Cost stickiness: A systematic literature review of 27 years of research and a future research agenda

Abstract

Recent research has found that the cost response to an equivalent activity change is asymmetric. This study systematically reviews 80 research articles published in 36 journals during the last 27 years (1994–2020). Through three reviews, the study synthesizes, appraises, and extends knowledge on cost stickiness by covering prior studies' themes, historical development, research impact, theories employed, research country, costs examined, and models used to capture cost stickiness. Despite the evidence on cost stickiness drivers, this study highlights several unexplored determinants that require further research, including culture, idle capacity management, business risks, auditor type, lobbying intensity, and CEO demographic characteristics. As the consequences of cost stickiness are largely unexplored, we call for more research examining its implications at the macro-economic level and for ubiquitous accounting techniques such as CVP analysis, pricing decisions, and cost estimation. Although prior studies have focused on non-financial companies and developed economies, examining cost stickiness in financial firms and developing economies could enrich the literature. As studies are either descriptive or rely primarily on a single theoretical perspective such as the agency and cost asymmetry theories, we call for research that adopts a multi-theoretical framework. Overall, the study discusses several research streams, identifies several literature gaps, and outlines a promising and detailed future research agenda.

Keywords: cost behavior; cost stickiness; cost asymmetry; management accounting

1. Introduction

Cost behavior research examines how costs behave and respond to changes in activities and the implications of this response. Several techniques, such as cost-volume-profit analysis (CVP), earnings forecasts, and cost estimation methods, assume that cost behavior is linear. The traditional cost model assumes a linear relationship between cost change and activity change. If an activity changes by a certain percent, costs will change by an equal ratio, where the slope of the cost model is fixed within the relevant range.

Nevertheless, several authors believe that the relationship between costs and sales is not perpetually linear. First, Malcolm (1991) believes that many overhead costs do not change strictly in proportion to activity changes. Second, Rayburn (1993) argues that while accountants propose a linear relationship between variable costs and volume, economists suggest a non-linear relationship. Third, Cooper and Kaplan (1998) document that some costs increase more in response to activity increase than they decrease in response to the same amount of activity decrease. Fourth, Kama and Weiss (2013) and Banker and Byzalov (2014) argue that the real world is non-linear, and cost functions are often non-linear too. Moreover, Somers and Casal (2009) argue that the non-linear hypothesis is more practical than the linear hypothesis among variables and consider it as an alternative to this linear relationship. These arguments assert that costs may exhibit non-linear behavior that contradicts traditional cost models' assumptions. However, the empirical evidence on these arguments was scarce until Anderson et al. (2003) developed a model that enables researchers to discover the cost response to activity change to identify whether cost behavior is asymmetric. Anderson et al. (2003) find that the Selling, General & Administrative (SG&A) costs of a USA sample increase by 0.55% per 1% demand increase but decrease by only 0.35% per 1% demand decrease. Since then, several authors have applied their models and found similar results across different contexts.

The literature has discussed several reasons for sticky costs. Guenther et al. (2014) categorize the reasons for stickiness behavior into four groups: legal reasons, social and personnel policy reasons, firm and operating policy reasons, and psychological and agency-related reasons. Moreover, Chen et al. (2012) examine the empire-building hypothesis and claim that managers tend to grow the firm they manage beyond its optimal size. They explain that managers with empire-building incentives hire new resources too rapidly when activity increases but fire the slack resources too slowly when activity declines. In the long run, this kind of resource adjustment could create empires and cause sticky cost behavior.

Conversely, Dierynck et al. (2012) find that the pressure to meet or beat earnings benchmarks motivates managers primarily to decrease labor costs when demand declines,

rather than increasing labor costs when demand increases, which creates anti-sticky cost behavior. Anderson et al. (2003) explain that when sales decrease, managers may be optimistic that the decline is temporary and sales will recover soon. Therefore, managers hesitate to retire slack resources. Further, managers may feel that operating with slack resources could be cheaper than adjusting them, which induces managers not to abandon the slack resources created when sales have declined, leading costs to behave in a sticky manner.

This study's primary objectives and contributions are to provide a systematic literature review of cost stickiness research during the last 27 years, discuss the different aspects of the current literature, identify its gaps, and present a detailed future research agenda. To the best of our knowledge, three prior reviews of the cost stickiness literature have been published: Banker and Byzalov (2014), Guenther et al. (2016), and Banker et al. (2018). A limitation of Guenther et al. (2016) is that the authors focus solely on the determinants of cost stickiness by reviewing 13 research papers published before 2015. They list several determinants of cost stickiness, including legal reasons, social and personal policy, firm operating and employability policy, and psychological and agency-related reasons. Banker and Byzalov (2014) examine the behavior of operating costs around the world from 1988 to 2008. They discuss empirical issues regarding the validity of the cost stickiness findings and examine several hypotheses. However, they do not attempt to provide a detailed literature review of cost behavior (Banker et al., 2018, p. 189). To fill this gap, Banker et al. (2018) present a review of recent findings and insights reported by the cost management literature. However, their study mainly considers the implications of cost management and does not address many substantial elements such as the existence and drivers of cost stickiness, historical development of cost stickiness, quality of published work, theories employed, types of costs examined, and the financial structure of firms.

Unlike the previous three studies, our study provides a systematic literature review of 80 cost stickiness studies from 1994 to 2020. It also examines the development of cost stickiness research over the years, classifies studies as financial and non-financial, classifies the themes of studies into the existence, determinants, and consequences of cost stickiness, identifies the most frequently employed theories, reviews the types of costs that have been examined in the cost stickiness literature, and discusses various control variables included in it. Accordingly, we believe that this review extends the previous reviews by discussing different research streams, identifying several gaps in the literature, reviewing studies to date, and providing a detailed future research agenda. The review also contributes by providing answers to important research questions: What are the most and least frequently examined

determinants and economic consequences of cost stickiness? How has research on cost stickiness developed over time? What are the top theories used to explain the cost stickiness phenomenon? How is cost stickiness research distributed among developed and developing countries? What are the significant gaps in the cost stickiness literature? How might future researchers develop and extend the research on cost stickiness? What is the impact of cost stickiness research? What are the top 10 authors and studies with the most citations? And how were models developed and employed to prove cost stickiness?

This study continues as follows. Section 2 presents the review procedures and protocol. Section 3 offers the first review, which covers six aspects of the cost stickiness research. Section 4 presents the second review, which discusses the results reported by reviewed studies as classified into three main themes. Section 5 presents the third review, which discusses the empirical models used to discover cost asymmetry. Section 6 discusses literature gaps and presents a future research agenda, while section 7 concludes.

2. Review Procedures and Protocol

Conducting a systematic review requires an organized plan. Several authors such as Beer and Micheli (2018) and Franco-Santos and Otley (2018) have followed the approach introduced by Tranfield et al. (2003) to undertake a systematic review in management science. In addition to drawing on Trainfield et al. (2003), we also considered the guidelines presented by Short (2009) in undertaking this review. Following Tranfield et al. (2003), we created a review plan consisting of three steps: 1) Identify the need for a review of cost stickiness studies and develop the review protocol. 2) Classify the selected studies based on each study's theme and review the studies' cost asymmetry models and results. 3) Identify the gaps in the literature and create a future research agenda based on the review results.

Transfield et al. (2003, p. 215) state: "The protocol is a plan that helps to protect objectivity by providing explicit descriptions of the steps to be taken." We created a review protocol comprising six steps. First, we identified the most common keywords in the cost stickiness literature to be used to search for articles and used keywords such as "cost behavior," "cost stickiness," "cost anti-stickiness," "sticky cost," "anti-sticky cost," "asymmetric cost behavior," and "cost asymmetry" when searching for the reviewed articles. We also reviewed the references at the end of the articles to find additional relevant articles. Next, we identified the search engines and databases we would use to search for the relevant articles. These included top databases such as JSTOR, ScienceDirect, Scopus, Wiley, and Emerald, in addition to Google Scholar. We used the following criteria in selecting the articles to review. First, the

article should examine cost stickiness as a central research question. Second, the article should be published in English and in online academic and peer-reviewed journals. Working papers, e-theses, and articles published on SSRN were not selected. Third, the chosen articles should be published in ABS 2-4* ranked journals to ensure the quality of the research reviewed.

To achieve the study's objectives, we conduct three central reviews. The first is a review of six different aspects of the reviewed studies: classification of studies, historical development, research impact, theories employed, the frequency distribution of cost stickiness research by country, and the frequency distribution of the reviewed studies by cost category. This review revealed which costs are examined more, whether cost stickiness research has focused on developing or developed countries, research impact, the theories employed to explain the sticky cost behavior, etc. The second review classifies studies into three main themes: the existence of cost stickiness, the determinants of cost stickiness, and the economic consequences of cost stickiness. The third is a review of cost asymmetry models applied in cost stickiness research. Figure 1 illustrates the study's structure. The details of all the reviewed studies, such as the study's objectives, the study's results, the variables examined, the theories employed, etc., are summarized in Appendices A–F.

Insert Figure (1) here

3. Review of the Aspects of Cost Stickiness Research

3.1 Themes and Classifications of the Review Studies

Table 1 shows the reviewed studies classified into two categories. The first is based on the nature of the examined sample: non-financial or financial. The majority of studies, i.e., 89% (71 studies out of 80), examine cost stickiness in non-financial firms. Only two studies, Hall (2016) and Belina et al. (2019), examine cost stickiness in financial institutions, while seven studies, namely Banker and Chen (2006), Bruggen and Zehnder (2014), Subramaniam and Watson (2016), Rouxelin et al. (2018), Ciftci and Zoubi (2019), Han et al. (2019), and Höglund and Sundvik (2019), investigate a mix of non-financial and financial samples. One possible explanation for this imbalance is that financial institutions are highly regulated and follow stringent regulations such as the Basel rules, which reduces their ability to adjust their resources to make costs behave in a sticky manner. However, this possible explanation requires an in-depth investigation and empirical evidence from the financial sectors.

Insert Table (1) here

The second classification is based on the central issue of each study. We classified the reviewed studies into three groups based on each study's central theme. Table 1 shows the first group of 19 studies (24% of the reviewed studies), whose primary purpose is to provide empirical evidence on the existence of cost stickiness. All of these studies examine non-financial firms. Although Noreen and Soderstrom (1994, 1997) raised the non-linear cost behavior issue, Anderson et al. (2003) is the most cited study in this regard; it is the first to present a piecewise regression model that can discover whether costs behave in a sticky or anti-sticky manner (see Section 5 for more details). Anderson et al. (2003) make a significant contribution to the management accounting literature by providing confirmed empirical evidence on sticky cost behavior that contradicts the traditional assumption of the linear relationship between cost changes and activity changes.

The second set includes 50 studies (or 62%) that examine the determinants of cost stickiness, such as corporate governance (Chen et al., 2012; Ibrahim & Ezat, 2017; Zhang et al., 2019a; Li et al., 2020), ownership structure (Chung et al., 2019), regulations (Banker et al., 2013b; Belina et al., 2019), culture (Kitching et al., 2016), and competition (Li & Zheng, 2017; Cheung et al., 2018; Costa & Habib, 2020). Two of these studies examine financial firms (Hall, 2016; Belina et al., 2019), and four explore both the financial and non-financial sectors (Bruggen & Zehnder, 2014; Subramaniam & Watson, 2016; Höglund & Sundvik, 2019; Ciftci & Zoubi 2019). The third group includes 11 studies that examine the economic consequences of cost stickiness. Eight of these examine non-financial firms, and three examine mixed samples of financial and non-financial firms.

Overall, researchers are predominantly interested in the determinants of cost stickiness, not its implications. Investigating the effect of variables such as corporate governance, regulations, culture, and competition could yield an in-depth understanding of this phenomenon and why it exists, which could lead to potential remedies. Likewise, it is vital to provide evidence on sticky behavior that goes against the common assumptions about cost behavior. Although it is helpful to understand the economic consequences of such cost behavior, only eleven studies have investigated this question. Finally, we see too few studies conducted in the banking and financial sectors.

3.2 The Historical Development of Cost Stickiness Research

The first research on cost stickiness started in the last century, with Brasch (1927) presenting evidence that the cost curve differs for the same change of activity; this could be the

first evidence of cost stickiness (Guenther et al., 2014). After that, research on cost stickiness largely paused until 1994. Noreen and Soderstrom published their first paper in 1994, followed by a second paper in 1997. All 80 of the reviewed studies were published in the last 27 years, with an average of three studies per year. Over the first 20 years (1994 to 2013), only 12 studies (15%) were published, while 85% of the studies were published during the last seven years (2014–2020). The most active year in terms of research on cost stickiness was 2019, with 21 studies (22%), followed by 2018 and 2020, with 12 studies (18%) each. These figures indicate that researchers' awareness of and attention to cost stickiness have significantly increased since 2014. The first study to examine cost stickiness in financial institutions appeared in 2016. Hall (2016) examines the potential effect of ownership structure on cost stickiness in a sample of 5,682 bank-year observations in the USA during 1997–2006. The next study is that of Belina et al. (2019), who examine the influence of policy changes on the stickiness of SG&A costs in a sample of US financial institutions from 2002 to 2016. Furthermore, Bruggen and Zehnder (2014), Subramaniam and Watson (2016), and Rouxelin et al. (2018) examine mixed samples, which implies that research of cost stickiness in banks and financial institutions did not develop at the same pace and momentum as cost stickiness research in non-financial institutions.

3.3 Cost Stickiness Research Impact

Two approaches were followed to evaluate the research impact of the reviewed articles. First, we examined the 2018 ABS academic journal guide to determine the classification of the journals in which the reviewed articles appeared. According to this guide, the journals are ranked based on a 1-4* scale. For this review, we considered only the papers published in journals 2-4*. Second, we used the number of citations of each study after adjusting for the influence of time.

3.3.1 Research Impact by Journal Classification

The review shows that 80 research articles were published in 36 academic journals ranked 2-4* in ABS 2018. Twenty-five per cent of the reviewed studies (20 out of 80) are published in top accounting journals ranked at levels 4* and 4; 24% (19 out of 80) are published in journals ranked at level 3; 51% (41 out of 80) are published in journals indexed at level 2. Thus, almost half of the reviewed studies are published in top-ranked journals (levels 3 and 4).

Seven studies are published in the top-ranked accounting journal, *The Accounting Review*: Banker and Chen (2006), Weiss (2010), Dierynck et al. (2012), Banker et al. (2014a), Cannon (2014), Hall (2016), and Rouxelin et al. (2018). Six of these studies examine different

determinants of cost stickiness, while Weiss (2010) examines its effect on the accuracy of earnings forecasts. Three studies are published in the second-ranked journal, *Journal of Accounting and Economics*: Noreen and Soderstrom (1994), Banker et al. (2013b), and Banker et al. (2016). Three studies are published in the *Journal of Accounting Research*: Anderson et al. (2003), Kama and Weiss (2013), and He et al. (2020). Five studies are published in *Contemporary Accounting Research*: Balakrishnan and Gruca (2008), Chen et al. (2012), Holzhacker et al. (2015), Lee et al. (2019), and Liu et al. (2019). Finally, two studies are published in *Review of Accounting Studies*: Noreen and Soderstrom (1997) conduct empirical research using a sample of hospitals in the USA to examine the behavior of overhead costs, while Chen et al. (2019) investigate the influence of managerial expectations on cost stickiness.

3.3.2 Research Impact by Citations

The second approach to evaluating the research impact of cost stickiness research is through articles' citations. Google Scholar and other websites present the citation statistics for each study. A high number of citations could be an indicator of the influence and popularity of this study. However, the number of citations alone cannot be used as an indicator of research impact. Since older published studies collect more citations than newer ones, we must consider the time effect. Dumay et al. (2016) and other studies have employed a formula where Citations Per Year (CPY) is calculated as the actual citations divided by the citation years (calculated as 2020 – publication year), which gives the average citations per year after considering the time effect. Accordingly, we collected the raw numbers of citations for the 80 studies from Google Scholar and employed the time effect formula to calculate CPY.

Table 2 presents the citation numbers (as of 10th January 2021), citation years, CPY, and ABS journal ranking of each study. The total CPY of all the reviewed studies is 861, with an average of 11 per study; the total number of citations is 7,317 (as of 10th January 2021), with an average of 91 per study. The studies of Anderson et al. (2003), Weiss (2010), and Chen et al. (2012) have the highest number of citations (1,289, 594, and 457, respectively) and the highest CPYs (72, 66, and 42, respectively). In addition to garnering the highest number of citations, the three studies are published in top-ranked journals: Chen et al. (2012) is published in *Contemporary Accounting Research*, Weiss (2010) is published in *The Accounting Review*, and Anderson et al. (2003) is published in the *Journal of Accounting Research*. Anderson et al. (2003) make a significant contribution to the cost stickiness literature. They introduce a new model, which several subsequent studies adopt, to determine whether costs are sticky. Chen et al. (2012) are the first to propose the empire-building hypothesis to explain cost stickiness and

the relationship between agency problems and cost stickiness. Weiss (2010) presents a different model to that provided by Anderson et al. (2003) that can predict earnings changes.

Insert Table (2) here

Panel B shows that Hall's (2016) study has the highest number of citations among the financial studies, with a citation number of 37 and CPY of 7. The study is published in *The Accounting Review* and examines the influence of incentives created by ownership structure on the labor cost management decisions in a sample of banks. Panel C of Table 2 shows that Subramaniam and Watson's (2016) study has the highest CPY among the studies investigating cost stickiness using both financial and non-financial samples.

The 10 most cited studies are Anderson et al. (2003), Banker and Chen (2006), Calleja et al. (2006), Anderson et al. (2007), Balakrishnan and Gruca (2008), Weiss (2010), Chen et al. (2012), Dierynck et al. (2012), Banker et al. (2013b), and Kama and Weiss (2013), which together have 4,559 citations and 62% of the total citations. However, the top 10 studies based on the CPY, which takes into consideration the time effect, are Anderson et al. (2003), Weiss (2010), Chen et al. (2012), Dierynck et al. (2012), Banker et al. (2013b), Kama and Weiss (2013), Balakrishnan et al. (2014), Banker et al. (2014b), Banker et al. (2016), and Subramaniam and Watson (2016), which together have 427 citations and 50% of the total citations.

3.4 Frequency Distribution of Theories

Researchers employ several theories to explain a specific managerial behavior, to present the motivations behind one particular managerial decision, or to explain particular results. Figure 2 exhibits the frequency distribution of the theories employed or referred to in the reviewed studies. It shows that 27 theories are mentioned in 44 studies with a total frequency of 73, while 36 studies do not refer to any theory. The most frequently employed theories are cost asymmetry theory, agency theory, and economic theory.

Insert Figure (2) here

Figure 2 shows that the most frequently employed theory is cost asymmetry theory, which is used in 22 studies. This theory appears under slightly different names, but authors generally include the same arguments and explanations. For instance, Balakrishnan et al.

(2014), Li and Zheng (2017), and Lee et al. (2019) call it "asymmetric cost behavior theory," while Banker et al. (2014b), Banker et al. (2016), Kitching et al. (2016), and Cohen et al. (2017) call it the "theory of sticky costs." Li and Zheng (2017) mention the "theory of asymmetric cost behavior" and examine whether product market competition can affect the cost stickiness, while Lee et al. (2019) use it to explain how the political uncertainty during countries' elections affects cost stickiness behavior. This theory argues that costs become asymmetric when the cost response to an equivalent change in activity is asymmetric because of the managers' deliberate decisions to adjust the resources differently. In our view, the term "theory of cost asymmetry" is more informative than the term "theory of sticky cost," as asymmetry covers two possibilities: cost behavior can be sticky or anti-sticky. In contrast, the "theory of sticky cost " acknowledges the possibility of sticky cost behavior but ignores anti-sticky cost behavior. Anti-sticky cost behavior is identified when the cost response to an equal activity change is higher when the activity decreases than when it increases. For example, SG&A increases by 0.55% when activity rises by 1%, but it decreases by 0.75 when activity decreases by 1%. In contrast, if SG&A increases by 0.55% and decreases by 0.35% for an equal change of activity by 1%, it is defined as "sticky cost behavior."

