The dynamics of cost behavior: Unveiling sticky costs in private companies

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Abstract

Purpose: While research on cost stickiness has predominantly focused on large public companies, the variability in results has cast doubt on the generalizability of sticky cost behavior to all companies. This paper investigates whether cost stickiness is observable in smaller private companies – i.e., firms without publicly traded securities – thus addressing a notable gap in the literature.
Design/methodology/approach: This study adopts the empirical framework of Anderson et al. (2003), using data from private Italian firms from 1998 to 2022. Furthermore, it extends the scope of analysis to include such diverse cost categories as selling, general, and administrative (SG&A) costs, total labor cost, purchase costs, rent costs, and other operating expenses.
Findings: The findings indicate that SG&A costs in private firms are significantly less sticky than those reported for large public firms. Cost stickiness is also observed in labor, rent, and other operating costs but not in purchase costs. Notably, cost stickiness varies across industries.
Originality/value: This study sheds new light into the dynamics of cost stickiness by highlighting how asymmetrical cost behavior in small and medium-sized private companies differs from that in large public companies, enhancing the understanding of cost management practices across business contexts.

Keywords: sticky costs, asymmetrical cost behavior, SG&A costs, private versus public companies, SMEs

JEL: M21, M41

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1. Introduction

Traditional cost models assume that costs are linear and change proportionally with activity changes. Since Anderson et al. (2003), research in management accounting has questioned whether cost behavior is symmetric for activity increases and decreases. Anderson et al. (2003) introduced the term "sticky" to describe costs that rise more with increases in activity volume than they fall with decreases of the same amount. They find that the selling, general, and administrative (SG&A) costs of a United States (US) sample increase by 0.55% per 1% increase in sales but decrease by only 0.35% per 1% decrease in sales. Drawing on their seminal work, which has sparked considerable debate, a rapidly growing literature has emerged to explore the existence of cost stickiness, examining its determinants and implications. Inconsistent results have raised questions about the generalizability of sticky cost behavior to all companies. This has led to new research conducted across countries, periods, cost categories, and types of companies. Most of these studies, however, have focused on large public companies. Consequently, there is a need to explore cost behavior among smaller and private firms to better understand what influences cost stickiness. I investigate whether private companies – i.e., firms whose shares are not publicly traded on stock exchanges – exhibit cost stickiness with reference to different cost components and whether small and medium-sized enterprises (SMEs) display similar behavior.

This paper contributes to the literature on sticky costs in three ways. First, there is limited knowledge concerning the occurrence of cost stickiness in private firms. To the best of my knowledge, only two prior studies, by Cheng et al. (2018) and Dalla Via and Perego (2014), have examined whether sticky cost behavior exists in private companies. Both cover relatively short periods and demonstrate that costs do not always behave asymmetrically. Second, prior research, including studies by Calleja et al. (2006) and Chen et al. (2012), demonstrates that corporate governance and firm characteristics, such as size (De Villiers et al., 2014; Habib & Huang, 2019), significantly influence cost stickiness. To build on the foundational findings of Anderson et al. (2003), it is essential to validate these results within SMEs. Doing so will contribute to the ongoing debate about the presence and characteristics of cost stickiness in smaller firms. Third, while previous studies have most commonly investigated SG&A costs, my analysis extends to total labor cost, purchase costs, rent costs, and other operating costs. Managers can adjust all these cost types, to varying degrees.

This study uses data collected from the financial statements of private Italian companies spanning from 1998 to 2022. These companies are on av-

erage significantly smaller than those examined in the literature. Several tests of cost stickiness are conducted for different categories of costs and a variety of determinants.

The results indicate that, on average, SG&A costs in private firms are much less sticky than those in the public companies examined by Anderson et al. (2003). Additionally, the absolute response of costs to a sales decline is greater in these firms than in large US companies. Evidence of cost stickiness is also found for labor cost, rent costs, and other operating costs but not for purchase costs. However, these results are not consistent across different industries.

The remainder of the paper is organized as follows: Section 2 reviews the literature. Section 3 describes the sample and the empirical model. Section 4 reports the results. Section 5 concludes.

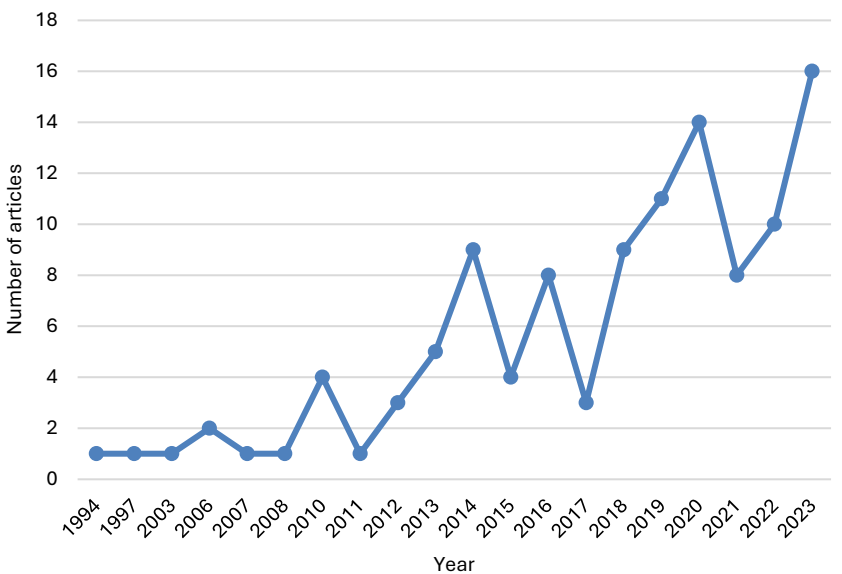
2. Literature review and hypothesis development

2.1. The emergence of cost stickiness literature and its research impact

Studies on cost stickiness began in 1994 with Noreen and Soderstrom (1994), who addressed the issue of whether overhead costs in hospital departments are strictly proportional to activity. That study was followed by a second paper by the same authors about the behavior of overhead costs in US hospitals (Noreen & Soderstrom, 1997). Other than these two papers, prior to the work of Anderson et al. (2003), limited empirical work addressed cost behavior asymmetry. With the aim of analyzing how costs respond to changes in activity levels, Anderson et al. (2003) laid the groundwork for a model that has been consistently applied in cost stickiness research. To understand how this literature has evolved and its research impact, I relied on articles listed in Scopus. Further, based on the analysis of the literature, I aim to justify the choice of Anderson et al. (2003) as a key reference. As a first step, I searched for articles published until 2023 and containing the following terms in their titles, abstracts, or lists of keywords: “cost stickiness,” “cost anti-stickiness,” “sticky cost,” “anti-sticky cost,” “asymmetric cost behavior,” “asymmetrical behavior,” “cost asymmetry,” “cost behavior,” “behavior of overhead.” Then I retained only articles published in English in journals in two Scopus categories: business, management, and accounting and economics, econometrics, and finance. I excluded conference papers, book chapters, conference reviews, and books. As a final step, I selected only ac-

counting peer-reviewed journals listed in the Academic Journal Guide of the Chartered Association of Business Schools (ABS-AJG) 2021 ranking 2–4*, and I manually excluded a few articles unrelated to the topic. As a result, the final list includes 112 articles published in 30 journals.[1] Figure 1 shows the publication trend and provides insights into the evolution of cost stickiness research. After an initial steady increase starting from 2011, the number of published articles rose significantly in recent years reaching a peak of 16 in 2023, indicating sustained interest in the topic.

Figure 1 – Cost stickiness articles per year



[1] In detail, the selection process started with 1,070 articles listed in Scopus, of which only 1,030 were written in English. After restricting the search to the categories of business, management, and accounting and economics, econometrics, and finance, 352 documents remained. Of these, 35 were classified as conference papers, book chapters, conference reviews, or books, leaving 317 articles published in journals. After retaining only articles published in peer-reviewed accounting journals listed in the ABS-AJG 2021 ranking (levels 2-4*), I was left with 121 articles. Nine articles were manually discarded because their research question did not focus on cost stickiness. For instance, I excluded Dye and Sridhar (2002), who investigate whether firm management can leverage information from capital market participants to make decisions about implementing or continuing strategy changes (mentioning sunk-cost behavior in the abstract), and Krishnan and Ramasubramanian (2023), who examine factors influencing cost-related learning in clinical labs. The word "sticky" does not appear in either paper.

