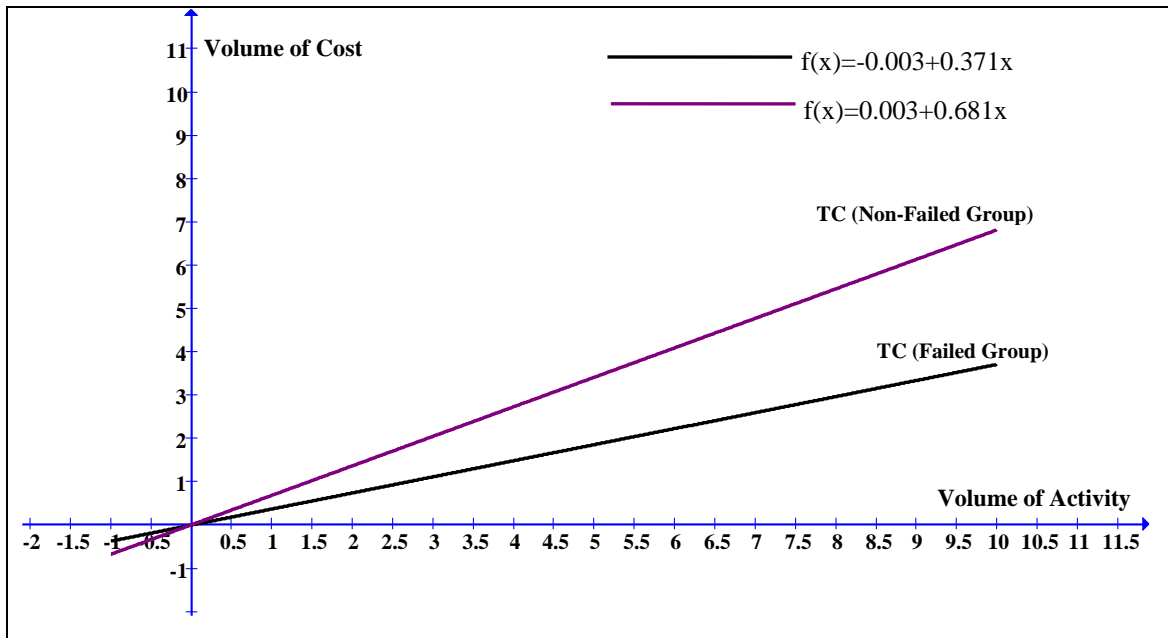


Figure (13)

Degree of Stickiness for the current study and previous studies.

