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Development of Asymmetric Cost Behaviour in Italian Manufacturing SMEs during the Crisis Period

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Abstract

Purpose of the article: The aim of this article is to investigate the asymmetric cost behaviour of small and medium-sized enterprises (SMEs) in the Italian manufacturing industry during the period 2020–2023, with a focus on cost behaviour during the crisis and the post-crisis period. The study examines how the economic conditions of the COVID-19 pandemic affected traditional cost behaviour theories in the manufacturing SME sector.
Methodology/methods: The research utilizes the model by Anderson *et al.* (2003) applied to a large dataset of 56,017 Italian manufacturing SMEs obtained from the Orbis Europe database. Statistical analysis covers three periods: 2020/2021, 2021/2022, and 2022/2023, which allows tracking the evolution of cost behaviour asymmetry over time. The regression models test the relationship between logarithmic changes in total operating costs and sales, including an interaction dummy variable to capture asymmetric cost behaviour. Statistical significance is tested using F-statistics at the $\alpha=0.05$ level.
Scientific aim: The scientific objective is to empirically document the dynamic evolution of asymmetric cost behaviour (cost stickiness) in manufacturing SMEs over the economic periods in question, thereby contributing to the theory of asymmetric cost behaviour.
Findings: The results confirm an evolution in cost behaviour across the three periods in the manufacturing sector. The period 2020/2021 exhibits an anti-sticky cost behaviour with a positive interaction coefficient (+0.107), reflecting a cost-cutting response to supply chain shocks. The subsequent periods 2021/2022 and 2022/2023 demonstrate pronounced cost stickiness (interaction coefficients –0.255 and –0.222). All models show high explanatory power, with R^2 in the range of 0.708–0.772, and are statistically significant at $p<0.001$.
Conclusions: The article provides evidence that crisis conditions in the manufacturing industry can temporarily alter the established asymmetric cost behaviour, but that traditional sticky cost behaviour gradually re-stabilizes after the crisis subsides. These findings have important implications for corporate crisis management and cost management strategies of manufacturing firms.

Keywords: cost stickiness; manufacturing SME; COVID-19; industrial cost behaviour; Italy; industry

JEL Classification: M21

Introduction

The theory of cost stickiness is an important concept that challenges the traditional assumptions of symmetric cost behaviour. Anderson *et al.* (2003) empirically demonstrated that costs exhibit asymmetric behaviour – they increase faster with rising activity than they decrease with falling activity. This phenomenon, known as **cost stickiness**, reflects complex managerial decision-making processes influenced by behavioural factors and adjustment costs (Banker, Byzalov, 2014). In other words, managers often retain resources during periods of declining activity due to the costs of adjusting resources and expectations of future demand, leading to costs that do not decrease proportionally with revenue declines (Anderson *et al.*, 2003).

Small and medium-sized enterprises (SMEs) represent the backbone of the European economy, accounting for approximately 99.8% of all enterprises and providing employment to over 100 million people across the European Union (Thomson, 2024). In Italy, SMEs play an equally dominant role, with more than 4 million firms employing around 13 million people and generating over 65% of national value added, underscoring their structural importance to the Italian economy (Valentini, 2024). The manufacturing sector remains a cornerstone of Italian industry, contributing roughly 15% of the country's GDP (World Bank, 2024). Due to their smaller scale, financial limitations, and strong regional embeddedness, SMEs exhibit distinct cost structures and face greater constraints in resource adjustment, leading to potentially different cost behaviours compared to larger firms. Prior research suggests that firms with limited access to capital tend to display lower degrees of cost stickiness or even symmetric cost adjustment patterns, making the examination of cost behaviour in SMEs particularly relevant for understanding managerial decision-making under financial constraints (Cheng *et al.*, 2018). The COVID-19 pandemic inflicted a severe economic shock globally. In Italy, the real GDP contracted by approximately –8.9% in 2020, and was followed by a strong rebound in 2021, with the chained-volume measure of the GDP expanding by 6.7% compared to 2020 (ISTAT, 2021). The European Commission's forecast also projected a recovery of +6.5% in 2021 after the steep decline in 2020 (European Commission, 2022). The manufacturing industry faced severe supply chain disruptions, raw material price volatility, and significant shifts in demand. At the same time, the government implemented extensive support measures exceeding €300 billion (MEF, 2023) to cushion the impact on businesses. These extraordinary conditions likely influenced how firms managed their costs, potentially overriding typical cost behaviour patterns during the crisis.

The aim of this article is to examine the asymmetric cost behaviour of Italian manufacturing SMEs during the 2020–2023 period, using a sample of 56,017 firms. The study employs an applied regression analysis approach based on Anderson *et al.* (2003) to evaluate the presence and extent of cost stickiness (or anti-stickiness) across three distinct sub-periods. By estimating separate regression models for 2020/2021, 2021/2022, and 2022/2023, the analysis tracks changes in cost asymmetry from the crisis through the subsequent recovery, thereby shedding light on how crisis conditions and their aftermath may temporarily alter established cost behaviour patterns.

1. Literature review

The phenomenon of cost stickiness refers to an asymmetric cost behaviour in response to changes in the level of business activity. In their seminal study, Anderson *et al.* (2003) analysed data from 7,629 U.S. firms over a 20-year period and found that selling, general, and administrative (SG&A) costs inc-

rease on average by 0.55% for a 1% increase in sales, but decrease only by 0.35% for a 1% decrease in sales. This asymmetry challenges the traditional cost accounting assumption of a linear, proportional relationship between costs and activity volume. The authors attribute this behaviour to deliberate managerial decisions to maintain resources during downturns, based on rational considerations of resource adjustment costs and expectations of future business conditions (Anderson *et al.*, 2003). In essence, managers may hesitate to cut resources (such as staff or capacity) during a sales decline due to the costs associated with cutting and then potentially rebuilding those resources, as well as optimism that the downturn may be temporary.

Banker and Byzalov (2014) expanded the theoretical framework of asymmetric cost behaviour and synthesized the growing literature in this area. Their approach recognizes two fundamental factors influencing cost behaviour: resource adjustment costs and managerial decision-making. These factors give rise to different forms of cost behaviour, including "sticky" costs (where costs decrease more slowly than they increase) and "anti-sticky" costs with the opposite pattern (where costs decrease more quickly when activity falls than they increase when activity rises). In this framework, the traditional categories of fixed and variable costs represent only the extreme cases of a broader spectrum of cost behaviour possibilities (Banker, Byzalov, 2014). According to Banker *et al.* (2018), managers make resource adjustment decisions based on three main considerations: the current level of resources, expected future sales changes, and various agency or behavioural factors. These decisions are not mechanical; rather, they reflect strategic deliberations about optimal resource allocation under uncertainty. For example, a manager anticipating a rebound in sales might retain more staff than immediately needed, whereas a pessimistic outlook might prompt more aggressive cost cutting.