About 20.5% of the articles (23 out of 112) are published in top accounting journals ranked 4* and 4 in the ABS-AJG list, 26.8% (30 out of 112) are published in journals ranked at level 3, and 52.7% (59 out of 112) in journals at level 2. Among the 23 top articles, seven studies are published in *The Accounting Review*: Banker and Chen (2006), Weiss (2010), Dierynck et al. (2012), Banker et al. (2014b), Cannon (2014), Holzhacker et al. (2015a), Hall (2016), and Rouxelin et al. (2018). Three studies are published in the *Journal of Accounting and Economics*: Noreen and Soderstrom (1994), Banker et al. (2013), 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. (2015b), Liu et al. (2019), Lee et al. (2020), Jang and Yehuda (2021), and Chang et al. (2022). Finally, two studies are published in *Review of Accounting Studies*: Noreen and Soderstrom (1997) and Chen et al. (2019).

As shown in Table 1, more than half of the articles were published in seven journals. *Journal of Management Accounting Research* is the journal with the most articles (16 or 14.3%), followed by *Accounting and Finance* (10 or 8.9%), *European Accounting Review* (eight or 7.1%), and *The Accounting Review* (eight articles or 7.1%).

Table 1 – Articles by journal

Journal	No.	Journal	No.
Journal of Management Accounting Research	16	*Journal of International Accounting, Auditing and Taxation*	3
Accounting and Finance	10	*China Journal of Accounting Research*	2
Accounting Review	8	*Journal of Accounting in Emerging Economies*	2
European Accounting Review	8	*Review of Accounting Studies*	2
Asia-Pacific Journal of Accounting and Economics	7	*Accounting Forum*	1
Contemporary Accounting Research	7	*Accounting Research Journal*	1
Journal of Management Control	7	*Asian Review of Accounting*	1
Management Accounting Research	5	*Critical Perspectives on Accounting*	1
Accounting and Business Research	4	*International Journal of Accounting Information Systems*	1
Advances in Accounting	4	*Journal of Accounting and Organizational Change*	1
Journal of Accounting, Auditing and Finance	4	*Journal of Accounting and Public Policy*	1
Australian Accounting Review	3	*Journal of Applied Accounting Research*	1
International Journal of Accounting	3	*Journal of Contemporary Accounting and Economics*	1
Journal of Accounting and Economics	3	*Journal of International Financial Management and Accounting*	1
Journal of Accounting Research	3	*Managerial Auditing Journal*	1

Citations are then used as performance indicators to explore the impact of research (Garfield, 1979). The number of citations may be regarded as a measure of the usefulness, impact, or influence of a publication. Table 2 exhibits the most cited articles based on number of citations as available in Scopus. Anderson et al. (2003) is the most cited article (582 citations in Scopus, 2,116 in Google Scholar), followed by Chen et al. (2012) with 415 citations (1,122 in Google Scholar), Weiss et al. (2010) with 226 citations (781 in Google Scholar), and Banker et al. (2013) with 225 citations (612 in Google Scholar). Since older articles collect more citations than newer ones, I also compute the number of citations per year. Based on average Scopus citations per year, Chen et al. (2012) is the most cited paper (47.7 citations per year), followed by Anderson et al. (2003) (29.1 citations per year) and Banker et al. (2013) (22.5 citations per year). If I consider the average number of Google Scholar citations per year, the lead article is Anderson et al. (2003) with 105.8 citations per year, followed by Chen et al. (2012) (102 citations per year), and Banker et al. (2013) (61.2 citations per year).

Table 2 – Top 10 articles by number of Scopus citations

Article	No. citations
Anderson et al. (2003)	582
Chen et al. (2012)	415
Weiss (2010)	226
Banker et al. (2013)	225
Kama and Weiss (2013)	215
Dierynck et al. (2012)	197
Banker and Byzalov (2014)	185
Banker et al. (2014a)	164
Calleja et al. (2006)	154
Noreen and Soderstrom (1997)	132

Overall, the results of the analysis confirm the seminal role of Anderson et al. (2003) in developing a foundational model that has been applied by subsequent studies, significantly contributing to the management accounting literature on cost stickiness.

2.2. Background and hypothesis

Cost behavior research explores how costs respond to changes in activities and the implications of these responses. Many management accounting tools and techniques operate under the assumption that cost behavior is lin-

ear. Similarly, traditional cost models assume a linear relationship between cost changes and activity changes. Nevertheless, the cost accounting literature has highlighted that, in practice, the relationship between costs and activity volume (i.e., sales) is not always linear. After the preliminary studies by Noreen and Soderstrom (1994, 1997), where they show that overhead costs do not behave proportionally to activity levels in US hospitals, Anderson et al. (2003) focus on the behavior of SG&A costs in a sample of 7,629 US firms during the period of 1979–1998. They select SG&A costs because the data are widely available and many of the components have a direct relationship with revenue. The results revealed that, when sales 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%. This differing response to the same level of activity change is labeled as "sticky." Specifically, costs are considered sticky if the magnitude of the increase in costs associated with a rise in volume is greater than the magnitude of the decrease associated with an equivalent decline in volume. The explanation relies on the resource-adjustment theory. When sales decrease, managers may be optimistic that the decline is temporary and that sales will recover soon. Therefore, to avoid the adjustment costs associated with reducing or restoring committed resources, they may hesitate to retire slack resources and delay reductions to committed resources until they are certain about the persistence of the demand decline.

Drawing from the empirical specification proposed by Anderson et al. (2003), several studies have discussed the existence of cost stickiness, its determinants, and consequences across different geographical settings, industries, and cost categories. For instance, in the US setting, Loy and Hartlieb (2018) examine changes in cost stickiness across different cohorts of listed US firms. They find that newer cohorts exhibit greater stickiness, with more recent firms showing a smaller decrease in SG&A costs when sales decline compared to older firms. This trend is partly due to the increasing knowledge-intensity and reliance on temporary labor in newer firms. In a different cost context, De Villiers et al. (2014) investigate the concept of audit fee stickiness, which refers to the tendency of audit fees to not fully adjust immediately to changes in their determinants, such as firm size, complexity, and risk. Their study, covering US firms from 2000 to 2008, reveals that audit fees respond more quickly to factors that increase them than to those that decrease them. This asymmetry in fee adjustments diminishes over longer periods and gradually disappears. An attempt to explore whether New Zealand charities exhibit asymmetric cost behavior similar to for-profit organizations shows that cost stickiness depends on charity size, income sources, and expenditure types. In particular, sticky behavior prevails among

large charities, while small charities show anti-sticky cost behavior (Habib & Huang, 2019). This stickiness is influenced by the accountability of charity managers, who are often reluctant to cut costs immediately after a decline in income to maintain stakeholder trust and confidence. Anti-stickiness behavior in the public sector emerges from the results of Cohen et al. (2017). They examine the costs of Greek municipalities and find that administrative costs and public relations expenses shrink more quickly when revenue declines than they rise when revenue increases, indicating anti-stickiness behavior. As highlighted by Balakrishnan and Gruca (2008), costs are not sticky per se, yet they exhibit stickiness when they are relevant to the main functions of the firm. Specifically, they examined data from the healthcare sector to compare the behavior of costs related to an organization's core competency with the operating costs of supported departments not directly related to a hospital's mission. In their results, stickiness is exhibited only by costs pertaining to patient care and not to other types of costs. Competition in retailing is identified as a cost stickiness driver by Krisnadewi and Soewarno (2019). They examine how cost behavior operates under conditions of strong competition in retailing, focusing on companies listed on the stock exchanges of Indonesia, Singapore, and Malaysia. Their findings suggest that firms facing greater competition exhibit higher cost stickiness, whereas when competitiveness is low, managers innovate more aggressively, raising their SG&A costs.

A different point of view is offered by Chen et al. (2012), who explore the relationship between the agency problem, corporate governance, and the asymmetrical behavior of SG&A costs. They demonstrate that weak corporate governance exacerbates the agency problem, leading to greater cost stickiness in SG&A expenses. This occurs because managers in poorly governed firms are more likely to retain excess resources during sales downturns to maintain their control and personal benefits. A notable attempt to perform a cross-country comparison in four countries with different rules and regulations confirms such conclusions. Calleja et al. (2006) find that operating costs of listed companies are sticky but exhibit different levels of stickiness. The level of cost stickiness appears higher in France and Germany than in the United Kingdom (UK) and US. This is due to their code-law governance systems and the lower pressure from the market. In contrast, UK and US firms are subject to the common-law system of corporate governance and intense pressure to consider shareholders' interests.