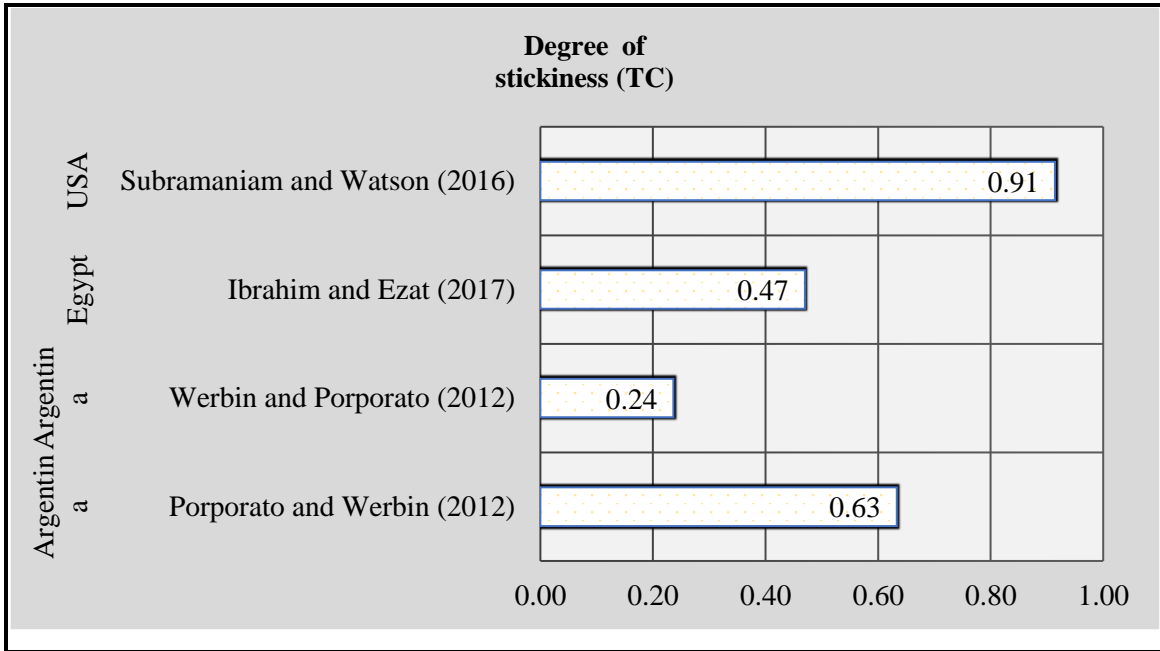


Figure (14)