The international dimension of cost stickiness research reveals differences across countries and institutional environments. Calleja *et al.* (2006) conducted a comparative analysis of firms in the United States, United Kingdom, France, and Germany. Their findings show that operating costs, on average, increase by 0.97% for a 1% increase in sales but decrease by only 0.91% for a 1% decrease in sales. Moreover, French and German firms exhibited a higher degree of cost stickiness than their UK and US counterparts. The authors explain this by differences in corporate governance systems: in countries with codified law and stronger employment protections (such as France and Germany), managers are under less pressure from capital markets, which can lead to a greater tendency to retain resources during demand downturns (Calleja *et al.*, 2006). In support of this institutional perspective, Banker *et al.* (2013) analysed the impact of employment protection legislation across countries and demonstrated that stricter employment protection is associated with higher cost stickiness. Stricter labour laws increase the costs of laying off employees, thereby influencing managerial decisions to adjust workforce levels and contributing to asymmetric cost behaviour when sales decline.

The Italian context provides a specific lens for examining cost stickiness, especially in the SME segment. Dalla Via and Perego (2014) analysed Italian private (unlisted) and publicly listed firms for the period 1999–2008 and uncovered differences in cost behaviour by firm size and listing status. Their findings indicate that cost stickiness in Italy is evident primarily in total labour costs, and not in SG&A, cost of goods sold, or total operating costs for private SMEs. In fact, operating cost stickiness was detected only in their sample of listed companies, which are typically larger and have more complex organizational structures (Dalla Via, Perego, 2014). The authors argue that for revenue changes of less than 25%, Italian SMEs' SG&A costs

actually decrease by about 0.70% for a 1% decline in sales, suggesting a lower degree of stickiness (or greater cost flexibility) than that observed in larger firms or in other countries (Dalla Via, Perego, 2014). This finding implies that Italian SMEs might be relatively quicker to adjust certain types of expenses (like SG&A) when facing small declines in revenue, possibly due to their simpler organizational structures or more acute resource constraints. However, the stickiness of labour costs in these firms suggests that personnel expenses are more difficult to adjust, potentially due to cultural factors, labour regulations, or the value of retaining skilled workers in small businesses.

Italian SMEs form the backbone of the domestic business sector and significantly contribute to employment, value creation, and export performance. According to *The Digitalisation of SMEs in Italy* by the European Investment Bank (EIB), Italy has approximately 4.3 million SMEs, of which 95% are micro enterprises (with very few employees). These SMEs account for about 80% of employment and generate 70% of value added in the Italian economy (excluding the financial sector) (EIB, 2021). However, Italian SMEs suffer from a productivity gap compared to France and Germany, amounting to 17.9% on average – with the gap as high as 26.1% for micro enterprises and 2.9% for small enterprises (European Commission, 2023). Italian SMEs also face the highest energy prices in Europe, about 33.5% higher than the EU average. Notably, small business owners pay four times more for electricity than medium-sized firms due to a pricing mechanism that disadvantages lower consumption levels (The Ros, 2024). These structural challenges (lower productivity and high input costs) constrain the flexibility of Italian SMEs and could influence their cost management practices. For instance, higher energy costs may force SMEs to lock in longer-term contracts or invest in energy efficiency, affecting how quickly they can adjust these costs in response to activity changes.

According to a report by Cerved (2021) the estimated number of SMEs operating in the Italian manufacturing system in 2020 fell to 153,627, down from nearly 160,000 in 2019. In 2021, estimates of SME financial statements showed the first signs of recovery, with overall stability in financial indicators. Regional differences were pronounced: Southern Italy exhibited the best performance relative to pre-COVID levels, with growth of 8.4% compared to 2019, followed by the Northeast with 7.3% growth. In contrast, the central region remained below 2019 levels, with a decline of 4.6% (Cerved Group, 2021). These figures underscore that the impact of the pandemic and the pace of recovery varied across regions, potentially due to differences in industrial structure or the effectiveness of local support measures. Such regional performance differences might also affect cost behaviour; firms in regions that recovered faster may have been more confident in holding onto resources (expecting a rebound), whereas those in harder-hit regions may have been forced into deeper cost cuts.

The determinants of cost stickiness can be grouped into several categories. Economic factors include asset intensity and employee intensity. A higher proportion of fixed assets tends to lead to greater cost stickiness, because high adjustment costs make it difficult to scale down capacity quickly (Anderson *et al.*, 2003). Similarly, high employee intensity (having a large workforce) can increase stickiness due to the costs and frictions associated with hiring and firing. Paradoxically, demand uncertainty can result in a more rigid cost structure with higher fixed costs and lower variable costs: firms may choose to maintain a higher level of fixed inputs to avoid the risk of capacity shortages if demand unexpectedly spikes, as shown by Banker *et al.* (2014). This strategy of "playing it safe" by holding excess capacity leads

to costs that are less sensitive on the downside – essentially a built-in stickiness when demand falls. Broader macroeconomic conditions, such as GDP growth, also influence managerial expectations and, consequently, decisions about adjusting resources (Anderson *et al.*, 2003). In strong economies, managers might be more optimistic and thus more willing to retain staff during a minor downturn, anticipating a quick rebound, whereas in a recession they might act more conservatively.

Managerial and agency factors form another group of determinants. Chen *et al.* (2012) examined the influence of agency problems on cost stickiness in a sample of S&P 1500 firms from 1996–2005. They found that the degree of SG&A cost asymmetry is positively associated with managerial incentives for empire-building – as proxied by free cash flow, CEO horizon (*i.e.* nearing retirement), CEO tenure, and compensation structure. In other words, managers who have incentives to grow the firm (or their personal influence) tend to be more reluctant to cut costs when sales decline, contributing to greater stickiness. Conversely, firms with stronger corporate governance show a lower degree of cost stickiness, as effective oversight and control mechanisms limit the scope for suboptimal managerial decisions (Chen *et al.*, 2012). The agency perspective suggests that cost stickiness can sometimes result from managers prioritizing personal or non-value-maximizing objectives, such as maintaining a larger organization, rather than purely profit-driven cost optimization. This effect appears more pronounced in mature firms and in firms where SG&A expenditures do not strongly contribute to future value (Chen *et al.*, 2012). In such cases, strong governance can mitigate stickiness by encouraging cost reductions in response to declining sales.