As outlined, cost stickiness studies do not always show consistent results. Banker et al. (2014a) refine the specifications of the traditional model of Anderson et al. (2003) and investigate how prior sales changes influence asymmetric cost behavior. They reveal that previous sales increases can lead to

higher cost stickiness, while prior sales decreases can result in more flexible cost adjustments and anti-sticky behavior. This moderating effect suggests that managers' expectations based on past sales performance significantly impact their cost management strategies. Cannon (2014) adopts a specific setting, the US air transportation industry, to challenge the assertion that cost stickiness occurs because managers retain idle capacity when demand decreases but add more capacity when it increases. As demand grows, managers add capacity and incur more costs, whereas when demand falls, they lower selling prices to use existing capacity rather than decreasing capacity. The results indicate that managers save more cost by removing capacity when demand falls than they save by removing capacity when demand grows, denoting anti-stickiness behavior. In addition, most studies on cost stickiness have examined public companies. Two exceptions are represented by the work of Dalla Via and Perego (2014) and Cheng et al. (2018), who focus on private companies. Dalla Via and Perego (2014) examine the Italian context and investigate four cost categories in manufacturing and trading companies: SG&A, cost of goods sold (COGS), total labor cost, and operating costs. They find evidence of stickiness only in total labor cost, whereas SG&A, COGS, and operating costs exhibit anti-stickiness behavior. In China, Cheng et al. (2018) analyze an extensive sample of private companies and show that, on average, cost behavior is anti-sticky. In particular, SG&A costs are sticky only in large firms but not in SMEs.

In general, private companies are more likely to exhibit cost stickiness compared to listed companies, largely due to their focus on long-term goals, lower exposure to external market pressures, and stronger alignment between ownership and management. For instance, management of private firms often has more control over decision-making. Without the pressure of quarterly earnings reports and external shareholders, managers might be less inclined to make immediate cost cuts when sales decline. Instead, they may focus on long-term growth and stability, leading to greater cost stickiness. Private companies may also prioritize maintaining relationships with employees, suppliers, and customers, further increasing the likelihood of retaining costs during downturns. In particular, public companies face pressure from investors, analysts, and the stock market, which can prompt them to adjust costs rapidly in response to fluctuations in demand. Private firms, on the other hand, are not exposed to the same level of scrutiny, allowing them to be more flexible in managing costs, even if doing so means accepting short-term inefficiencies. This reduced pressure may lead private firms to avoid drastic layoffs or cost-cutting measures, maintaining higher levels of SG&A and other operational costs, hence exhibiting greater cost stickiness. In addition,

there is often a stronger alignment between ownership and management. This alignment can lead to decisions that are more focused on long-term sustainability rather than short-term financial metrics, potentially resulting in greater cost stickiness. For instance, management might be more reluctant to cut spending in strategic areas, even in the face of revenue declines.

To summarize, the inconclusive evidence on sticky cost behavior from previous research and the predominant focus on large, listed companies in the literature highlight the need to investigate whether cost stickiness is present in private companies. However, this behavior is not universal, and factors like access to capital, industry dynamics, and the specific governance structure of the firm can influence the degree of cost stickiness in both private and public firms.

Thus, I formulate the following hypothesis:

H1: In private companies, the relative increase in SG&A costs when sales revenue rises is greater than the relative decrease in SG&A costs when sales revenue falls.

3. Research design

3.1. Sample

The data used in this study are extracted from the database AIDA, maintained by Bureau van Dijk, which provides financial statements of Italian companies. To further expand the dataset and obtain a complete sample, I also gathered data from the Italian Chamber of Commerce. The dataset includes annual data for firms covering the 24 years from 1998 to 2022. Before extracting data, I exclude public companies as well as firms with revenues below €5 million and consolidated balance sheets to avoid duplicate firms in my sample. I exclude the very small companies because it is very unlikely that they have a well-defined cost structure and can respond promptly to changes revenue trends.

Following the description of how the sample was developed by Anderson et al. (2003), I refine the sample by removing missing data on either sales revenue/costs or isolated data in the time-series. I then delete observations where costs are greater than revenues as well as observations with nonpositive amounts for either sales revenue or costs. Finally, observations without an industry code or with an ATECO code equal to 99 (i.e., extraterritorial organizations and bodies) are removed. The total number of remaining ob-

servations is 1,040,059 for 111,500 firms, an average of about 9.4 observations per firm. Table 3 presents the distribution of companies and observations by industry. The largest share of companies is in the manufacturing sector (40,629 firms, 36.4%), followed by the trading sector (32,393 firms, 29.1%), and the construction sector (9,555 firms, 8.6%). Together, manufacturing and trading companies account for over half of the sample.

Table 3 – Sample distribution by industry

(Ateco classification) – Industry	No. companies	% companies	No. obs.	% obs.
A (01-03) – Agriculture, Forestry and Fishing	259	0.2%	4,694	0.5%
B (05-09) – Mining and Quarrying	22	0.0%	610	0.1%
C (10-33) – Manufacturing	40,629	36.4%	447,243	43.0%
D (35) – Electricity, Gas, Steam and Air Conditioning Supply	1,267	1.1%	10,104	1.0%
E (36-39) – Water Supply; Sewerage, Waste Management and Remediation Activities	1,811	1.6%	18,007	1.7%
F (41-43) – Construction	9,555	8.6%	59,078	5.7%
G (45-47) – Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles	32,393	29.1%	293,689	28.2%
H (49-53) – Transportation and Storage	5,620	5.0%	49,608	4.8%
I (55-56) – Accommodation and Food Service Activities	1,402	1.3%	11,484	1.1%
J (58-63) – Information and Communication	3,092	2.8%	26,452	2.5%
K (64-66) – Financial and Insurance Activities	827	0.7%	6,087	0.6%
L (68) – Real Estate Activities	4,101	3.7%	27,290	2.6%
M (69-75) – Professional, Scientific and Technical Activities	4,067	3.6%	30,562	2.9%
N (77-82) – Administrative and Support Service Activities	3,814	3.4%	30,063	2.9%
O (84) – Public Administration and Defence; Compulsory Social Security	5	0.0%	16	0.0%
P (85) – Education	190	0.2%	1,351	0.1%
Q (86-88) – Human Health and Social Work Activities	1,511	1.4%	16,704	1.6%
R (90-93) – Arts, Entertainment and Recreation	588	0.5%	4,103	0.4%
S (94-96) – Other Service Activities	352	0.3%	2,930	0.3%
Total	111,500	100.0%	1,040,059	100.0%

3.2. Model specification

My baseline model is the empirical model introduced by Anderson et al. (2003). As previously outlined, it is the most frequently adopted model in the cost stickiness literature.

$$log\left[\frac{\mathrm{COST}_{i,t}}{\mathrm{COST}_{i,t-1}}\right] = \beta_0 + \beta_1 \cdot log\left[\frac{\mathrm{REV}_{\mathrm{i,t}}}{\mathrm{REV}_{\mathrm{i,t\text{-}1}}}\right] + \beta_2 \cdot Decrease_{i,t} \cdot log\left[\frac{\mathrm{REV}_{\mathrm{i,t}}}{\mathrm{REV}_{\mathrm{i,t\text{-}1}}}\right] + \varepsilon_{i,t} \quad (1)$$

The most commonly investigated cost variable is SG&A. In Italian financial statements, the closest equivalent to SG&A is "services," despite its inclusion of third-party job costs, which does not exactly correspond to SG&A. I use "services" as a proxy for SG&A and maintain the SG&A label for consistency with the literature. Additionally, I examine the behavior of other cost categories, such as purchase costs, total labor cost, rent costs, and other operating expenses. As suggested by Anderson et al. (2003), using ratios of current amounts to previous period values for all variables allows for better cross-sectional comparisons between firms of different sizes and industries. Both cost (COST) and revenue (REV) ratios are log-transformed to achieve a more normal distribution and enhance economic interpretation. Sticky cost behavior is identified using the dummy variable *Decrease*, which equals 1 when current period revenues decrease from the previous period and 0 otherwise. In this formulation, the coefficient β_1 measures the percentage change in costs associated with a 1% increase in sales revenue. Conversely, when revenues decrease, the dummy variable equals 1, and the sum of coefficients $\beta_1 + \beta_2$ measures the percentage decrease in costs associated with a 1% decrease in sales revenue. A β_2 value of zero indicates identical upward and downward cost changes, while a negative value indicates stickiness. One limitation of this model is using sales revenue as a proxy for the actual sales volume, making it difficult to distinguish the effects of price variations from volume variations.

4. Results

4.1. Descriptive statistics

Descriptive statistics of the sample are shown in Table 4. Panel A presents information about the distribution of sales revenue and costs. The mean of sales revenue is around €37 million, whereas the mean of SG&A is €7.7 million. On average, SG&A costs as a percentage of sales revenue are 23.76% (median = 18.36%, standard deviation = 19.95%). Purchase cost is on average 50.67% of sales revenues, and labor cost represents 15.69% of sales revenues.

Panel B of Table 4 provides information about the frequency of firm-periods when sales revenue or costs decline relative to the previous period. Sales revenue fell in 33.08% of the firm-periods in the sample, and SG&A costs fell in 34.13% of the firm-periods. The mean value of revenue decreases is 12.59% (median = 8.46%, standard deviation = 13.01%), and the mean value of decreases in SG&A costs is 14.52% (median = 9.98%, standard deviation = 14.70%).