The second most frequent theory is the agency theory, which explains the motivations behind managers' decisions, information asymmetry, the conflict of interest that results from ownership separation, and the role of corporate governance. This theory has been used in 13 studies. For example, Chen et al. (2012) use agency theory arguments when examining the relationship between cost asymmetry and agency problems. They argue that effective corporate governance systems could bring cost stickiness levels closer to the optimal cost response level. Ibrahim and Ezat (2017) argue that since cost stickiness results from managers' deliberate intervention in resource adjustments when the activity level changes, corporate governance could play a significant role in mitigating cost stickiness. Ibrahim (2018) uses agency theory to build hypotheses about the effect of board characteristics on cost stickiness. Hall (2016) and Chung et al. (2019) test the agency theory hypothesis that ownership structure could affect managerial decisions. Chung et al. (2019) examine whether institutional ownership could mitigate cost stickiness, while Hall (2016) examines ownership structure as a solution of agency theory to reduce agency costs.

Five theories have been employed two times each. For example, the signaling theory argues that managers may send signals to markets to change or confirm the perceptions of the company's market participants (Han et al., 2019; Costa & Habib, 2020). The theory is also relevant to their research questions, as they examine whether cost stickiness affects

management earnings forecasts. Eighteen theories have been referred to just once. For example, stakeholder theory, which focuses on stakeholders rather than shareholders, is mentioned by Habib and Hasan (2019). The theory is relevant to their research objectives, as they examine whether firms engaged in Corporate Social Responsibility (CSR) activities exhibit asymmetric cost behavior. Banker et al. (2016) use conservatism theory to explore the effect of cost stickiness on conservatism estimates. Venieris et al. (2015) use the intellectual capital theory to examine the potential relationship between cost stickiness and investing in intangible assets.

3.5 Frequency Distribution of Research Articles by Country of Interest

The review shows 80 studies examining 66 countries individually or as a part of a cross-country study: 38 are developed countries, while 28 are classified as developing countries. These countries have been examined 327 times: 249 times with a percentage of 76% in developed nations and 78 times with a percentage of 24% in developing nations. The average number of times each country has been examined is five (327/66). On average, each developed country has been examined 6.55 times (249/38), compared to 2.78 times (78/28) for each developing country.

The USA comes first, where cost stickiness has been examined 57 times, with a percentage of 17%, followed by Germany with nine times, and Australia, Belgium, Finland, Italy, and the UK with eight times each. The first seven developed countries (USA, Germany, Australia, Belgium, Finland, Italy, and the UK) dominate the cost stickiness research with a 32% share of the total (106/327). The only two studies that examine cost stickiness using financial samples are conducted in the USA, namely Hall (2016) and Belina et al. (2019), while six studies examining cost stickiness using both non-financial and financial samples also use firms listed in the USA; they are Banker and Chen (2006), Bruggen and Zehnder (2014), Subramaniam and Watson (2016), Rouxelin et al. (2018), Ciftci and Zoubi (2019), and Han et al. (2019). Examples of studies examining cost stickiness in Germany are Holzhacker et al. (2015), a single-country study; and Calleja et al. (2006), a cross-country study.

The review shows that cost stickiness has been examined in 28 developing countries 78 times, with an average of 2.78 times per country. China has been examined eight times; it is followed by two countries (Indonesia and Malaysia) that have been examined five times each, while ten countries have been investigated once each. Examples of studies examining cost stickiness in China include Xue and Hong (2016), Xu and Sim (2017), and Cheng et al. (2018), which are all single- country studies.

All the studies conducted in developing countries use non-financial samples. Research on cost stickiness is rare in the Arab region, as in developing countries. Only five studies examine cost stickiness in only three out of 22 Arab nations: Egypt, Jordan, and the UAE. Ibrahim and Ezat (2017) discuss the cost behavior of three costs in Egypt considering the corporate governance code applied in 2007. Ibrahim (2018) examines the effect of board characteristics on Egypt's cost stickiness in 2008–2013. We found only one study on the UAE: Zanella et al. (2015). The authors examine the behavior of SG&A and operating costs in 46 listed firms in the UAE stock market during the period 2002–2011. Overall, research on the USA dominates the cost stickiness literature, and the Arab region's cost stickiness research does not fit with the size of their economies.

3.6 Frequency Distribution of Studies by Cost Category

It is beneficial to review the different categories of costs examined in the cost stickiness literature. We find that the literature has examined the behavior of 18 various costs. Five of the cost categories (SG&A, operating costs, Cost of Goods Sold (COGS), total cost, and labor costs) dominate and have been examined in 85% of the studies. Together, SG&A and operating costs dominate the costs examined in the reviewed articles, accounting for 61% of all costs examined. One explanation for the domination of SG&A and operating costs in the cost stickiness literature is that they represent the companies' cost structure's main costs and more than 50% of the total costs of the non-financial companies. They are also more likely than other costs to be significantly affected by the managers' decisions to adjust resources when the activity changes, directly affecting costs' behavior.

Operating costs are examined 28 times in non-financial samples, but with different measurements. For example, 28 studies examine operating costs in general, such as Calleja et al. (2006), Kama and Weiss (2013), Bugeja et al. (2015), Holzhacker et al. (2015), Bradbury and Scott (2018), and Lee et al. (2019). Shust and Weiss (2014) measure operating costs in three different ways: first as sales minus income from operations after depreciation; second, operating expenses before depreciation; and third, operating costs paid in cash. Balakrishnan and Gruca (2008) examine operating costs after excluding depreciation costs, and Xu and Sim (2017) examine operating costs as sales minus operating income. Total costs are examined ten times. Subramaniam and Watson (2016) and Ibrahim and Ezat (2017) measure total costs as the sum of SG&A and COGS, while Rouxelin et al. (2018) measure total costs as the sum of SG&A, COGS, and labor costs. Labor costs are examined seven times. For example, Dierynck et al. (2012) analyze labor cost behavior in Belgium, Via and Perego (2014) in Italy, Prabowo

et al. (2018) in 22 European countries, and Hall (2016) in the USA. Unlike other studies, Yang (2015) measures labor costs in two different ways: labor costs of SG&A plus depreciation costs of SG&A, and labor costs of COGS plus depreciation costs of COGS.

On the other hand, some costs are examined just once. For example, Villiers et al. (2014) examine the cost behavior of audit fees in the USA; to the best of our knowledge, this is the only study to explore such a relationship. Investigating the behavior of audit fees could help in understanding the audit pricing and audit fees market competition. Banker et al. (2016) examine the behavior of interest expense and depreciation expense in the USA. Chen et al. (2017) may be the only study to examine the behavior of administrative and public relation expenses.

4. Review of Cost Stickiness Research Results

In the second review, we summarize the reviewed studies' objectives, hypotheses, and results. The reviewed studies are classified into three main research themes: empirical evidence on cost stickiness, determinants of cost stickiness, and economic consequences of cost stickiness.

4.1 Empirical Evidence on Cost Stickiness

Although some studies argued that cost behavior is not necessarily linear all the time, there was a need to prove that. Table 1 shows 19 studies, representing 24% of the reviewed studies, whose primary objective is to prove the existence of cost stickiness. The early research on cost stickiness was conducted using USA firms. Noreen and Soderstrom (1994) were among the first to examine cost stickiness, assuming that the linearity assumption is at the heart of almost all cost accounting systems. The study focuses on whether overhead costs are moving proportionally to activity change, and the results present evidence that overhead costs do not behave proportionally to activity level. Noreen and Soderstrom (1997) published another paper using the same sample of US hospitals, but for 1977–1992 and using time-series behavior of overhead costs. They find that overhead costs increase more than costs decrease for the same change in activity level. The authors conclude that standard costing systems such as Activity Based Costing (ABC) assume that cost behavior is linear, which could overstate the influence of activity change on cost.

In 2003, Anderson et al. (2003) presented a paper that has attracted many researchers to cost stickiness. They offer a simple model and rational hypotheses to discover cost stickiness empirically. They state (p. 52): "If the traditional fixed- and variable-cost model is valid,

upward and downward changes in costs will be equal…." They examine the SG&A of a sample of 7,629 US firms during the period 1979–1998. The results show that when the sales level increases by 1%, SG&A costs increase by 0.55%, but if sales fall by the same amount, SG&A costs decrease by only 0.35%, which is clear evidence that the cost response to the same level of activity change is different. The study also presents the resource-adjustment hypothesis, which explains the reasons for cost stickiness. According to this hypothesis, managers do not always behave the same way with resources when activity changes equally. They may be reluctant to adjust the resources downward during prosperity periods or be optimistic about demand recovery during recessionary periods. The cost of adjusting resources due to activity changes could be more significant for hiring or firing employees, resulting in a different cost response when activity changes equally.

In a different environment and unlike the above studies, Via and Perego (2014) explore four behavior costs—SG&A, COGS, operating costs, and labor costs—in Italy during the period 1999–2008. Applying the models of Anderson et al. (2003) and Weiss (2010), they provide interesting evidence on the stickiness of operating and labor costs and on the anti-stickiness of SG&A and COGS. In China, Cheng et al. (2018) examine the SG&A behavior of a sample of 241,982 private firms with a vast number of firm-years, i.e., 1,046,294 firm-year observations from 1999 to 2007, which could increase the models' estimation accuracy compared with the small samples examined by other studies. The results present empirical evidence on the stickiness of SG&A in large firms, but anti-sticky behavior is shown in small and medium firms. On average, SG&A is found to behave in an anti-sticky manner where SG&A costs increase by 0.55% but decrease by 0.57% for a 1% sales change.

In a different cost context, Villiers et al.'s (2014) study may be the only one to examine audit fees' behavior. They use a sample of 30,298 firm-years during the period 2000–2008 in the USA and apply Anderson et al.'s (2003) model. The findings indicate that audit fees' behavior is sticky: audit fees reacted more quickly to changes leading to its increase than changes leading to its decrease. Habib and Huang (2019) may be the only study to investigate cost stickiness in charities. They prove that cost stickiness can appear not only in profit firms but also in charities. An impressive result is that cost stickiness is prevalent in large charities, while small charities show anti-sticky cost behavior. This could open doors for future researchers to extend the research in this area. Finally, Wu et al. (2020) further investigate cost stickiness in Taiwan's public sector, where public schools' operating costs exhibit a sticky cost behavior.

4.2 Determinants of Cost Stickiness

4.2.1 Corporate Governance and Management Control Mechanisms

Table 1 exhibits 50 studies, representing 62% of the reviewed studies, that examine different variables affecting cost stickiness, classified under 13 categories. The review covers ten studies that attempt to determine the role of effective corporate governance and internal control in mitigating cost stickiness. First, Calleja et al. (2006) is an international study conducted in four countries with different regulations and rules: France, Germany, the UK, and the USA. Across the four countries, operating costs are found to be sticky. However, the degree of cost stickiness was lower in the UK and the USA than in France and Germany. The authors explain that the common-law system of corporate governance in the UK and the USA emphasizes the notion of shareholders' value maximization and optimizing capital markets' role in realizing this goal. These firms are under intense pressure to consider shareholders' interests. However, in France and Germany, the code law governance imposes less pressure on corporate market control, explaining the high cost stickiness in these countries.

In the USA, Chen et al. (2012) explore whether corporate governance affects the relationship between agency problems and SG&A behavior. The primary study's hypotheses are built on empire-building and downsizing assumptions, where some managers are keen to increase their companies' size by retaining slack resources. They find that cost stickiness is positively related to managers' empire-building incentives, which make them reluctant to retire slack resources when activity declines, which in turn causes cost stickiness. However, the positive relationship between agency problems and stickiness is more pronounced in weaker corporate governance. The findings indicate that agency problems shift cost stickiness from its optimal level and that strong corporate governance could mitigate the influence of agency problems on SG&A stickiness.

In Australia, Bugeja et al. (2015) explore the cost behavior of operating costs using a sample of 171,095 firm-years during the period 1990–2010. They compare the Australian results with the US results and consider the effect of corporate governance. They adopt Chen et al.'s (2012) arguments that strong corporate governance can mitigate agency costs and prohibit empire-building behavior. The Australian findings indicate that cost stickiness is lower when Chief Executive Officers (CEOs) face a short horizon in firms with a higher percentage of non-executive directors and in non-CEO duality firms. The results also indicate that cost stickiness increased after firms adopted IFRS but was less pronounced under strong corporate governance systems. In China, Xue and Hong (2016) examine whether earnings

management and corporate governance affect cost behavior. The samples with no earnings management evidence are found to exhibit more cost stickiness. The separation of CEO and chairman, good external governance, and managerial ownership are associated with more cost stickiness. However, the joint impact of earnings management and corporate governance is found to be associated with less cost stickiness.

In developing economies, two studies examine the role of corporate governance in reducing cost stickiness in Egypt. Ibrahim and Ezat (2017) examine the effect of corporate governance reforms in Egypt in 2007 on the behavior of SG&A, COGS, and total cost using three samples of firms during the period 2004–2011. SG&A shows sticky behavior before the governance code, but anti-sticky behavior after the code. In contrast, COGS and total cost show sticky behavior before and after the governance reforms, but the extent of stickiness was more significant after the governance reforms than before. The other study, Ibrahim (2018), examines COGS behavior and the effect of board characteristics between 2008 and 2013 and concludes that several board aspects affect cost stickiness. In line with Bugeja et al. (2015), the results indicate that firms with boards with role duality show more cost stickiness. However, unlike Bugeja et al. (2015) and Chen et al. (2012), the Egyptian context results indicate that firms with a higher percentage of non-executives on their board show more cost stickiness. In line with Chen et al. (2012) in the US context, Ibrahim (2018) finds that firm-years with high institutional ownership show a lower cost stickiness.

Four recent studies examine cost stickiness from the governance perspective: Cai et al. (2019), Höglund and Sundvik (2019), Zhang et al. (2019a), and Li et al. (2020). One of Höglund and Sundvik's (2019) primary objectives is to investigate external auditors' impact on cost stickiness, especially when managers have income-shifting incentives. They provide evidence that cost stickiness is less prevalent when income-shifting incentive exists in the audited firms, with these firms demonstrating less cost stickiness than unaudited firms. Furthermore, Li et al. (2020) examine whether management control mechanisms such as risk-taking incentives influence cost stickiness in the USA. The results indicate that risk-taking motives push executives to make operational decisions that lower cost stickiness and create a more significant cost elasticity. Future studies can extend this research by investigating the role of management control systems in alleviating cost stickiness.

Overall, this group of studies argues that corporate governance and internal control can significantly affect managers' decisions regarding resource adjustments due to activity changes, bringing the stickiness closer to the optimal cost value. Most of the studies' results provide evidence of the positive role of corporate governance. However, this empirical

evidence is based on quantitative analysis; it would have been more informative to ask the managers responsible for adjusting the resources directly about their reactions when activity changes and to explore the effect of different corporate governance structures. A mixed approach is highly recommended for future research.

4.2.2 Ownership Structure

Table 1 shows three studies that examine the influence of ownership structure on cost stickiness, two using non-financial firms in the EU and the USA, and one using samples of banks in Argentina, Brazil, Canada, and the USA. Prabowo et al. (2018) explore the effect of state ownership on labor cost stickiness using a sample of 40,418 non-financial firm-years in 22 European countries between 1993 and 2012. Generally, the labor cost is sticky, but state-owned firms exhibit higher labor cost stickiness than private firms. The authors explain that state intervention in managers' employment decisions via state ownership prohibits managers from laying off employees when activity decreases to prevent employment rates from declining, whereas when activity increases, state ownership can encourage managers to hire more employees to meet the high demand, reducing the unemployment rates. Similarly, Hall (2016) examines the influence of public and private ownership on labor cost management, but the study discusses four bank samples from 1997 to 2006 in four countries: Argentina, Brazil, Canada, and the USA. The results indicate that public and private bank managers treat resources differently. Public banks reduce labor costs to avoid earnings declines when activity decreases, while private banks are found to reduce labor costs to comply with the required regulatory capital.

In the USA, Chung et al. (2019) investigate the effect of institutional ownership as a governance and monitoring mechanism on cost stickiness using a sample of 39,083 non-financial firm-years. They find that long-term institutional investors can reduce cost stickiness, which is consistent with the results found by Chen et al. (2012) in the USA and Ibrahim (2018) in Egypt. The results also imply that relative to state ownership, private ownership can reduce cost stickiness, which are consistent with results reported by Prabowo et al. (2018) in the EU.

Although ownership structure is one of the corporate governance mechanisms that could affect managers' decisions, it has not been examined adequately in the cost stickiness context. Chen et al. (2012) and Ibrahim (2018) examined institutional ownership's role in cost stickiness only in additional analyses. Although cost stickiness is likely to be affected by ownership intervention in the managers' decision regarding resource adjustment, we found

only three studies that address it as the central research theme, which suggests another gap in the cost stickiness literature.

4.2.3 Regulations and Tax

Belina et al. (2019) examine the effect of Medical Loss Ratio (MLR) regulatory policy change on SG&A cost stickiness using a sample of 22 health insurance firms in the USA during the period 2002–2006. They find evidence that the stickiness of SG&A declined significantly after firms complied with the minimum MLR target requirements. They also notice that during the period of revenue declines, SG&A costs decreased more after the Patient Protection and Affordable Care Act (ACA) than before the ACA. In the non-financial sector, five studies comply with the review criteria. Banker et al. (2013b) investigate the effect of Employment Protection Legislation (EPL) on the stickiness of operating costs using samples of 15,833 firms and 128,333 firm-years in 19 OECD countries during 1990–2008. The EPL provisions are used as a proxy for labor adjustment costs. They present clear evidence that operating costs' stickiness is positively related to the strictness of country-level EPL provisions. They explain that strict labor provisions that protect employees' rights may prohibit managers from adjusting resources by reducing the slack resources among employees when activity declines, affecting cost behavior.

Holzhacker et al. (2015) explore the influence of fixed-price regulations on operating costs' stickiness in Germany. They expect that this regulation decreases cost stickiness, while the fixed-price regulation change increases operating risk and cost pressures. Generally, German hospitals are found to reduce cost stickiness due to changes in their regulatory environment. However, state hospitals continue to exhibit cost stickiness even after fixed-price regulations.

In the taxation literature, Xu and Zheng (2018) examine the relationship between tax avoidance practices and the stickiness of SG&A costs in the USA. They argue that tax avoidance helps managers save cash, and these cash savings might induce managers to retain slack resources when activity declines. Tax avoidance might also mitigate managers' concerns regarding adjustment costs because of cash savings. The results indicate a negative relationship between tax avoidance and cost stickiness. Another study in the tax context, Haga et al. (2019), explores the relationship between SG&A stickiness and corporate tax rate cuts using a sample of 69,876 firm-years during 2011–2016 in the OECD countries. The common-law countries and high tax compliance countries show less income-decreasing cost behavior, and the results reveal an income-decreasing cost behavior before the tax rate cuts.

Overall, the first three studies conclude that imposing strict regulations such as MLR, EPL, and fixed-price regulations could mitigate managerial discretion and prohibit managers from adjusting resources when activity declines, reducing cost stickiness. The other two studies find that tax avoidance practices and tax rate cuts could affect both cost stickiness and managers' decisions to adjust resources when activity declines significantly.