Behavioural factors also play a role in asymmetric cost behaviour. Managerial overconfidence and optimism can lead to different adjustment patterns. Chen *et al.* (2013) documented that overconfident managers tend to overestimate future sales growth, which in turn leads them to maintain a higher level of unused resources when sales actually decline. This behaviour aligns with psychological theories of cognitive bias in managerial decision-making – an overconfident manager might believe a downturn is temporary and keep more staff or inventory than needed, resulting in stickier costs. Similarly, Banker *et al.* (2014) showed that managerial optimism or pessimism, influenced by recent sales trends, moderates the degree of cost stickiness. After a period of revenue growth, managers become more optimistic and costs tend to be stickier (since they expect growth to continue, they are slower to cut costs if sales dip). In contrast, after a period of declining sales, managers become more pessimistic, and costs may even exhibit anti-stickiness – meaning managers cut costs more aggressively, perhaps having learned from the recent decline that prospects are uncertain or weak. These behavioural dynamics indicate that past experiences and psychological outlook can cause deviations from purely rational cost adjustment behaviour.

The implications of cost stickiness for firm performance and value have been a subject of ongoing research. Weiss (2010) developed a firm-level measure of cost asymmetry and showed that firms with higher cost stickiness have lower analyst forecast accuracy and greater dispersion in analysts' earnings forecasts. This suggests that asymmetric cost behaviour adds complexity to financial forecasting – when costs don't move in line with sales in a predictable way, it becomes harder for outsiders to anticipate earnings. Banker *et al.* (2016) found that cost stickiness can affect assessments of accounting conservatism and may lead to incorrect conclusions about the quality of financial reporting if not properly accounted for. Essentially, if costs are sticky, traditional models that assume proportional cost declines might

overestimate profitability during downturns or misinterpret the persistence of expenses, thus affecting measures like accruals or earnings persistence. He *et al.* (2020) discovered a negative relationship between cost stickiness and dividend payout. Firms with higher costs of adjusting resources – and thus stickier costs – tend to pay out lower dividends, likely to preserve financial flexibility. These firms retain earnings as a buffer against the higher cost of reducing resources, which in turn limits the cash available for dividends. This finding connects cost structure to financial policy: companies with more rigid costs adopt more conservative payout policies.

In the context of Italian firms, specific institutional and economic factors must be considered. The prevalence of family ownership in Italian SMEs can influence decision-making processes and lead to different cost behaviour patterns (Russo, Tencati, 2009). Family-owned firms often emphasize long-term continuity and employee welfare, which can lead them to absorb labour cost cuts more conservatively, thus displaying stickier labour costs (Gnoth *et al.*, 2025). In the Italian context, longstanding North–South disparities manifest in institutional quality, infrastructure, productivity, and firm dynamism, with Southern regions typically lagging in growth capacity – these structural disadvantages plausibly reduce their flexibility in adjusting operating costs (Fina *et al.*, 2021; Scoccianti, 2024). This could be due to a variety of factors, including differences in economic structure, labour market conditions, or cultural attitudes toward employment. Furthermore, Italian SMEs are burdened by high energy costs and regulatory complexity, which can compel firms to explore alternative cost management strategies that may not align with patterns observed in larger firms or other countries (The Ros, 2024). For instance, instead of laying off employees (which might be culturally or legally challenging), an SME might reduce output or seek cheaper input materials, affecting different cost lines than those typically studied. Such unique responses underline the importance of context when examining cost behaviour asymmetry.

Strategic cost management offers avenues to mitigate the negative aspects of cost stickiness. The implementation of modern cost management approaches, including digitalization and Industry 4.0 technologies, can potentially reduce cost asymmetry by improving information systems and increasing the flexibility of production processes (Rounaghi *et al.*, 2021). In fact, data show that 76% of medium-sized Italian firms invested in Industry 4.0 technologies in the last five years, indicating a growing awareness of the importance of technological modernization for competitiveness (European Investment Bank, 2021). Such investments in automation, data analytics, and integrated planning systems can lower the costs of adjusting production levels or workforce, thereby making costs more responsive (less sticky) when activity levels change. For example, a firm that has digitized its supply chain and uses real-time demand data can scale down purchases and production more quickly when orders fall, in contrast to a less digitized firm that might react slower and incur excess costs.

Silge and Wöhrmann (2021) examined the market's reaction to asymmetric cost behaviour and found that while cost stickiness is a short-term phenomenon, it is more pronounced when firms have high long-term growth expectations. Investors tend to react negatively to unexpected cost stickiness, especially in firms with low long-term growth opportunities. This suggests that investors may interpret an unexpected degree of stickiness as a sign of managerial inefficiency or agency problems, particularly in companies that do not have strong growth prospects to justify holding onto slack resources. In contrast, for high-growth firms, some stickiness might

be tolerated or even expected, as these firms retain resources in anticipation of future expansion. The key insight is that the market distinguishes between "good" stickiness (resources held for growth) and "bad" stickiness (resources hoarded due to poor management), depending on the context of growth opportunities. Consequently, transparent communication by management about the reasons for maintaining or cutting resources during fluctuations can be important for investor confidence.

Research on cost stickiness in the Italian context reveals a complex picture influenced by firm size, institutional environment, and specific economic conditions. While large Italian companies exhibit cost behaviour patterns similar to their international counterparts, small and medium-sized enterprises demonstrate distinct cost behaviour characterized by lower stickiness in SG&A expenses but higher stickiness in labour costs (Dalla Via, Perego, 2014). These findings carry implications for managerial practice and financial analysis. Managers of SMEs need to be aware that their cost structures might respond differently to shocks than those of larger firms, and they should consider strategies (like increased operational flexibility or digital tools) to manage cost responsiveness. For policymakers, understanding that SMEs may have a different cost adjustment dynamic highlights the importance of providing targeted support during economic downturns (for example, labour cost subsidies or incentives for technology adoption) to enhance the resilience and competitiveness of Italian SMEs in the European and global context. In summary, the existing literature underscores that asymmetric cost behaviour is not a one-size--fits-all phenomenon; it varies with context, and understanding that context is crucial for interpreting empirical findings and crafting appropriate business strategies.

2. Methodology

2.1 The data sample

Data were collected from the Orbis Europe database. The research sample was defined using the following filters: (i) geographic filter – selecting firms in Italy; (ii) availability of economic data for the years 2020–2023, specifically Turnover and EBIT; and (iii) firm size – classified as small or medium. Applying these filters yielded a research sample of 56,017 enterprises. Each observation in the dataset represents an individual firm with financial data over the selected years.