According to the descriptive evidence, in the Italian context, there are many SMEs with size in terms of sales revenue significantly lower than the firms in the US samples gathered from Compustat files by Anderson et al. (2003), Subramaniam and Weidenmier (2016), and Anderson and Lanen (2009). Compared to Anderson et al. (2003), the sample covers a similar number of firm-years (24 years versus 20 years in Anderson et al., 2003), but it includes more companies (111,500 firms compared to 7,629 firms in Anderson et al., 2003) and observations (1,040,059 observations compared to 64,663 observations in Anderson et al., 2003). As highlighted, the sample is characterized by smaller (non-inflation adjusted) firms (mean sales revenue of €37 million compared to $1,277 million in Anderson et al. (2003); median sales of €11 million compared to $88 million in Anderson et al., 2003) with lower SG&A costs (mean costs of €8 million compared to $229 million in Anderson et al. (2003); median costs of €2 million compared to $17 million in Anderson et al., 2003). Despite these differences, the distribution of the ratio of SG&A costs to sales revenue is very similar in the two samples with my sample showing a slightly lower ratio compared to Anderson et al. (2003) (24% versus 26%, respectively). Further, the sample shows a higher frequency of sales declines (33% versus 27% in Anderson et al., 2003) and SG&A declines (34% versus 25% in Anderson et al., 2003). When sales decline, however, the extent of the decline is slightly lower in Italian companies (a mean of 12.6% versus 17.5% in Anderson et al., 2003), a median of 8.5% versus 11% in Anderson et al., 2003). Concerning SG&A costs, on average they decline by 14.5% (compared to 15.7% in Anderson et al., 2003), but the median amount of the decline is essentially the same in both samples (9.98% versus 10.07% in Anderson et al., 2003).

Table 4 – Descriptive statistics

Panel A – Distribution of sales revenue and costs

	Mean	Standard deviation	Median	Lower quartile	Upper quartile
Sales revenue	37.02	300.42	11.42	7.29	22.86
SG&A costs	7.70	48.98	2.27	1.11	5.05
SG&A costs as a percentage of revenue	23.76%	19.95%	18.36%	9.68%	30.50%
Total labor cost	4.33	23.41	1.48	0.67	3.23
Total labor cost as a percentage of revenue	15.69%	14.40%	11.99%	5.80%	20.93%
Purchase costs	21.58	253.45	5.51	2.68	12.09
Purchase costs as a percentage of revenue	50.67%	28.70%	53.72%	29.85%	74.69%
Rent costs	0.84	7.37	0.21	0.07	0.52
Rent costs as a percentage of revenue	3.00%	5.16%	1.59%	0.53%	3.53%
Other opex	0.68	35.35	0.11	0.05	0.26
Other opex as a percentage of revenue	1.56%	3.10%	0.78%	0.38%	1.62%

Monetary amounts are expressed in millions of Euro.

Panel B – Frequency and magnitude of declines in sales revenue and costs

	Percentage of firm-years with negative percentage change from previous period	Mean percentage decrease across periods	Standard deviation of percentage decreases across periods	Median percentage decrease across periods	Lower quartile of percentage decreases across periods	Upper quartile of percentage decreases across periods
Sales revenue	33.08%	12.59%	13.01%	8.46%	3.54%	17.12%
SG&A costs	34.13%	14.52%	14.70%	9.98%	4.31%	19.69%
Total labor	26.53%	10.39%	13.55%	5.93%	2.41%	12.83%
Purchase costs	35.82%	18.26%	18.59%	12.40%	5.37%	24.54%
Rent costs	33.13%	21.16%	23.57%	12.43%	4.51%	28.70%
Other opex	39.16%	33.32%	25.10%	27.64%	12.21%	50.24%

4.2. Multivariate analysis

The statistical analysis consists of pooled regressions, based on ordinary least squares (OLS). Extreme observations are eliminated by trimming the top and the bottom 0.5% of the continuous variables in the sample. The classical assumptions underlying the statistical models are checked, in particular the presence of multicollinearity between variables and the presence of heteroskedasticity. Multicollinearity does not affect the models since the VIFs (variance inflation factors) do not exceed the suggested threshold of 5.0. To detect heteroskedasticity problems, I performed the Breusch-Pagan test statistic finding positive results. Like Calleja et al. (2006), who identify a similar issue, I proceed in applying the White correction for the estimation of the heteroskedasticity-corrected standard errors and the associated *t*-statistics (White, 1980).

Table 5 presents the estimated values from the baseline model (1), with changes in costs and sales revenue defined for one-year periods. The value obtained for β_1 reveals that SG&A costs increase, on average, by 0.72% for 1% increase in sales revenue, labor cost by 0.40%, purchase cost by 0.94, rent costs by 0.42%, and other operating costs by 0.52%. Estimations of β_2 are all negative, with the exception of the purchase cost, which shows a positive value. The estimated value of β_2 = -0.0361 (*t*-statistic = -8.48) provides evidence of SG&A cost stickiness. In particular, the combined value of $\beta_1 + \beta_2$ = 0.6789 indicates that SG&A costs

decreased only by 0.68% for a 1% decrease in sales revenue. The results show that SG&A costs decrease significantly less when activity falls than they increase when activity rises by the same amount. Thus, this result supports hypothesis 1. Labor cost, rent costs, and other operating costs show similar stickiness. For instance, labor cost decreased by 0.31% for a 1% decrease in sales revenue. The rigidity of the regulations present in the labor market suggests that the stickiness of this type of cost is expected. On the contrary, the estimations of the purchase cost model show anti-stickiness, meaning that purchase cost decreases significantly more when activity falls by 1% than it increases for growth in revenues of 1%.

Table 5 – Cost stickiness: estimations with baseline model (1)

	(1)	(2)	(3)	(4)	(5)
	Model (1) SG&A costs	Model (1) Total labor costs	Model (1) Purchase costs	Model (1) Rent costs	Model (1) Other opex
β_0	0.0144*** (48.90)	0.0327*** (139.62)	-0.0004 (-1.13)	0.0303*** (48.23)	0.0138*** (13.23)
β_1	0.7150*** (304.97)	0.4038*** (205.44)	0.9417*** (329.04)	0.4176*** (98.08)	0.5156*** (77.11)
β_2	-0.0361*** (-8.48)	-0.0918*** (-26.44)	0.0715*** (13.45)	-0.1156*** (-15.49)	-0.3044*** (-25.13)
R^2	0.3489	0.1911	0.4212	0.0318	0.0125
No. obs.	882,578	871,099	866,244	833,912	876,960

This table shows the results of regressions using the baseline model (1). Column (1) displays the results for SG&A costs, Column (2) for total labor costs, Column (3) for purchase costs, Column (4) for rent costs, and Column (5) for other operating expenses. The coefficient β_1 measures the percentage change in costs associated with a 1% increase in sales revenue. The sum of coefficients $\beta_1 + \beta_2$ measures the percentage decrease in costs associated with a 1% decrease in sales revenue. A β_2 value of zero indicates identical upward and downward cost changes, while a negative value indicates sticky behavior. *t*-statistics are shown in parentheses and are based on heteroskedasticity-robust standard errors (White correction). Statistical significance is denoted as follows: ***$p < 0.001$; **$p < 0.01$; *$p < 0.05$.

Comparing the results with those of Anderson et al. (2003), the estimate β_1 of the change in SG&A costs that follows increased sales revenue is much larger (0.7150 compared to 0.5459 in Anderson et al., 2003), whereas the estimated change in SG&A costs that follows a decline in sales revenue is much lower in absolute value than the coefficient reported by Anderson et al. (2003) (β_2 = -0.0361 compared to -0.1914 in Anderson et al., 2003). Thus, in the Italian sample, SG&A costs are much less sticky, and the absolute response of costs to a sales decline is greater

than in large US companies. The difference in cost stickiness between private companies in Italy and public companies in the US could be influenced by several factors related to ownership structure, regulatory environments, and managerial incentives. For instance, private companies often have more centralized decision-making. Owners may directly control cost-cutting measures and be quicker to reduce SG&A costs during downturns. Further, private companies, which are not exposed to stock market pressures, might prioritize maintaining cash flow and profitability over presenting stable earnings to external parties. Italian private companies may adopt a more conservative, risk-averse approach, reducing SG&A costs quickly to safeguard financial health. In contrast, US public companies might be more willing to ride out short-term downturns in the belief that maintaining higher SG&A spending will pay off when the economy rebounds, due to their growth-oriented focus.