4.2.4 Culture, Religion and Strategic Policies

Different cultures across different countries could influence several managerial decisions, including behavior decisions. However, only one study that meets the review criteria addresses the effect of culture on cost stickiness. Kitching et al. (2016) introduce a cross-country study to examine whether national culture affects operating costs' stickiness using samples of 245,348 firm-years during the period 1990–2013 from 39 countries. They find evidence that operating costs are less sticky in countries with higher masculinity, long-term orientation, and uncertainty avoidance. Despite the substantial influence of culture, empirical evidence of its effect on cost stickiness is rare. Kitching et al. (2016) recommend investigating the effect of different cultural dimensions on cost stickiness. Ma et al. (2019) may be the only study that considers religion in the cost stickiness context. The authors find that religion reduces SG&A stickiness in a USA sample and that the negative relation between religion and cost stickiness improves firms' value. In the US context, Ballas et al. (2020) explore how SG&A stickiness could be affected by firms' strategic choices. They provide evidence of SG&A stickiness in prospector firms but SG&A anti-stickiness in defender firms.

4.2.5 Competition and Stakeholders' Orientation

Five studies examine the effect of competition on cost stickiness. Li and Zheng (2017) discuss whether product market competition affects the stickiness of operating costs. They argue that firms' investment and cost retention decisions respond, to some extent, to the firms' interactions with their rivals in markets. The evidence shows that operating costs' stickiness is highly correlated with product market competition. This relationship is more pronounced in financially strong firms, firms with optimistic managers, and single-segment firms. The second study, Cheung et al. (2018), uses a sample of 172,427 listed firms of 38 countries during the period 1990–2012 to examine the effect of external competition on the stickiness of SG&A costs. The study argues that both internal and external factors affect managers' decisions to adjust resources when activity changes, and therefore external factors such as competition should be examined by researchers. The evidence shows that cost stickiness is

more pronounced in a competitive environment with higher entry costs, product differentiation, and firms with larger market size. As the authors explain, managers may be subject to higher agency costs in environments with more product differentiation and may adjust resources when activity increases, while they are more reluctant to adjust the resources significantly when activity declines, which in turn increases cost stickiness. Costa and Habib (2020) use a sample of US firms to investigate whether the relationship between trade credit and sticky costs is moderated by product market competition and customer concentration. Firms operating in non-competitive markets with more significant trade credit exhibit a lower degree of cost stickiness. Lee et al. (2020) find that SG&A stickiness is triggered by banking competition in the USA. In another context, Liu et al. (2019) find that customer orientation and employee orientation can positively affect cost stickiness. However, customer orientation is stronger in firms with a stronger governance structure, while the impact of employee orientation is more prevalent in firms with weak governance structures.

4.2.6 Social, Organizational, and Intellectual Capital; Sustainability Activities

The review covers five studies that examine the influence of community, social, and intellectual capital on cost stickiness. In the US context, Hartlieb et al. (2019) investigate whether community social capital as a socio-economic factor could affect the stickiness of operating costs using a sample of 7,766 US firms with 52,870 firm-years between 1990 and 2014. Community social capital could restrain managers' opportunistic decisions to adjust resources when demand changes. As they expected, firms located in US counties with a high level of social capital present less cost stickiness. In the Australian context, Yang (2019) examines a sample of firms in the 1990–2016 period to explore whether intellectual capital (IC) efficiency affects cost stickiness. The study assumes that IC can bring several economic benefits to firms and claims that if the IC is efficient, managers can be optimistic and retain unutilized resources when activity declines. The benefits of having efficient IC could absorb the cost of unutilized resources when activity decreases. The finding that cost stickiness increases in firms with more efficient IC provides empirical evidence consistent with the study's argument. Another study in the US context, Venieris et al. (2015), explores the influence of organizational capital on SG&A stickiness. They argue that firms with more intangible assets have higher slack and unutilized resources than firms with less intangible assets. Since these assets' adjustment costs are substantial when activity changes, this increases the managers' reluctance to modify these resources and raises the cost stickiness level. The findings indicate that firms with more organizational capital present more sticky

SG&A costs, while firms with low levels of organizational capital show anti-sticky cost behavior. We note that the three studies examine different types of capital: community social capital, organizational capital, and intellectual capital, assuming rational hypotheses. However, more evidence is still required to explore the influence of these types of capital on cost stickiness in different environments.

Habib and Hasan (2019) examine whether engagement in CSR activities presents stickier cost behavior. Even when the activity level declines, these activities should not be suspended, as they are social activities. The evidence shows that operating costs increase by 0.87% but decrease by 0.79% for a 1% activity change, while strategic CSR costs show more cost stickiness than tactical CSR costs. Economic growth is found to affect cost behavior: during the recession period, CSR costs exhibit anti-sticky behavior, but in expansion periods, they act in a sticky manner. Although the authors' hypothesis—that managers' decisions to reduce social activity resources should not be affected by changes in the firms' operating activities—makes sense, they find little evidence of this.

Finally, Golden et al. (2020a) may be the only study to explore how Environmental, Social, and Governance (ESG) sustainability factors might influence cost behavior. There is evidence that the cost stickiness level increases with sticky CSR activities, while non-sticky sustainability factors do not have a similar influence. One impressive result is that firms with greater cost stickiness and sticky CSR activities show more significant ESG reporting.

4.2.7 Uncertainty and Risk

Researchers argue that uncertainty and risk affect managers' decisions about resource adjustments and significantly affect cost behavior. Since managers are uncertain about future demand fluctuations, they are reluctant to adjust resources when the activity level changes, which causes costs to behave in a sticky or anti-sticky manner. When the demand declines, they might retain slack resources hoping that the demand will recover soon, creating stickiness. However, if they were confident that demand would not recover, they would retire slack resources, which would mitigate cost stickiness. Despite the importance of uncertainty and risks as reasons for cost stickiness, the literature presents only three studies on the effects of uncertainty and risks on cost stickiness. Lee et al. (2019) conduct a cross-country study using a large sample of 266,538 firm-years from 56 countries during 1989–2012. The authors hypothesize that cost stickiness is greater in election years due to the uncertainty surrounding elections. The results were consistent with the study's hypothesis: cost stickiness increased during election years relative to non-election years. During election years, managers were

reluctant to adjust resources and decided to postpone adjustments even when activity changed. The other study was presented by Banker et al. (2014a), who explore the apparent relationship between demand uncertainty and cost behavior at the firm level and the industry level. They hypothesize that firms with higher demand uncertainty tend to have a more rigid cost structure with higher fixed costs but lower variable costs. They provide evidence that higher demand uncertainty could be a reason for an increased level of fixed input in the cost structure and for fewer variable costs, due to the reluctance of managers to adjust resources downward when activity declines. This increases the ratio of fixed costs and causes costs to behave in a sticky manner.

On the other hand, the literature does not present enough studies examining the potential influence of business risks on cost stickiness. Li and Zheng (2018) might be the only study to explore one of the risks facing different businesses. The authors find evidence that when activity declines, managers are more likely to reduce operating costs more aggressively in the presence of high rollover risk, which implies that cost stickiness decreases in the presence of rollover risk. Different sorts of risks could affect managers' resource-adjustment decisions. Future researchers could extend and develop the cost stickiness literature from this perspective.

4.2.8 Earnings Targets and Managerial Incentives and Growth Expectations

Dierynck et al. (2012) analyze the behavior of labor costs and whether the market pressure to meet or beat zero earnings could be a reason to change resource-adjustment decisions when demand changes. The study's central hypothesis is that managers under pressure to meet or beat the zero earnings benchmark will behave differently when activity changes. They are likely to adjust resources upward to a smaller extent when activity increases but significantly adjust resources downward when activity declines to save costs. Although Anderson et al. (2003) hypothesize that adjustment costs could make managers reluctant to retire slack resources when activity falls, Dierynck et al. (2012) assume that managers who are under pressure to meet or beat the zero earnings benchmark are likely to retire more resources when activity declines, which brings cost behavior to the optimal level and reduces cost stickiness. Dierynck et al. (2012) find that firms with small profits fire employees who are not costly to fire. Firms that report healthy profits limit the number of dismissals to protect their reputation; instead, they reduce the number of working hours when activity declines.

Kama and Weiss (2013) explore the influence of managers' incentives to avoid losses or meet earnings targets on their decisions to adjust resources when activity changes, which in

turn affect cost behavior. The authors present evidence that incentives to achieve earnings targets affect managers' decision to reduce cost stickiness. Managers are more likely to retire slack resources when activity declines if they have incentives to avoid losses or meet earnings forecasts, which reduces the extent of cost stickiness.

The two studies present similar results in different environments. Their results confirm the argument that managerial incentives to avoid losses or earnings declines or to meet earnings targets are likely to encourage managers to hire fewer resources when activity flourishes and retire more slack resources rapidly when activity declines, which leads to less cost stickiness in the end. Unlike the other determinants of cost stickiness, the incentives to avoid losses or to meet earnings targets could affect cost stickiness positively. For example, unlike the effect of uncertainty about future demand, which makes managers reluctant to retire slack resources, the impact of meeting or beating earnings targets encourages managers to hire fewer resources when activity increases and retire more resources when activity declines.

One recent study, Chen et al. (2019), examines the influence of managerial expectations about future demand changes on cost stickiness using a USA sample during 1994–2014. They hypothesize that when optimistic managerial expectations are accompanied by a low level of unused resources and high adjustment costs, the costs are more likely to behave in a sticky manner. They examine managerial expectations, taking into consideration the unused resource level and the adjustment costs. The results confirm their hypothesis that the incremental effect of managerial expectations is more substantial when adjustment costs and unused resource levels are high. In contrast, when these levels are low, they find no evidence of the effect of managerial expectations in this context. Finally, Silge and Wöhrmann (2019) explore how long-term growth expectations affect cost behavior. They find evidence that sticky cost is positively correlated with high long-term growth expectations.

4.2.9 CEO Compensation Policy and Overconfidence

The literature includes one study that examines CEOs' compensation policy as a determinant of cost behavior. Bruggen and Zehnder (2014) consider the alignment of executives' and owners' interests through equity-based compensation as a factor that could affect cost stickiness. The authors present evidence that when an equity-based compensation policy manages CEOs' compensation and when the interests of CEOs and investors are aligned, managers are more likely to make resource-adjustment decisions that increase cost stickiness. The authors argue that this finding weakens the hypothesis, introduced by Chen et al. (2012), that empire-building is a reason for cost stickiness.

On the other hand, Yang (2015) may be the only study to examine the impact of bidder CEO hubris and overconfidence in merger events on cost stickiness in Korea. The study's central hypothesis is that bidder CEOs who overestimate a merged firm's growth are more likely to retain slack resources when activity falls than are CEOs of stand-alone firms, and that optimistic and overconfident bidder CEOs result in more cost stickiness. The results are consistent with the study's hypothesis that when activity falls, optimistic and overconfident CEOs are more likely to handle resources in a manner that increases cost stickiness, which is consistent with hubris theory. More recently, Hartlieb et al. (2020) find that sticky cost behavior is positively associated with generalized trust.

4.2.10 Industry Effect and Macroeconomics

Subramaniam and Watson (2016) examine the behavior of three costs, SG&A, COGS, and total costs, to see whether the industry could be a determinant of cost stickiness. They examine cost behavior in four different sectors: merchandising, financial, manufacturing, and services. They present evidence that firms listed in the service industry exhibit SG&A stickiness, while financial industry firms do not. They find that COGS is sticky in financial firms, but not in service firms. Manufacturing firms show the highest cost stickiness, while merchandising firms show the lowest cost stickiness. The study concludes that the nature of the industry could be a determinant of cost stickiness. In addition to Ibrahim (2015), Stimolo and Porporato (2019) consider the macroeconomic effects on cost behavior. They argue that Argentina is a country with unexpected macroeconomic changes. They find that SG&A behaves in a sticky manner, and this behavior differs based on the economic conditions and industries.

4.2.11 Idle Capacity Management and Skilled Labor

Cannon (2014) examines a sample of 504 firm-quarter observations of firms from the USA's air transportation industry from 1992 to 2007 to explore the behavior of total capacity costs. The study provides evidence that model specifications can affect cost behavior; it argues that using revenues as a proxy for cost-generating activities results in sticky cost. The author also finds that managers add more capacity when activity increases, but when activity falls, they lower selling prices and do not reduce capacity, which results in cost stickiness. On the other hand, managers save more costs by removing capacity when activity falls than they save by removing capacity when activity grows, which causes anti-stickiness. Overall, the firm's idle capacity management could be a determinant of cost behavior.

Golden et al. (2020b) may be the first study to use a new proxy for labor adjustment costs (reliance on skilled labor) to examine this proxy's effect on cost stickiness. They find that the index is positively associated with firm-level cost stickiness. Managers may be reluctant to fire employees with high skills when demand declines. Investigating the influence of labor-skills structure is a new research area that has not yet been adequately examined in the cost stickiness context.

4.2.12 Cost Structure and Operating Lease Expenses

Balakrishnan et al. (2014) examine cost structure as a determinant of cost response to activity changes and ask whether cost structures with more fixed or controllable costs could affect cost response differently. They find that SG&A costs increase more than they decrease for the same activity change and that the fixed-costs proportion of the cost structure leads to non-stationary behavior in cost elasticity, which could mislead researchers when they interpret results. The authors also conclude that the log-specification models presented by Anderson et al. (2003) and others to detect cost stickiness could result in biased results. They recommend that researchers consider the impact of cost structure on short-term and long-term cost management decisions and be cautious when interpreting results. On the other hand, Cook et al. (2018) explore whether operating lease expenses are a determinant of cost stickiness and find evidence that they are.

4.2.13 Prior Sales Changes

Banker et al. (2014b) examine the moderating effect of prior sales changes on cost stickiness. The study presents a modified theory of cost stickiness: when prior sales increase, SG&A costs behave in a sticky way, but when previous sales decrease, SG&A costs behave in an anti-sticky manner. The authors confirm these results with different costs such as COGS, research and development, and other SG&A. In a robustness analysis, they also examine two years of prior sales changes rather than only one and obtain similar results. The results also confirm the other studies' arguments that optimistic demand expectations are determinants of cost stickiness, especially with previous sales changes. In a similar context, Ciftci and Zoubi (2019) explore the influence of sales change magnitude on cost behavior in the USA, finding evidence that conditional on a prior sales increase, small current sales changes could lead to greater cost stickiness, while large current sales changes could lead to less stickiness. If previous sales changes are considered, small current sales changes can lead to higher cost anti-stickiness, while large current sales changes could lead to less cost anti-stickiness.

4.3 Economic Consequences of Cost Stickiness

The literature includes 11 studies, representing 14% of the reviewed studies, that examine cost stickiness from different dimensions. Eight studies are conducted in non-financial sectors, and three use mixed samples of financial and non-financial firms. Six studies examine cost stickiness in the earnings-forecasting context, while one relates it to conservatism, and one relates it to the prediction of the unemployment rate. First, Weiss (2010) explores the market implications of cost stickiness, investigates how cost stickiness affects analysts' earnings forecasts, and examines the market reaction to earnings announcements. As Weiss (2010) expected, cost stickiness reduces the accuracy of the analysts' earnings prediction model. Concerning the market reaction, firms with cost stickiness have a weaker market reaction to announcements of earnings surprises. The study provides evidence on the negative market consequences of cost stickiness that analysts and investors should consider. In the same context, Ciftci et al. (2016) investigate whether analysts include information on cost variability and cost stickiness when preparing earnings forecasts and the implications of cost stickiness for the accuracy of earnings forecasts. They find evidence that including information on cost stickiness and cost variability in the forecast models leads to substantial, systematic, and large forecast errors, confirming the negative implications of cost stickiness.

Ciftci and Salma (2018) introduce another study that examines the implications of cost stickiness. They argue that management forecast errors could damage managers' credibility and threaten their job security, pushing investors to ask for more disclosure. The evidence proves the negative consequences of cost stickiness, illustrating a positive relationship between cost stickiness and management earnings forecast errors. They also find that managers do not consider cost stickiness in their predictions. The results confirm Ciftci et al.'s (2016) finding that incorporating cost stickiness information in the forecast models results in large forecast errors. Han et al. (2019) explore the influence of cost stickiness on management earnings expectations. The results show that cost stickiness level is associated with more favorable management earnings forecasts. Furthermore, when the resource-adjustment costs are high, the association between cost stickiness and management earnings forecasts is more pronounced. Banker and Chen (2006) compare various models used to predict future earnings and find that the models that incorporate cost variability and cost stickiness are superior in improving the forecast accuracy of future earnings.

Stock price crash risk has been examined from different perspectives. Tang et al. (2020) may be the first to explore how sticky cost affects stock price crash risk. They find a negative

relationship between sticky cost and stock price crash risk. Other factors, such as competition, CEO age, and performance, also affect this relationship. Generally, investigating the effects of cost stickiness on capital market outcomes is an exciting area of research.

Banker et al. (2016) examine the potential impact of cost stickiness on conservatism models' accuracy and estimates. They argue that conservatism models could be biased if they do not consider cost stickiness. The authors find that conservatism models that do not consider cost stickiness, such as the Basu model, are distorted and biased by 25% than models that control for cost stickiness. They also found that cost stickiness could distort the correlation between conservatism and managerial ownership and some conservatism drivers such as leverage, book to market value, and firm size.

Unlike Weiss (2010), Ciftci et al. (2016), Ciftci and Salma (2018), and Han et al. (2019), who examine the relationship between cost stickiness and analysts' and management earnings forecasts, Rouxelin et al. (2018) discuss whether aggregate cost stickiness affects the prediction of the future unemployment rate at the macroeconomic level. The rationale is that cost stickiness results from managers' decisions on employee hiring, retention, and termination due to changes in the activity level. Therefore, it might work as a predictor of the future unemployment rate. The authors employ three forecasting models to predict the unemployment rate and incorporate aggregate cost stickiness information into the three models. Although they find that incorporating cost stickiness information improves forecasting accuracy, professional macro forecasts are not fully included in the cost stickiness information in their predictions. They also find that cost stickiness affects the unemployment rate positively.

Overall, most studies that examine the implications of cost stickiness focus on its incorporation into earnings prediction models (Weiss, 2010; Ciftci et al., 2016; Ciftci & Salma, 2018; Han et al., 2019). Only one study examines its inclusion in conservatism models (Banker et al., 2016), and only one study examines its predictive power in a macroeconomic context (Rouxelin et al., 2018). The implications of cost stickiness could spread into different accounting and finance areas not yet investigated. For example, CVP analysis and ABC assume a linear relationship between cost and activity level; the implications of ignoring sticky cost behavior when applying these techniques could be a good research question. Moreover, the predictive power of cost stickiness for macroeconomic indicators has not been examined, even though cost stickiness results from resource-adjustment decisions.

5. Review of the Cost Stickiness Models

The empirical model presented by Anderson et al. (2003) is a pioneer model that enables many researchers to do more empirical research on cost stickiness. Built on a piecewise-linear correlation between log changes in activity measured by changes in sales and log changes in costs, the model helps researchers estimate the cost response to contemporary changes in an activity. It includes a variable (decrease_dummy) that takes one if activity decreased during the last two periods, enabling differentiation between periods with activity increases and decreases. Anderson et al. (2003) argue that using the ratio form and log specification reduces heteroscedasticity and improves several aspects, such as the comparability of the model's variables and accommodation of an economic interpretation of the estimated coefficients. Another advantage of log models is that they are less sensitive to outliers than linear models are. Furthermore, the model variables can be scaled to consider inflation. However, one of the model's disadvantages is that it cannot estimate earnings (Banker & Byzalov, 2014) because earnings include negative figures (losses), and log cannot be calculated for negative figures.

