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The influence of the trade-off between profitability and future increases in sales on cost stickiness*

La influencia del dilema entre rentabilidad inmediata y crecimiento futuro de las ventas en la histéresis de los costes

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Abstract

This study analyses cost stickiness under the dilemma between current profitability and future sales increase. When activity decreases firms are faced to keep profitability adjusting resources, while they should also consider long term consequences and keep slack resources which allow building firms capacities to adapt to external challenges and take advantage of future opportunities. We find empirical evidence that changes in current firm profitability and one year ahead sales increase significantly influence resource adjustment in periods when sales decrease. We find a significant moderating effect of changes in profitability, as well as a significant stressing effect of one year ahead sales increase, on cost stickiness.

Key words: *Cost stickiness, profitability, increases in sales, slack, resource adjustment.*

JEL Classification: *M41, M21, M10.*

Resumen

Este estudio analiza la histéresis de los costes bajo el dilema de conseguir una rentabilidad inmediata o futuros incrementos de ventas. Cuando la actividad disminuye las empresas se enfrentan al dilema de mantener la rentabilidad recortando

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gastos, pero tienen que considerar también las consecuencias a largo plazo de mantener capacidad sobrante o recursos de holgura que les permitan construir capacidades para adaptarse a los desafíos que les plantea el entorno, así como afrontar con ventaja las oportunidades futuras. En este trabajo encontramos evidencia empírica de que los cambios en la rentabilidad presente, así como los aumentos futuros en las ventas influyen significativamente el ajuste de recursos de las empresas en los períodos en los que disminuyen las ventas. Encontramos un efecto moderador de los cambios en la rentabilidad presente, así como un efecto acentuador de los aumentos futuros en las ventas, en la histéresis de los costes.

Palabras clave: *Histéresis de los costes, rentabilidad económica, aumento de las ventas, recursos sobrantes, disminución de costes.*

1. INTRODUCTION

Cost stickiness has attracted considerable academic attention during recent years. Cooper and Kaplan (1998, p. 246-7) alleged that two steps are required for costs decrease when activity decreases: reducing demands for resources and lowering the spending. According to this, costs' response to an increase in activity is significantly stronger in comparison to their response to a decrease in activity. This type of cost behaviour is labelled sticky, and stickiness the correspondent effect. Therefore, sticky costs occur due to asymmetric adjustments of resources when activity increases and decreases.

Anderson *et al.* (2007) identified three factors causing cost stickiness: fixity of costs, management failure to control costs, and management decisions to maintain resources during a downturn. In the same vein, Yasukata and Kajiwara (2011) distinguished two different causes of cost stickiness: as a result of managers being unable to adjust firms' capacity, and as the deliberate decision of managers. On the one hand cost downward adjustment is more difficult than upward adjustment because firms face difficulties in removing committed resources. Some costs, as for example maintenance or general services, are difficult to avoid. The adjustment of resources entails also increases in severance pay for employees, returns of materials and services, organizational adjustments, etc. In this respect, some prior studies found empirical evidence on the inability of managers to adjust resources, as well as on the incidence of objective factors and firm characteristics on cost stickiness (*e.g.* Anderson *et al.*, 2003; Calleja *et al.*, 2006; Argilés-Bosch and García-Blandón, 2011; Dalla and Perego, 2014; Balakrishnan *et al.*, 2014). On the other hand, other studies stress on the deliberate decisions of managers, depending on expectations (Cooper and Kaplan, 1992; Yasukata and Kawijara, 2011; Banker *et al.*, 2014), past sales growth (Anderson *et al.*, 2013), the type of adjusted resources (Balakrishnan and Gruca, 2008), manager's building incentives (Chen *et al.*, 2012), CEO compensation and expectations for value creation of input resource expenditures (Banker *et al.*, 2011a; Banker *et al.*, 2011b), incentives to meet earnings targets (Kama and Weiss, 2013), changes in regulation (Balakrishnan *et al.*, 2004; Holzhacker *et al.*, 2015), capacity utilization (Cannon, 2014), demand uncertainty (Banker *et al.*, 2013), etc. However no previous study analysed cost stickiness under the scope of attaining current profitability and future sales growth. Banker *et al.*

(2011b) analysed value creation by selling, general and administrative expenses (SGA), but they neither focused on profitability nor analysed the specific case of sales decreases. Kama and Weiss (2013) did not focus on profitability, they studied cost behaviour of firms with incentives of attaining specific targets of avoiding losses and decrease in annual earnings. They used dummy variables distinguishing between firms suspicious of attaining these targets and the remaining firms, but they did not analyse the whole range of profitability or changes in profitability influencing resource adjustments. Moreover, no previous study considered the trade-off between profitability and sales growth.

The trade-off between efficiency and flexibility is an enduring postulate in management literature (e.g. Adler *et al.*, 1999; Tan and Wang, 2010). Thomson (1967) described it as the important paradox of administration. It has been extensively analysed by management research, but it has not deserved similar attention in accounting research. More specifically, no previous empirical research on cost stickiness focuses on this dilemma. Banker *et al.* (2011a) support the premise that cost behaviour is driven by deliberate resource commitment decisions made by forward-looking managers. Some studies found association between firm's costs and future earnings per share (e.g. Anderson *et al.*, 2007; Baumgarten *et al.*, 2010), future profitability (Banker *et al.*, 2006; Banker and Chen, 2006) and a ratio of increases in sales to market capitalization (Baumgarten *et al.*, 2010). Banker *et al.* (2011b) found that the potential of future value-creation influences resource expenditure. Weiss (2010) analysed the incidence of cost behaviour on analysts' forecasts. The incidence of expectations on cost stickiness has also been analysed, as previously mentioned. This study contributes analyzing cost stickiness under this scope: the management of firm resources and the dilemma between efficiency and flexibility. In this vein, we link the extant research on cost accounting with management research. We use one year ahead sales increase and change in current profitability as indicators of flexibility and efficiency respectively.

We use a sample of American industrial firms with at least 20 years of data in COMPUSTAT. We find empirical evidence that managers, in decisions on resource adjustment when activity decreases, consider changes in current profitability, as well as future increases in sales. When enduring a decrease in activity managers are faced to the dilemma of cutting costs to uphold firm profitability, versus keeping enough resources to ensure firm's future advantageous position and to allow firm's sales recovery. They consider that resource adjustment hinders the ability of firms to build capabilities that enable them advantages to attain future increases in sales, while on the other hand they also consider cutting costs as a measure to attain targets of profitability. We find empirical evidence that changes in current firm profitability and one year ahead sales increase significantly influence resource adjustment decisions in periods of sales decrease. More precisely, we find a significant moderating effect of change in profitability, as well as a significant stressing effect of one year ahead sales increase, on resource adjustment when activity decreases. However, firms with high profitability are less urged to adjust resources when activity decreases, while firms with low profitability are more urged to cut costs in such circumstances. We find empirical evidence of such behaviour with firm-year observations.