4.3. Cost stickiness over time

The effect of time on SG&A cost stickiness is examined in different ways. To test whether stickiness reverses in subsequent periods, model (1) is extended by including additional terms referring to the change in sales revenue of the previous period.

$$log\left[\frac{\mathrm{COST}_{i,t}}{\mathrm{COST}_{i,t-1}}\right] = \beta_0 + \beta_1 \cdot log\left[\frac{\mathrm{REV_{i,t}}}{\mathrm{REV_{i,t\text{-}1}}}\right] + \beta_2 \cdot Decrease_{i,t} \cdot log\left[\frac{\mathrm{REV_{i,t}}}{\mathrm{REV_{i,t\text{-}1}}}\right] +$$

$$+\beta_3 \cdot log\left[\frac{\mathrm{REV_{i,t\text{-}1}}}{\mathrm{REV_{i,t\text{-}2}}}\right] + \beta_4 \cdot Decrease_{i,t-1} \cdot log\left[\frac{\mathrm{REV_{i,t\text{-}1}}}{\mathrm{REV_{i,t\text{-}2}}}\right] + \varepsilon_{i,t} \qquad (2)$$

Compared to the baseline model, similar values of β_1 and β_2 are expected. If positive, the coefficient β_3 indicates a lagged adjustment of costs for changes in sales revenue. Further, the coefficient β_4, if positive and lower than β_2 taken in absolute value, indicates a partial reversal of cost stickiness after a period of sales revenue decline.

Table 6 – Cost stickiness of SG&A costs over time: lagged effects and aggregation of periods

	(1)	(2)	(3)	(4)
	Model (2) One-year periods SG&A costs	**Model (1) Two-year periods SG&A costs**	**Model (1) Three-year periods SG&A costs**	**Model (1) Four-year periods SG&A costs**
β_0	0.0112*** (32.49)	0.0214*** (52.19)	0.0270*** (53.21)	0.0342*** (57.32)
β_1	0.7107*** (269.69)	0.7796*** (371.03)	0.8152*** (390.25)	0.8334*** (407.74)
β_2	-0.0133*** (-2.89)	-0.0532*** (-12.97)	-0.0639*** (-15.06)	-0.0614*** (-13.98)
β_3	0.0587*** (27.31)			
β_4	0.0219*** (5.25)			
R^2	0.3662	0.4192	0.4486	0.4764
No. obs.	739,686	773,088	690,305	616.877

This table shows the results of regressions using model (2) and different estimations of model (1). Column (1) displays the results for model (2) which includes additional terms referred to the change in sales revenue of the previous period, Column (2) through (4) show the results with model (1) with estimations computed by aggregating two-, three-, and four-year periods of data, respectively. The coefficient β_1 measures the percentage change in costs associated with a 1% increase in sales revenue. The sum of coefficients $\beta_1 + \beta_2$ measures the percentage decrease in costs associated with a 1% decrease in sales revenue. A β_2 value of zero indicates identical upward and downward cost changes, while a negative value indicates sticky behavior. If positive, the coefficient β_3 indicates a lagged adjustment of costs for changes in sales revenue. The coefficient β_4, if positive and lower than β_2 taken in absolute value, indicates a partial reversal of cost stickiness after a period of sales revenue decline. *t*-statistics are shown in parentheses and are based on heteroskedasticity-robust standard errors (White correction). Statistical significance is denoted as follows: ***$p < 0.001$; **$p < 0.01$; *$p < 0.05$.

Column (1) of Table 6 exhibits the results of model (2). As expected, the coefficient β_1 is similar to the same coefficient of the baseline model (1) (0.7107 in model (2) versus 0.7150 in model (1)), but the coefficient β_2 is somewhat lower than model (1) (-0.0133 in model (2) versus -0.0361 in model (1)), indicating concurrent stickiness of SG&A costs. The significant and positive coefficient β_3 of 0.0587 indicates a lagged adjustment of costs for changes in sales revenue. In combination with the significant and positive coefficient β_4 of 0.0219 ($\beta_4 > |\beta_2|$), the results show a complete reversal of cost stickiness after a period of sales revenue decline. Managers tend to wait and postpone decisions about the reduction of committed resources[2].

[2] The same test conducted on total labor costs (untabulated) shows that cost stickiness is not reversed, as indicated by the positive coefficient β_4. However, the coefficient β_2 remains negative, indicating that labor costs do not decrease proportionally with sales revenue de-

The second test is based on the baseline model (1), with the only difference being that estimations are computed by aggregating two-, three-, and four-year periods of data. In case of cost stickiness, the value of the coefficient β_2 is expected to decrease in absolute value compared to the computation made with the one-year period. On a longer period, managers can better forecast the resources needed by the company, leading to less pronounced stickiness (i.e., greater decrease in costs). Columns (2) to (4) of Table 6 present the results for the three aggregation periods. Contrary to the expectation, the coefficient β_2 increases as the aggregation period increases from a two- to a three-year period (-0.0532 versus -0.0639, respectively; a test of equality is rejected at 5% level) and does not significantly change in a four-year period[3].

In their sample, Anderson et al. (2003) find partial reversal of cost stickiness in the period after a revenue decline but also that stickiness shrinks with the length of the aggregation period. The latter result is not confirmed in the sample, showing that the effect of time on cost stickiness is still uncertain. A similar and inconsistent pattern is also documented by Calleja et al. (2006). Their findings show that stickiness is less pronounced for UK and US firms when periods are aggregated, whereas stickiness declines only marginally for French firms and increases significantly for German ones.

Note that a marginal decline in stickiness or a marked increase is also documented by Calleja et al. (2006) for French and German companies, thus revealing that the theoretical hypothesis is not perfectly confirmed by the empirical findings. Only Anderson et al. (2003) confirm the trend for SG&A costs in their sample.

Finally, to check the consistency of the coefficients over time, I estimated model (1) on a year-by-year basis for the 24 years of the sample. The mean value of β_1 is 0.7143 (standard deviation = 0.0376), and the mean value of β_2 is -0.0570 (standard deviation = 0.0472). The lower and upper quartiles are 0.7017 and 0.7415 for β_1 and -0.0981 and -0.0250 for β_2. The aggregated *z*-statistics are 18.92 for β_1 and -1.21 for β_2. The coefficient β_2 is negative and significant in 15 of the 24 years (positive and significant in one year, not significant in eight years). Thus, given that the mean coefficient is negative but differs insignificantly from zero, it is impossible to confirm the persis-

clines. This suggests that while there is some initial downward adjustment in labor costs following a decline in sales revenue, the overall stickiness persists, likely due to the higher level of commitment associated with labor resources.

[3] An additional test on total labor costs (untabulated) yields comparable results. Specifically, the coefficient β_2 increases in absolute value as the aggregation period increases from two to three years. This suggests that, even for labor costs, managers do not significantly adjust resource commitments over extended periods, resulting in persistent cost stickiness.

tence of the stickiness of SG&A costs. Anderson and Lanen (2009) find a similar result in a US sample more comparable to that of Anderson et al. (2003). They provide evidence of a negative and not significant mean coefficient β_2, which is estimated as negative and significant in 11 of the 26 years of their sample[4].

4.4. Cost stickiness by industry

To identify whether sticky costs are influenced by industry factors, I estimate the baseline model (1) for each of the two-digit ATECO 2007 codes (from 01 to 96). Table 7 provides a summary of the sign and significance of the β_2 coefficient computed for each industry, along with a detailed list of industry codes and their corresponding β_2 coefficients. There is evidence of cost stickiness in 30 of 84 industries, whereas the estimated coefficient is positive and significant in three industries, and it is not significant in 51. Out of the 30 industries with evidence of cost stickiness, 11 are included in the manufacturing sector (e.g., manufacture of food products, beverages, wood and wood and cork products, electrical equipment). Further, companies in the trading sector (wholesale and retail trade, repair of motor vehicles and motorcycles) exhibit cost stickiness as do those in specialized construction, transportation and storage, food and beverage services, information and communication, and rental and leasing. On average, sticky costs are observed in 36% of the industries, and stickiness seems more prevalent in certain industries due to structural, operational, and strategic factors. For example, manufacturers often maintain stable costs for general services or fixed asset investments, even during periods of declining sales, to avoid the expenses and disruptions of restarting operations when demand rebounds. Similarly, retailers may be bound by long-term lease agreements for physical stores and may have a higher level of committed resources, making it difficult to scale down quickly in response to declining sales[5].

[4] The same year-by-year test on total labor costs (untabulated) reveals a similar pattern, with the coefficient β_2 being consistently negative in most years. However, in 2020, the coefficient is positive but not significant, while in 2021, it is negative but not significant. These results suggest that the COVID-19 years introduced variability in the labor cost behavior, but without statistically significant effects.

[5] A similar industry-level analysis for total labor costs (untabulated) shows a comparable pattern, with the coefficient β_2 being positive and significant in 3 industries, negative and significant in 48 industries, and not significant in 33 industries. This suggests that labor cost stickiness is more widespread than with SG&A costs, particularly in industries where labor is a more committed resource, and adjustments are slower in response to revenue fluctuations.