To prove that costs behave in a sticky way, β1 should be statistically significant and positive and β2 statistically significant but negative, and the value of β1 should be greater than the sum of β1 and β2, while anti-sticky behavior is when the value of β1 is less than the sum of β1 and β2. Put simply, the cost is sticky when ($\beta1 + \beta2 < \beta1$) and anti-sticky when ($\beta1 + \beta2 > \beta1$).

One more advantage of Anderson et al.'s (2003) model is that researchers can add as many variables as they want to examine their effects, but as interaction terms. The original model contains two essential variables with β1 and β2; new variables can be multiplied by the β2 variable to create new three-way interaction term variables. However, a drawback is that adding new variables as interaction terms could increase the multicollinearity problem. Therefore, Chen et al. (2012) and Ibrahim (2018) perform mean-centering for all continuous variables before creating the interaction terms, except for the dummy variables. Researchers subtract the values from the mean of each continuous variable.

Weiss (2010) introduces a slightly different model where the result of dividing cost change by sales change of the most recent period with a sales increase is deducted from the result of dividing cost change by sales change of the most recent period with a sales decrease across the last four periods. Banker and Byzalov (2014) argue that Anderson et al.'s (2003) model is more appropriate for examining cost stickiness determinants, while Weiss's (2010) model is more appropriate for investigating cost stickiness consequences, with an advantage of Weiss's (2010) model being that *sticky* can be used as an explanatory variable to investigate the effects of cost stickiness. A potential drawback of Weiss's model is that it is based on a rolling

window of four observations, which can lead to substantial data loss, sample selection bias, and distorted inferences (Banker et al., 2018).

While many sticky cost models focus on the association between costs and sales changes, Banker et al. (2013a) suggest a different model that concentrates on the association between the actual costs and sales levels. If the researcher intends to capture sticky cost behavior in equations that are expressed in terms of levels (not changes), this model may be preferable. Also, Kaspereit (2016) suggests regression-based firm-year cost stickiness scores. This specification is contingent on the expected level of asymmetry in a regression equation that captures higher-order interactions with typical factors that influence sticky cost behavior, such as asset intensity.

Banker et al. (2018) argue that since these firm-year scores consider the variation of conventional factors that influence cost stickiness, they should not be employed as dependent variables in research settings investigating new cost management determinants. Including these firm-year scores as additional interaction terms in an equation that also considers interactions with the conventional independent variables is a more suitable way to investigate new cost stickiness determinants. Anderson et al. (2016) suggest a binary-driver equation that considers both cost stickiness and cost inertia (an asymmetry because of the change of existing substantial assets such as equipment) and provide evidence that this addition dramatically enhances the model's explanatory power.

6. Gaps in the Literature and Future Research Agenda

The review results indicate that there are several literature gaps and future research opportunities. First, there are too few studies on cost stickiness. We found only 80 studies published in 36 international ABS 2-4* ranked journals over a period of 27 years (1994–2020). This low number does not reflect the importance of cost stickiness as a problem that could distort the accuracy of several accounting techniques, such as cost estimation, pricing, and earnings forecasts. Despite the potentially negative consequences of cost stickiness, only 11 studies have examined its economic effects. This means future researchers will need to research and review the economic influence of cost stickiness at both the firm and country level. For example, given that cost stickiness results from an improper adjustment of resources when activity changes, this could significantly affect the macroeconomic indicators of any economy. Despite its importance, the empirical evidence on this topic is scarce. The influence of improper resource adjustments on countries' growth rates is a crucial research question.

Moreover, we found no studies that examine the economic consequences of cost stickiness in the banking industry, despite the unique characteristics of banks. First, the cost structure of banks differs from that of non-financial companies. Most banks' costs are labor-based costs, and banks have to follow labor regulations that could make managers reluctant or unable to retire slack labor resources. Banker et al. (2013b) examine the effect of the employment protection legislation on cost behavior. It would be interesting to extend their work by investigating how employment protection legislation in banks could affect cost stickiness. Second, the intangibility level of banks is much higher than that of non-financial companies. Third, unlike other financial firms, banks have to follow the Basel rules and regulations of central banks. These rules could affect their resource-adjustment decisions. The unique nature of banks' cost structure and assets makes this an exciting research avenue to investigate.

Another interesting research question is how asymmetric resources adjustment could affect the outcomes of accounting techniques such as CVP analysis, pricing, cost estimation and prediction, and ABC, which assume a linear cost behavior and systematic resource adjustment to the same demand change. Some efforts have been made by Weiss (2010), Ciftci et al. (2016), and Ciftci and Salma (2018), who investigate the relationship between cost stickiness and analysts' and management earnings forecasts. However, more research on the accuracy of pricing, ABC, and CVP outcomes considering cost stickiness is still needed. For example, when managers use ABC, they typically assume a linear relationship between activity cost and the chosen cost driver. Given the recent evidence of cost stickiness, researchers should revisit the application of ABC in this way. Besides, if Activity-Based Budgeting (ABB) is applied, managers usually estimate different activities' costs, assuming a linear cost behavior. Incorporating the asymmetric cost behavior into the estimation models helps to increase their accuracy and predictability power. When managers follow the standard pricing model where a profit margin is added to a predetermined and estimated cost, they have to assume a linear cost behavior that could lead to inaccurate estimates.

Second, although 62% of the reviewed studies examine the determinants of cost stickiness, there is a lack of research on some determinants. For example, although uncertainty about future demand could be a reason for cost stickiness, we found only three studies that examine it as a determinant of cost stickiness: Banker et al. (2014a), Li and Zheng (2018), and Lee et al. (2019). The presence of key employees who provide important intellectual capital could be a reason for cost stickiness. When activity declines, managers may be reluctant to retire such employees and may continue paying high salaries despite the low demand.

However, only one study (Yang, 2019) has examined intellectual capital as a determinant of cost stickiness. Future researchers should also explore cost stickiness determinants such as culture, competition, industry effect, idle capacity management, and CEO overconfidence, as these determinants are largely unexplored. Moreover, although ownership structure could affect managers' behavior and decisions, especially regarding resource adjustment, only three studies examine the influence of ownership structure. Prabowo et al. (2018) and Chung et al. (2019) study non-financial firms, and Hall (2016) examines financial firms. Further, different sorts of business risks could affect managers' decisions regarding resource adjustment, which in turn could affect cost behavior. Only one study (Li and Zheng, 2018) examines this potential relationship.

Third, although 71 studies examine non-financial firms, we found only two studies that examine financial firms, namely Hall (2016) and Belina et al. (2019). This shows the need for more research on banks and financial firms. Cost structure could differ between financial and non-financial firms; however, banks are still subject to the same activity changes and reasons for cost stickiness that non-financial firms face. During the 2008 financial crisis, banks and other financial institutions were the first to suffer and to make decisions regarding slack resource adjustments, which indicates that cost stickiness could be prevalent in financial firms and might even be greater than in non-financial firms. Thus, there is ample room for future researchers to contribute by examining cost stickiness in banks. For example, the nature of banks' resources and assets is slightly different from the nature of those owned by non-financial companies. One more research idea in banking is whether the nature and magnitude of cost stickiness differ between traditional and Islamic banks. Islamic banks apply additional monitoring and governance rules known as the "Islamic Sharia," whereby Islamic banks' activities have to adhere to Shariah or Islamic law. An interesting question is whether the Islamic law applied in Islamic banks helps to mitigate sticky cost behavior. To the best of our knowledge, no study has examined this question so far.

Fourth, one of the most relevant hypotheses for cost stickiness is the empire-building hypothesis. To keep their firms large, some managers are likely to retain unused resources when activity declines, a notion introduced by Chen et al. (2012). Despite its relevance and importance as one explanation of sticky cost behavior, this idea has not been examined adequately in the literature. Chen et al. (2012) introduced it to formulate their study hypotheses, and Bruggen and Zehnder (2014) discussed it. Both studies were conducted in the USA, which invites future research to examine this hypothesis in different countries.

Fifth, most researchers follow a quantitative approach to study cost stickiness. However, if they also sent questionnaires or performed interviews, the managers responsible for adjusting resources could help the researchers understand the cost stickiness problem from different perspectives. Hearing from the problem/decision-makers themselves could significantly contribute to the cost stickiness literature and reveal whether managers recognize cost stickiness and understand its adverse economic consequences. If so, what do they do to avoid its effects?

Sixth, although regulations and monitoring mechanisms can help alleviate cost stickiness, they are less effective in developing countries. Political, economic, and financial instability is likely to be higher in these countries, increasing the probability of cost stickiness; however, only 24% of the reviewed studies examine cost stickiness in developing countries, while 76% of the reviewed studies examined cost stickiness in developed countries. This invites more research in different environments, particularly those with weaker and fewer regulations and financial and economic instability.

External auditors play a vital role and influence many managerial decisions. The external auditor's primary mission is to examine whether the financial statements are free from error and fraud, in addition to other tasks such as reporting on the internal control system and misallocation of resources. The auditor type is also likely to affect managers' decisions to adjust resources when demand changes. The impact of auditor type on cost behavior would be a fascinating research question to explore. Auditor type is just one aspect of the quality of the audit process; other elements could also be examined. To the best of our knowledge, only one study, Höglund and Sundvik (2019), investigates external auditors' role in the cost stickiness context, finding that audited firms demonstrated less cost stickiness than unaudited firms. On the cost level, only one study examines audit fees' behavior: Villiers et al. (2014) discuss the behavior of audit fees in the USA. Future research could extend this research area in different contexts.

Another exciting research avenue is the link between institutional investors and cost behavior in their investee firms. Chung et al. (2019) provide evidence that long-term institutional investors are associated with lower sticky cost behavior. However, institutional investors differ in their investment objectives and horizons. While long-term institutional investors who favor stable shareholding and long-term relationships with their investee firms tend to engage with the firm's management to increase shareholder value (Chen et al., 2007), short-term institutional investors who are information-driven are not expected to monitor the management of their investee firms (Yan & Zhang, 2007). Moreover, Brickley et al. (1988)

classify institutional investors into three groups according to their business relationship with their investee companies, and thereby their potential sensitivity to management pressure. The three groups are pressure-sensitive (banks and insurance companies), pressure-insensitive (investment companies), and pressure-intermediate (pension funds). In extending this research line, it would be interesting to examine how different types of institutional investors (i.e., banks, insurance companies, investment companies, and pension funds) could influence cost stickiness. Furthermore, the link between institutional ownership stability and sticky cost behavior is largely unexplored. Recent research provides evidence that institutional ownership stability has a significant influence on many firm-level decisions, including cost of debt (Elyasiani et al., 2010), earnings management (Sakaki et al., 2017), stock price crash (Callen & Fang, 2013), and firm innovation (Sakaki & Jory, 2019). Therefore, future research could investigate how institutional ownership stability influences corporate managerial cost decisions.

Other forms of ownership, such as government ownership and insider ownership, have not been explored in the context of cost stickiness. Usually, governments seek to achieve social, economic, and political goals such as decreasing unemployment, increasing Gross Domestic Product (GDP) rates, and accelerating economic growth rather than profit maximization. Consequently, as an owner, the government could encourage managers to hire additional resources when demand increases. In contrast, when demand decreases, governments could urge managers to retain slack resources to improve macroeconomic indicators. Accordingly, the cost increase as a response to demand increase will be higher than the cost decrease due to a demand decrease of an equivalent percentage, leading to cost stickiness. Moreover, governments fear that if demand declines and managers decide to retire slack resources, this retirement may worsen the economic situation and cause a recession. Therefore, a higher percentage of governmental ownership could increase cost stickiness and vice versa. Generally, governments could play a role in the resource-adjustment process when demand changes. Future researchers could examine this unexplored research area and provide evidence on the government's cost behavior role. Likewise, insider ownership could affect cost behavior. Future researchers could investigate the entrenchment hypothesis in the cost stickiness context, where higher managerial ownership is assumed to result in ineffective alignment.

Huneeus and Kim (2018) report that a firm's lobbying activity reduced aggregate productivity by 22% compared with an economy without lobbying activity, confirming the argument that lobbying activities significantly affect a firm's misallocation of resources. Therefore, another exciting research opportunity is the link between corporate lobbying

expenditures and sticky cost behavior. Future researchers can further examine whether the relation between lobbying expenditures and sticky cost behavior is more substantial around election years or significant political events. It is also important to note that lobbying expenditures are classified based on the lobbying activity's purpose. This creates an opportunity for researchers to perform cross-sectional tests examining how certain lobbying activities influence firms' asymmetric cost behavior.

Only one study investigated sticky cost behavior in the charity sector in New Zealand (Habib & Huang, 2019). Future studies can examine this phenomenon in not-for-profit sectors in other countries. One limitation of that study is that the authors did not control for agency-related variables such as CEO tenure, CEO compensation, and Free Cash Flows (FCF) in their models. Future studies should incorporate such variables in their models when assessing the degree of cost stickiness in the not-for-profit sectors.

The corporate awareness of CSR activities has increased in recent decades. Companies with social responsibility initiatives might adjust resources, especially social resources, differently when the demand changes. A comparative study could use two matching samples of companies: some highly concerned with society and its needs and others that pay less attention. Another interesting question is whether the activity classification, i.e., whether it is a social activity or a business activity, pushes managers to adjust the resources differently. If so, cost behavior may differ based on the activity classification.

Most studies that examine cost behavior test the cost as totals such as SG&A and COGS. Breaking down and disaggregating the total cost into its components and then investigating each cost component individually could help researchers identify the cost category that has created the sticky cost behavior. The total SG&A may contain costs that behave systematically.

Culture and religion are significant factors that could affect managers' decision to adjust resources when demand changes. Only one study, Kitching et al. (2016), examines how culture could affect cost stickiness, and Ma et al. (2019) is the only study to explore religion's role. An exciting research question is whether CEO attributes, including culture, religion, education, experience, and gender, affect resource-adjustment decisions and cost behavior when demand changes.

Researchers should remember that the figures published in financial statements and used in the relevant models to discover cost stickiness could be manipulated, causing misleading results. Thus, they should ensure that the variables' values are real and not manipulated or do their best to exclude the manipulated portion. The models used to discover

cost stickiness could be effective; however, the inputs could lead to misleading results. One research question that needs attention is whether the manipulated figures can change the cost behavior so that it becomes sticky or anti-sticky. If so, does this effect invalidate the other causes of cost stickiness examined in the literature, or act in combination with them? In the same context, do the nature and magnitude of cost stickiness differ between firms with an unqualified audit report and firms with a qualified/adverse/disclaimer audit report? The evidence on cost stickiness is provided based on the figures disclosed in the financial statements. If these figures are not accurate, this could result in artificial sticky cost behavior. Therefore, different audit opinions concerning the faithful representation of the financial statements could be examined in the cost stickiness context.

Another worthwhile question is whether interested parties recognize sticky cost behavior. For example, do analysts, managers, investors, and other affected stakeholders recognize that resource-adjustment decisions could affect normal cost behavior? A qualitative approach could be applied through interviews and questions to explore the perceptions of interested parties and how those perceptions affect their decisions.

Although the literature includes three review studies (other than this one), none of these reviews present a meta-analysis of the coefficients of cost stickiness models. Most empirical research investigating cost stickiness has relied on Anderson et al.'s (2003) model across years and countries. A meta-analysis is performed when several studies address the same research questions using similar models, such as multiple regression models. Meta-analysis has several benefits, such as summarizing similar studies' results and unifying all the results in one or two tables, although that could be a time-consuming process.

The efficient-market hypothesis was introduced by Fama (1970) to explain three pricing efficiency forms and how information is incorporated in share prices. An interesting research question is whether market participants such as investors and analysts recognize cost stickiness behavior, whether it affects their expectations and decisions, and whether cost stickiness information is reflected in share prices. Investigating how cost stickiness could affect capital markets could be an innovative research idea.

Finally, the reviewed studies provide evidence on cost stickiness and examine its determinants and/or consequences. However, a study that proposes new solutions or mechanisms that could mitigate this problem would be a significant contribution. Future researchers could think about ways to control or alleviate cost stickiness or even help maintain the cost behavior closer to that expected. Whether new regulations should be put in place to maintain normal cost behavior is an interesting research question.

6.1 Control Variables and Future Research

The cost stickiness literature has examined several control variables that could affect managers' decisions to adjust resources, and thus cost behavior. However, these variables have not been adequately examined as primary study questions or variables. Researchers can extend the research by investigating the controls as primary variables in new studies. For example, Anderson et al. (2003) first introduced economic growth as a control variable that could affect cost stickiness. To the best of our knowledge, only one study, Ibrahim (2015), examines the effect of economic growth on cost stickiness as a primary study hypothesis and question, dividing the study period into two: the prosperity period and the recession period. During recession period, managers are more likely to retire slack resources when demand declines, whereas during a prosperity period, they are more likely to retain slack resources because they believe that the demand decline is temporary. One research question is: How could the economic situation/health/growth affect cost behavior? Another research question is: In which economies is the cost stickiness phenomenon most prevalent? Interestingly, a third research question is: How could the central banks' monetary policies affect cost behavior?

One more control variable is the successive decrease used by Anderson et al. (2003) to control cost stickiness. The rationale for including consecutive decreases is that when demand/sales have decreased in two consecutive periods, this could be an indicator that the demand decline will continue. Managers become more confident that the demand decline is not temporary, which motivates them to retire the slack resources, reducing cost stickiness. However, this variable was addressed in studies such as Anderson et al. (2003), Chen et al. (2012), and Ibrahim (2018) as a control variable only. New evidence is required to test the hypothesis that successive demand declines could mitigate cost stickiness. One research question is whether uncertainty about future demand changes influences the likelihood of cost stickiness.

Institutional ownership has been examined in the cost stickiness context as a control variable. Chen et al. (2012) find evidence that institutional ownership effectively brings cost behavior closer to the expected behavior. However, despite the importance of institutional investors in driving their investee firms' policies, only Chung et al. (2019) investigate the ownership–cost stickiness nexus. Relative to individual investors, institutional owners are sophisticated investors with more experience, financial knowledge, and power. They are likely to effectively monitor and affect managerial decisions, including resource-adjustment

decisions. Future researchers could extend this research and examine institutional owners' role in monitoring the resource-adjustment process.

The empire-building hypothesis is another exciting research area. Chen et al. (2012) examine several control variables to capture managers' incentives for empire building in the context of cost stickiness, such as compensation structure, CEO horizon, tenure, and FCF. These interesting controls have not been examined adequately in the cost stickiness context. Chen et al. (2012) find evidence that cost stickiness increases with FCF and CEO tenure, whereas it decreases when the CEO changes or immediately before a CEO change. In particular, when managers have more FCF, they are encouraged to overinvest in projects rather than paying it out to shareholders. An interesting question is how empire-building incentives could affect managers' resource-adjustment process and thus cost behavior.

Other variables such as asset intensity, employee intensity, debt intensity, working capital intensity, stock performance, industry, and performance have been examined as controls by Calleja et al. (2006) and Chen et al. (2012). Future research can do a more in-depth investigation of these controls using different measurements or proxies. In general, we advise prospective researchers to look for the control variables employed in the cost stickiness models and expand the research on these controls.

7. Summary

This study presents a systematic literature review of cost stickiness research to date by producing three essential reviews. The study covers 27 years of research by reviewing 80 academic studies on cost stickiness published during the 1994–2020 period. The first review explores six aspects of the reviewed studies: classification of studies, historical development, research impact, and frequency distribution of research by cost category, theory, and country. The reviewed studies are classified according to three themes: the existence, the determinants, and the economic consequences of cost stickiness. The second is a review of the studies' objectives, hypotheses, and results, while the third is a review of the models used to provide evidence on cost stickiness.