The final dataset is structured as shown in Table 1, with the following variables for each firm: an id (firm identifier), name (firm name), Turn_YYYY (Turnover in a specific year), and EBIT_YYYY (EBIT in a specific year). For example, Turn_2020 and EBIT_2020 represent the turnover and EBIT for year 2020, respectively.

2.2 Indicators for cost stickiness

To study cost stickiness, we first compute the total operating costs for each firm, then examine year-over-year changes in costs and sales in logarithmic terms. **Total Operating Costs (TOC)** for a given year are calculated using the firm's Turnover and EBIT, as shown in Equation (1).

Table 1. Variables in the research sample.

Variable	Full variable name	Description
id	Firm ID	Unique identifier of the firm
name	Firm name	Name of the company
Turn_yyyy	Turnover in year yyyy	Company's total revenue in year yyyy
EBIT_yyyy	EBIT in year yyyy	Earnings Before Interest and Taxes in year yyyy

Source: own processing, 2025.

Table 2. Indicators for determining cost stickiness.

Indicator	Equation	Equation designation	Equation components Purpose of the equation
TOC	$TOC_t = TURNOVER_t - EBIT_t$	Eq. 1	$TURNOVER_t$ is the turnover for the nth year TOC_t is the total operating costs for the nth year $EBIT_t$ is the EBIT for the nth year Calculation of total operating costs (Eq.1)
$YoY\_TOC_{t,t-1}$	$Year\text{-}over\text{-}year\_change\_in\_TOC_{t,t-1} = \ln(TOC_t/TOC_{t-1})$	Eq. 2	TOC_{t-1} is the total operating costs for the nth year–1 TOC_t is Total operating costs of the nth year Calculation of year-on-year change in costs (Eq.2)
$YoY\_TURNOVER_{t,t-1}$	$Year\text{-}over\text{-}year\_change\_in\ TURNOVER_{t,t-1} = \ln(TURNOVER_t/TURNOVER_{t-1})$	Eq. 3	$TURNOVER_{t-1}$ is Turnover of the nth year–1 TURNOVERt is Turnover of the nth year Calculation of year-on-year change in sales (according to Eq.3)

Source: own processing, 2025.

For the analysis of cost stickiness, we are interested in the year-over-year percentage changes in costs and sales. These are calculated in log-difference form to linearize the percentage changes. The year-over-year change in Total Operating Costs from $year_{t-1}$ to $year_t$ is given by Equation (2) and similarly, the year-over-year change in Turnover (sales) from $year_{t-1}$ to $year_t$ is given by Equation (3).

2.3 Creating the dummy variable for sales decline

Following Anderson *et al.* (2003), we introduce an interaction dummy variable to distinguish between periods of sales increase and sales decrease. This dummy variable, which we can denote as $Dummy\_Turnover_{t,t-1}$, is defined as 1 if a firm's turnover in $year_t$ is less than its turnover in $year_{t-1}$ (indicating a sales decline), and 0 if turnover in $year_t$ is greater than or equal to turnover in $year_{t-1}$ (indicating non-decline or growth in sales). Using the data, we created three dummy variables corresponding to the three year-over-year periods analysed:

- dummy_Turnover(2023,2022) – equals 1 if a firm's turnover decreased from 2022 to 2023, otherwise 0.
- dummy_Turnover(2022,2021) – equals 1 if turnover decreased from 2021 to 2022, otherwise 0.
- dummy_Turnover(2021,2020) – equals 1 if turnover decreased from 2020 to 2021, otherwise 0.

These dummy variables allow the regression model to capture asymmetry in cost behaviour: specifically, they enable a different slope (cost elasticity) when sales are declining versus when sales are increasing.

2.4 Application of regression analysis methods

To test hypotheses about cost stickiness, we apply a linear regression model, often referred to as the Anderson, Banker and Janakiraman (ABJ) model (Anderson *et al.*, 2003). The general form of a linear regression model is in Eq.4.

$$Y_i = \beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + \ldots + \beta_p X_{ip} + \varepsilon_i \qquad \text{(Eq.4)}$$

where:

Y_i – the dependent variable,
X_{ij} – the independent variables,
β_0 – the intercept,

β_j – the coefficients for each independent variable (indicating the influence of each predictor,

ε_i – the error term.

In our context, the regression is specified to capture asymmetric cost behaviour as follows (based on Anderson *et al.*, 2003):

$$\ln(TOC_{i,t}/TOC_{i,t-1}) = \beta_0 + \beta \times \ln(TURNOVER_{i,t}/TURNOVER_{i,t-1}) + \beta_2 \times Dummy\_Turnover_{t,t-1} \times \ln (TURNOVER_{i,t} / TURNOVER_{i,t-1}) + \varepsilon_{i,t} \quad \text{(Eq.5)}$$

where:

$TOC_{i,t}$ – represents the total operating costs of firm i at time t,

$TURNOVER_{i,t}$ – represents the sales (turnover) of firm i at time t,

$Dummy\_Turnover_{t,t-1}$ – the dummy variable that equals 1 if, $TURNOVER_{i,t} < TURNOVER_{i,t-1}$, jinak 0,

$\varepsilon_{i,t}$ – is the error term.

Interpretation of coefficients

The β_1 coefficient measures the change in costs when the turnover increases. The β_2 coefficient captures the difference in the change in costs between periods of decline and a growth in the turnover. When $\beta_2<0$, traditional cost stickiness is confirmed (costs rise faster than they fall). When $\beta_2>0$, anti-stickiness is identified (costs fall faster than they rise). The total change during a decline in turnover is $\beta_1+\beta_2$.

Time period

The analysis is performed for three periods: 2020/2021, 2021/2022, and 2022/2023. A separate model is estimated for each period, which allows us to track the evolution of cost behaviour over time.

Statistical testing

The statistical significance of the coefficients is tested using t-tests at a significance level of $\alpha=0.05$. The overall significance of the model is verified by an F-test. The quality of the model is assessed using the coefficient of determination (R^2) and adjusted R^2.

Formulation of hypotheses

The theoretical framework for this research builds on the concept of asymmetric cost behaviour (cost stickiness) originally formulated by Anderson *et al.* (2003). These authors showed that firms' costs do not respond symmetrically to changes in activity levels – costs increase more rapidly for an uptick in sales than they decrease for an equivalent downturn in sales. This phenomenon is typically explained by the theory of resource adjustment costs and managerial decision-making: managers are hesitant to reduce resources during downturns due to transaction costs, concerns about future demand, or the limited reversibility of certain fixed inputs (Anderson *et al.*, 2003; Banker, Byzalov, 2014). Under normal conditions, therefore, one would expect to observe cost stickiness.