Our results provide useful insights for the management and cost accounting literature, enhancing our understanding of resource adjustment. They are im-

portant for various users of financial information. They are useful in assessing financial statements, and more specifically costs changes. External analysts of financial information should be aware that resource adjustments in periods of sales decrease may entail immediate gains in current profitability, or may prevent decreases in current profitability, but it may also restrict future sales recovery and/or sales increase. The maintenance of slack resources when activity decreases, even for firms facing gloomy sales expectations, may be a good indicator of a proactive strategic orientation towards building firm capabilities. Our results have significant implications for the management accounting literature, providing new knowledge on management decisions on resource adjustment, with respect to the balance between short and long term consequences.

The remainder of the paper is organized as follows. The next section discusses theoretical issues and raise hypotheses, we then discuss methodological issues, describe the sample used in the study, explain results and raise concluding remarks.

2. THEORY AND HYPOTHESES DEVELOPMENT

Stigler (1939) was the first to suggest the existence of a trade-off between flexibility and efficiency. Thomson (1967) described it as the important paradox of administration. He mentioned two opposed extremes of the organization. On the one hand, the technical core of the organization is concerned on scoring well on assessments of technical rationality. On the other hand, the upper reaches of the administration are concerned in providing the capacities and resources which allow the organization to make demands on its environment and to take advantage of opportunities afforded by that environment. Fuss and McFadden (1978) argued that the improvement in efficiency is usually a loss in flexibility. They argue that there is a competition over firm's scarce resources between flexibility and efficiency. There are two important strategic choices, efficiency and flexibility, that explain management decisions.

According to Cyert and March (1956) firms build flexibility through investing in resources. They introduced the notion of slack as a pool of excess resources that helps firms to adjust to unexpected fluctuations. Slack is potentially utilizable resources that can be diverted or redeployed for the achievement of organizational goals (George, 2005). A certain level of excess resources provides flexibility to experiment, take risks and make proactive choices. Firms use this slack to build capabilities that make firms competitive, allow them to take strategic choices, act as buffers in periods of economic difficulties, facilitate the adjustment to unanticipated contingencies, etc. Resources act as inducements to experiment, take risks, make proactive choices, build capabilities, as well as to take advantage of market circumstances and opportunities. The presence or absence of excess resources determines to what extent firms are able to take profit of available advantages. Surplus resources make it easier to pursue firms' projects. Thompson (1967) argued that slack resources provide a reactive protection against threats and facilitate proactive initiatives. According to this author, the presence of excess resources provides the flexibility for a firm to decide on a course of action when trying to adapt to its environment. Slack resources allow firms to adapt to complex competitive landscapes, as well as to redeploy organizational means for the achievement of long term goals. They act as buffers that help to

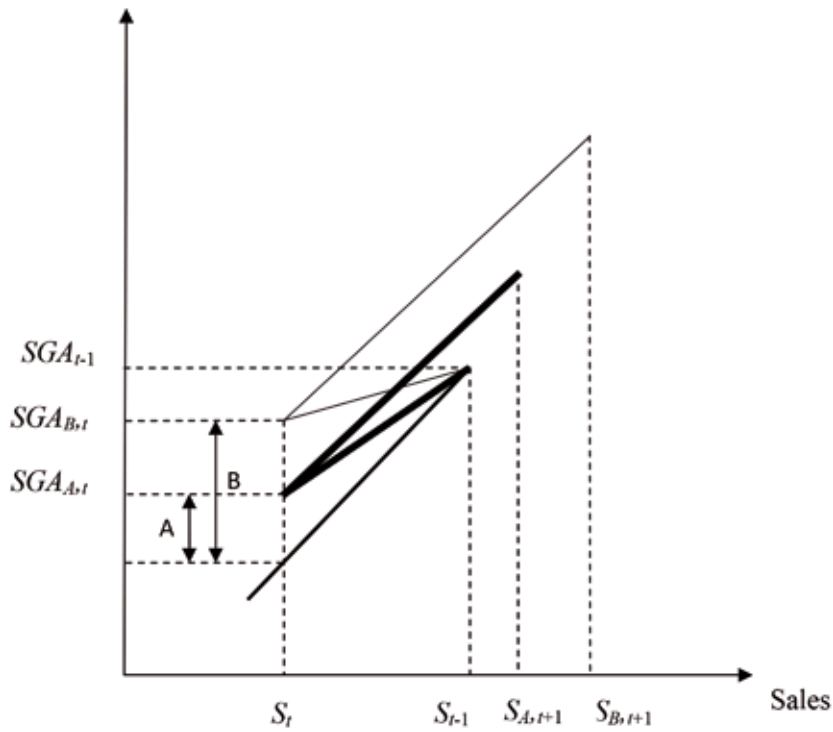
pursue and build new capabilities. Damanpour (1987) and Greve (2003) argued that slack resources have a positive effect on innovation. Firms with no surplus resources are more constrained to deal with operational issues. Managers and employees direct their efforts to urgent matters and rush orders in such cases. Coordination, planning, process improvement, innovation, market research, etc. are set aside, or may not be properly dealt with, because any available resource is committed to daily or imminent operational activities, when there are no slack resources. Any unanticipated event is an important disruption that may hardly be managed in these cases. In this respect, firms with slack resources are in better position to make proactive choices that can be translated into future sales increases. They have quicker response to such circumstances. They also have more potential ability to respond to competitor strategies, to cater special needs, to deliver new orders from customers, to shift resources into or away from their existing markets, etc. (George, 2005). Indeed, they are in better position to meet increases in demand. Firms with no slack resources are more likely to lose opportunities for expansion of sales. They will be unable to mobilize the necessary resources quickly enough when opportunities for sales present themselves. Weiss (2001) refer to tactical flexibility as the ability of a firm to adjust overall output to exogenous shocks. In this study we focus on tactical flexibility and approach it as the achievement of future increases in sales. Mishina *et al.* (2004) and Bradley *et al.* (2011) found empirical evidence on the influence of slack on future sales growth. In this respect, when sales decrease managers may decide to cut resources proportionately, or almost proportionately, with respect to sales increases, or they may decide to cut resources to a lesser extent, because managers' expectations for future sales are optimistic, but also because managers may give priority to allow futures sales recovery. The resource-based view (Penrose, 1959) and the behavioural theory (Cyert and March, 1963) of the firm argue on the beneficial effects of resources on sales growth. They provide both, a reactive bulwark against threats and the implementation of proactive strategic initiatives. According to it, managers need slack to fuel innovation and increase sales. Figure 1 depicts scenarios A and B, with lower and greater cost stickiness allowing lower and greater future sales increase respectively.