Table 7 – Cost stickiness of SG&A costs by industry

Coefficient β_2	SG&A costs No. of industries (%)
Positive and significant	3 (3.6%)
Negative and significant	30 (35.7%)
Not significant	51 (60.7%)
Total	84

ATECO industry	Coeff. β_2	ATECO industry	Coeff. β_2	ATECO industry	Coeff. β_2
01	-0.0645	32	-0.0647*	66	0.0085
02	0.5493	33	-0.0525	68	0.0543*
03	-0.1199	35	0.0043	69	-0.1056
06	0.8109	36	-0.2196*	70	-0.0147
08	-0.2333	37	0.2201*	71	-0.0514
09	0.3887	38	0.0122	72	-0.0572
10	-0.0670*	39	0.1138	73	-0.0484
11	-0.0797*	41	-0.0023	74	-0.0019
12	-0.0636	42	-0.0477	75	8.7948
13	-0.0242	43	-0.1004*	77	-0.1111*
14	-0.0556*	45	-0.1272*	78	-0.0569
15	-0.0351	46	-0.0457*	79	0.0213
16	-0.1161*	47	-0.1305*	80	-0.3237*
17	-0.0276	49	-0.0726*	81	-0.1554*
18	-0.1353*	50	-0.1501*	82	-0.0023
19	-0.1220	51	0.0063	84	0.0000
20	-0.0016	52	-0.0371*	85	-0.0411
21	-0.0188	53	-0.0151	86	-0.1753*
22	-0.0441*	55	-0.0259	87	-0.1816*
23	-0.0483*	56	-0.2087*	88	-0.0999
24	0.0315	58	-0.0914*	89	-0.4063
25	0.0187	59	-0.1950*	90	-0.1158
26	-0.1071*	60	0.1055	91	0.0793
27	-0.0562*	61	-0.0842	92	-0.0502
28	-0.0077	62	-0.1234*	93	-0.1029
29	0.0046	63	-0.2452*	94	0.9989*
30	-0.0855*	64	0.0357	95	0.2063
31	-0.0289	65	-0.1278	96	-0.2186*

This table summarizes the sign and significance of the β_2 coefficient for each industry, along with a detailed list of industry codes and their corresponding β_2 coefficients. A β_2 value of zero indicates identical upward and downward cost changes, while a negative value indicates sticky behavior. Statistical significance is denoted as follows: $*p < 0.05$.

As additional check, I perform the analysis at macro-level of the ATECO 2007 industry classification (i.e., from letter A to letter S, each letter includes one or more two-digit codes). Letters C (manufacturing activities) and G (wholesale and retail trade, repair and motor vehicles and motorcycles) represent the industries of 72% of the companies in the sample, and they both provide indications of cost stickiness. Overall, nine of the 18 macro-level industries show a negative and significant β_2.

Anderson et al. (2003) did not perform this test, but Anderson and Lanen (2009) conducted a similar analysis based on the SIC classification and applied to SG&A costs. They found stickiness in 22 out of 67 industries.

4.5. Variation in the degree of stickiness

Economic factors and firm characteristics can influence the degree of cost stickiness across firms. To examine the role of such determinants, I expand the baseline model (1) to include the percentage growth in real gross national product (GNP), assets intensity (ASSETS), employee intensity (EMP), and a dummy variable coded as 1 when revenues declined in the previous period (SUCC_DEC). Intensity is calculated by scaling assets and the number of employees by sales revenue of the same year. Like Anderson et al. (2003), I insert the selected determinants in the model as a specification of β_2.

$$log\left[\frac{\mathrm{COST}_{i,t}}{\mathrm{COST}_{i,t-1}}\right] = \beta_0 + \beta_1 \cdot log\left[\frac{\mathrm{REV_{i,t}}}{\mathrm{REV_{i,t\text{-}1}}}\right] + \beta_2 \cdot DEC_{i,t} \cdot log\left[\frac{\mathrm{REV_{i,t}}}{\mathrm{REV_{i,t\text{-}1}}}\right] +$$

$$+\beta_3 \cdot DEC_{i,t} \cdot log\left[\frac{\mathrm{REV_{i,t}}}{\mathrm{REV_{i,t\text{-}1}}}\right] \cdot SUCC\_DEC_{i,t} + \beta_4 \cdot DEC_{i,t} \cdot log\left[\frac{\mathrm{REV_{i,t}}}{\mathrm{REV_{i,t\text{-}1}}}\right] \cdot GNP_{i,t} +$$

$$+\beta_5 \cdot DEC_{i,t} \cdot log\left[\frac{\mathrm{REV_{i,t}}}{\mathrm{REV_{i,t\text{-}1}}}\right] \cdot log\left[\frac{\mathrm{ASSETS}_{i,t}}{\mathrm{REV_{i,t}}}\right] + \beta_6 \cdot DEC_{i,t} \cdot log\left[\frac{\mathrm{REV_{i,t}}}{\mathrm{REV_{i,t\text{-}1}}}\right]$$

$$\cdot log\left[\frac{\mathrm{EMP}_{i,t}}{\mathrm{REV_{i,t}}}\right] + \varepsilon_{i,t} \qquad (3)$$

As in the baseline model (1), the degree of cost stickiness changes with the magnitude of the coefficients β_2 through β_6. The results are presented in Table 8.

Table 8 – Variation in the degree of stickiness

	(1) Model (3) SG&A costs	(2) Model (3) SG&A costs
β_0	0.0147*** (49.79)	0.0145*** (49.46)
β_1	0.7204*** (303.24)	0.7165*** (304.92)
β_2	0.4408*** (25.87)	-0.0847*** (-17.37)
β_3 (successive decrease)	0.1057*** (21.60)	0.1086*** (22.37)
β_4 (GNP)	-0.0130*** (-20.53)	-0.0133*** (-20.84)
β_5 (asset intensity)	-0.1052*** (-24.09)	-0.0572*** (-14.20)
β_6 (employee intensity)	0.0896*** (31.63)	
R^2	0.3653	0.3539
No. obs.	827,375	874,827

This table presents the results of regressions using model (3), which extends model (1) by incorporating a dummy variable coded as '1' when revenues declined in the previous period (successive decrease), the percentage growth in real gross national product (GNP), assets intensity, and employee intensity. Intensity is calculated scaling assets and number of employees by sales revenue of the same year. Column (1) shows the results for the complete model with SG&A costs, whereas column (2) shows the results obtained by excluding the term with employee intensity from the model. The degree of cost stickiness changes with the magnitude of the coefficients β_2 through β_6. *t*-statistics are shown in parentheses and are based on heteroskedasticity-robust standard errors (White correction). Statistical significance is denoted as follows: ***$p < 0.001$; **$p < 0.01$; *$p < 0.05$.

The estimated coefficient $\beta_1 = 0.7204$ resembles in model (1), but the sign of the coefficient $\beta_2 = 0.4408$ is reversed. Further examination reveals a strong multicollinearity between the interaction term of β_2 and the term with employee intensity associated with β_6. The significant and positive sign associated with the measure of employee intensity ($\beta_6 = 0.0896$) suggests that SG&A costs decrease more at firms that need more employees to support their sales. Column (2) of Table 8 exhibits the results of model (3) obtained by excluding the term with employee intensity from the model. Compared to the baseline model, SG&A cost stickiness is more pronounced ($\beta_2 = -0.0847$). The positive and significant coefficient $\beta_3 = 0.1086$ indicates that the degree of cost stickiness shrinks when a decrease in sales revenue is preceded by another period of revenue decline. An opposite sign of the coefficient referred to the term with the percentage growth in real GNP ($\beta_4 = -0.0133$) suggests that cost stickiness is greater in higher growth periods. The

incidence of the total assets is estimated by the coefficient β_5, which is significant and negative (-0.0572), indicating that stickiness is emphasized in firms where sales are supported by more assets. In sum, managers are likely to view a reduction in demand that persists over successive years as more permanent, prompting more significant cost adjustments. Conversely, they may perceive revenue declines during a strong economic climate as transitory, while those occurring when growth is low or negative are seen as more enduring. Additionally, the degree of cost stickiness increases with the adjustment costs associated with reducing committed resources, as managers are reluctant to reduce these costs unless absolutely necessary.

These findings align with the results reported by Anderson et al. (2003). As in the work of Subramaniam and Weidenmier (2016) and Calleja et al. (2006), asset-intensive firms exhibit sticky cost behavior when revenues decline. Furthermore, Subramaniam and Weidenmier (2016) confirm that the degree of stickiness is lower in periods of revenue decline that are preceded by other periods of revenue decline, indicating that managers consider the reduction more permanent after successive decreases[6].

4.6. Cost stickiness in small and medium-sized companies

Italy is renowned for its distinctive economic structure characterized by many SMEs. These SMEs form the backbone of the economy, contributing substantially to employment and production. To determine whether cost stickiness is driven by large companies, I develop a second sample by excluding all companies classified as "large," according to the latest European Union Directive 2023/775/EU, which modified the Directive 2013/34/EU about "annual financial statements, consolidated financial statements and related reports of certain types of undertakings." Specifically, companies are classified as "large" if, at the end of the fiscal year, they exceed two of three criteria: i) a balance sheet total of at least €25 million, ii) net turnover of at least €50 million, and iii) an average number of employees during the financial year of at least 250.