Degree of Stickiness for....continued

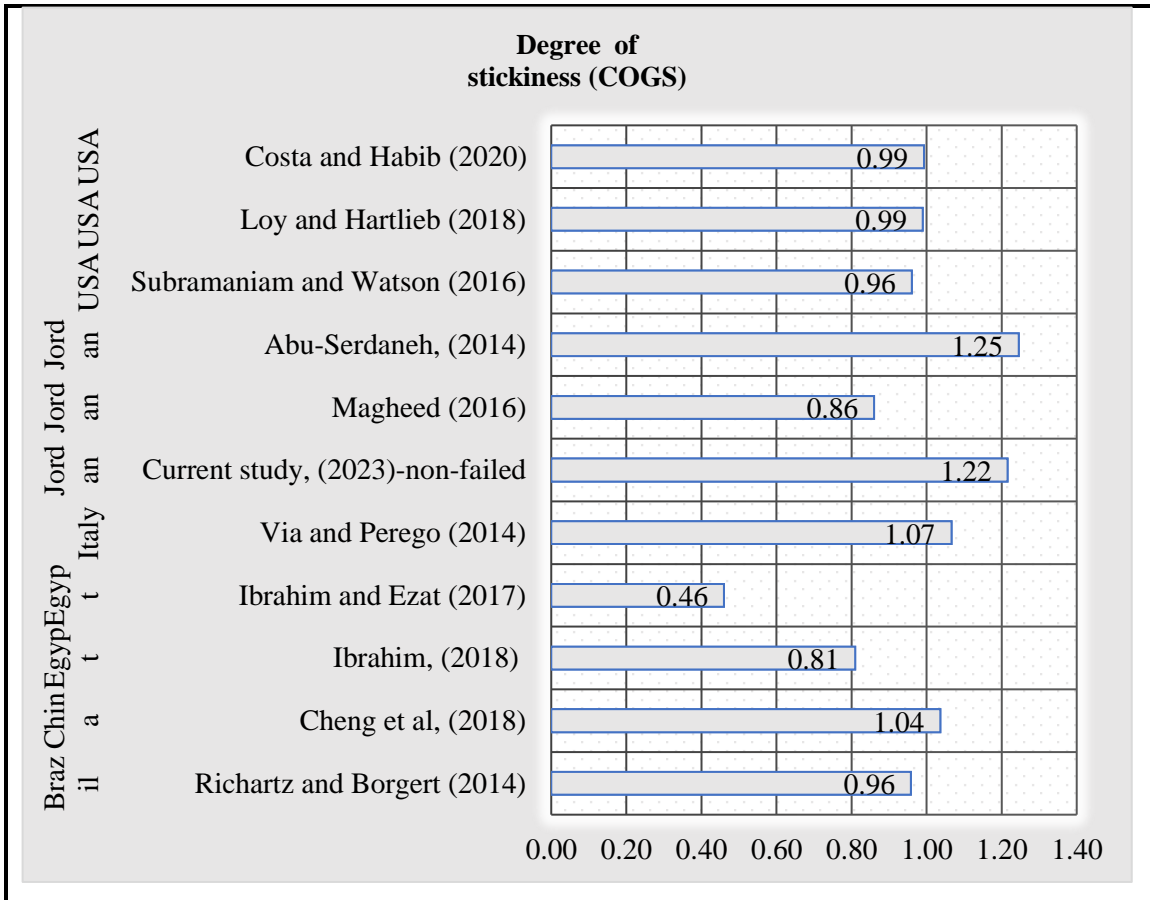
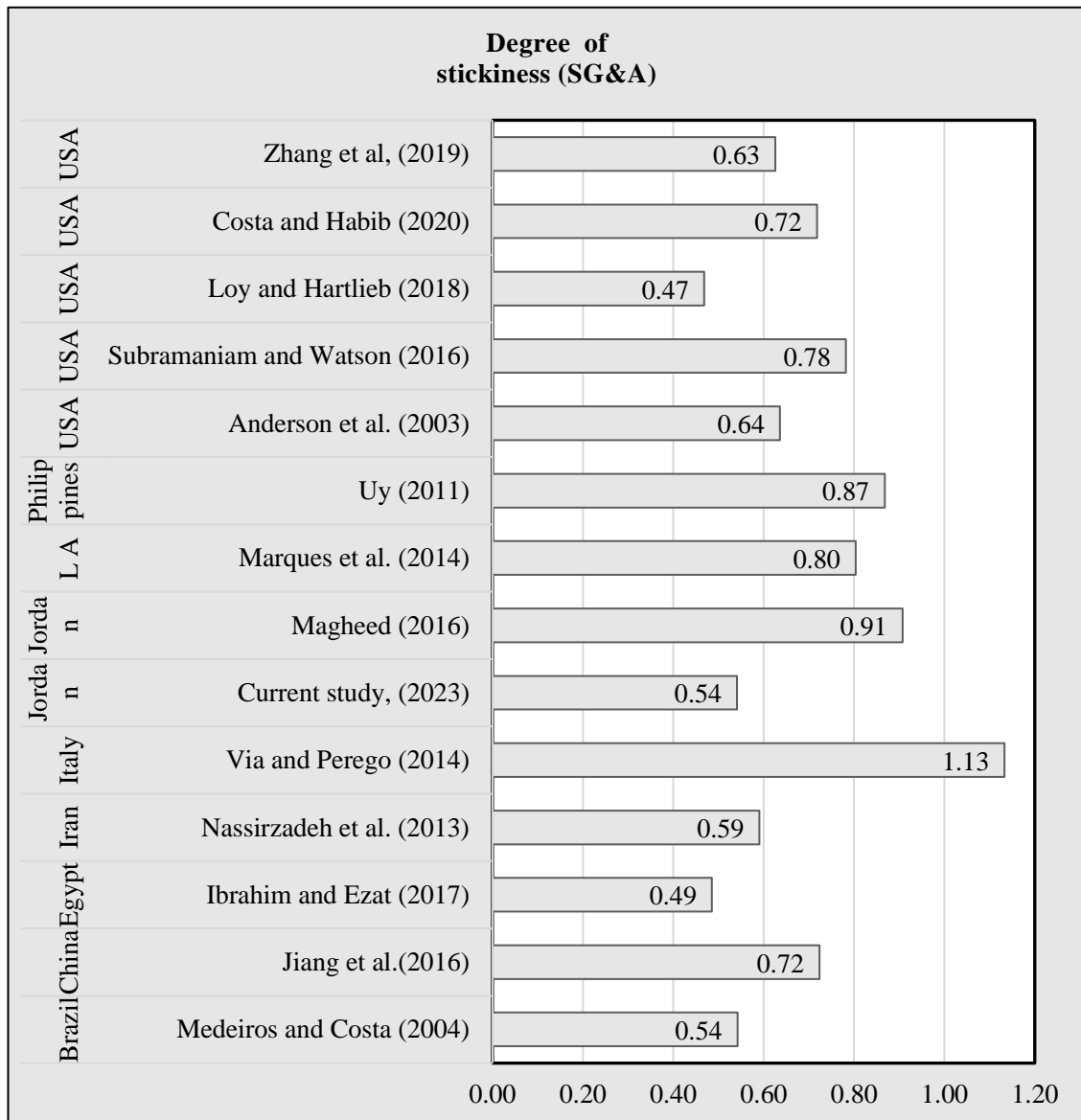