We thus formulate the following hypothesis:

H1. The attainment of greater (lower) future sales growth drives greater (lower) cost stickiness when activity decreases.

The adjustment of resources when activity decreases produces an immediate effect of improving firm income, with respect to firms that do not adjust resources, as well as of reducing the amount of investment used. The subsequent effect is an improvement in firm profitability, by increasing income and by reducing the investment in resources (Starr and MacMillan, 1990). The adjustment of resources has an additional effect of improving efficiency, because it reveals more clearly the scarcity of resources and stimulates their efficient use. In this vein, Baker and Nelson (2005) argue that firms with fewer resources are likely to leverage them more efficiently. According to these authors, resource constraints alter the behaviour by which resources are expended, forcing managers to apply the appropriate level and type of resource that any specific challenge demands. Therefore, firms more focused on the specific concern of improving figures of profitability will be more prone to adjust resources when they face decreases in activity.

FIGURE 1
COST STICKINESS AND FUTURE SALES INCREASE



The lowest line depicts the initial increase in costs when sales increase (from $t-2$ to $t-1$). A symmetric behavior would entail that costs would decrease along this line when sales decrease (from $t-1$ to t). However, an asymmetric behavior currently takes place, which may be different according to deliberate firms' decisions. In scenario A (thicker line) managers cut more resources than in scenario B (thinner line), given a decrease in sales in period t with respect to period $t-1$. Therefore, firm in scenario B is in an advantageous position to allow sales recovery with respect to firm in scenario A. Distances A and B between costs increase and decrease indicate cost stickiness for scenario A and B respectively. The greater slope lines depict cost curve when sales increase.

The agency theory describes the conflict between shareholders and managers. The later do not always act in the best interest of shareholders and choose actions to maximize their own utility (Jensen and Meckling, 1976). Some authors (*e.g.* Jensen, 1986; Phan and Hill, 1995) argue that surplus resources make it easier for managers to pursue self-serving behaviours, which are not usually reconciled with firm performance. On the contrary, surplus resources often jeopardize performance. Hope and Thomas (2008) found empirical evidence of this management behaviour. Accordingly, firms more focused on profitability will give priority to capacity adjustment, the elimination of slack resources and the avoidance of the opportunistic behaviour of managers, thus preventing cost stickiness.

On the other hand, the agency theory argues that incentives to meet earnings targets promote self interested management behaviour. There is a bulk of empirical research finding that managers' concern for meeting earnings benchmarks induces cost reduction (*e.g.* Roychowdhury, 2006; Cohen *et al.*, 2008). More specifically, Kama and Weiss (2013) found that managers faced to meet earnings targets diminish cost stickiness. In this vein, managers aiming at preserving firm profitability will cut slack resources excessively when sales decrease, even if it jeopardizes futures increases in sales, as depicted by scenarios A and B in Figure 1.

We thus formulate the following hypothesis:

H2. The attainment of favourable (unfavourable) changes in profitability drives lower (greater) cost stickiness when activity decreases.

3. METHODOLOGY

The purpose of our analysis is to test the influence of the attainment of future sales increases and current profitability on resource adjustment when activity decreases. We rely on the model used in the seminal study of Anderson *et al.* (2003), as well as in most of the subsequent research on cost stickiness (*e.g.* Dalla and Perego, 2013; Banker *et al.*, 2011a), and formulate the following equation:

$$\begin{aligned}
 & \log \frac{SGA_{i,t}}{SGA_{i,t-1}} \\
 &= \beta_0 + \beta_1 \cdot \log \frac{S_{i,t}}{S_{i,t-1}} + \beta_2 \cdot D \cdot \log \frac{S_{i,t}}{S_{i,t-1}} + \beta_3 \cdot D \cdot \log \frac{S_{i,t}}{S_{i,t-1}} \cdot DNEXT \cdot \log \frac{S_{i,t+1}}{S_{i,t}} \\
 & (1) + \beta_4 \cdot D \cdot \log \frac{S_{i,t}}{S_{i,t-1}} \cdot CHROA_t + \beta_5 \cdot D \cdot \log \frac{S_{i,t}}{S_{i,t-1}} \cdot \log \frac{SEXP_{i,t+1}}{S_{i,t}} \\
 & + \beta_6 \cdot D \cdot \log \frac{S_{i,t}}{S_{i,t-1}} \cdot ROA_t + \beta_7 \cdot D \cdot \log \frac{S_{i,t}}{S_{i,t-1}} \cdot ASSTS_{i,t} \\
 & + \beta_8 \cdot D \cdot \log \frac{S_{i,t}}{S_{i,t-1}} \cdot DEBTS_{i,t} + \sum_t \beta_t \cdot Y_{i,t} \\
 & + \varepsilon_{i,t}
 \end{aligned}$$

where *SGA* indicates selling general and administrative expenses for a firm *i* at year *t*, *S* sales, *ROA* return on assets, *CHROA* change in ROA (measured as the difference between current and previous year ROA), *SEXP* sales expectations, and *ASSTS* and *DEBTS* the ratios of total assets (*ASS*) and long term debt to sales respectively. *D* and *DNEXT* are dummy variables indicating respectively, with value 1, that sales decrease with respect to previous year and that sales increase in the following year with respect to current year respectively (and 0 otherwise). *Y* are also dummy variables, indicating that an observation belongs to a given year, with value 1 and 0 otherwise. They control for specific seasonal or temporary effects. All variables used in this study are explained in the annex.

Changes in costs depend on changes in sales. The logarithmic specification of the model entails that the coefficient β_1 measures the percentage increase in costs for a 1% increase in sales. If the traditional fixed- and variable-cost model is valid, upward and downward changes in costs, given changes in output, will be equal and consequently $\beta_2=0$. Because of D takes the value of 1 when sales decrease between periods $t-1$ and t , the sum of coefficients $\beta_1+\beta_2$ measures the percent decrease in costs that follows a 1% decrease in output. If costs are sticky, the changes in costs following output increases should be greater than under output decreases, thus being $\beta_2<0$, conditional on $\beta_1>0$.

