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Apostolos Ballas, Vasilios-Christos Naoum & Orestes Vlismas

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The Effect of Strategy on the Asymmetric Cost Behavior of SG&A Expenses

APOSTOLOS BALLAS [*], VASILIOS-CHRISTOS NAOUM[**] and ORESTES VLISMAS[†],

[*]*Business Analysis and Valuation Laboratory & Department of Accounting and Finance, Athens University of Economics and Business, Athens, Greece;* [**]*Department of Maritime Studies, University of Piraeus, Piraeus, Greece;* [†]*Department of Accounting and Finance, Athens University of Economics and Business, Athens, Greece*

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Abstract Asymmetric cost behavior has been attributed to deliberate managerial resource commitment decisions and a firm's strategic choices is a significant determinant of these decisions. This study investigates the effect of strategy on the intensity and direction of the asymmetric cost behavior of selling, general, and administrative (SG&A) expenses. Employing a sample of US-listed firms for the period 1991–2014, we provide empirical evidence that a firm's strategic orientation determines the direction and intensity of cost asymmetry. Firms classified as prospectors exhibit SG&A cost stickiness whereas firms classified as defenders exhibit SG&A cost anti-stickiness. Sensitivity and causality tests indicate that a firm's strategic positioning and its portfolio of intangible re-sources independently affect the resource allocation decisions that are responsible for the direction of cost asymmetry for the SG&A expenses.

Keywords: Asymmetric cost behavior; Strategy; SG&A expenses

JEL codes: L10; M10; M41

1. Introduction

A firm's strategic positioning shapes its business model and affects its cost structure and the behavior of various costs items. This study attempts to shed light on the relationship between a firm's strategic orientation and the direction of asymmetric cost behavior of its selling, general, and administrative (SG&A) expenses. Empirical evidence for this relationship may enhance the usefulness of strategically oriented information (Bjøornenak & Olson, 1999; Bromwich, 1990; Roslender, 1995; Roslender & Hart, 2003; Shank, 1996). Strategically constituted management accounting relies on the traditional microeconomic rationalization that separates operating costs as fixed or variable regarding the magnitude of changes observed in the activity volume (Anderson et al., 2003; Noreen, 1991). Asymmetric cost behavior literature argues that not only the magnitude but also the direction of activity change shapes cost behavior. We conjecture that, even within the context of asymmetric cost behavior, a firm's business strategy determines the direction of asymmetric cost responses to activity changes of different direction.

Correspondence Address: Apostolos Ballas, Business Analysis and Valuation Laboratory & Department of Accounting and Finance, Athens University of Economics and Business, 76 Patission Str. GR-10434, Athens, Greece. Email: aballas@aueb.gr
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Prior literature attempts to explain the cross sectional variation of cost stickiness and identifies a number of determinants that contribute to its intensity, such as (i) the magnitude of adjustment costs (i.e., economic sacrifices, social, contractual, or psychological costs), (ii) the managerial expectations for the future level of sales, (iii) the magnitude of economic activity change, (iv) the incentives for managing earnings, and (v) the intensity of intangible investments (Anderson et al., 2003; Banker, Byzalov, et al., 2013; Calleja et al., 2006; Venieris et al., 2015). Banker and Byzalov (2014) formulate a theoretical framework for cost asymmetry. They argue that managerial decisions, for resource commitments associated with the sticky cost phenomenon, depend on: (i) the current period's sales volume, (ii) the resource levels of the previous period, which determine the intensity and level of adjustment costs, (iii) the anticipated level of future sales, which affects the level of future adjustment costs, and (iv) the agency and behavioral factors which drive managers' choices.

The relation of asymmetric cost behavior with resource allocation decisions drives our research interest to explore the relation of cost asymmetry with strategic positioning (Balakrishnan & Gruca, 2008). Asymmetric cost behavior emerges by managerial resource allocation decisions to maintain idle resources following sales volume declines (Banker & Byzalov, 2014). Such managerial resource allocation decisions are expected to be anchored with business strategy which shapes a firm's priorities for the optimum resource usage.

Venieris et al. (2015) document that a firm's intensity of intangible investments signifies its orientation towards achieving higher levels of operating performance in the long term. To some extent, this could be interpreted as evidence of the strategic resource and cost asymmetry relationship. Banker, Flasher, et al. (2013) provide empirical evidence that firms adopting a differentiation strategy exhibit, on average, more intense cost asymmetry as compared to firms oriented toward the implementation of a cost leadership strategy. We expand on previous studies (Banker, Flasher, et al., 2013; Venieris et al., 2015) by documenting that, for SG&A expenses, a firm's strategic positioning affects not only the intensity of asymmetric cost behavior but also its direction.