The results indicate that cost stickiness research in the financial sector is rare. Only 2% of the reviewed studies use financial samples, while 89% of the studies use non-financial samples and seven studies use mixed samples. Moreover, 24% of the studies provide empirical evidence on cost stickiness, 62% examine different cost stickiness determinants, and 14% examine the economic consequences of cost stickiness; none of the last group of studies examine financial firms. The historical development of cost stickiness research shows a

significant increase in the number of studies during the last seven years, with 85% of the studies being published between 2014 and 2020, while the remaining 15% of the studies were published during the first 20 years (1994–2014). Regarding research impact, almost half of the studies are published in top-ranked journals, i.e., ranked 3, 4 and 4*, according to ABS 2018. Studies on the USA and Germany dominate the cost stickiness literature, accounting for 20% of the reviewed studies. The reviewed studies have examined the behavior of 18 different costs; however, 85% of the studies discuss only five costs: SG&A, operating costs, COGS, total cost, and labor cost.

The systematic review provides an agenda for future research with several interesting ideas. Researchers could extend the cost stickiness research by providing more evidence on the influence of different cost stickiness determinants such as culture, competition, risk, uncertainty, and regulations. The economic consequences of cost stickiness on the firm level and country level are another exciting research area. How wrong resource-adjustment decisions could affect the firm's financial performance and the country's macroeconomic indicators such as unemployment or growth rate is an interesting research question. Another exciting area is to explore the empire-building hypothesis as a reason for cost stickiness. Furthermore, investigating any solutions to mitigate or avoid the negative consequences of cost stickiness could contribute to the accuracy and credibility of earnings forecasts and cost estimations. Finally, business risks are more likely to affect managers' decisions relating to resource adjustments when activities change, but the literature does not present enough evidence on this argument.

This study has some limitations that future researchers should consider. First, we review only the literature written in English, even though other important studies exist. For example, Brasch (1927) is written in German and is regarded as one of the first studies published on non-linear cost behavior. However, we do not include it in this review because it does not meet our selection criteria. Second, to evaluate the reviewed articles' research impact, we used the 2018 ABS journal ranking as our first approach. However, using the ABS ranking may have led us to exclude other relevant journals. Furthermore, articles published in journals classified at 1* are not covered, even though they might include exciting ideas. Third, only studies with cost stickiness as their primary research question are included in the review. Finally, the review is limited to published articles, so it excludes, for example, working papers, e-theses, and working papers on SSRN. Although the review criteria may seem strict, they are necessary to ensure the quality of the research reviewed.

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Fig. (1) Approach and Structure of the Study

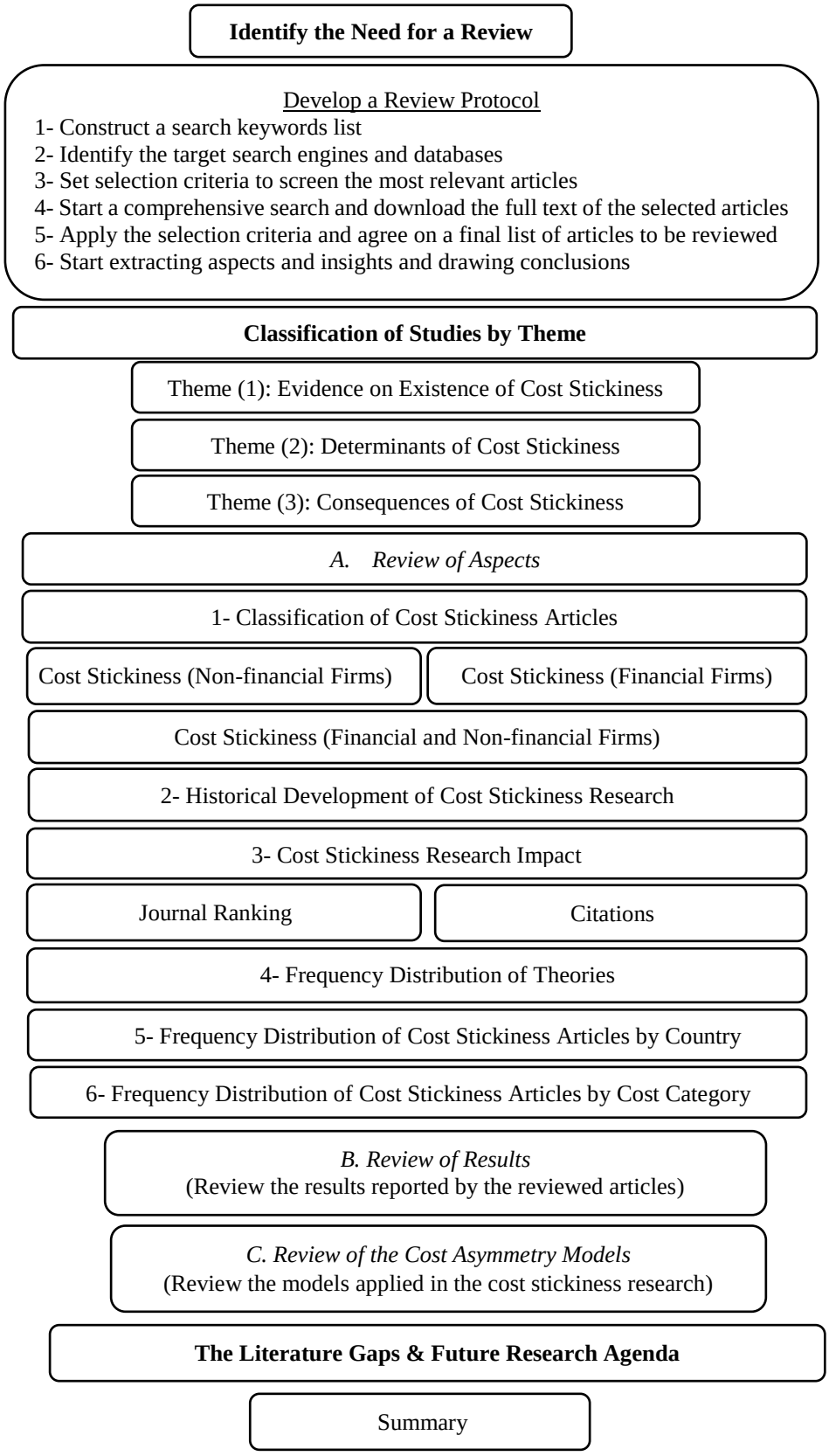


Table 1

Themes and classification of the reviewed studies.

Theme	Non-Financial	Financial	Financial and Non-financial	Total
Theme (1): Empirical Evidence on Existence of Cost Stickiness (19 studies) 24%				
Cost Stickiness Existence	Noreen and Soderstrom (1994) Noreen and Soderstrom (1997) Anderson et al. (2003) Anderson et al. (2007) Balakrishnan and Gruca (2008) Shust and Weiss (2014) Via and Perego (2014) Villiers et al. (2014) Zanella et al. (2015) Cohen et al. (2017) Xu and Sim (2017) Bradbury and Scott (2018) Cheng et al. (2018) Loy and Hartlieb (2018) Habib and Huang (2019) Krisnadewi and Soewarno (2019) Zhang et al. (2019b) Gray (2020) Wu et al. (2020)			19
Theme (2): Determinants of Cost Stickiness (50 studies) 62%				
2.1 Corporate Governance and Management Control Mechanisms	Calleja et al. (2006) Chen et al. (2012) Bugeja et al. (2015) Xue and Hong (2016) Ibrahim and Ezat (2017) Ibrahim (2018) Cai et al. (2019) Zhang et al. (2019a) Li et al. (2020)		Höglund and Sundvik (2019)	10
2.2 Ownership Structure	Prabowo et al. (2018) Chung et al. (2019)	Hall (2016)		3
2.3 Regulations and Tax	Banker et al. (2013b) Holzhacker et al. (2015) Xu and Zheng (2018) Haga et al. (2019) Kuiate and Noland (2019)	Belina et al. (2019)		6
2.4 Culture, Religion and Strategic Policies	Kitching et al. (2016) Ma et al. (2019) Ballas et al. (2020)			3
2.5 Competition and Stakeholders' Orientation	Li and Zheng (2017) Cheung et al. (2018) Liu et al. (2019) Costa and Habib (2020) Lee et al. (2020)			5
2.6 Social, Organizational, Intellectual Capital, CSR and Sustainability Activities	Venieris et al. (2015) Habib and Hasan (2019) Hartlieb et al. (2019) Yang (2019) Golden et al. (2020a)			5
2.7 Uncertainty and Risk	Banker et al. (2014a) Li and Zheng (2018) Lee et al. (2019)			3

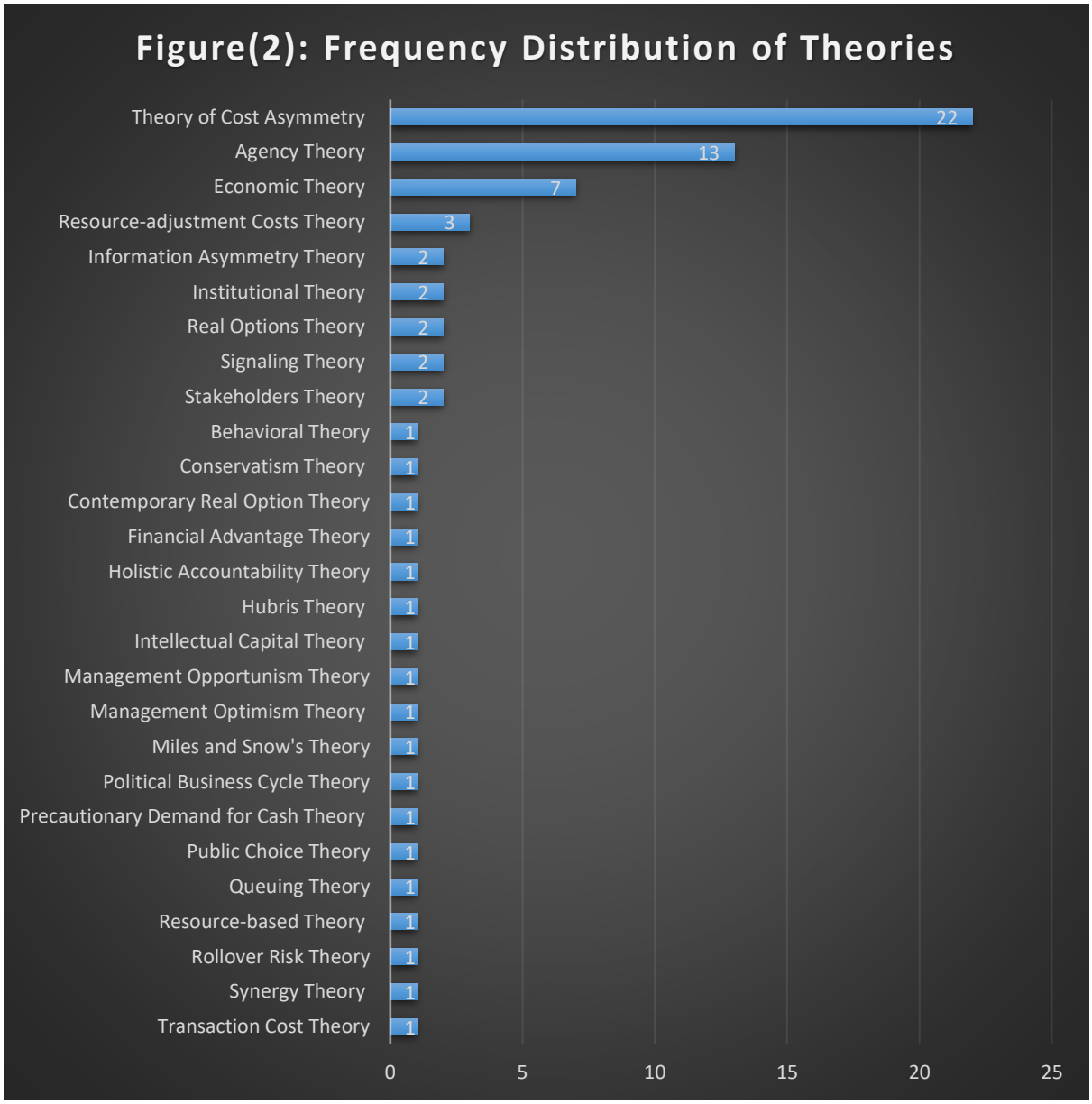
2.8 Earnings Targets, Managerial Incentives and Growth Expectations	Dierynck et al. (2012) Kama and Weiss (2013) Chen et al. (2019) Silge and Wöhrmann (2019)			4
2.9 CEO Compensation Policy and Overconfidence	Yang (2015) Hartlieb et al. (2020)		Bruggen and Zehnder (2014)	3
2.10 Industry Effect and Macro-economic Effect (GDP)	Stimolo and Porporato (2019)		Subramaniam and Watson (2016)	2
2.11 Idle Capacity Management and Skilled Labor	Cannon (2014) Golden et al. (2020b)			2
2.12 Cost Structure and Operating Lease Expenses	Balakrishnan et al. (2014) Cook et al. (2018)			2
2.13 Prior Sales Changes	Banker et al. (2014b)		Ciftci and Zoubi (2019)	2
Theme (3): Consequences of Cost Stickiness (11 studies) 14%				
Consequences of Cost Stickiness	Weiss (2010) Banker et al. (2016) Ciftci et al. (2016) Ciftci and Salma (2018) Madadian et al. (2018) He et al. (2020) Lopatta et al. (2020) Tang et al. (2020)		Banker and Chen (2006) Rouxelin et al. (2018) Han et al. (2019)	11
Total No.	71	2	7	80
Total %	89%	2%	9%	100%

Table 2
Research impact by citations per year (CPY) and 2018 ABS ranking.

No.	Study	No. of Citations*	Citation Yrs.	CPY**	ABS 2018
Panel (A): Non-Financial Institution Studies					
1	Anderson et al. (2003)	1289	18	72	4*
2	Chen et al. (2012)	594	9	66	4
3	Weiss (2010)	457	11	42	4*
4	Kama & Weiss (2013)	330	8	41	4*
5	Banker et al. (2013b)	305	8	38	4*
6	Banker et al. (2014b)	253	7	36	2
7	Balakrishnan et al. (2014)	231	7	33	2
8	Dierynck et al. (2012)	258	9	29	4*
9	Banker et al. (2016)	136	5	27	4*
10	Calleja et al. (2006)	391	15	26	3
11	Balakrishnan & Gruca (2008)	317	13	24	4
12	Anderson et al. (2007)	302	14	22	3
13	Habib & Hasan (2019)	41	2	21	3
14	Banker et al. (2014a)	158	8	20	4*
15	Cannon (2014)	122	7	17	4*
16	Holzhacker et al. (2015)	93	6	16	4
17	Lee et al. (2019)	29	2	15	4
18	Xue & Hong (2016)	73	5	15	2
19	Noreen & Soderstrom (1997)	321	24	13	4
20	Via & Perego (2014)	94	7	13	2
21	Venieris et al. (2015)	72	6	12	3
22	Noreen & Soderstrom (1994)	259	27	10	4*
23	Ciftci et al. (2016)	47	5	9	2
24	Chung et al. (2019)	15	2	8	2
25	He et al. (2020)	8	1	8	4*
26	Kitching et al. (2016)	41	5	8	3
27	Li & Zheng (2017)	33	4	8	3
28	Bugeja et al. (2015)	39	6	7	2
29	Chen et al. (2019)	14	2	7	4
30	Cohen et al. (2017)	28	4	7	2
31	Liu et al. (2019)	14	2	7	4
32	Villiers et al. (2014)	46	7	7	2
33	Hartlieb et al. (2019)	11	2	6	3
34	Prabowo et al. (2018)	19	3	6	3
35	Bradbury & Scott (2018)	15	3	5	2
36	Ciftci & Salama (2018)	15	3	5	2
37	Shust & Weiss (2014)	38	7	5	2
38	Cheung et al. (2018)	11	3	4	2
39	Xu & Zheng (2018)	13	3	4	3
40	Yang (2015)	25	6	4	2

41	Ballas et al. (2020)	3	1	3	3
42	Cheng et al. (2018)	9	3	3	2
43	Golden et al. (2020a)	3	1	3	3
44	Ibrahim & Ezat (2017)	13	4	3	2
45	Ibrahim (2018)	9	3	3	2
46	Xu & Sim (2017)	11	4	3	2
47	Yang (2019)	5	2	3	2
48	Zanella et al. (2015)	16	6	3	2
49	Costa & Habib (2020)	2	1	2	2
50	Gray (2020)	2	1	2	2
51	Haga et al. (2019)	4	2	2	3
52	Hartlieb et al. (2020)	2	1	2	3
53	Kuiate & Noland (2019)	3	2	2	2
54	Ma et al. (2019)	3	2	2	3
55	Cai et al. (2019)	2	2	1	2
56	Cook et al. (2018)	2	3	1	2
57	Habib & Huang (2019)	1	2	1	3
58	Li & Zheng (2018)	2	3	1	2
59	Lopatta et al. (2020)	1	1	1	2
60	Loy & Hartlieb (2018)	4	3	1	2
61	Stimolo & Porporato (2019)	2	2	1	2
62	Zhang et al. (2019a)	2	2	1	2
63	Zhang et al. (2019b)	2	2	1	2
64	Golden et al. (2020b)	0	1	0	2
65	Krisnadewi & Soewarno (2019)	0	2	0	2
66	Lee et al. (2020)	0	1	0	2
67	Li et al. (2020)	0	1	0	3
68	Madadian et al. (2018)	1	3	0	3
69	Silge & Wöhrmann (2019)	0	2	0	2
70	Tang et al. (2020)	0	1	0	2
71	Wu et al. (2020)	0	1	0	2
Panel (B): Financial Institutions Studies					
No.	Study			CPY**	ABS 2018
72	Hall (2016)	37	5	7	4*
73	Belina et al. (2019)	2	2	1	3
Panel (C): Both Financial and Non-financial Institutions Studies					
74	Subramaniam & Watson (2016)	216	5	43	2
75	Banker & Chen (2006)	316	15	21	4*
76	Rouxelin et al. (2018)	40	3	13	4*
77	Brüggen & Zehnder (2014)	31	7	4	2
78	Han et al. (2019)	6	2	3	2
79	Höglund & Sundvik (2019)	6	2	3	3
80	Ciftci & Zoubi (2019)	2	2	1	2
	Total	7,317	394	861	

*Number of Citations as published by Google Scholar as of 10 January 2021. **CPY = Citations / (2021-Publication Year).