We use SGA in our dependent variable. More precisely, the dependent variable is the logarithm of SGA_t/SGA_{t-1} . They are a sort of slack resources. They are more linked to strategic activities than most other operating costs. They include a bulk of resources related to managing, planning and building firm capacities. They include a considerable share of fixed costs. They behave more as fixed costs than most other operating costs, such as for example raw materials or direct labour. They include resources used in strategic firm activities that allow firms to be in an advantageous position to face competition. These resources allow firms to take actions to adapt to environmental circumstances, as well as to be in an advantageous position to attain future sales increases. SGA are an interesting approach for resources committed to coordination, planning, process improvement, innovation, marketing research, building capabilities, etc., which enable firms to be in advantageous position and allow sales recovery. They are usually used in analyzing cost stickiness (e.g. Anderson *et al.*, 2003; Chen *et al.*, 2012; Banker and Byzalov, 2014; Anderson *et al.*, 2013). Moreover, they have been persistently used in empirical research on slack versus financial performance, as a measure of slack (e.g. Singh, 1986; Bergh and Lawless, 1998; Reuer and Leiblein, 2000). Anderson *et al.* (2007) found future positive returns related to increases in these costs in revenue declining periods. Therefore, we focus on SGA in our analysis on cost stickiness.

We are interested in analyzing how firms' attainment of future increases in sales deters managers from adjusting resources in periods when activity decreases. According to our hypotheses stickiness is more pronounced for those firms being able to get greater future increases in sales. We use the interaction variable with the logarithm of one year ahead to current year sales (S_{t+1}/S_t) as a proxy for this effect. We assume that firms giving priority to future increases in sales are more able to get higher sales increases, with respect to those that do not give priority to supply firms' customers or clients demand. Therefore, this variable offers a plausible proxy measuring comparative firms' orientation to future increases in sales. Given that we also control for the effect of sales expectations on cost stickiness, the interaction variable with S_{t+1}/S_t captures the net effect of surplus resources devoted to meet unexpected demand fluctuations and/or to make proactive choices trying to increase sales above expectations. We are also interested in testing that the focus on firm profitability influences a lower degree of cost stickiness. As mentioned, studies linking flexibility or slack to efficiency usually use financial performance, and more precisely ROA, as an approach for efficiency, or merely as a measure of financial performance (e.g. Tan and Peng, 2003; Eben and Johnson, 2005; Tan and Wang, 2010; Bradley *et al.*, 2011). Firms giving priority to current profitability will be more prone to apply measures that render higher profitability in the short run, and thus a more

favourable change in profitability, with respect to those that do not have such priority. We use the interaction variable with *CHROA* as a proxy for this effect. Therefore, β_3 and β_4 allow tests for our hypotheses H1 and H2 respectively, being negative and positive their hypothesized signs respectively.

Managers' current expectations for future sales are also a factor recognised as influencing resource adjustment when business activity decreases. Managers take into account that it will take time to reacquire resources if they have been reduced, and to bring those resources' performance up to earlier levels. In their seminal study, Anderson *et al.* (2003) suggested that managers are deterred from adjusting resources, or delay this adjustment, when they believe that the decrease in sales is temporary. In this vein, they found that the degree of stickiness decreases with longer periods of time. Indeed, Yasukata and Kajiwarra (2011) found a significant lower resource adjustment in periods of sales decreases matched with managers' optimism about future sales. As we do not have information on managers' expectations with respect to sales in the following year, we use mechanical predictive models based on current year sales and recent changes in sales. Following previous research using similar parsimonious predictive models for earnings and cash flow prediction (*e.g.* Carnes *et al.*, 2003; Kim and Kross, 2005), we estimate the following equation:

$$(2) \quad S_{i,t+1} = \alpha_0 + \alpha_1 \cdot S_{i,t} + \alpha_2 \cdot \Delta S_{i,t} + \sum_t \alpha_t \cdot Y_{i,t}$$

where ΔS is sales changes with respect to previous year, measured as $S_t - S_{t-1}$. We also include dummy variables for years, controlling for specific yearly effects. We perform fixed effects estimations of Equation (2) and calculate *SEXP* with the corresponding predicted values, which are used in the corresponding interaction variable in Equation 1. A negative sign is expected for β_5 . Given the usefulness of mechanical or statistical procedures –as compared to expert opinion– in medical research (*e.g.*: Grove *et al.*, 2000; Ægisdóttir *et al.*, 2006), as well as in audit research (*e.g.*: Koh and Killough, 1990; Simnett, 1996; Gadenne and Iselin, 2000; Bhimani *et al.*, 2009)¹, and the recognised human bias in business prediction and judgement (*e.g.*: Furnham and Boo, 2011; Kim and Prather-Kinsey, 2010; Louis *et al.*, 2013), our variable is a plausible proxy for manager's expectations for future sales.

We include the interaction variable with *ROA* as additional control variable, considering that more (less) profitable firms are less (more) urged to adjust resources when activity decreases. Moreover, less (more) profitable firms have likely higher (lower) *SGA* to sales ratio, thus being in less (more) need to get slack. Therefore a negative sign is expected for β_6 .

Following previous studies we also include assets and debt intensity in Equation 1 (*ASSTS* and *DEBTS* respectively), as additional interaction control variables. Firms will find significant difficulties and rigidities in depleting

¹ McKee (2003) found that auditor signalling rate for bankrupt companies, when other opinion modifications related to going concern issues were also considered, was similar to models' prediction accuracies.

resources, especially for firms requiring more assets to support their sales. Asset-depletion is in most cases unrelated to circumstantial changes in sales, and consequently we expect an effect of asset intensity on cost stickiness. On the other hand, indebtedness moderates the sticky behaviour of firms. The fact that indebted firms have to meet interest payments, and may be subject to more scrutiny from creditors, encourages managers to apply efforts to adjust resources. Previous studies found empirical evidence of negative and positive coefficients for these variables, respectively (*e.g.*: Chen *et al.*, 2012; Calleja *et al.*, 2006; Dalla and Perego, 2013). We consequently expect these signs for β_7 and β_8 respectively. There are no expectations for the dummy variables for the years included in the model.