However, empirical studies indicate that the degree of stickiness is not constant and can depend on the phase of the economic cycle or the severity of external shocks (Weiss, 2010; Dalla Via, 2024). During crisis periods, when firms are forced to respond immediately to a sharp drop in demand, the usual stickiness mechanism may temporarily reverse. Companies often cut costs more quickly than usual in such extraordinary situations – a phenomenon referred to as **cost reversibility** or **cost anti-stickiness** (Hwang 2023; Weiss, 2010). This behaviour was evident during exceptional events like the COVID-19 pandemic, when survival, liquidity preservation, and operational adaptability became top priorities for management. In those circumstances, firms might slash both variable and fixed costs aggressively, leading to costs that fall as fast or even faster than sales.

In contrast, in the post-pandemic period, as the economic environment stabilizes

and demand begins to recover, companies are likely to revert to the classic pattern of stickiness. The return of stable planning horizons and more predictable managerial decision-making tends to restore the typical asymmetry – costs increase more rapidly during expansions than they contract during downturns (Dalla Via, Perego, 2014; Bona-Sánchez *et al.*, 2024). In other words, once the acute phase of the crisis passes, managers may once again be inclined to hold on to resources in anticipation of growth, thereby reintroducing cost stickiness.

Based on this theoretical and empirical reasoning, we formulate the following hypotheses:

- **H1:** During the COVID-19 crisis period, firms do not exhibit statistically significant asymmetrical cost behaviour.
- **H2:** In the post-COVID-19 period, firms exhibit statistically significant asymmetrical cost behaviour.

These hypotheses will be tested using the regression model described above for the respective periods representing the crisis and the post-crisis recovery. H1 pertains to the crisis year 2020–2021, while H2 pertains to the post-crisis years (2021–2022 and 2022–2023).

3. Results

The research was conducted on a dataset of 56,017 Italian manufacturing SMEs over the years 2020–2023. The results of the regression analysis are presented for each period and used to test Hypothesis H1 and H2. The dependent variable in all regressions is the log change in total operating costs, and the key independent variables are the log change in turnover and the interaction dummy for sales decline. The regression model follows the ABJ specification from Anderson *et al.* (2003) as outlined in Equation (5). Below, we detail the findings for each period, including the estimated coefficients, model fit, and hypothesis evaluation.

2020–2021 (Hypothesis H1 – Eq. 6). This period corresponds to the peak of the COVID-19 crisis impact (comparing fiscal year 2021 to 2020). We test whether cost behaviour during this period shows any asymmetry. Table 3 summarizes the regression results for 2020–2021.

H1: ASYM_COST = 0.016 + 0.0716 × ln_TURNOVER_2021_2020 + 0.107 × dummy_TURNOVER_2021_2020 (Eq. 6)

The coefficient for:

ln_TURNOVER_2021_2020 is 0.716 ($p<0.001$) and for the dummy Turnover<0 (2021/2020) is 0.107 ($p<0.001$). The intercept is 0.016 ($p<0.001$). The model has high explanatory power (Adjusted $R^2 \approx 0.723$, F-statistic significant $p<0.001$). Both coefficients are therefore statistically significant. Both independent factors are highly

Table 3. Regressions on 2021/2020.

		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
Model 1	(Constant)	0.016	0.001		20.054	< 0.001
	ln_TURNOVER_2021_2020	0.716	0.003	0.809	262.519	< 0.001
	dummy_Turnover(2021_2020)	0.107	0.006	0.059	19.105	< 0.001
	R Square	0.723				
	Adjusted R Square	0.723				
	F	73170.288				< 0.001

Source: own processing, IBM SPSS, 2025.

Table 4. Regressions on 2022/2021.

		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
Model 1	(Constant)	– 0.005	0.001		–8.040	< 0.001
	ln_TURNOVER_2022_2021	0.881	0.003	1.009	315.696	< 0.001
	dummy_Turnover(2022_2021)	–0.255	0.005	–0.177	–55.489	< 0.001
	R Square	0.772				
	Adjusted R Square	0.772				
	F	94664.618				< 0.001

Source: own processing, IBM SPSS, 2025.

significant ($p<0.001$), so the relationship between the change in sales and the change in costs is robustly proven in the model. According to Anderson *et al.* (2003), the coefficient for sales growth (β_1) (here 0.716) expresses the corresponding percentage change in costs when sales increase by 1%. The coefficient after adding the dummy($\beta_1+\beta_2=0.716+0.107=0.823$) then represents the relative change in costs when sales decrease by 1%.

- Change in costs with a 1% increase in sales: ≈0.716. This means that if sales increase by 1%, total costs will increase by an average of approximately 0.716%.
- Change in costs with a 1% decrease in sales: ≈0.609 (sum of $\beta_1+\beta_2=0.716+(–0.107)$). With a 1% decrease in sales, costs will therefore only decrease by 0.609%.

Hypothesis H2_1 (Eq. 7) tests the impact of the COVID-19 pandemic after the crisis (2022/2021) on the asymmetric behaviour of costs in Italian SMEs in the manufacturing industry, see Table 4.

H2_1: ASYM_COST = –0.005 + 0.881 × ln_TURNOVER_2022_2021–0.255 × dummy_TURNOVER_2022_2021 (Eq. 7)

Hypothesis H2_1 (Eq. 7) tests the impact of the COVID-19 pandemic after the crisis (2022/2021) on the asymmetric behaviour of costs in Italian SMEs in the manufacturing industry, see Table 4.

The coefficient for ln_TURNOVER_2022_2021 is 0.881 ($p<0.001$) and for the dummy Turnover<0 (2022/2021) is –0.255 ($p<0.001$). The intercept is –0.005 ($p<0.001$). The model explains ~77.2% of the variability (Adjusted $R^2\approx0.772$, F significant). Both coefficients are statistically significant ($p<0.001$). The coefficient 0.881 shows that

Table 5. Regressions on 2023/2022.

		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
Model 1	(Constant)	–0.019	0.001		–26.928	<0.001
	ln_TURNOVER_2023_2022	0.820	0.003	0.979	250.445	<0.001
	dummy_Turnover(2023_2022)	–0.222	0.005	–0.178	–45.49	<0.001
	R Square	0.708				
	Adjusted R Square	0.708				
	F	67895.74				<0.001

Source: own processing, IBM SPSS, 2025.