Appendix A. Non-financial companies – Existence of cost stickiness (19 articles)

No.	Study	State, Sample, and Period	Costs Examined	Variables Examined	Theory	Objectives and Results	Journal
1	Noreen and Soderstrom (1994)	USA 100 hospitals 1987-1990	Overhead Costs	Activity measure at hospital; Size of hospital (dummy, 1 for large hospital, 0 otherwise)	Queuing theory	**Objective:** Examining whether overhead costs are moving proportionally to activity change using data from hospitals in Washington State. **Results:** Across 22 overhead accounts, on average, average cost per unit of activity increases marginal costs by approximately 40% and by over 100% in some departments. Overhead costs do not move proportionally to activity level, and in this case incremental costs are different from average costs.	Journal of Accounting and Economics
2	Noreen and Soderstrom (1997)	USA 108 hospitals 1977-1992	Overhead Costs Operating Cost (OC)	N/A	N/A	**Objectives:** Examining the behavior of overhead costs in a sample of USA hospitals. **Results:** The results show that costs behave asymmetrically because overhead cost increased more with activity level increase than it decreased with activity level decrease. The authors conclude that costing systems such as ABC could overstate incremental overhead costs.	Review of Accounting Studies
3	Anderson et al. (2003)	USA 7,629 firms Ranging from 8,565 to 63,958 firm-years 1979-1998	SG&A	Successive sales decrease (SSD) (dummy); Economic growth; Asset intensity; Employee intensity	N/A	**Objectives:** Examining sticky cost behavior and exploring different determinants that could affect it, such as asset intensity, economic growth, and employee intensity. **Results:** The results indicate that SG&A costs increase by 0.55% and decrease by 0.35% on average for a 1% change in sales. Economic growth affects cost stickiness.	Journal of Accounting Research
4	Anderson et al. (2007)	USA 23,002 firm-years 1983-2002	SG&A	Capital expenditures; Effective tax rate; Earning quality; Audit qualification; Labor force; Leverage; Sales growth; Economic growth	N/A	**Objectives:** Investigating the possibility of achieving positive abnormal returns in periods in which revenues are declining based on SG&A cost ratio. Estimating a SG&A costs model that considers both fixed and sticky components of cost behavior. **Results:** The authors find that in periods of declining revenue, firms with high increases in SG&A ratio achieved more positive abnormal returns relative to firms with low increases in SG&A ratio. The results indicate a positive relationship between future earnings and changes in SG&A costs in declining-revenue periods.	Journal of Accounting, Auditing and Finance
5	Balakrishnan and Gruca (2008)	Canada Ranging from 189 to 377 observations 1986-1989	OC (excluding depreciation and teaching costs)	Activity (equivalent patient days); Dummy (a decline in activity level compared to previous year)	Resource-based theory; Institutional theory	**Objectives**: Examining short-term behavior of overall operating costs for hospitals in Ontario. Investigating the behavior of cost stickiness at the departmental level. **Results:** There is a significant positive influence of change in activity volume on change in overall operating costs. The authors find that overall operating costs in Ontario hospitals behave in a sticky manner. At the departmental level, in the direct	Contemporary Accounting Research

No.	Study	State, Sample, and Period	Costs Examined	Variables Examined	Theory	Objectives and Results	Journal
						patient care department, there is a significant positive effect of change of volume on change of operating costs. Operating costs are sticky in this department as well. For ancillary services and various support departments, operating costs are not found sticky, and change in volume also has a significant impact on change in the operating costs of these departments. For the fixed support department, costs are not related to the volume.	
6	Shust and Weiss (2014)	USA 78,803 annual observations 271,907 quarterly observations 1988-2011	OC (sales revenue minus income from operations) (after depreciation) OC before depreciation OC paid in cash	N/A	N/A	**Objectives:** Testing the validity of the assertion that reported expenses and economic costs can be used interchangeably to estimate the degree of cost stickiness. **Results:** Using three alternative stickiness specifications (the ABJ model, linear ABJ model, and Weiss stickiness measure), the authors find that both reported operating expenses and operating costs paid in cash show sticky cost behavior. But the operating expenses are significantly stickier than operating costs paid in cash. Depreciation plays a vital role in the level of cost stickiness across different cost stickiness specifications.	Journal of Management Accounting Research
7	Via and Perego (2014)	Italy Multiple samples 1999-2008	SG&A COGS OC Labor Costs (LC)	Asset intensity; Employee intensity; Debt intensity	N/A	**Objectives:** Examining the existence of cost stickiness in small and medium sized companies using four types of costs: SG&A, COGS, OC, and LC. **Results:** In listed companies, operating costs and labor costs exhibit sticky cost behavior. In small and medium sized companies, only labor costs exhibit sticky behavior. However, other types of costs exhibit anti-sticky behavior.	Accounting and Finance
8	Villiers et al. (2014)	USA 5568 firms 30,298 firm-years 2000-2008	Audit fees	Number of unique business segments; Current assets to total assets; Quick ratio; Long-term debt to total assets; Return on investment	Economic theory	**Objectives:** Investigating audit fee stickiness to provide better understanding of audit pricing and audit fee market competitiveness. **Results:** The results show that audit fees exhibited sticky behavior (audit fees are not adjusted fully or immediately to changes in their determinants). Audit fees reacted more quickly to changes leading to an increase than to changes leading to a decrease. The only exception to the above results was during the recessionary period from 2000 to 2003, when the audit fee market was highly competitive. Differences between increasing and decreasing movements of audit fees diminished in the next period and gradually disappeared over longer time periods (4 years).	Managerial Auditing Journal
9	Zanella et al. (2015)	UAE 49 firms 2002-2011	SG&A OC	Economic growth; Asset intensity; Employee intensity	Standard economic theory	**Objectives:** Examining sticky cost behavior of publicly listed companies in the United Arab Emirates. **Results:** The results reveal that there is little or no support for the existence of cost stickiness in publicly listed companies in the UAE. This is because the majority	Applied Economics

No.	Study	State, Sample, and Period	Costs Examined	Variables Examined	Theory	Objectives and Results	Journal
						of the UAE workforce is considered expatriate, and these workers do not have the benefits of EPL that are available in other countries.	
10	Cohen et al. (2017)	Greece 1852 observations 2002-2008	Administrative and public relation expenses	Asset intensity; Debt intensity; Election year (dummy, 1 if year before the election, 0 otherwise)	Sticky costs theory	**Objectives:** Examining the sticky cost phenomenon for municipal costs in Greek local governments. **Results:** The results reveal the anti-sticky cost behavior of administrative and public relation expenses in Greek local governments. However, cost of service provision shows sticky cost behavior.	Journal of Applied Accounting Research
11	Xu and Sim (2017)	China 918 firms 3672 observations 2010-2014	OC = Sales minus operating income	Asset intensity; Employee intensity; Economic growth	N/A	**Objective:** Examining the cost behavior of listed manufacturing firms in China. **Results:** Costs of listed manufacturing firms in China are sticky, biased, and overestimated. However, the degree of cost stickiness differs significantly across industries in different regions. The degree of cost stickiness tends to decrease in subsequent periods, and it does not reverse in subsequent years. Macro-economic growth positively affects the degree of cost stickiness. Asset intensity and employee intensity do not affect cost stickiness.	Applied Economics
12	Bradbury and Scott (2018)	New Zealand 328 observations from 73 municipalities 2008-2012	OC	Asset intensity; Employee intensity; Expected demand; Operating slack; Past cost structure; Sales decrease (dummy)	N/A	**Objectives:** Investigating cost behavior in local governmental organizations in New Zealand. Examining whether managers can forecast sticky cost behavior. **Results:** Operating costs in local governmental organizations in New Zealand exhibit sticky cost behavior. Municipal costs are "super sticky," meaning that costs rise no matter what is the directional change in sales. Costs are well understood by managers and are incorporated into their managerial forecasts.	Australian Journal of Management
13	Cheng et al. (2018)	China 241,982 Private firms 1,046,294 firm-years 1999-2007	SG&A	Economic growth; Asset intensity; Employee intensity; Percentage growth of real GNP in each region; Financial competition index; Financial lending allocation	N/A	**Objectives:** Examining how the direction and magnitude of sticky cost behavior is affected by limited access to capital. **Results:** Based on three subsamples divided according to firm size, the results show that SG&A costs are sticky in large firms and anti-sticky in small and medium firms. But on average, cost behavior in China's private firms is anti-sticky. Companies located in regions with a lower level of financial development (which have limited access to external capital) have a higher degree of cost anti-stickiness than firms located in regions with a higher level of financial development.	Asia-Pacific Journal of Accounting and Economics

No.	Study	State, Sample, and Period	Costs Examined	Variables Examined	Theory	Objectives and Results	Journal
14	Loy and Hartlieb (2018)	USA Ranging from 112,613 to 172,931 firm-years 1970-2014	SG&A COGS Core expenses Non-core expenses OC	Employee intensity; Asset intensity	N/A	**Objectives:** Examining whether the degree of cost stickiness differs across listed cohorts. **Results:** Results reveal that proxies for sticky costs differ decisively across listing cohorts. USA public firms exhibit on average more cost stickiness and become more knowledge-intensive with each additional listing cohort. This development is mitigated by newer listing cohorts' higher reliance on temporary labor.	Journal of Management Control
15	Habib and Huang (2019)	New Zealand 89379 charity-years 2007-2014	Total expenditures Program-based expenditures (service cost) Administrative expenses	Asset intensity; Employee intensity; Gross income ratio; Income decrease (dummy); Total reported surplus; Total reported deficit; Total donations received; Government grants; Financial crisis (dummy)	Agency theory Holistic accountability theory	**Objectives** Investigating whether cost stickiness exists in New Zealand charities. **Results** The authors find evidence of cost stickiness in New Zealand charities. This sticky cost behavior differs across some charities' characteristics such as source of income and expenditures, size, sectors, and crisis period. Large charities exhibit cost stickiness, but small charities exhibit anti-sticky cost behavior. Service costs are not stickier than administrative costs. There is a higher degree of cost stickiness in charities that depend mainly on donations. The degree of cost stickiness is higher in crisis period than in non-crisis period.	The International Journal of Accounting
16	Krisnadewi and Soewarno (2019)	Indonesia, Malaysia, and Singapore 160 Firm-years 2008-2017	SG&A	Sales; Sales decrease (dummy); SSD (dummy); Asset intensity; Debt intensity; GDP	Cost behavior theory Contemporary real option theory	**Objectives:** Examining sticky cost behavior in three Asian countries under competitive pressure in the retail industry. **Results:** Companies facing greater competition exhibit higher cost stickiness. Managers tend to be more aggressive in innovating, and SG&A costs become higher when the firm's level of competitiveness is low.	Journal of Applied Accounting Research
17	Zhang et al. (2019b)	USA 247 observations 2009-2017	SG&A	Sales; Sales decrease (dummy); Asset intensity; Employee intensity; Asset decline (dummy)	Cost behavior theory	**Objectives:** Examining whether sticky cost behavior exists in the tourism and hospitality industry. Identifying any sources of cost stickiness in these two industries. Investigating how managerial behaviors can control cost stickiness. **Results:** Firms in tourism and hospitality industries exhibit cost stickiness. In these industries, excess of assets is the major determinant of cost stickiness. Executives can reduce the level of cost stickiness by adjusting the amount of assets, which is more observable in years of declining revenue.	Tourism Management Perspectives
18	Gray (2020)	USA 1,198 firm-years 1997-2016	Operating lease costs	Revenue; Sales decrease (dummy)	N/A	**Objective:** Investigating whether operating lease costs exhibit sticky behavior in retail firms. **Results:** While both operating lease expenses and future lease commitments exhibit cost stickiness, operating lease expenses are stickier than future lease commitments. Various other SG&A cost components exhibit lower cost stickiness than operating lease expenses.	Advances in Management Accounting

No.	Study	State, Sample, and Period	Costs Examined	Variables Examined	Theory	Objectives and Results	Journal
19	Wu et al. (2020)	Taiwan 263 school-years 2011-2013	OC	Number of students; Enrollment pressure for the school principal; Intensity of long-term assets; Dummy variable (decrease in number of students)	Public choice theory	**Objectives:** Examining whether the cost stickiness phenomenon exists in a sample of public schools in Taiwan. **Results:** Operating expenses of public schools exhibit sticky cost behavior. Cost stickiness behavior is more pronounced in schools whose principals are exposed to greater enrollment pressure.	Applied Economics

Appendix B. Non-financial companies – Determinants of cost stickiness (44 articles)

No.	Study	State, Sample, and Period	Costs Examined	Variables Examined	Theory	Objectives and Results	Journal
1	Calleja et al. (2006)	France, Germany, UK, and USA 3500 firms 26,983 observations 1988-2004	OC	Asset intensity; Employee intensity; Debt intensity; Working capital intensity; Return on equity	N/A	***Objectives:*** Replicating the models in the previous literature to examine cost stickiness behavior in a sample of firms from France, Germany, UK, and USA. ***Results:*** Across the four countries, operating costs are found to be sticky. The degree of cost stickiness declines in longer time periods and during sustained declines of revenues. The system of corporate governance and the system of managerial oversight affect the level of cost stickiness across countries.	Management Accounting Research
2	Chen at al. (2012)	USA 1500 firms Base sample 51,314 firm-years Testing sample 5,278 firm-years 1996-2005	SG&A	**Economic Variables** Employee intensity; Asset intensity; SSD (dummy); Stock performance **Agency Variables** FCF; Tenure; Horizon; Fixed pay **Governance Variables** Board size; CEO duality; % of independent directors; % of institutional ownership; BCF anti-takeover index; Staggered board	Agency theory	**Objectives:** Examining the relationship between SG&A cost asymmetry and the agency problem after taking into consideration some economic determinants as control variables. Investigating whether corporate governance has an effect on the relationship between the agency problem and SG&A cost asymmetry. **Results:** There is a positive relationship between cost asymmetry and managers' self-interest due to the agency problem, which shifts cost stickiness from its optimal level. Strong corporate governance mechanisms mitigate the influence of the agency problem on SG&A cost asymmetry.	Contemporary Accounting Research
3	Dierynck et al. (2012)	Belgium 37,880 firm-years 1995-2006	LC	Employee intensity; Asset intensity; Economic growth; Loss in prior year (dummy, 1 if the firm reported loss in prior year, 0 otherwise); Abnormal accruals; Small profit (indicator variable, which equals to 1 for observations that reported a small profit, 0 otherwise)	N/A	**Objectives:** Examining how the labor cost behavior of private firms in Belgium is affected by the managerial incentives to meet or beat the zero earnings benchmark. Investigating whether managers consider severance costs when adjusting labor costs. **Results:** The managerial incentives to meet or beat the zero earnings benchmark affect labor costs, and firms with such incentives show less cost asymmetry than other firms. The results also show that when activity decreases, the asymmetric labor costs of large-profit firms are affected by managerial decisions to the change number of hours per employee. However, in small-profit firms, asymmetric labor costs are affected by decisions of immediate cost reduction such as firing an employee. In large-profit firms, differences in severance costs have no effect on managers' decisions, but in small-profit firms, managers tend to focus on blue collar workers (employees who can be fired in the cheapest way).	The Accounting Review

No.	Study	State, Sample, and Period	Costs Examined	Variables Examined	Theory	Objectives and Results	Journal
4	Banker et al. (2013b)	19 OECD countries 15,833 firms 128,333 observations 1990-2008	OC	Economic growth; Asset intensity; Common law (dummy); EPL; Trade union intensity; Bargaining coordination and centralization; Unemployment benefits	Economic theory of sticky costs	***Objectives:*** Examining if there is a relationship between sticky cost behavior and EPL using economy-wide structural variables. ***Results:*** The results show that the greater the strictness of EPL, the greater the stickiness of cost behavior, which supports the economic theory of sticky costs.	Journal of Accounting and Economics
5	Kama and Weiss (2013)	USA 11,758 firms 97,547 firm-years 1979-2006	OC	Asset intensity; Employee intensity; SSD (dummy); Target (dummy, 1 if analysis forecast error is between 0 and 1 cent, 0 otherwise)	N/A	**Objectives:** Examining how asymmetric cost behavior is shaped by managers' deliberate choices resulting from agency-driven incentives. **Results:** The degree of cost stickiness is reduced by managers' deliberate decisions to adjust resources to achieve their earnings targets. The influence of managers' motivations to achieve earning targets on the degree of cost stickiness is stronger in the pessimistic case than in the optimistic case.	Journal of Accounting Research
6	Balakrishnan et al. (2014)	USA 127,726 firm-years 1980-2004	SG&A	Sales decrease (dummy); Sales revenues; Economic growth; Asset intensity; Size	Asymmetric cost behavior theory	***Objectives:*** Showing how and why the cost structure and industry characteristics in previous studies affect and confound the cost response to changes in sales. Examining how the existence of controllable or fixed costs can influence cost elasticity and cost response. Investigating the effect of using standard log-specification in cost stickiness analysis. ***Results:*** SG&A increases by 0.6608 if sales increase by 1%. SG&A decreases by 0.1476 if sales decline by 1%. Fixed costs lead to non-stationary behavior in SG&A elasticity, which affects the interpretation of results. The standard log-specification used in the literature leads to biased results, which confounds the asymmetric response.	Journal of Management Accounting Research
7	Banker et al. (2014a)	USA **Firm-level Sample** Ranges from 45,990 to 51,016 observations 1979-2008 **Industry-level Sample** Ranges from 20,109 to 20,744 observations 1958-2005	SG&A COGS	Demand uncertainty; Economic growth; Industry (dummy)	Real options theory of investment	***Objectives:*** Investigating the relationship between demand uncertainty and cost behavior at the firm level and the industry level. ***Results*** For the firm level and the industry level (except for material cost), the results indicate that higher demand uncertainty causes an increased level of fixed inputs, which leads to a more rigid short-run cost structure consisting of more fixed and less variable costs. Downside risk has the opposite effect: if downside risk increases, the level of fixed inputs decreases, resulting in a less rigid short-run cost structure consisting of less fixed and more variable costs.	The Accounting Review

No.	Study	State, Sample, and Period	Costs Examined	Variables Examined	Theory	Objectives and Results	Journal
8	Banker et al. (2014b)	USA 18,066 firms 156,689 firm-years 1979-2009	*Main model:* SG&A *Extension analysis:* Advertising expense Research and development Other SG&A COGS	Economic growth; Asset intensity; Employee intensity; Order backlog; FCF	Theory of asymmetric cost behavior Theory of sticky cost	**Objectives:** Refining the empirical models and theory of sticky costs and providing more complex patterns of cost asymmetry behavior based on two opposing processes (prior sales increase and prior sales decrease). **Result:** The results support the authors' modified theory of asymmetric cost behavior in that when prior sales increase, SG&A costs show significant sticky cost behavior, but in the case of prior sales decrease, SG&A costs show significant anti-sticky behavior. The authors confirm these results using advertising expense, research and development costs, other SG&A, COGS, and number of employees, which confirms that the main results are not driven by any specific component of SG&A costs.	Journal of Management Accounting Research
9	Cannon (2014)	USA 504 firm-quarters 1992-2007	Total capacity costs	Capacity; Capacity unit cost; Passenger revenue; Capacity increase (dummy); Capacity decrease (dummy)	Economic theory	**Objectives:** Investigating the determinants of sticky cost behavior using a sample from the air transportation industry in the USA. Examining prior literature's claim that cost stickiness occurs because managers retain idle capacity when demand decreases but adds more capacity when demand increases. ***Results:*** The study concludes that using revenue as a proxy for cost-generating activities results in sticky cost behavior. The study confirms that when demand grows, managers tend to add more capacity, which incurs more costs. However, when demand falls, managers lower selling prices rather than decreasing capacity. The results also reveal that managers save more costs by removing capacity when demand falls than they add when demand grows, which results in anti-sticky cost behavior.	The Accounting Review
10	Bugeja et al. (2015)	Australia USA 171,095 firm-years 1990-2010	OC	Asset intensity; Economic growth; Employee intensity; Fixed asset intensity; Avoid loss (dummy); Avoid earning decline (dummy); CEO turnover (dummy); CEO chair (dummy); Accounting loss (dummy); Board independence	N/A	**Objectives:** Examining the cost behavior of Australian listed firms and comparing these results with those of a sample from the USA. Investigating whether the degree of cost asymmetry changes across industries and over time, and determining which factors affect the degree of cost stickiness. **Results:** The cost behavior in Australian listed companies is sticky on average, and the degree of cost stickiness is higher in the USA than in Australia. Degree of cost stickiness differs across industries. The degree of cost stickiness changes over time and increases after the adoption of IFRS. Costs are stickier in companies that use more assets and people, which results in higher adjustment costs.	Australian Accounting Review
11	Holzhacker et al. (2015)	Germany 16,186 hospital-years 1993-2008	OC	Impatient days; Economic growth; Employee intensity; Asset intensity; Average length of stay at hospital; Hospital beds; Dummy (1 if the year is 2003 or later, 0	Institutional theory Economic theory	**Objectives:** Investigating the impact of fixed price regulations on cost asymmetry and cost elasticity. Examining the influence of ownership on firm responses to cost asymmetry and cost elasticity in response to price regulation. **Results:** In response to a change in their regulatory environment, German hospitals reduced cost asymmetry to decrease their operating risk and increase their survivability in a	Contemporary Accounting Research