4. SAMPLE

We use COMPUSTAT data for all industrial American firms (SIC codes 2 and 3) with data from 1979 to 2009. We do not consider firms in the service industry because of their different cost structure and business approach. Table 1 displays sample and data screening. We start with 37,730 year-data observations from 1,453 different firms. We remove 4,065 observations, and 32 firms, with missing data in sales and SGA for the current and previous years. The remaining 1,421 firms and 33,665 observations are the available sample for our study. Sales decrease with respect to previous year in around 30% of observations (10,236), while they increase in around 70% (23,427). Almost all firms experience both, increases and decreases in sales, throughout all years. In an attempt to clean their sample from the effects of mergers, acquisitions and other special operations Dalla and Perego (2013) refused observations with more than 50% sales changes with respect to previous year. We begin performing our study with the full sample, and look for robust results applying a lower restrictive removal criterion. Excluding observations with more than 70% sales change (*i.e.*: when the ratio of sales at t to sales at $t-1$ is lower than 0.3 and higher than 1.7) provides a final sample of 32,663 firm-year observations. The screening procedure leads to different samples depending on the availability of data for variables included in the different models and sample selection criteria. Given that Equation 1 includes lagged and forward variables, lower numbers of observations are available in the subsequent estimations. Some authors (*e.g.* Weiss, 2010; Anderson and Lanen, 2007; Chen *et al.*, 2012) excluded observations where sales and costs move in opposite directions. However, Banker and Byzalov (2014) found that this sample selection criterion is fundamentally flawed. These authors also criticized the criterion of excluding observations for which costs exceed sales, as ambiguous and potentially source of bias. We also refuse this criterion, because it excludes observations with negative income.

Table 2 displays descriptive statistics for our sample. Sales and total assets are converted into values of 2009 applying the US inflation ratio. They are lower in periods when sales decrease with respect to periods when sales increase. The average sales increase across all periods is 21.08%, while the average decrease is 13.16% (*i.e.*: 1-0,8684), with a 10.67% mean increase for the overall sample. The asymmetric cost behaviour can be observed for SGA, with this univariate analysis: on average they increase 17.41% in periods of sales increasing 21%,

TABLE 1
SAMPLE AND DATA SCREENING

Base sample	Number of firms	Number of observations
Industrial firms with more than 20 years in COMPUSTAT (years 1979 to 2009)	1,453	37,730
Removed with missing data in S and SGA for the current and previous years	32	4,065
Remaining firms and observations	1,421	33,665
Number of observations with increases in sales	1,419	23,427
Number of observations with decreases in sales	1,392	10,236
Number of observations with no change in sales	2	2
Additionally removed with sales changing more than 70% compared to previous year	0	1,002
Remaining firms and observations with additional removal	1,421	32,663

TABLE 2
DESCRIPTIVE STATISTICS: MEAN VALUES

	Whole sample	Sales increases	Sales decreases
S^*	4,114.676	4,293.625	3,705.918
ASS^*	4,064.307	4,118.683	3,940.643
S_t/S_{t-1}	1.1067	1.2108	0.8684
SGA_t/SGA_{t-1}	1.1090	1.1741	0.9602
$SGATS$	0.2426	0.2369	0.2555
ROA	0.0818	0.1100	0.0174
$ASSTS$	0.9664	0.9340	1.0405
$DEBTS$	0.1765	0.1688	0.1941
$CHROA$	-0.0039	0.0137	-0.0443

* Constant values: 000 \$.

S is sales, ASS total assets, SGA selling general and administrative expenses, $SGATS$ the ratio of SGA to sales, ROA return on assets, $ASSTS$ the ratio of assets to sales, $DEBTS$ the ratio of long term debt to sales and $CHROA$ the change in ROA with respect to previous year. All data refer to year t , with the exception of variables with $t-1$ subscript.

while they only decrease 3.98% in periods of sales decreasing 13.16%. The average SGA to sales ratio ($SGATS$) is 24.26% for the whole sample, being slightly lower (higher) in periods when sales increase (decrease). The table displays an improvement in most ratios when sales increase, with respect to periods when they decrease: ROA , $CHROA$, $ASSTS$ and $DEBTS$. Profitability improves in periods of increasing sales, while it declines when sales decrease. The slight decrease in profitability for the overall sample can be explained in terms of the increasing competitive pressure.

5. RESULTS

5.1. Regression results

Table 3 displays estimations for Equation 1. We perform panel data regressions correcting for autocorrelation disturbances. The Hausman test rejects the null hypothesis of no correlation between individual effects and explanatory variables: χ^2 values of 308.68 (with 31 d.f.), 363.79 (with 36 d.f.), 377.11 (with 30 d.f.), 242.21 (with 36 d.f.) and 222.71 (with 36 d.f.) for the estimations in columns A, B, C, D and E respectively. As individual effects are correlated with the regressors in all estimations, the random effects estimator is inconsistent, while the fixed effects estimator is consistent and efficient. We therefore perform panel data estimations with fixed effects.

All models estimated in this table present a significant goodness of fit, with overall R-squares ranging from 40 to 53%. The coefficients for the dummies for years are not displayed, because of simplicity, and because they have no interest for our analysis. Columns A and B display estimations with the full sample, while estimations in columns C to E are performed excluding observations when sales change more than 70% with respect to previous year. Columns A and C display results for the basic model for cost stickiness, while columns B, D and E present results for the full model formulated in Equation 1. We explain results referring to β coefficients with its corresponding subscripts.

Results in column A suggest the existence of the typical sticky behaviour for SGA for the full sample: β_1 and β_2 are positive and negative respectively, and significant at the 1% confidence level. SGA increased 0.68% per 1% sales increase, while they only decreased 0.58% (the combined value of $\beta_1 + \beta_2$) per 1% sales decrease. These results are in accordance with most previous research on cost stickiness.

As mentioned, column B displays results for the whole sample and the full model formulated in Equation 1. With the exception of the interaction variable for asset intensity, all control variables present the expected signs, and are significant with $p < 0.05$. The coefficient β_5 (corresponding to the interaction variable for the ratio of the expected sales at $t+1$ to sales at t) is significantly negative with $p < 0.01$, indicating the existence of the expected stressing effect of expectations on cost stickiness. According to this result, resource adjustment in SGA when activity decreases is lower for higher future expected sales, and vice-versa. The coefficient β_6 (corresponding to the interaction variable for ROA) is significantly negative (at $p < 0.01$), according to expectations, indicating that the urgency to adjust SGA grows with lower profitability in periods of decreasing sales, and vice-versa. The significant positive sign of β_8 (at $p < 0.05$) reveals a moderating effect of indebtedness on cost stickiness. The more firms are indebted, the more they are urged to meet interest payments, and consequently to adjust SGA, when sales decrease.