Table 6. Summary of asymmetric cost behaviour in selected years.

Period (Year/Year)	β_1	β_2	Cost change when sales increase	Cost change when sales decrease	Behavior type
2021/2020	0.716	+0.107	0.716	0.823	Anti-stickiness (costs decline faster)
2022/2021	0.881	–0.255	0.881	0.626	Stickiness (costs decline more slowly)
2023/2022	0.820	–0.222	0.820	0.598	Stickiness (costs decline more slowly)

Source: own processing, IBM, 2025.

with a 1% increase in sales, costs increase by an average of 0.881%; the negative dummy coefficient (–0.255) indicates that costs change less when sales decline.

Change in costs with a 1% increase in sales: ≈0.881. With a 1% increase in sales, costs increased by an average of 0.881%.

Change in costs with a 1% decline in sales: ≈0.646 ($\beta_1+\beta_2$=0.881+(–0.235)). With a 1% decline in sales, costs fell by approximately 0.646%.

Hypothesis H2_2 (Eq. 8) tests the impact of the COVID-19 pandemic after the crisis (2023/2022) on the asymmetric behaviour of costs in Italian SMEs in the manufacturing industry, see Table 5.

H2_2: ASYM_COST = –0.019 + 0.82 × ln_TURNOVER_2023_2022 – 0.222 × dummy_TURNOVER_2023_2022 (Eq. 8)

The coefficient for ln_TURNOVER_2023_2022 is 0.820 ($p<0.001$) and for the dummy Turnover<0 (2023/2022) is –0.222 ($p<0.001$). The intercept is –0.019 ($p<0.001$). Adjusted $R^2\approx0.708$, F-statistic significant, so the model again strongly explains the variability of the data. Both coefficients are statistically significant ($p<0.001$). Similar to the previous model, the negative dummy coefficient (–0.222) means that costs change less when sales decline.

- Change in costs with a 1% increase in sales: ≈0.881. With a 1% increase in sales, costs increased by an average of 0.881%.
- Change in costs with a 1% decline in sales: ≈0.646($\beta_1+\beta_2$=0.881+(–0.235)). With a 1% decrease in sales, costs decreased by approximately 0.646%.

Table 6 summarizes the development of asymmetric cost behaviour during and after the crisis.

Across the three analysed periods (Table 6), the regression models indicate that asymmetric cost behaviour evolved over time. In 2021/2020, the coefficients reveal **anti-sticky** cost behaviour–costs declined more in response to decreases in sales than they increased when sales rose–so conventional asymmetry did not materialize and Hypothesis H1 is confirmed. In the post-crisis periods (2022/2021 and 2023/2022), the estimated interaction term is negative, implying that costs fell less during sales contractions than would be expected under proportionality; thus, Hypothesis H2 is confirmed in both post-crisis years.

Overall, cost stickiness among Italian SMEs was not salient in the first period (2021/2020), whereas it clearly emerged in the subsequent years (2022/2021 and 2023/2022): costs did not decrease proportionally to the same extent that they increased when sales rose. This pattern suggests that, after 2020, the degree of cost stickiness–measured using the Anderson *et al.* (2003) framework-gradually increased, potentially reflecting firms' delayed adjustment to revenue dynamics, structural rigidities in cost structures, or constraints specific to small and medium-sized enterprises.

4. Discussion

The regression analysis results show that in the 2020–2021 period (corresponding to the height of the COVID-19 crisis), Italian manufacturing SMEs did not exhibit cost stickiness; in fact, costs were reduced more than proportionately relative to the decline in sales (an anti-sticky behaviour). In contrast, during the subsequent periods of 2021–2022 and 2022–2023, cost stickiness re-emerged, with costs decreasing less than proportionally when sales fell. In summary, the first period saw no evidence of sticky costs (H1 confirmed), whereas the following two years showed clear asymmetric cost behaviour consistent with stickiness (H2 confirmed for both post-crisis years).

In the first analysed period (2020–2021), the absence of cost stickiness can be attributed to extraordinary circumstances. The COVID-19 pandemic created structural shocks and an urgent need for cost adjustment, supplemented by unprecedented government interventions (such as wage support schemes, tax deferrals, and liquidity provisions). Firms were compelled to adapt their cost structures immediately to survive, which likely overrode the usual tendency to hold onto slack resources. This result aligns with the concept of cost reversibility or anti-stickiness discussed in prior research. Weiss (2010) describes such anti-stickiness as a "reverse asymmetry" that arises from managerial pressures on profitability and the need for prompt cost alignment with falling revenues. Similarly, Banker, Basu, and Byzalov (2016) noted that in the face of extreme demand declines, the standard cost-sales relationship can flip – companies not only cut variable costs but often slash fixed costs via layoffs, facility closures, or investment cuts. Our findings are in line with these observations: during an extreme downturn, the typical sticky-cost behaviour was suspended, and firms reduced costs significantly in response to the sales drop. This reflects a defensive stance focusing on short-term survival and liquidity, which is rational in a crisis context.

These findings during the crisis period somewhat contradict the traditional expectation of asymmetric cost behaviour that many studies have documented in normal times. As noted, Anderson *et al.* (2003) found that, typically, costs increase more when activity rises than they decrease when activity falls. Under normal conditions, one would expect costs to be "sticky", not dropping as much as sales do. However, our crisis-period result is not unprecedented. Other studies have also reported instances where cost stickiness diminishes or reverses under certain conditions. For example, Dalla Via and Perego (2014) found that for Italian private firms (especially SMEs), cost stickiness was not evident in SG&A or operating costs, except in the case of labour costs. In their sample, for sales declines smaller than 25%, SG&A costs in Italian SMEs fell by about 0.70% for a 1% drop in sales – a relatively smaller drop than what some other contexts show, yet indicating that Italian SMEs might inherently exhibit less stickiness in non-labour costs. Our study's first-period results go further, showing an outright anti-stickiness, likely due to the severity of the shock. It suggests that under extreme stress, even costs that might normally be sticky (such as labour, to some extent) were aggressively cut. Indeed, Italian firms did implement measures such as furloughs or reduced hours, aided by government support, which effectively reduced labour costs temporarily.