Figure (15)

Degree of Stickiness for.... continued





جامعة النجاح الوطنية
كلية الدراسات العليا

شدة سلوك التكلفة غير المتماثلة في الشركات الصناعية المدرجة
في بورصة عمان (ASE) وتأثيره على العائد على السهم

إعداد

مهند خيرى خالد ضميدي

إشراف

د. معز ابو عليا

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قدمت هذه الرسالة استكمالاً لمتطلبات الحصول على درجة الماجستير في المحاسبة، من كلية الدراسات العليا،
في جامعة النجاح الوطنية، نابلس - فلسطين.

2023

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الملخص

مصطلح "التكلفة اللزجة" يتعلق باستجابة التكلفة غير المتماثلة للتغيرات في النشاط. على وجه التحديد، يشير إلى حالة يكون فيها الانخفاض في التكلفة بسبب انخفاض حجم النشاط أقل من الزيادة في التكلفة الناتجة عن زيادة مكافئة في النشاط. بالنظر إلى هذا التعريف لظاهرة التكلفة اللزجة، فإن الهدف من الدراسة هو فحص مدى سلوك التكلفة غير المتماثلة في الشركات الصناعية الفاشلة وغير الفاشلة المدرجة في بورصة عمان خلال الفترة 2013-2019، وتحديدًا فيما يتعلق بتكلفة البيع والتكاليف الإدارية (SG&A) وتكلفة البضائع المباعة (COGS) والتكلفة الإجمالية (TC). بالإضافة إلى ذلك، تحلل الدراسة تأثير سلوك التكلفة غير المتماثل على ربحية السهم (EPS) وسلطت الضوء على التأثير السلبي لتكلفة البضائع المباعة على EPS.

استخدمت الدراسة نموذج الانحدار التجريبي واختبار Breusch-Pagan لتحليل بيانات اللوحة. أظهرت النتائج أن طريقة OLS المجمع كانت الأنسب للدراسة. تم استخدام نموذجين لدراسة سلوك التكلفة غير المتماثل وتأثيره على ربحية السهم (EPS).

كشفت الدراسة عن سلوك التكلفة غير المتكافئ السائد في الشركات الصناعية الأردنية، لا سيما في تكاليف العمولات العامة والإدارية. ومع ذلك، أظهرت المجموعة غير الفاشلة فقط سلوك تكلفة غير متماثل (مضاد

للاتصاق) في تكلفة السلع المباعة. هذا يسلط الضوء على أهمية اتخاذ القرارات الإدارية عند تعديل التكاليف استجابة للتغيرات في مستويات النشاط.

كشف التحليل الإضافي للقطاعات الصناعية الفردية عن اختلافات في سلوك التكلفة وأظهر انحرافات عن النتائج التي تم الحصول عليها عند دراسة القطاعات كعينة واحدة. لقد وجد أن إدراج التكاليف للزجة والمضادة للزوجة في التحليل، كان له تأثير كبير على عائد السهم (EPS) في مختلف القطاعات الصناعية. لذلك، تؤكد هذه النتائج على أهمية مراجعة النماذج التحليلية والتنبؤية في المحاسبة الإدارية ومحاسبة التكاليف والمحاسبة المالية، لدمج تأثير سلوك التكلفة للزج والمضاد للزوجة.

الكلمات المفتاحية: سلوك التكلفة غير المتماثل، التكلفة للزجة، مقاومة للزوجة، التنبؤ بالأرباح، تعديل التكاليف، التفاؤل، التشاؤم.