With respect to our variables of interest, the coefficient β_3 (corresponding to the interaction variable for one year ahead increase in sales) is significantly negative with $p < 0.01$, indicating a stressing effect on cost stickiness and providing support for our hypothesis H1. This finding suggests that managers focusing on flexibility, and therefore giving priority to future increases in sales, prefer to adjust less SGA when activity decreases. Managers consider that the more

TABLE 3
FIXED EFFECTS ESTIMATIONS FOR THE INCIDENCE OF ONE YEAR AHEAD SALES INCREASE AND CHANGE IN PROFITABILITY ON COST STICKINESS. DEPENDENT VARIABLE: $\log(SGA_t/SGA_{t-1})$

	Excluding observations where sales change more than 70%									
	Full Sample					with standardized ROA				
	(A)		(B)		(C)		(D)		(E)	
	Coef.	t	Coef.	t	Coef.	t	Coef.	t	Coef.	t
$\beta_1: \log(S/S_{t-1})$	0.677515	118.0 ***	0.698307	118.0 ***	0.642421	73.91 ***	0.650556	76.12 ***	0.652881	76.28 ***
$\beta_2: D \cdot \log(S/S_{t-1})$	-0.101206	-9.7 ***	0.038368	2.7 ***	-0.057285	-4.15 ***	0.247483	12.63 ***	0.207510	10.42 ***
$\beta_3: D \cdot \log(S/S_{t-1}) \cdot DNEXT \cdot \log(S_{t+1}/S_t)$			-0.191364	-3.0 ***			-1.133954	-7.89 ***	-1.078413	-7.49 ***
$\beta_4: D \cdot \log(S/S_{t-1}) \cdot CHROA_t$			1.223381	28.0 ***			1.590957	32.91 ***	0.229663	32.52 ***
$\beta_5: D \cdot \log(S/S_{t-1}) \cdot \log(SEXP_{t-1}/S_t)$			-0.115593	-9.7 ***			-0.078419	-5.79 ***	-0.070529	-5.32 ***
$\beta_6: D \cdot \log(S/S_{t-1}) \cdot ROA_t$			-0.392391	-8.6 ***			-0.326776	-6.89 ***	-0.045964	-6.82 ***
$\beta_7: D \cdot \log(S/S_{t-1}) \cdot ASSTS_t$			0.004295	1.0			-0.079281	-8.11 ***	-0.086922	-8.85 ***
$\beta_8: D \cdot \log(S/S_{t-1}) \cdot DEBTS_t$			0.027123	2.2 **			0.070152	3.49 ***	0.088160	4.39 ***
Dummies for years										
β_9 : Intercept	0.028660	12 ***	0.027311	12.4 ***	0.029592	12.96 ***	0.030107	14.41 ***	0.030139	14.4 ***
R ²	0.5061***		0.5294***		0.4017***		0.4575***		0.457***	
Number of observations	33,665		28,665		30,476		27,293		27,293	
Number of firms	1,421		1,417		1,417		1,416		1,416	

*, **, and *** indicate significance at the 10 per cent, 5 per cent and 1 per cent levels based on two-tailed tests, respectively. SGA is selling general and administrative expenses, S is sales, D a dummy variable indicating that sales decrease with respect to previous year, DNEXT a dummy variable indicating that sales increase one year ahead with respect to current year, ROA return on assets, CHROA the change in ROA with respect to previous year, SEXP sales expectation, ASSTS the ratio of total assets to sales and DEBTS the ratio of long term debt to sales.

they reduce resources, the less they will be able to achieve sales increases in the following year. On the contrary, the coefficient β_4 (corresponding to the interaction variable for profitability change) is significantly positive at $p < 0.01$. This result suggests that upholding current profitability influences decisions on adjustment in SGA when activity decreases, and provides support for our hypothesis H2. Managers apply greater adjustments in SGA in order to avoid greater decreases in current profitability when sales decrease. They must balance the decision with the attainment of future increases in sales.

Columns C, D and E display results with the restricted sample. As mentioned before, these estimations are performed excluding cases with more than 70% sales change with respect to previous year. Indeed, column E offers estimations with standardized *ROA* values, using industry-year means and standard deviations (in the interaction variables with *ROA* and *CHROA*). Results are similar to those included in columns A and B. The coefficient for the interaction term with asset intensity is now negative and significant at $p < 0.01$ (see β_7 in columns D and E). As expected, asset intensity is a source of difficulties and rigidities when firms are faced to cut down SGA when sales decrease. We also repeat estimations excluding cases with more than 50% sales change, similarly to Dalla and Perego (2013), and results (not displayed) are substantially the same with respect to our variables of interest. Therefore, we find strong support for our hypotheses H1 and H2.

Assuming that results in columns B, D and E in Table 3 may be biased, because some of the covariates may be endogenous, we perform an additional analysis in order to provide robust results. One of our interaction variables in Equation 1 is built with one year ahead sales increase, which in its turn depends on additional factors, as for instance size (usually bigger firms grow less than smaller), SGA slack and increase in capacity, measured with investment in property plant and equipments (*PPE*). We regress $\log(S_{i,t+1}/S_{i,t})$ depending on $\log ASS_{i,t}$, $SGATS_{i,t}$ and $\log(PPE_{i,t+1}/PPE_{i,t})$. All variables present the expected significant signs (negative the former and positive the remaining variables). Given that the interaction variable with the corresponding residuals is significant when it is included in Equation 1, the suspected variable is endogenous, suggesting that it is plausible that managers consider future sales growth in decisions on resource adjustment, taking into account firm slack, size and investment. We consequently include additional variables in our model as instruments for this variable. More precisely, we use:

$$(3) \quad D \cdot \log \frac{S_{i,t}}{S_{i,t-1}} \cdot DNEXT \cdot \log ASS_{i,t}$$

$$(4) \quad D \cdot \log \frac{S_{i,t}}{S_{i,t-1}} \cdot DNEXT \cdot SGATS_{i,t}$$

$$(5) \quad D \cdot \log \frac{S_{i,t}}{S_{i,t-1}} \cdot DNEXT \cdot \log \frac{PPE_{i,t+1}}{PPE_{i,t}}$$

as instruments for:

$$(6) \quad D \cdot \log \frac{S_{i,t}}{S_{i,t-1}} \cdot DNEXT \cdot \log \frac{S_{i,t+1}}{S_{i,t}}$$

We use the two-stages least-squares within estimator, available in STATA for the fixed effects option. Results with the full and restricted samples, displayed in columns A to C in Table 4, are essentially the same as those in Table 3. They are robust to a reverse casualty problem. More precisely, β_3 and β_4 are significantly negative and positive (with $p < 0.01$), respectively in all cases. Therefore, our results are not likely biased by endogeneity, and they provide robust support for our hypotheses H1 and H2. As additional robustness tests, we repeat estimations with instrumental variables and excluding observations where sales and SGA move in opposite directions, following Anderson *et al.* (2003) sample selection criterion. Results (not displayed) provide additional strong support for our hypotheses H1 and H2, given that β_4 is significantly positive with $p < 0.01$ in all estimations, and β_3 is significantly negative with $p < 0.05$ (with $p < 0.1$ in estimations with standardized ROA).