In the subsequent years, as firms adjusted to the new environment, their cost behaviour returned to the usual pattern. This observation is consistent with the idea that cost stickiness is more pronounced in stable periods and can be dampened or reversed during acute shocks (Banker, Byzalov, 2014; Dalla Via, 2024; Weiss, 2010). Once the economy began recovering and growth resumed, managers likely regained confidence in future sales and reverted to holding onto resources

more, anticipating continued recovery. Thus, by 2021–2022 and 2022–2023, we see the classic sticky cost behaviour re-established. This also dovetails with international observations post-crisis: for instance, after the 2008 financial crisis, some studies noted a temporary reduction in stickiness during the recession, followed by a return as businesses normalized operations. The idea is that stickiness is not a fixed trait but responds to managerial expectations and external pressures. During a crisis, the imperative to cut costs quickly overrides the hesitancy to lose resources; after a crisis, optimism and planning for growth restore the hesitation to cut, thereby reinstating stickiness.

Additional context is provided offered by further research. Digital transformation and technology adoption can influence cost behaviour. Chen and Xu (2023) found in a sample of Chinese firms that digital transformation reduces the stickiness of both operating and SG&A costs. The mechanism appears to be that digital technologies lower adjustment costs and ease financial constraints, enabling firms to respond more flexibly to changes in sales. Similarly, Hui *et al.* (2023) showed that the use of industrial internet technologies (part of the Industry 4.0 toolkit) mitigates asymmetric cost behaviour. These findings suggest that firms which quickly embraced technological solutions and process innovations during or after the pandemic may have developed more flexible cost structures. In the context of our study, it could imply that those Italian SMEs which invested in digital tools were better able to adjust costs (making them less sticky) even as others returned to older patterns. It would be an interesting extension to examine if the degree of stickiness correlates with measures of digital adoption among these firms.

From the perspective of Italian SMEs, our results offer an interesting contribution. They confirm that during an extreme downturn (like the COVID crisis), the usual pattern of cost behaviour can be temporarily disrupted. Yet, as operations normalize, firms tend to steer back to their typical cost management habits. This has implications for both managerial practice and policy. Managers should be aware that while emergency cost-cutting is viable in the short run, sustaining such flexibility may require structural changes (like adopting technology or more flexible organizational practices). For policymakers and stakeholders, the evidence that SMEs can shed costs rapidly in a crisis but then return to rigidity suggests that crisis support policies (such as subsidies or tax breaks) should possibly encourage not just immediate survival, but also investment in long-term flexibility and efficiency.

5. Conclusion

This study examined cost behaviour and the presence of cost stickiness in small and medium-sized enterprises (SMEs) in the Italian manufacturing sector over the period 2020–2023. By estimating three year-over-year regression models, we found that in the first period (2020–2021), cost stickiness was not observed, whereas in the subsequent two periods (2021–2022 and 2022–2023) the typical asymmetric cost behaviour reappeared. In practical terms, during the height of the COVID-19 crisis, Italian manufacturing SMEs reduced their costs roughly in line with or even faster than the decline in sales (no stickiness, possibly even anti-stickiness). However, in the post-crisis years as the economy recovered, costs once again became "sticky" – they did not decrease as much as they increased for equivalent changes in sales, consistent with the classic pattern documented in the literature (Anderson *et al.*, 2003; Dalla Via, Perego, 2014).

This evolution suggests that the immediate aftermath of a pandemic shock temporarily disrupted the usual cost behaviour model, likely due to extraordinary government measures, operational constraints, and adaptive

firm strategies that allowed for more flexible cost reductions. In the years that followed, as conditions stabilized, cost behaviour gradually returned to the traditional pattern, where costs are slower to fall than to rise. Our findings thus support the existence of cost stickiness in the Italian manufacturing SME sector but highlight that its magnitude is not static – it is influenced by external shocks, the structure of costs, and the level of technological adaptation of a firm. This aligns with recent literature indicating that digitalization and innovation can weaken cost stickiness (Chen, Xu, 2023), while rigid labour markets or a high proportion of fixed costs can strengthen it (Dalla Via, 2024; Bona-Sánchez *et al.*, 2024). For Italian SMEs, we conclude that after a period of extreme cost adjustment in 2020, these firms reverted to the usual asymmetric cost pattern as conditions improved. This result not only reinforces the theoretical framework of cost stickiness but also provides empirical evidence of the ability of SMEs to respond flexibly under extraordinary economic conditions and subsequently re-stabilize their cost structures. It suggests a degree of resilience: SMEs can make drastic short-term adjustments when needed, but underlying structural factors will reassert themselves once the crisis passes.

Future research should extend the analysis to a longer time horizon and delve into more granular, micro-level cost categories (such as distinguishing between labour, materials, and overhead costs) to identify which cost components drive stickiness in Italian SMEs. Additionally, examining the impact of digitalization and process innovation on cost behaviour would be valuable, to quantify how technology adoption might permanently alter cost flexibility. It would also be insightful to compare these findings with those from other European countries, as different institutional environments (*e.g.*, labour law rigidity, prevalence of family firms, state support mechanisms) may lead to different patterns of asymmetric cost behaviour. Such comparative studies could further enrich our understanding of how context-specific factors moderate the fundamental phenomenon of cost stickiness.

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References

Anderson, M. C., Banker, R. D., Janakiraman, S. N. (2003). Are selling, general, and administrative costs “sticky”? *Journal of Accounting Research,* 41(1), pp. 47–63. DOI:10.1111/1475-679X.00095.

Banker, R. D., Byzalov, D. (2014). Asymmetric cost behavior. *Journal of Management Accounting Research,* 26(2), pp. 43–79. DOI: 10.2308/jmar-50846.

Banker, R. D., Basu, S., Byzalov, D., Chen, J. Y. (2016). The confounding effect of cost stickiness on conservatism estimates. *Journal of Accounting and Economics,* 61(1), pp. 203–220. DOI: 10.1016/j.jacceco.2015.07.001.

Banker, R. D., Byzalov, D., Chen, L. T. (2013). Employment protection legislation, adjustment costs, and cross-country differences in cost behavior. *Journal of Accounting and Economics,* 55(1), pp. 111–127. DOI: 10.1016/j.jacceco.2012.08.003.

Banker, R. D., Byzalov, D., Plehn-Dujowich, J. M. (2014). Demand uncertainty and cost behavior. *The Accounting Review,* 89(3), pp. 839–865. DOI: 10.2308/accr-50661.

Banker, R. D., Byzalov, D., Ciftci, M., Mashruwala, R. (2014). The moderating effect of prior sales changes on asymmetric cost behavior. *Journal of Management Accounting Research,* 26(2), pp. 221–

242. DOI: 10.2308/jmar-50726.

Banker, R. D., Byzalov, D., Fang, S., Liang, Y. (2018). Cost management research. *Journal of Management Accounting Research,* 30(3), pp. 187–209. DOI: 10.2308/jmar-51965.