The total number of remaining observations in the SME sample is 923,368 for 107,883 firms, an average of about 8.6 observations per firm.

[6] An equivalent analysis on total labor costs (untabulated) yields similar results. The results align closely with SG&A costs in the full model, showing comparable patterns of cost stickiness. However, in the model excluding employee intensity, the coefficient β_5 is positive, suggesting that in firms with higher asset intensity, labor costs are less sticky, indicating greater flexibility in adjusting labor-related expenses compared to other types of committed resources.

The mean of sales revenue is €14.3 million (standard deviation = €12.4 million), whereas the mean value of SG&A is €3.3 million (standard deviation = €4.5 million). On average, SG&A costs as a percentage of sales revenue are 23.87% (median = 18.44%, standard deviation = 20.00%). Purchase cost is on average 50.57% of sales revenues, and labor cost represents 15.69% of sales revenues. Despite the smaller average size of the companies in the sample, the cost structure is comparable to the full sample.

In line with the main results, the value obtained for β_1 indicates that SG&A costs increase, on average, by 0.72% for a 1% increase in sales revenue and decrease by 0.68% for a 1% decrease in sales revenue (β_1 = 0.7190, t-statistic = 287.13; β_2 = -0.0400, t-statistic = -8.85).[7] The results are confirmed also for labor cost, purchase cost, rent costs, and other operating costs.

4.7. Cost stickiness in Dalla Via and Perego (2014)

To the best of my knowledge, Dalla Via and Perego (2014) is the only study that has addressed the issue of cost stickiness in the Italian context. Compared to Anderson et al. (2003) and to the sample adopted in this study, they examined a shorter time horizon (10 years, from 1998 to 2008) and focused on companies operating in the manufacturing and trading industries (ATECO 2007 codes from 05 to 43 and from 45 to 47, respectively) with at least €7 million of sales revenue. Unlike Anderson et al. (2003) and the current study, their results show that SG&A costs increase, on average, by 0.57% for a 1% increase in sales revenue but decrease, on average, by 0.66% for a 1% decrease in sales revenue. This indicates anti-stickiness behavior. Evidence of stickiness emerges only for the total labor cost of manufacturers.

To understand whether these results are confirmed, I restrict the current sample to replicate the setting of Dalla Via and Perego (2014) with reference to SG&A costs and total labor cost. Table 9 presents the descriptive statistics for the manufacturing and trading industries sample.

[7] The baseline model applied to large companies (116,691 observations) confirms evidence of cost stickiness: β_1 = 0.6980, *t*-statistic = 104.17; β_2 = -0.0274, *t*-statistic = -2.16. On average, SG&A costs increase by 0.70% for a 1% increase in sales revenue and decrease by 0.67% for 1% decrease in sales revenue.

Table 9 – Descriptive statistics of the restricted sample (replication of Dalla Via and Perego, 2014)

Panel A – Distribution of sales revenue and costs

	Mean	Standard deviation	Median	Lower quartile	Upper quartile
Manufacturing industry					
Sales revenue	38.95	251.89	13.97	9.38	26.62
SG&A costs	8.02	35.48	3.16	1.82	6.17
SG&A costs as a percentage of revenue	23.73%	14.87%	20.67%	13.80%	29.84%
Sales revenue	38.75	257.97	13.91	9.37	26.37
Total labor cost	4.68	18.94	2.03	1.13	3.89
Total labor cost as a percentage of revenue	15.16%	9.71%	13.70%	8.23%	20.20%
Trading industry					
Sales revenue	41.54	256.11	14.50	97.06	26.70
SG&A costs	4.03	18.33	1.32	0.70	2.69
SG&A costs as a percentage of revenue	11.04%	10.30%	7.91%	4.92%	13.42%
Sales revenue	41.71	259.77	14.50	9.71	26.67
Total labor cost	2.45	11.50	0.85	0.44	1.69
Total labor cost as a percentage of revenue	6.92%	5.98%	5.34%	2.94%	9.44%

Monetary amounts are expressed in millions of Euro. Due to screening procedure, sales revenue exhibit different statistics for each type of cost.

Panel B – Frequency and magnitude of declines in sales revenue and costs

	Percentage of firm-years with negative percentage change from previous period	Mean percentage decrease across periods	Standard deviation of percentage decreases across periods	Median percentage decrease across periods	Lower quartile of percentage decreases across periods	Upper quartile of percentage decreases across periods
Manufacturing industry						
Sales revenue	30.68%	10.49%	9.55%	7.65%	3.33%	14.77%
SG&A costs	32.37%	11.90%	10.47%	8.85%	3.83%	16.99%
Sales revenue	30.25%	10.57%	9.65%	7.70%	3.35%	14.89%
Total labor cost	23.46%	7.53%	8.30%	4.75%	1.97%	9.90%
Trading industry						
Sales revenue	28.67%	9.55%	9.00%	6.84%	2.88%	13.38%
SG&A costs	30.36%	11.64%	10.40%	8.50%	3.80%	16.56%
Sales revenue	28.37%	9.57%	9.02%	6.83%	2.89%	13.39%
Total labor cost	20.70%	8.83%	9.46%	5.48%	2.25%	11.92%

The means of the sales revenue are about €39 million and about €42 million, respectively. The median in all instances is around €14 million. Due to inclusion of more companies compared to the original sample, the average size is larger but with a similar cost structure. The frequency of sales declines in Dalla Via and Perego (2004) is comparable to that of this study (about 30% in both) as is the magnitude of the decline (about 10%). SG&A costs decline in about 31% of observations (33% in Dalla Via and Perego, 2004), with an average decline of 12% (compared to 11% in Dalla Via and Perego, 2004).

Table 10 presents the estimated values of the baseline model (1) applied to SG&A costs and total costs in the manufacturing and trading industries.

Table 10 – Cost stickiness: estimations with the restricted sample (replication of Dalla Via and Perego, 2014)

	(1)	(2)	(3)	(4)
	Model (1) Manufacturing industry SG&A costs	**Model (1) Trading industry SG&A costs**	**Model (1) Manufacturing industry Total labor cost**	**Model (1) Trading industry Total labor cost**
β_0	0.0172***	0.0250***	0.0364***	0.0481***
	(27.89)	(28.13)	(83.93)	(67.74)
β_1	0.5842***	0.4908***	0.2777***	0.2998***
	(117.75)	(65.52)	(79.94)	(48.93)
β_2	0.0743***	0.1166***	-0.0350***	-0.0487***
	(7.19)	(7.67)	(-4.88)	(-3.81)
R^2	0.3038	0.2062	0.1365	0.0965
No. obs.	121,047	62,333	124,035	63,329

Column (1) reports the results of applying the model to SG&A costs in manufacturing firms, Column (2) displays the results for SG&A costs in trading firms, Column (3) presents the results for total labor costs in manufacturing firms, and Column (4) shows the results for total labor costs in trading firms. The coefficient β_1 measures the percentage change in costs associated with a 1% increase in sales revenue. The sum of coefficients $\beta_1 + \beta_2$ measures the percentage decrease in costs associated with a 1% decrease in sales revenue. A β_2 value of zero indicates identical upward and downward cost changes, while a negative value indicates sticky behavior. *t*-statistics are shown in parentheses and are based on heteroskedasticity-robust standard errors (White correction). Statistical significance is denoted as follows:

$$***p < 0.001; **p < 0.01; *p < 0.05.$$

The value obtained for β_1 reveals that SG&A costs increase, on average, by 0.54% for a 1% increase in sales revenue and the labor cost by 0.28%.

Estimations of β_2 are positive for SG&A costs and negative for the total labor cost. This means that, when sales revenue decreases by 1%, total labor cost decreases by 0.25%, suggesting stickiness of this type of cost. In contrast, the positive estimated coefficient β_2 for SG&A costs shows that, for a 1% decrease in revenue, costs decline more (0.66% in the manufacturing industry and 0.61% in the trading industry) than they increase for a 1% increase in revenue (0.58% in the manufacturing industry and 0.49% in the trading industry), denoting anti-stickiness. The results about the main cost category, SG&A costs, confirm the findings of Dalla Via and Perego (2014), but they contrast with those of Anderson et al. (2003) and the current study.