No.	Study	State, Sample, and Period	Costs Examined	Variables Examined	Theory	Objectives and Results	Journal
				otherwise); Time trend; Dummy variables for German states; Impatient decrease (dummy, 1 if there is a decrease in impatient days, 0 otherwise); Successive decrease in hospital impatient days		tougher regulatory environment. In for-profit hospitals, cost elasticity increased dramatically after the introduction of fixed price regulation. However, in governmental hospitals, cost elasticity increased to a lesser extent due to this fixed price regulation. The results shed the light on the difference between downward and upward changes in cost elasticity. For example, in order to make their costs more elastic, for-profit hospitals offset the pre-existing cost asymmetry. However, governmental hospitals continued to show cost asymmetry even after the introduction of fixed price regulation.	
12	Venieris et al. (2015)	USA 55,769 firm-years 1979-2009	SG&A	FCF; Asset intensity; Employee intensity; Economic growth	Intellectual capital theory	**Objectives:** Investigating whether there is a relationship between intangible related investments and sticky cost behavior of SG&A. **Results:** Firms with high organizational capital show sticky cost behavior, but firms with low organizational capital exhibit anti-sticky cost behavior. Robustness tests support the generalization of these results to research and development expenses and advertising expenses.	Management Accounting Research
13	Yang (2015)	Korea Merged Firms 303 firm observations Control Firms 1786 firm observations 1995-2011	LC of SG&A plus depreciation costs of SG&A LC of COGS plus depreciation costs of COGS	Bidder hubris (dummy, 1 if the firm is merged firm, 0 otherwise); Size; Leverage; FCF; Total assets over sales; Chaebol dummy (1 if the firm belongs to a Chaebol group in Korea, 0 otherwise); Optimism; Synergy	Hubris theory Synergy theory	**Objectives:** Investigating the influence of bidder CEO hubris or overconfidence in the event of mergers on long-run cost stickiness in Korea. **Results:** Bidder CEO overconfidence regarding merger synergy positively affects cost stickiness in the long run. The degree of cost stickiness is higher for optimistic bidder CEOs than for optimistic non-bidder CEOs. The learning and self-attribution effects play a vital rule on the degree of cost stickiness. For example, costs are stickier for bidder CEOs with successful prior operating synergies than they are for optimistic bidder CEOs with less successful prior operating synergies.	Emerging Markets Finance and Trade
14	Kitching et al. (2016)	39 countries 50,080 firms 245,348 firm years 1990-2013	OC	Sales decrease (dummy); Culture; Asset intensity; Economic growth; Common law (dummy); Anti-director index; Human development index; Judicial efficiency	Theory of sticky cost behavior	**Objectives:** Investigating whether asymmetric cost behavior is affected by the national culture in 39 countries. **Results:** National culture affects resource-management decisions, which leads to differences in cost stickiness across countries. For example, cost behavior exhibits less stickiness in countries with higher masculinity, long-term orientation, and uncertainty avoidance.	The International Journal of Accounting
15	Xue and Hong (2016)	China 7702 firm-years 2003-2010	Administration and operation expenses Research and development Advertising	Capital intensity; Growth rate; FACT (eight factors of corporate governance)	Institutional economic theory	**Objectives:** Investigating the separate and joint influence of earnings management and corporate governance on SGA stickiness. **Results:** The non-earnings management sub-sample exhibits more SGA stickiness than the earnings management sub-sample. The difference in the reduction in the stickiness	China journal of Accounting Research

No.	Study	State, Sample, and Period	Costs Examined	Variables Examined	Theory	Objectives and Results	Journal
			Other general expenses			behavior between the two sub-samples is much higher in other general expenses than in advertising expenses and research and development. Effective corporate governance mechanisms have a negative effect on expense stickiness. The joint effect of corporate governance and earnings management reduces expense stickiness. This reduction is more attributable to earnings management incentives than to corporate governance.	
16	Ibrahim and Ezat (2017)	Egypt Ranging from 412 to 511 firm-years 2004-2011	SG&A COGS Total costs = (SG&A + COGS)	Sales; Sales decrease (dummy, 1 if current year net sales are less than previous year, 0 otherwise)	Agency theory Asymmetric cost behavior theory Resource adjustments cost theory	**Objectives:** Investigating the asymmetric cost behavior in Egyptian listed companies and across different sectors. Examining the magnitude and nature of sticky cost behavior before and after the application of Egyptian corporate governance code. **Results:** The results reveal that sticky cost behavior is prevalent in Egyptian listed companies. SG&A, COGS, and total costs are found to be sticky.	Journal of Accounting in Emerging Economics
17	Li and Zheng (2017)	USA 50,735 firm-years 1996-2009	OC	Economic growth; Asset intensity; Employee intensity; Competition measures (LLM and THHI); Tariff cut (dummy, 1 in the years influenced by great tariff cut for the firm's industry, 0 otherwise)	Real options theory Theory of asymmetric cost behavior	**Objectives:** Investigating whether sticky cost behavior is affected by a firm's operating environment (product market competition). **Results:** The results reveal that there is a significant positive relationship between product market competition and sticky cost behavior. The relationship between competition and cost stickiness is more pronounced in financially strong companies than in financially weak companies. The degree of cost stickiness resulting from product market competition increased in firms with managerial optimism relative to firms with managerial pessimism.	Review of Quantitative Finance and Accounting
18	Cheung et al. (2018)	38 countries 172,427 observations 1990-2012	SG&A	Asset intensity; Employee intensity; Economic growth; Competition factors	N/A	**Objectives:** Investigating the effect of external competition factors on asymmetric cost behavior. **Results:** The degree of asymmetric cost behavior is influenced by external competition factors. For example, the degree of SG&A cost stickiness is higher in firms with larger market size, entry costs, and product differentiation.	Asia-Pacific Journal of Accounting and Economics
19	Cook et al. (2018)	USA Ranges from 100,511 observations to 14,179 observations 1980-2014	OC	Dummy variable (1 if sales growth is negative, 0 otherwise)	N/A	**Objectives:** Examining whether firms' current operating lease expenses are the drivers of measures of sticky costs, operational inflexibility, and operating leverage. Examining whether asset volatility is significantly affected by firms' operating lease expense. **Results:** Operating lease expense is a fundamental driver of measures of operational inflexibility, sticky costs, and operating leverage. Firms' asset volatility and pricing decisions are significantly affected by their operating lease expenses.	Finance Research Letters
20	Ibrahim (2018)	Egypt 80 companies 2008-2013	COGS	Board size; Role duality; Non-executives ratio; SSD (dummy); Economic	Agency theory	**Objectives:**	Accounting Research Journal

No.	Study	State, Sample, and Period	Costs Examined	Variables Examined	Theory	Objectives and Results	Journal
				growth; Institutional ownership	Cost asymmetry theory	Investigating asymmetric cost behavior in emerging economies and comparing the results with those of several developed countries. Investigating whether cost behavior is influenced by board characteristics. **Results:** Egyptian firms exhibit sticky cost behavior for COGS. Cost stickiness increases with larger board size, a higher ratio of non-executives, and chairman/CEO separation. Cost stickiness is mitigated by institutional ownership, economic growth, and SSD.	
21	Li and Zheng (2018)	USA 121,436 firm-years 1979-2015	OC	Rollover risk proxy; Sales; Asset intensity; Employee intensity; GDP; Sales decrease (dummy); SSD (dummy); Financial constraints	Theory of rollover risk	**Objectives:** Examining the influence of rollover risk on operational initiatives, which results in sticky cost behavior. **Results:** Rollover risk negatively influences the level of cost stickiness. This negative association is stronger for companies that have limited financing sources or more financial constraints.	Accounting and Finance
22	Prabowo et al. (2018)	22 European Countries 5931 firms 40,418 firm-years 1993-2012	LC	State-owned enterprises (dummy); Asset intensity; SSD (dummy); Common law (dummy); Economic growth; Employee protection legislation; Socio-political variables	N/A	**Objectives:** Examining the influence of state ownership on the labor cost stickiness of companies from 22 European countries. **Results:** State-owned enterprises show higher labor cost stickiness than private firms due to the effects of left-wing governments and election years. Thus, socio-political factors have a stronger influence over state-owned enterprises. Labor costs show a lower degree of stickiness in the year prior to privatization. This may be attributed to labor restructuring due to privatization. The degree of labor cost stickiness is not affected by operating in a strategic industry.	European Accounting Review
23	Xu and Zheng (2018)	USA 5,285 firms 32,685 firm-years 1993-2013	SG&A	Cash effective tax rate; Sales revenues; Sales decrease (dummy); Annual buy and hold return; Asset intensity; Employee intensity; SSD (dummy); Advertising expenses; Research and development expenses; Avoid loss (dummy); Avoid earning decrease (dummy)	Precautionary demand for cash theory	**Objectives:** Investigating the relationship between tax avoidance and sticky cost behavior. **Results:** Cash savings from tax avoidance reduce managers' resource-adjustments costs, indicating that there is a significant negative relationship between sticky cost behavior and tax avoidance. This relationship is affected by the firm's business strategy, tax fees paid to the auditor, and cash flow volatility. The relationship between sticky cost behavior and tax avoidance is more pronounced for prospectors than for defenders. The relationship between sticky cost behavior and tax avoidance is more pronounced in firms with high cash flow volatility.	Journal of Accounting, Auditing, and Finance
24	Cai et al. (2019)	China 938 firm-years 2009-2017	SG&A	Shared auditors; Revenue; Sales decrease (dummy); Overconfidence; Economic growth; Asset intensity; Employee	Management opportunism theory	**Objective:** Investigating whether auditor sharing between suppliers and their customers influences suppliers' sticky cost behavior. **Results:**	China Journal of Accounting Research

No.	Study	State, Sample, and Period	Costs Examined	Variables Examined	Theory	Objectives and Results	Journal
				intensity; Manager overconfidence		When suppliers' managers exhibit optimistic expectations, shared auditors substantially decrease suppliers' cost stickiness. When suppliers' managers exhibit pessimistic expectations, shared auditors substantially increase suppliers' cost stickiness. The effect of shared auditors on suppliers' cost stickiness is stronger when the number of shared auditors increases.	
25	Chen et al. (2019)	USA 45,048 firm-years 1994-2014	SG&A	Sales revenue; Sales change; Asset intensity; Revenue decrease (dummy); Management tone variables; Unused resources	N/A	**Objectives:** Investigating the influence of managerial expectations (unused resource constraints and resource-adjustment costs) on sticky cost behavior. **Results:** The strongest effect of managerial expectations on sticky cost behavior occurs when unused resources and adjustment costs are high. In contrast, managerial expectations do not affect the level of sticky cost behavior when unused resources and adjustment costs are low. When there is an increased level of unused resources, managerial pessimism exhibits anti-sticky cost behavior. However, managerial optimism leads to sticky cost behavior. A high magnitude of adjustment costs, a low level of unused resources, and optimistic managerial expectations lead to the highest level of cost stickiness, while the opposite directions of these three factors result in the highest level of anti-sticky cost behavior.	Review of Accounting Studies
26	Chung et al. (2019)	USA 39,083 firm-years 1981-2012	Total costs	Institutional ownership variables; Size; profitability; Market-to-book ratio of assets; Leverage; Tangibility of firm assets	Agency theory	**Objectives:** Investigating whether institutional ownership, as a monitoring mechanism, can reduce the problem of cost stickiness. **Results:** Long-term institutional investors have a significant negative effect on cost stickiness, which in turn improves future market and accounting performance.	North American Journal of Economics and Finance
27	Habib and Hasan (2019)	USA 21,957 firm-years 1991-2013	OC	Sales; SSD (dummy); Asset intensity; Employee intensity; Stock return; CSR classifications	Stakeholder theory Agency theory	**Objectives:** Investigating whether firms involved in CSR activities exhibit sticky cost behavior. Examining CSR-related cost behavior patterns for two aspects of CSR (strategic CSR and tactical CSR) separately. Investigating CSR-related cost behavior patterns across different economic conditions. **Results:** CSR-related costs show sticky cost behavior. Strategic CSR costs exhibit greater cost stickiness than tactical CSR costs. Tactical CSR costs show anti-sticky behavior in recession periods but sticky behavior in expansion periods.	Business and Society
28	Haga et al. (2019)	OECD countries 33 countries 69,876 firm-years 2011-2016	SG&A	Economic growth; Change in sales; Asset intensity; Dummy (1 for the year before national tax rate cut, 0 otherwise); Tax compliance measure; SSD (dummy); Sales decrease	N/A	**Objectives:** Investigating cost behavior before corporate tax rate cuts took effect in OECD countries. **Results:** The results reveal income-decreasing SG&A cost behavior prior to tax rate cuts in OECD countries. The level of this decrease is proportional to size of the decrease in tax rate. Common-law countries and higher tax compliance countries exhibit less	Journal of International Accounting, Auditing, and Taxation

No.	Study	State, Sample, and Period	Costs Examined	Variables Examined	Theory	Objectives and Results	Journal
				(dummy); Common law (dummy)		income-decreasing cost behavior. Compared with unlisted companies, listed companies show less income-decreasing cost behavior prior to tax rate cuts.	
29	Hartlieb et al. (2019)	USA 7,766 firms 52,870 observations 1990-2014	OC	Change in sales; Sales decrease (dummy); Asset intensity; Employee intensity; FCF; Economic growth; Social capital; State-level union membership; Unemployment rate; Education level; SSD (dummy); Religious adherence; Income per capita; Population density; Population	N/A	**Objectives:** Examining whether community social capital affects asymmetric cost behavior. **Results:** The results reveal that community social capital has a significant negative influence on cost stickiness.	Management Accounting Research
30	Kuiate and Noland (2019)	USA 1024 firm-years 1989-1997	LC	Total revenues or total miles; Sales decrease (dummy); Pensions offers (dummy)	N/A	**Objective:** Investigating the consequences of providing pension benefits in a high labor turnover industry (the trucking industry), with a specific focus on the cost stickiness of core competencies and profitability. **Results:** During periods when sales fall, firms retain their competent employees, which leads to stickier wage costs. Providing retirement plans to competent employees has a positive influence on firms' profitability.	Journal of Accounting and Organizational Change
31	Lee et al. (2019)	56 countries 32,892 firms 266,538 firm-years 1989-2012	OC	Election year (dummy, 1 for election year, 0 otherwise); Common law (dummy); Economic growth; Asset intensity; Sales decrease (dummy); Lagged sales decrease (dummy)	Theory of asymmetric cost behavior Political business cycle theory	**Objectives:** Examining whether political uncertainty during elections affects cost stickiness. Investigating whether country-level political, legal, and disclosure standards affect the relation between political uncertainty and cost stickiness. Studying if changes in cost stickiness during election periods are affected by countries that show stronger uncertainty avoidance. **Results:** Sticky cost behavior increases during election periods relative to non-election periods because managers delay resource-divestment decisions during election periods. The relationship between political uncertainty and cost stickiness is stronger in countries with sound legal, political, and disclosure institutions. Countries that exhibit lower uncertainty avoidance have higher cost stickiness during election years.	Contemporary Accounting Research
32	Liu et al. (2019)	USA 19,783 firm-years 1990-2013	SG&A	Stakeholder orientation indicators; Sales; Asset intensity; employee intensity; Sales decrease (dummy); FCF; Return on assets; Research and	Adjustment cost theory Agency theory	**Objective:** Investigating whether SG&A cost stickiness is influenced by stakeholder orientation. **Results:** Customer orientation has a positive influence on cost stickiness, and this association is stronger in firms with more growth opportunities, stronger governance structures, and SG&A costs associated with high future value. Employee orientation has a	Contemporary Accounting Research

No.	Study	State, Sample, and Period	Costs Examined	Variables Examined	Theory	Objectives and Results	Journal
				development; Book to market value; Institutional ownership; Independent directors; Board size		positive influence on cost stickiness, and this association is more pronounced in firms with weak governance structures, SG&A costs associated with low future value, and mature firms.	
33	Ma et al. (2019)	USA 106,712 firm-years 1971-2010	SG&A	Religion variables; Sales; Asset intensity; Stock return; Growth; Sales decrease (dummy); Tobin's Q; Return on assets; Leverage; Research and development; Advertising expenses; Capital expenses; Tangible assets intensity; Operating margin; Sales growth; Partition variables	N/A	**Objective:** Examining whether and how religion influences SG&A cost stickiness. **Results:** Religion reduces cost stickiness through the risk-aversion mechanism and the ethical mechanism. This negative association between religion and cost stickiness enhances firm value.	Journal of Business Ethics
34	Silge and Wöhrmann (2019)	USA H_1: 59,183 observations H_2: 37,178 observations H_3: 37,146 observations 1990–2014	SG&A	**Determinants Model:** Growth opportunities; Asset intensity; Employee intensity; SSD (dummy); Successive sales increase (dummy); Economic growth	N/A	**Objective:** Examining whether long-term growth expectations influence cost stickiness and investors' response to such cost behavior. **Results:** High long-term growth expectations lead to a higher level of sticky cost behavior. Investors negatively respond to unexpected cost stickiness, especially when the firm experiences low long-term growth expectations.	Review of Managerial Science
35	Stimolo and Porporato (2019)	Argentina 96 firms 667 observations 2004-2012	SG&A	Revenues; Revenue decrease (dummy); Asset intensity; GDP; Industry dummy; Aggressive economic growth and recession (dummy)	N/A	**Objectives:** Investigating the determinants of sticky cost behavior in a country with unexpected macro-economic changes (Argentina). **Results** SG&A costs exhibit cost stickiness behavior, and this behavior differs across sub-samples based on industries. Social and cultural factors including labor inflexibility driven by powerful unions, macro-economic environment, and asset intensity (industry) affect sticky cost behavior.	Journal of Accounting in Emerging Economies
36	Yang (2019)	Australia 10,048 firm-years 1990-2016	OC	Accruals earnings management constraints; Intellectual capital efficiency; Sales; Sales decrease (dummy); GDP; SSD (dummy); Property, plant, and equipment intensity; Asset	Agency theory	**Objectives**: Investigating the influence of intellectual capital efficiency and accruals earnings management constraints on sticky cost behavior. **Results:** Companies with limited capability to conduct earnings manipulation exhibit anti-sticky cost behavior. Human capital efficiency has a positive association with the level of cost stickiness. The level of cost asymmetry is stronger in the post-IFRS period than in the pre-IFRS period.	Australian Accounting Review