While firms frequently reverse the sign of the change in ROA (an approximately 50% average for all years), the full reversion is substantially lower: only 27.7% and 21.9% of increases and decreases in ROA are fully reverted in the next year respectively. Moreover, on average only around 19% of firms move above and below the median ROA across the periods analyzed in our sample. Therefore, a substantial part of changes in ROA can be considered a change in efficiency, and this variable is a plausible appropriate proxy for testing our hypothesis on the efficiency driver.

We repeat our analysis for total operating expenses, and results (not displayed) are essentially the same.

5.2. Additional analysis: cost behavior when sales increase

We complete our study analyzing the trade-off between profitability and future sales increases when sales increase. We formulate the following equation, similar to Equation 1, where the dummy variable *IN* indicates that sales increase in a given period with respect to previous year:

$$(7) \quad \begin{aligned} & \log \frac{SGA_{i,t}}{SGA_{i,t-1}} \\ &= \theta_0 + \theta_1 \cdot \log \frac{S_{i,t}}{S_{i,t-1}} + \theta_2 \cdot IN \cdot \log \frac{S_{i,t}}{S_{i,t-1}} + \theta_3 \cdot IN \cdot \log \frac{S_{i,t}}{S_{i,t-1}} \cdot DNEXT \cdot \log \frac{S_{i,t+1}}{S_{i,t}} \\ &+ \theta_4 \cdot IN \cdot \log \frac{S_{i,t}}{S_{i,t-1}} \cdot CHROA_t + \theta_5 \cdot IN \cdot \log \frac{S_{i,t}}{S_{i,t-1}} \cdot \log \frac{SEXP_{i,t+1}}{S_{i,t}} \\ &+ \theta_6 \cdot IN \cdot \log \frac{S_{i,t}}{S_{i,t-1}} \cdot ROA_t + \theta_7 \cdot IN \cdot \log \frac{S_{i,t}}{S_{i,t-1}} \cdot ASSTS_{i,t} \\ &+ \theta_8 \cdot IN \cdot \log \frac{S_{i,t}}{S_{i,t-1}} \cdot DEBTS_{i,t} + \sum_t \theta_t \cdot Y_{i,t} \\ &+ \varepsilon_{i,t} \end{aligned}$$

The Hausman test rejects the null hypothesis of no correlation between individual effects and the explanatory variable, therefore indicating that the fixed effects estimator is consistent and efficient. We again find that $\log(S_{i,t+1}/S_{i,t})$ is endogenous and consequently we use the two-stages least-squares within estimator using:

$$(8) \quad IN \cdot \log \frac{S_{i,t}}{S_{i,t-1}} \cdot DNEXT \cdot \log ASS_{i,t}$$

$$(9) \quad IN \cdot \log \frac{S_{i,t}}{S_{i,t-1}} \cdot DNEXT \cdot SGATS_{i,t}$$

$$(10) \quad IN \cdot \log \frac{S_{i,t}}{S_{i,t-1}} \cdot DNEXT \cdot \log \frac{PPE_{i,t+1}}{PPE_{i,t}}$$

as instruments for:

$$(11) \quad IN \cdot \log \frac{S_{i,t}}{S_{i,t-1}} \cdot DNEXT \cdot \log \frac{S_{i,t+1}}{S_{i,t}}$$

Table 5 shows estimations. All models present significant goodness of fit in all estimations. The significant positive coefficient θ_2 indicates how much costs increase when sales increase is larger than how much they decrease when sales decrease. As compared with our previous findings when analyzing decreases of sales, this result constitutes a complementary piece of evidence regarding the asymmetric behaviour of costs. Asset intensity is related with firms' rigidities to adjust their organizations to sales fluctuations, consequently moderating this greater cost increase. The significant (at $p < 0.01$) negative sign of θ_7 is in accordance with this expectation, while it is not for the restricted sample. The significant (at $p < 0.05$) positive sign of θ_8 with the restricted sample indicates a stressing effect of indebtedness on cost increase when sales increase, suggesting that indebted firms are not urged to meet interest payments when activity increases. A likely explanation for this unexpected sign is that debt is a source of financial resources to endeavour expansion plans, with the subsequent achievement of growth through debt. Creditors' requirements are less demanding in periods of economic growth. They loosen conditions for indebtedness in favourable economic settings. However, the coefficient for this variable is not significant at $p < 0.1$ with the full sample. The significant positive sign of the interaction variable with ROA (θ_6) reveals that firms with lower previous profitability are more prone to save resources with respect to more profitable firms, even in periods of economic growth, and vice versa for firms with an advantageous profitability background. The sign of θ_5 is negative, significant at $p < 0.01$ and contrary to expectations. A likely explanation for this surprising sign is that expectations for future sales are mainly based on past performance. Managers tend to have positive expectations for future sales when they have experienced favourable past performance. Given that SGA are mainly fixed, the increase in these costs is lower than the increase in sales when they soar.