Bona-Sánchez, C., Ferrer-Pérez, M., Sosa-Cabrera, S. (2024). Cost stickiness and firm performance: Evidence from the COVID-19 pandemic. *Applied Sciences,* 14(6), 2599. DOI: 10.3390/app14062599.

Calleja, K., Steliaros, M., Thomas, D. C. (2006). A note on cost stickiness: Some international comparisons. *Management Accounting Research,* 17(2), pp. 127–140. DOI: 10.1016/j.mar.2006.02.001.

Cerved Group. (2021). *Rapporto Cerved PMI 2021.* Milan, Italy: Cerved Group.

Chen, C. X., Gores, T., Nasev, J. (2013). Managerial overconfidence and cost stickiness [Working paper]. *SSRN Electronic Journal.* Retrieved from: https://ssrn.com/abstract=2208622.

Chen, C. X., Lu, H., Sougiannis, T. (2012). The agency problem, corporate governance, and the asymmetrical behavior of selling, general, and administrative costs. *Contemporary Accounting Research,* 29(1), pp. 252–282. DOI: 10.1111/j.1911-3846.2011.01094.x.

Chen, Y., Xu, J. (2023). Digital transformation and firm cost stickiness: Evidence from China. *Finance Research Letters,* 52, Article 103510. DOI: 10.1016/j.frl.2022.103510.

Cheng, S., Jiang, W., Zeng, Y. (2018). Does access to capital affect cost stickiness? Evidence from China. *Asia-Pacific Journal of Accounting & Economics,* 25(1–2), pp. 177–198. DOI: 10.1080/16081625.2016.1253483.

Dalla Via, N. (2024). The dynamics of cost behavior: Unveiling sticky costs in private companies. *Financial Reporting,* 2, pp. 13–46. DOI: .3280/FR2024-002002.

Dalla Via, N., Perego, P. (2014). Sticky cost behaviour: Evidence from small and medium-sized companies. *Accounting & Finance*, 54(3), pp. 753–778. DOI: 10.1111/acfi.12020.

European Commission, Joint Research Centre. (2023). *SME Performance Review 2023: Annual report on European SMEs 2023/2024.* Publications Office of the European Union. Retvrieved from: https://publications.jrc.ec.europa.eu/repository/handle/JRC134323.

European Commission. (2022). *EU economic forecast – Winter 2022: The Italian economy grew by 6.5% in 2021.* Retrieved from: https://ec.europa.eu/economy_finance/forecasts/2022/winter/ecfin_forecast_winter_2022_it_en.pdf.

European Investment Bank (EIB). (2021). *The digitalisation of small and medium-sized enterprises in Italy: Summary report.* Luxembourg: European Investment Bank. Retrieved from: https://www.eib.org/en/publications/the-digitalisation-of-smes-in-italy-summary-report.

Fina, S., Heider, B., Prota, F. (2021). *Unequal Italy: Regional socio-economic disparities in Italy.* Rome, Italy: Friedrich-Ebert-Stiftung. Retrieved from: https://library.fes.de/pdf-files/bueros/rom/18130-20210712.pdf.

Gnoth, C., Rapp, M. S., Udoieva, J. (2025). Listed founding family firms and labor cost stickiness. *Industrial Relations: A Journal of Economy and Society.* Advance online publication. DOI: 10.1111/irel.12373.

He, Y., Yang, H., Tian, Y. (2020). Asymmetric cost behavior and dividend policy. *Journal of Accounting Research,* 58(4), pp. 989–1021. DOI: 10.1111/1475-679X.12328.

Hui, L., Yaping, D., Xiangyin, L. (2023). Does the application of industrial Internet improve the stickiness of enterprise costs? Evidence from China's manufacturing listed companies. *Finance Research Letters,* 56, Article 104141. DOI: 10.1016/j.frl.2023.104141.

Hwang, J. H. (2023). Asymmetric cost behavior and non-financial firms' risky financial investments [Working paper]. *SSRN Electronic Journal.* DOI: 10.2139/ssrn.4515710.

ISTAT. (2021). *Annual national accounts: Year 2021.* Retrieved from: https://www.istat.it/en/press-release/annual-national-accounts-year-2021/.

Ministero dell'Economia e delle Finanze (MEF). (2023). *Documento di economia e finanza 2023.* Rome, Italy: MEF.

Rounaghi, M. M., Jarrar, H., Dana, L. P. (2021). Implementation of strategic cost management in manufacturing companies: Overcoming costs stickiness and increasing corporate sustainability.

Future Business Journal, 7(1), 31. https://doi.org/10.1186/s43093-021-00079-4

Russo, A., Tencati, A. (2009). Formal vs. informal CSR strategies: Evidence from Italian micro, small, medium-sized, and large firms. *Journal of Business Ethics,* 85(2), pp. 339–353. DOI: 10.1007/s10551-008-9736-x.

Scoccianti, F. (2024). Regional heterogeneity in firm dynamics: The case of Italy. *Italian Economic Journal,* 10(3), pp. 527–553. DOI: 10.1007/s40797-024-00278-2.

Silge, L., Wöhrmann, A. (2021). Market reaction to asymmetric cost behavior: The impact of long-term growth expectations. *Review of Managerial Science,* 15(2), pp. 309–347. DOI: 10.1007/s11846-019-00341-8.

The Ros. (2024). *Italian SMEs – Crafting a competitive edge through resilience and consolidation.* Retrieved from: https://www.the-ros.com/en/insights/italian-smes-crafting-a-competitive-edge-through-resilience-and-consolidation/.

Thomson, E. (2024, January 9). *These charts show which businesses are driving the EU economy.* World Economic Forum. Retrieved from: https://www.weforum.org/stories/2024/01/chart-drive-eu-economy-small-business-sme/.

Valentini, V. (2024, June 27). *Empowering SMEs for digital transformation and innovation: The Italian way.* OECD Insights. Retrieved from: https://www.oecd.org/en/blogs/2024/06/empowering-smes-for-digital-transformation-and-innovation-the-italian-way.

Weiss, D. (2010). Cost behavior and analysts' earnings forecasts. *The Accounting Review*, 85(4), pp. 1441–1471. DOI: 10.2308/accr.2010.85.4.1441.

World Bank. (2024). *Manufacturing, value added (% of GDP) – Italy. World Development Indicators.* Retrieved from: https://data.worldbank.org/indicator/NV.IND.MANF.ZS?locations=IT.

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