No.	Study	State, Sample, and Period	Costs Examined	Variables Examined	Theory	Objectives and Results	Journal
				intensity; Employee intensity; Avoid loss (dummy)			
37	Zhang et al. (2019a)	China 1,199 firm-years 2009-2013	SG&A	Initial public offering overfunding; Revenue; Revenue decrease (dummy); Asset intensity; Employee intensity; GDP	N/A	**Objectives:** Investigating the effect of initial public offering overfunding on sticky cost behavior and whether this effect is moderated by corporate governance. **Results:** Initial public offering overfunding liquidity is positively associated with cost stickiness, and this effect is more pronounced in companies that have weak governance including less power balance, less supervision by institutional investors, and fewer debt constraints.	Asia-Pacific Journal of Accounting and Economics
38	Ballas et al. (2020)	USA 27,708 firm-years 1991-2014	SG&A	Strategy; Advertising expenses; Sales revenue; Sales decrease (dummy); Employee intensity; Asset intensity; SSD (dummy); FCF; Growth; Gross profit; Research and development expenses; Strategic change (dummy); Managerial ability	Miles and Snow's theory	**Objective:** Examining how the intensity and direction of SG&A asymmetric cost behavior are influenced by firms' strategic choices. **Results:** The direction and intensity of a firm's cost stickiness are influenced by the firm's strategic orientation. While SG&A cost stickiness is observed in prospector firms, SG&A cost anti-stickiness is observed in defender firms. Resource allocation decisions are influenced by the firm's portfolio of intangible resources and its strategic position.	European Accounting Review
39	Costa and Habib (2020)	USA 147,764 firm-years 1977-2017	SG&A COGS	Sales; Sales decrease (dummy); Trade credit; SSD (dummy); GDP; Asset intensity; Employee intensity; Stock performance; Operating slack; Capital expenditures; Acquisition ratio; Product market competition; Customer concentration (dummy)	Financial advantage theory Signalling transaction cost theory Information asymmetry theory	**Objectives:** Examining the relationship between trade credit and sticky cost behavior and whether this relation is moderated by product market competition, agency problems, and customer concentration. **Results:** Trade credit is negatively associated with sticky cost behavior, and this relationship is more pronounced in firms with high agency problems. Firms operating in non-competitive markets with greater trade credit exhibit a lower degree of sticky cost behavior. High customer concentration reduces the monitoring ability of trade credit in reducing cost stickiness.	Accounting and Finance
40	Golden et al. (2020a)	USA H_1 and H_2: 20,341 firm-years H_3 and H_4: 5048 firm-years 2003-2015	SG&A OC	CSR variables; Sales revenue; Sales decrease (dummy); Employee intensity; Asset intensity; SSD (dummy); Stock return; Cost change; Return on assets; Leverage; Size;	Stakeholder theory	**Objective:** Examining whether ESG sustainability factors affect firms' cost stickiness behavior. **Results:** Sticky CSR activities have a positive influence on the level of cost stickiness, while non-sticky sustainability factors do not. The relationship between ESG disclosure and sticky cost behavior is more pronounced for firms with sticky CSR activities. Firms with greater cost stickiness and sticky CSR activities exhibit greater ESG disclosure.	Advances in Management Accounting

No.	Study	State, Sample, and Period	Costs Examined	Variables Examined	Theory	Objectives and Results	Journal
				Equipment newness; Capital intensity; Inverse closing stock price; Stock price return			
41	Golden et al. (2020b)	USA 60,183 firm-years 1999-2016	OC	Sales; Sales decrease (dummy); Employee intensity; Asset intensity; SSD (dummy); Cash; Unemployment rate; Wrongful discharge laws score; Hiring credits (dummy); Employee costs; Research and development	Theory of asymmetric cost behavior	**Objectives** Examining the relationship between labor adjustment costs and asymmetric cost behavior using a new proxy for labor adjustment costs (reliance on skilled labor). **Results** Labor skill index is positively associated with cost stickiness. This relationship is stronger for firms situated in jurisdictions with weak hiring credits and lower rates of unemployment, and for firms in jurisdictions with robust employment protection laws.	Management Accounting Research
42	Hartlieb et al. (2020)	44 Countries 21,496 firms 146,761 firm-years 1989-2014	OC	Sales; Sales decrease (dummy); SSD (dummy); Generalized trust; Asset intensity; Employee intensity; Economic growth; Law (dummy); Country-level variables	N/A	**Objective:** Investigating whether cost stickiness is influenced by generalized trust. **Results:** Cost stickiness is positively influenced by generalized trust.	The International Journal of Accounting
43	Lee et al. (2020)	USA 8,614 firms 62,584 firm-years 1990-2006	SG&A	Sales; Sales decrease (dummy); Banking competition; Employee intensity; Asset intensity; SSD (dummy); Stock return	N/A	**Objective:** Examining whether sticky cost behavior of non-financial firms is influenced by banking competition. **Results:** The increase in banking competition caused by Interstate Banking and Branching Efficiency Act increases firms' competitive pressure and facilitates their access to external funding resources which in turn increases their level of cost stickiness.	Finance Research Letters
44	Li et al. (2020)	USA CEO sample 15,458 firm-years Top 5 paid executives' sample 17,436 firm-years 1992-2015	SG&A	Sales; Sales decrease (dummy); Annual return; Employee intensity; Asset intensity; SSD (dummy); Portfolio vega; Portfolio delta	Adjustment-based cost stickiness theory Agency theory	**Objectives:** Investigating whether management control mechanisms through risk-taking incentive influence asymmetric cost behavior. **Results:** Risk-taking incentives motivate executives to execute operational decisions that lead to lower cost stickiness and a greater level of cost elasticity. The effect of risk-taking incentive on sticky cost behavior is greater than the effect of earnings management incentives on sticky cost behavior.	Review of Quantitative Finance and Accounting

Appendix C. Non-financial companies – Consequences of cost stickiness (8 articles)

No.	Study	State, Sample, and Period	Costs Examined	Variables Examined	Theory	Objectives and Results	Journal
1	Weiss (2010)	USA 2520 firms 44,931 firm-quarters 1986-2005	SG&A COGS	Market value of equity; Loss (dummy); Sticky (difference in the slope of cost function between the most two recent quarters from quarter t-3 through quarter t); Dummy variable, 1 if unexpected earnings forecast is negative, 0 otherwise; Standard deviation of analyst forecast; Number of analysts earning forecast	N/A	**Objectives:** Investigating how analyst earnings forecast accuracy, analysts' selection of covered firms, and market reaction to earnings announcements are affected by firms' cost behavior. **Results:** Sticky cost behavior has a significant negative relationship with accuracy of analyst earnings forecast. Analysts' coverage priorities are affected by sticky cost behavior, and investors tend to consider cost stickiness when evaluating firm value. Firms with stickier cost behavior have a weaker market response to earnings surprises than firms with a lower degree of cost stickiness.	The Accounting Review
2	Banker et al. (2016)	USA 55,448 observations 1987-2007	Depreciation expense Interest expense	Asset intensity; Employee intensity; Size; Leverage; Book to market; Ownership measures; litigious industries	Conservatism theory Theory of sticky costs	***Objectives:*** Investigating the influence of cost stickiness on conservatism estimates. ***Results:*** Conditional conservatism models that do not consider cost stickiness, such as the Basu model, show a specific source of bias (an overstatement by more than 25% for conditional conservatism estimates). Validation tests reveal that the piecewise-linear effect of changes in sales has a significant asymmetric effect on both interest expense and depreciation expense, which represents cost stickiness. When the authors control for the variation of cost stickiness, the estimates of the degree of variation in conservatism differ considerably across industries and firms.	Journal of Accounting and Economics
3	Ciftci et al. (2016)	USA 107,577 firm-quarters 1998-2011	*Sticky* variable measured as the difference in the slope of the cost function between the most recent quarter with a sales increase and the most recent quarter with a sales decrease	Book to market of equity; Number of analysts issuing an earnings forecast; Industry adjusted return on equity; Lag of unexpected earnings divided by share price; Logged sum of trading volume (12 months prior to the month in which the earnings forecast is made)	N/A	**Objectives:** Investigating whether analysts' earnings forecasts error is influenced by improper incorporation of information about cost stickiness and cost variability. **Results:** The results reveal that analysts' incorporation of both cost stickiness and cost variation leads to systematic and substantial errors in earnings forecasts. Specifically, improper incorporation of cost behavior information results in smaller errors when sales beat expectations (favorable scenarios) than when sales miss expectations (unfavorable scenarios).	Journal of Management Accounting Research
4	Ciftci and Salama (2018)	USA 130,628 firm-quarters 1994-2015	Total costs	Mean value of industry cost stickiness; EPS issuance (dummy); Operating leverage;	N/A	**Objectives:** Investigating whether there is a relationship between management earnings forecast, proxied by Earnings Per Share (EPS), and cost stickiness. Examining the effect of cost stickiness drivers on the relationship between management earnings	Journal of Management Accounting Research

No.	Study	State, Sample, and Period	Costs Examined	Variables Examined	Theory	Objectives and Results	Journal
				CAPM Beta; Number of analysts who prepare one quarter ahead EPS forecast; Market-to-book value; Standard deviation of earnings divided by total assets; Loss (dummy); Leverage; Market value of equity; EPS increase (dummy); Dummy variable (1 if company's auditor in previous year was a big N auditor, 0 otherwise); Difference in days between EPS announcement date and EPS forecast date		forecast and cost stickiness. Studying the relationship between management earnings forecast errors and cost stickiness. Comparing management earnings forecast with analyst forecast. **Results:** The results indicate that there is a positive relationship between cost stickiness and management earnings issuance. This relationship remains positive even after the authors control for the drivers of cost stickiness. There is a positive relationship between management earnings forecast error and cost stickiness. For sticky cost firms, managers' forecast errors are lower than analysts'.	
5	Madadian et al. (2018)	USA 9022 firm-years 2002-2011	SG&A	N/A	Behavioral theory	**Objectives:** Examining whether similarity of SG&A costs influences financial analysts' information uncertainty. **Results:** SG&A expenses similarity is negatively associated with forecast dispersion and error of one-year-ahead profits for companies whose previous SG&A percentage surpasses the social benchmark. SG&A similarity is negatively associated with analyst coverage, particularly for companies whose previous SG&A percentage surpasses the social benchmark.	Accounting and Business Research
6	He et al. (2020)	USA 87,807 firm-years 1978-2016	SG&A OC Total costs	Asset intensity; SSD (dummy); Economic growth; Sales increase (dummy); FCF; Size; Leverage; Debt; Tobin's Q; Cash holding; Asset tangibility; Return on assets; Earnings persistence; Loss (dummy); Special items	N/A	**Objective:** Investigating the influence of cost asymmetry on firms' dividend policy. **Results:** Firms with stickier cost behavior pay lower dividends than less stickier firms. The negative association between cost stickiness and dividend payments is affected by resource-adjustment costs. Dividends payments are negatively affected by firms' unionization, and this negative effect is higher in firms that exhibit a high level of cost stickiness.	Journal of Accounting Research
7	Lopatta et al. (2020)	USA 11,202 firm-years 1992-2016	SG&A	CEO characteristics; Sales revenue; Asset intensity; Employee intensity; SSD (dummy); Prior year loss	Agency theory	**Objective:** Examining how CEO-related cost asymmetric decisions affect shareholder value. **Results:**	Managerial and Decision Economics

No.	Study	State, Sample, and Period	Costs Examined	Variables Examined	Theory	Objectives and Results	Journal
				(dummy); Economic growth; Operating cash flows; Avoid decrease (dummy); Avoid loss (dummy); Abnormal accruals; Life cycle; PPE; Stock return; CEO horizon; Size; Leverage; Beta; Market share; Dividends; Research and development; Advertising expense; Capital intensity; Return on assets; Tobin's Q		CEO-related excess cost stickiness decisions decrease shareholder value, and this relationship is driven by certain CEO characteristics such as CEO compensation and CEO power. CEO-related excess cost anti-stickiness decisions do not reduce shareholder value.	
8	Tang et al. (2020)	China 12,227 firm-years 2009-2017	Total costs	Crash risk; Sticky (dummy); Firm return; Firm return volatility; Size; Book to market; Leverage; Return on assets; CEO duality; Shareholding concentration; State ownership (dummy); Overconfidence; Earnings management; Turnover	Theory of sticky cost	**Objective:** Investigating the influence of sticky cost behavior on stock price crash risk. **Results:** The authors find a negative association between sticky cost behavior and stock price crash risk. This negative association is more pronounced in state-owned firms and in companies with a greater level of competition, a younger CEO, lower performance, poor finance risk, and concentrated ownership.	Emerging Markets, Finance, and Trade

Appendix D. Financial companies – Determinants of cost stickiness (2 articles)

No.	Study	State, Sample, and Period	Costs Examined	Variables Examined	Theory	Objectives and Results	Journal
1	Hall (2016)	USA 5682 bank-years 1997-2006	LC	Public bank (dummy); Change in federal fund rate multiplied by total bank loans; Asset intensity; Employee intensity; Bank ownership decisions; Small increase (dummy); Indicator variable (1 if bank tier 1 capital ratio lies in the lowest quartile of the distribution of all banks in the sample, 0 otherwise); SSD (dummy); Prior year loss (dummy)	Asymmetric cost theory Agency theory	**Objectives:** Investigating how labor cost management decisions are affected by incentives created by ownership structure in private and public banks. **Results:** Public banks tend to choose a more elastic labor cost structure, which is in line with managers' preference for more flexibility to achieve forecasted earnings when they are under pressure from equity investors. Because public banks have higher financial reporting incentives, their managers tend to reduce labor costs to avoid reporting lower profits than in the previous year, but private banks tend to reduce labor costs to manage required regulatory capital.	The Accounting Review
2	Belina et al. (2019)	USA 22 health insurance companies 175 firm-years 2002-2016	SG&A	Net revenues; Revenue decrease (dummy); Dummy variable (1 for years after the ACA was adopted, 0 otherwise)	N/A	**Objectives:** Studying the influence of MLR regulatory policy change on SG&A cost stickiness. **Results:** SG&A stickiness decreases significantly after the adoption of the minimum MLR target requirements.	Journal of Accounting and Public Policy

Appendix E. Both financial and non-financial – Determinants of cost stickiness (4 articles)

No.	Study	State, Sample, and Period	Costs Examined	Variables Examined	Theory	Objectives and Results	Journal
1	Brüggen and Zehnder (2014)	USA 2441 firms 18,378 firm-years 1992-2006	SG&A	CEO equity compensation; CEO fixed compensation; CEO share ownership; Asset intensity; Employee intensity; SSD (dummy); Board size; Board independence	Agency theory	***Objectives:*** Investigating whether there is a relationship between SG&A cost stickiness and equity-based compensation. Examining whether the degree of cost stickiness is affected by the alignment between executives' interests and owners' interests. ***Results:*** CEOs whose compensation is entirely based on equity-based compensation and whose interests are in alignment with owners' interests take decisions that lead to more SG&A cost stickiness than CEOs with less equity-based compensation do. This supports the argument of "good" cost stickiness and weakens the argument of empire building.	Journal of Management Control
2	Subramaniam and Watson (2016)	USA 9592 firms 82,118 observations 1979-2000	SG&A COGS Total costs = (SG&A + COGS)	Fixed asset intensity; Employee intensity; Inventory intensity; Concentration intensity	N/A	**Objectives:** Examining whether different industry groups affect cost stickiness. Investigating whether sticky cost behavior results from large changes in activity level or from all changes in activity level. Examining whether sticky cost behavior determinants differ across industries. **Results:** Cost stickiness behavior differs across industries. SG&A exhibits sticky behavior for service firms but not for financial firms. COGS shows sticky behavior for financial firms, but only marginally for service companies. The merchandising industry shows the least sticky behavior, and the manufacturing industry shows the stickiest behavior. Sticky cost behavior is industry specific in the level of activity changes.	Advances in Management Accounting
3	Ciftci and Zoubi (2019)	USA 185,542 firm-years 1979-2015	SG&A	Sales; Asset intensity; Employee intensity; Cost change; Sales directions indicators	N/A	**Objective:** Examining the effect of sales change magnitude on asymmetric cost behavior. **Results:** Conditional on a prior sales increase, small current sales changes lead to greater cost stickiness and vice versa. Conditional on a prior sales decrease, small current sales changes lead to higher cost anti-stickiness and vice versa.	Journal of Management Accounting Research
4	Höglund and Sundvik (2019)	Finland 81,608 firm-years 2012-2014	SG&A	Sales; Sales decrease (dummy); Asset intensity; Industry (dummy); Indicator variable (coded 1 if the observation is from the year immediately before the tax reduction when there is a specific tax incentive to manage earnings downwards, 0 otherwise); Indicator	N/A	**Objectives:** Investigating the relationship between company auditing and intertemporal income shifting. Investigating the influence of auditors on cost stickiness when there is an incentive for income shifting. **Results:** On average, small sample companies are more likely to exhibit discretionary accrual behavior to reduce taxable income before the tax reduction. Among companies that predict tax reduction the most, there is a significant difference between audited and unaudited companies in accrual income shifting. When income shifting incentive is present, the audited companies demonstrate less cost stickiness than the unaudited companies.	Accounting and Business Research

No.	Study	State, Sample, and Period	Costs Examined	Variables Examined	Theory	Objectives and Results	Journal
				variable (coded 1 if the company is audited, 0 otherwise).			

Appendix F. Both financial and non-financial – Consequences of cost stickiness (3 articles)

No.	Study	State, Sample, and Period	Costs Examined	Variables Examined	Theory	Objectives and Results	Journal
1	Banker and Chen (2006)	USA First sample 8771 firms 39,367 firm-years Second sample 4348 firms 15,500 firm-years 1992-2002	N/A	N/A	N/A	**Objectives:** Investigating whether models that consider the relationship between sales changes and cost changes have more ability to predict future earnings than models that do not consider this relationship. **Results:** The results reveal that the model that incorporates cost variability and cost stickiness is better than the other models in improving the forecast accuracy of future earnings and in providing relevant information content.	The Accounting Review
2	Rouxelin et al. (2018)	USA 115 calendar-quarters 1985-2013	Total costs (Both SG&A and COGS are combined to proxy LC).	Unemployment rate; Change in unemployment rate; Advance GDP; Aggregate GAAP earnings; Stock market return; Industrial production index; Uncertainty index; University of Michigan consumer sentiment index; Employment growth dispersion; Return dispersion; Effective federal funds interest rate; Inflation rate	N/A	**Objectives:** Investigating whether incorporating sticky cost behavior in three different models of forecasting unemployment provides better forecasting performance. **Results:** The authors assess the validity of aggregate cost stickiness and find that periods of great cost stickiness (when companies are reluctant to terminate employees) are followed by a growing number of employees overall. For all three types of unemployment prediction models, the results show that forecasting performance improves when the models incorporate cost stickiness. In-sample results show that there is a negative association between aggregate cost stickiness and future unemployment rate over multiple quarters. When the authors combine the three models (including stickiness), the forecasting ability outperforms the survey of professional forecasters' expectations up to two quarters ahead.	The Accounting Review
3	Han et al. (2019)	USA Ranging from 4,996 to 3,816 firm-years 2005-2016	SG&A COGS Total costs	MEF; Frequency of quarterly MEF; Sales increase (dummy); Institutional ownership; Financial analysts; Volatility; MEF cost; Earnings predictability; Earnings response coefficient; Earnings non-synchronicity; Financing strategy; Asset growth; Litigation industry	Information asymmetry theory Managerial optimism theory	**Objectives:** Examining the relationship between degree of cost stickiness and Management Earnings Forecasts (MEF). **Results:** Cost stickiness has a positive influence on MEF issuance, frequency, and more favorable earnings news forecasted by management. The higher the resource-adjustment costs and firm efficiency, the stronger the relationship between cost stickiness and MEF behavior.	Asian Review of Accounting

No.	Study	State, Sample, and Period	Costs Examined	Variables Examined	Theory	Objectives and Results	Journal
				(dummy); Durable industry (dummy); EPS change; Leverage; Size; Book to market; Return on assets; Financial crisis			