A notable difference emerges when comparing the data screening process of the studies. Different from Anderson et al. (2003) and this study, Dalla Via and Perego (2014) drop observations whenever revenues (costs) change by more than 50% compared to the previous year's revenues (costs). This step removes the effects of mergers, acquisitions, and divestitures and is applied by other studies in this literature (Calleja et al. 2006; Subramaniam and Weidenmier, 2016). To verify whether this methodological difference impacts the cost stickiness relation and justifies the contradictory results, I restrict the current sample by excluding revenues (costs) that change by more than 50% compared to the previous year's revenues (costs)[8]. The refined analysis reveals that SG&A costs no longer exhibit cost stickiness behavior. On average, SG&A costs increase by 0.61% for a 1% increase in sales revenue, the labor cost by 0.33%, the purchase cost by 0.86%, the rent costs by 0.19%, and the other operating costs by 0.12%. Compared to the main analysis, the positive and significant estimated value of $\beta_2 = 0.0428$ (*t*-statistic = 11.52) indicates that SG&A costs decrease by 0.65% for a 1% decrease in sales revenue. Thus, SG&A costs decrease significantly more when activity falls than they increase when activity rises by the same amount, demonstrating anti-stickiness. A similar reversed result is observed for rent costs and other operating costs, which no longer exhibit stickiness. The findings about total labor cost and purchase cost confirm the pattern identified in the main analysis. The constraints of the labor law induce managers to adopt sticky behavior and reduce the magnitude of labor cost reductions in periods of sales declines. Total labor cost decreases by 0.30% for a 1% decrease in sales revenue compared to an increase of 0.33% for a 1% increase in sales revenue. In contrast, purchase cost decreases significantly more when activity falls by 1% than it increases for an increase in revenues of 1%. These results show

[8] Changing the minimum sales revenue threshold from €5 million to €7 million does not qualitatively influence the results.

that cost categories more subject to managerial adjustments and less correlated with sales revenue tend to show inconsistent results and are more sensitive to the data preparation process. This test highlights how a simple modification to the data screening process influences the outcome of the analysis. Furthermore, it highlights the importance of carefully considering unusually large changes in revenues and costs due to mergers, acquisitions, divestitures, or other corporate decisions.

5. Discussion and conclusion

After the study by Anderson et al. (2003), a significant body of literature has investigated cost stickiness in specific industries and countries and via different empirical models. The trend of publications over time demonstrates that there is still considerable interest in the topic, and the research impact of the major studies continues to increase. The doubts raised by Anderson and Lanen (2009) about the generalizability of sticky cost behavior have stimulated debate in the literature. Different specifications or settings can lead to the observation of linear cost behavior or anti-sticky behavior, which occurs when costs increase less when activity rises than they decrease when activity falls by an equivalent amount. For instance, Balakrishnan et al. (2011) suggest that both long-term and short-term decisions influence the asymmetric behavior of costs. Specifically, important factors to consider in the analysis include the unique characteristics of a cost structure, such as the presence of fixed costs and economies of scale in variable costs.

This paper adds to the sticky cost literature by analyzing whether costs behave asymmetrically in small and medium-sized private companies. It also extends the analysis to other cost types that are adjustable by managers and thus influenced by managerial behavior, such as total labor cost, purchase costs, rent costs, and other operating costs. Above all, it demonstrates that, on average, cost stickiness is observed in private firms, though it does not always occur over time and across industries. Additionally, its evidence suggests that changes in empirical specifications can influence the results.

The regulatory context, particularly the distinction between code law and common law systems, influences cost stickiness in both private and listed companies. Studies have predominantly focused on countries with common law systems – such as the US, UK, and Canada – where shareholder value is prioritized and companies have more flexibility in cost management. Companies operating in these environments are more likely to adjust SG&A costs rapidly in response to revenue declines. In these countries, investor protec-

tion is stronger, and firms face pressure from shareholders and analysts to optimize costs, resulting in less cost stickiness, particularly in discretionary SG&A spending. In contrast, in code law systems, such as those in Italy and much of continental Europe, legal frameworks are more prescriptive, with corporate governance focusing on broader stakeholder interests, including those of employees, creditors, and the community. As this study demonstrates, this often leads to greater cost stickiness, particularly in areas like SG&A costs, where companies may be reluctant or legally constrained from cutting administrative expenses or reducing staff, even during downturns.

In examining cost stickiness in Italy from 1998 to 2022, it is crucial to interpret the results within the broader economic context, as this period encompasses several significant economic crises that likely influenced corporate behavior. As outlined in the results, while cost stickiness appears to be a general trend that is present in most years, its persistence cannot be confirmed. The financial crisis of 2007–2009 led to a sharp economic contraction, which could have increased cost stickiness as companies hesitated to reduce labor, SG&A, or other operational costs, anticipating a recovery and wanting to avoid the expenses associated with rehiring or restarting operations. Moreover, the crisis affected corporate debt financing and firms' behavior, with those facing lower financial reporting quality (FRQ) encountering more pronounced financing challenges, as they turned to alternatives like equity or cash resources due to the increased sensitivity of bondholders to information asymmetries (Bafundi and Imperatore, 2023). Similarly, the subprime crisis of 2010–2011 in Europe resulted in austerity measures and financial instability, particularly in Southern European countries like Italy. During this period, firms might have faced legal or operational constraints that prevented them from adjusting costs quickly, which would have further reinforced cost stickiness. More recently, the COVID-19 pandemic in 2020 caused unprecedented disruptions in both supply chains and demand. During this period, companies may have been reluctant or unable to cut costs, particularly in labor, due to government policies or subsidies designed to protect jobs. Each of these crisis periods influenced how companies managed their costs and provided a unique backdrop for understanding how cost stickiness plays out in the real world, where external shocks force companies to balance short-term performance with long-term sustainability. In this study, the year-by-year analysis revealed that after 2007 (i.e., the beginning of the financial crisis), all individual years showed evidence of cost stickiness, except for 2009–2010 and 2021–2022. During 2009-2010, companies likely had little choice but to adjust costs more aggressively than they would in a typical downturn, due to the severe economic pressures and extraordinary external

factors resulting from the financial crisis and its aftermath. The post-pandemic economic environment, 2021-2022, is another exceptional period. According to the findings, the anti-stickiness observed in 2021 suggests that companies were cutting costs more aggressively than usual in response to economic fluctuations. This can be attributed to the post-pandemic recovery period, during which businesses faced volatile demand, inflation, and supply chain disruptions. As input costs soared – due to inflation, rising energy prices, and supply chain bottlenecks – companies may have been forced to react swiftly by reducing controllable costs, such as labor, SG&A, or discretionary spending, to maintain profitability. Rather than waiting to see whether the revenue decline was temporary, firms likely took proactive measures to reduce expenses and counter the negative impact of rising costs on margins. In 2022, the absence of stickiness likely reflects that companies had developed more flexible cost structures in response to the economic uncertainty of previous years. By this time, many firms had likely adapted to operating in a highly volatile environment, enabling them to adjust costs more dynamically in response to market conditions.

It is important to interpret the findings on cost stickiness in the Italian context considering the way costs are classified in financial statements. In Italian firms, the closest equivalent to SG&A costs is the "cost of services" category, which includes not only general administrative expenses but also outsourced services and third-party job costs. This broader scope makes it difficult to directly compare Italian firms' cost behavior with that of firms in international studies where SG&A is more narrowly defined. The inclusion of third-party costs, which can fluctuate based on project-specific needs or temporary contracts, introduces a level of flexibility that may not be present in traditional SG&A categories. As a result, Italian companies may exhibit different patterns of cost adjustment, particularly during economic downturns, where outsourced services can be reduced more easily than internal administrative costs. This difference could explain why certain cost stickiness patterns in Italian firms diverge from those observed in other countries, highlighting the need to consider these structural differences when analyzing the results.

This study has several limitations, which also open avenues for future research. The first limitation concerns the potential generalizability of the results. The study is based on private Italian companies, and Italy is a country renowned for its distinctive economic structure characterized by a significant presence of SMEs. As highlighted here, results might be influenced by firm-specific characteristics and the regulatory environment. Future research could explore other settings using a similar replication approach. Second, the research design intentionally replicates the seminal study by Anderson et al.

(2003). While this choice has several advantages, such as the comparability of results, it excludes theoretical constructs and empirical specifications proposed by later studies. Third, consistent with previous research, the analysis is conducted at the firm level without considering managerial traits and attitudes. Future research should explore the cognitive factors that drive sticky cost behavior and the resulting managerial actions. A different methodological approach, such as an experimental study, might provide a better understanding of how managers adjust resources, ultimately contributing to more effective cost management strategies. Fourth, sales revenue was used as a proxy for sales volume, which can introduce a limitation due to price variation. While sales revenue reflects the total monetary value of goods sold, it does not account for changes in pricing, which can affect the interpretation of cost behavior. For instance, an increase in sales revenue may be driven by higher prices rather than actual increases in sales volume, leading to potential inaccuracies in the analysis of cost stickiness or cost structure. Consequently, future research might benefit from separating the effects of price changes and volume fluctuations to provide a more precise understanding of the underlying cost dynamics.

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