TABLE 5
FIXED EFFECTS ESTIMATIONS, ADJUSTING FOR ENDOGENEITY, FOR THE INCIDENCE OF ONE YEAR AHEAD SALES INCREASE
AND CHANGE IN PROFITABILITY ON COSTS WHEN SALES INCREASE. DEPENDENT VARIABLE: $\log(SGA_t/SGA_{t-1})$

	Full sample				Excluding observations where sales change more than 70%			
	Coef.	t	Coef.	t	Coef.	t	Coef.	t
$\theta_1: \log(S_t/S_{t-1})$	0.576309	79.73	***	74.42	***	68.45	***	68.45
$\theta_2: IN \cdot \log(S_t/S_{t-1})$	0.101206	9.71	***	11.13	***	4.04	***	4.04
$\theta_3: IN \cdot \log(S_t/S_{t-1}) \cdot DNEXT \cdot \log(S_{t+1}/S_t)$				7.33	***			5.37
$\theta_4: IN \cdot \log(S_t/S_{t-1}) \cdot CHROA_t$				-1.290470	***			-43.85
$\theta_5: IN \cdot \log(S_t/S_{t-1}) \cdot \log(SEXP_{it}/S_t)$				-0.065220	***			-5.85
$\theta_6: IN \cdot \log(S_t/S_{t-1}) \cdot ROA_t$				0.419718	***			14.14
$\theta_7: IN \cdot \log(S_t/S_{t-1}) \cdot ASSTS_t$				-0.040809	***			0.05
$\theta_8: IN \cdot \log(S_t/S_{t-1}) \cdot DEBTS_t$				0.0120234	0.80			2.40
Dummies for years								
θ_0 : Intercept	0.028660	12	***	0.021679	***	13.05	***	10.1
R ²	0.5061	***		0.5489	***	0.4017	***	0.4645
Number of observations	33,665			28,623		30,476		27,260
Number of firms	1,421			1,416		1,417		1,415

*, ** and *** indicate significance at the 10 per cent, 5 per cent and 1 per cent levels based on two-tailed tests, respectively.
SGA is selling general and administrative expenses, *S* is sales, *IN* a dummy variable indicating that sales increase with respect to previous year, *DNEXT* a dummy variable indicating that sales increase one year ahead with respect to current year, *ROA* return on assets, *CHROA* the change in *ROA* with respect to previous year, *SEXP* sales expectation, *ASSTS* the ratio of total assets to sales and *DEBTS* the ratio of long term debt to sales.

As for our variables of interest, the coefficient of θ_3 is positive and significant at $p < 0.01$ in estimations with the full and restricted samples, indicating the existence of a stressing effect of the interaction variable for future sales increase. There is a positive relationship between future sales growth and increases in SGA in periods of increasing sales. This result suggests that firms focusing on flexibility keep slack in SGA as a means to build capabilities that will fuel future growth. On the contrary, the sign of θ_4 is negative and significant at $p < 0.01$, indicating that orientation to profitability moderates the higher increase in SGA when activity increases. Unfavorable changes in profitability are associated with greater SGA, while positive changes in profitability are associated with lower expenditures in these expenses, which means that firms aiming at improving immediate profitability focus on monitoring SGA. These results provide support for the hypothesis on the flexibility orientation, as well as on the profitability strategic orientation, of firms when activity increases. They suggest that the trade-off between profitability and sales growth exists not only when sales decrease, but also when sales increase.

Results with fixed effects without instruments for the suspected endogenous variable are essentially the same. We do not display these results for simplicity reasons.

6. CONCLUSIONS

In this study we analyze cost stickiness under the scope of the dilemma between current profitability and future sales growth. We use a sample of industrial firms with at least 20 years of data in COMPUSTAT. We focus on SGA considering that they are a sort of slack resources. They are substantially related to resources used in managing and planning, as well as in building firm capabilities. These resources allow firms to be in an advantageous position to face competition. We find evidence that the change in profitability and one year ahead sales increase significantly influence resource adjustment when firm sales decrease. According to our results, the higher (lower) the increase in one year ahead sales, the higher (lower) the asymmetric cost behaviour, considering that we control for sales expectations and other variables. Given that resource adjustment hinders the ability of firms to meet future increases in demand, managers consider that they will lose chances to increase future sales if they cut costs when activity decreases. We also find a significant positive moderating effect of change in profitability on cost stickiness. In periods of decreasing sales managers apply greater resource adjustment when they want to avoid greater decrease in profitability. They avoid maintaining slack resources despite it may curtail to take advantage of future opportunities. Our results suggest that managers balance advantages and drawbacks of both options, future sales increase and change in current profitability, when they must consider adjusting SGA when activity decreases. We also find that firms with high profitability are less urged adjusting resources than those with low profitability when activity decreases, and vice versa for firms with low profitability. All control variables included in our models present the expected significant signs. Results are robust to different estimation methods, sample selection criteria and alternative variables used.

We also find consistent results with our hypotheses when activity increases. SGA increase more when activity increases. In this setting future sales growth stresses the effect on SGA increases, while change in profitability moderates the effect on the increase in these resources. Our results suggest that the trade-off between profitability and sales growth exists not only when sales decrease, but also when sales increase.

Cost stickiness is not merely the result of firm failure to adjust resources when activity decreases. It is also a managers’ choice influenced by their expectations and strategies. More precisely, strategies of profitability and sales growth are important factors explaining resource adjustments when firm sales decrease.

Overall, our results enhance our understanding of firms’ costs behaviour and provide useful insights for the management and financial accounting literature. Depending on their strategic choices, when activity decreases managers may adjust resources to meet short term targets in terms of profitability, but they may also keep slack resources, despite gloomy sales expectations, to meet targets in terms of flexibility. One of the limitations of our study is that it does not use data on managers’ expectations. We use mere mechanical indicators of them. An additional limitation is that we do not use true indicators of firms’ strategies on flexibility and efficiency. We have analyzed mere specific issues related to flexibility and efficiency. More research is needed with more accurate measures of both, managers’ expectations and firms’ strategies.

ANNEX

VARIABLE DEFINITION

Variable	Description
<i>SGA</i>	Selling, general and administrative expenses
<i>S</i>	Sales
<i>D</i>	Dummy variable indicating, with value 1, that sales decrease with respect to previous year, and 0 otherwise
<i>DNEXT</i>	Dummy variable indicating, with value 1, that sales increase in the following with respect to current year, and 0 otherwise
<i>ROA</i>	Ratio of return on assets: operating income after depreciation divided by total assets
<i>CHROA</i>	Change in return on assets: difference between current and previous year return on assets
<i>SEXP</i>	Sales expectations: The predicted sales value for the following year with Equation 2
<i>ASSTS</i>	Ratio of total assets to sales
<i>DEBTS</i>	Ratio of long term debt to sales
<i>Y</i>	Dummy variables indicating, with value 1, that a given observation belongs to a given year, and 0 otherwise
ΔS	Difference between current and previous year sales (when estimating Equation 2 sales were converted into values of 2009 applying the US inflation rate)
<i>ASS</i>	Total assets (converted into values of 2009 applying the US inflation rate)
<i>SGATS</i>	Ratio of selling, general and administrative expenses to sales
<i>PPE</i>	Property, plant and equipment
<i>IN</i>	Dummy variable indicating, with value 1, that sales increase with respect to previous year, and 0 otherwise

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