A firm's strategic mission shapes the underlying economic rationale of the resource allocation managerial decisions. Defenders are anchored with a hold or harvest strategic mission, which aims on maximizing current period's earnings at the expense of future economic benefits. In contrast, prospectors attempt to implement a build strategic mission that focuses on maximizing long term economic benefits (Langfield-Smith, 2007).

We argue that firms categorized as prospectors, as defined by Miles and Snow (1978), exhibit SG&A cost stickiness. Prospectors are expected to be more innovative and engage in resource demanding organizational activities (e.g., R&D programs, advertising campaigns, HR development programs, sophisticated CRM systems, etc.) for the development of strategic capabilities to enhance long term operating performance. The aforementioned organizational activities (i) consume resources which are associated with the level of the SG&A expenses, (ii) elevate the levels of the associated future and current period's adjustment costs due to their strategic significance for the future operating performance, and (iii) are anchored with managerial expectations for increased uncertainty for the future sales level, beyond the sales volatility attributed to demand uncertainty. Prior literature argues that increased future and/or current period's adjustment costs, and optimistic managerial expectations for future sales increase the intensity of cost stickiness (Banker & Byzalov, 2014). In addition, a temporal sales decline is evaluated by prospectors under the prism of long-term economic consequences. Aiming to retain a high sales growth rate and to maximize future economic benefits, a prospector will carefully reduce the level of SG&A expenses which might undermine the future competitive advantage.

In contrast, firms categorized as defenders, are expected to exhibit SG&A cost anti-stickiness because their strategic orientation (i.e., focus on achieving incremental growth primarily through

market penetration, efficient cost management and effective usage of single core technology, etc.) is likely to reduce the levels of future and current periods' adjustment costs attributed to the SG&A expenses. Ceteris paribus, a defender shapes conservative expectation (relatively to a prospector) for the strategic significance and ability of the current period's SG&A expenses to generate sales in the future. As a result, a defender, compared to a prospector, expects less intense downward effects on the future sales revenues caused by a certain reduction in the level of the current period's SG&A expense. More conservative managerial expectations lower the perceived level of the future adjustment costs of the SG&A expenses.

We also conjecture the following for defenders: Managers' short term resource allocation decisions, for the SG&A expenses concerning the evolution of the current period's sale revenues, are motivated by their orientation towards the short term rather than the potential effects of the volatility of SG&A expenses on the future level of sales. In theory, defenders are expected to achieve the maximum operating efficiency, signified by minimizing the average unit production cost. When sales increase, defenders might determine the proportion of SG&A expenses relatively to sales to ensure a minimum return on investment. Yet, a part of current period's SG&A expenses (i.e., operating costs that are not related with production process and unit production costs) might depend on managerial discretion. If managers observe or predict a decrease on the current period's activity, they are likely to reduce the discretionary part of SG&A expenses to preserve the minimum return on investment.

To investigate our propositions, we use a sample that consists of 27,708 firm-year observations of US listed firms for the period 1991–2014. The strategic profile of each firm is defined using the method of Bentley et al. (2013). We apply a variety of econometric specifications (i.e., log-linear, and linear specification) for testing asymmetric cost behavior. We argue that in the case of firms categorized as prospectors (defenders), SG&A expenses should exhibit cost stickiness (anti-stickiness). Granger and difference-in-differences causality tests document that a firm's strategic position is responsible for the direction of cost asymmetry for the SG&A expenses. This asymmetry is not an outcome of its cost structure.

The rest of this study is organized as follows. In section 2, we set the background for this study. Then, we lay out the motivation and research hypotheses in sections 3 and 4, respectively. Next, we describe the methodology and data in section 5. We then outline the results in section 6. We conduct robustness tests for our results in section 7. Lastly, the conclusions of this study are presented in section 8.

2. Background

2.1. Strategic Typologies

Strategy is an organizational process that aims to shape the long-term goals of a firm, and to define the plan and resources required to achieve these goals (Nag et al., 2007). In the strategic management literature, various strategic typologies have been developed. These are based on a variety of criteria defining a continuum of mixed strategies that a firm might follow.

One stream of strategic typologies emphasizes the type of competitive advantage that a firm develops (Langfield-Smith, 2007). For instance, Porter (1980) recognizes cost leadership and product differentiation as the two generic strategic prototypes. March (1991) describes strategies in terms of exploration or exploitation, while Treacy and Wiersema (1995) outline them in terms of operational excellence, product leadership, and customer intimacy.

Variations in the strategic mission is another criterion for defining strategic typologies. This may be based on mutually competitive operational goals of achieving high market share growth

versus maximizing short-term earnings (Gupta & Govindarajan, 1984). A firm's strategic mission might be classified as build, hold, harvest, or divest (Langfield-Smith, 2007). A build strategic mission aims to increase market share and enhance strategic positioning. Realizing this strategic mission requires sacrificing economic resources for enchasing future operating performance. Doing so reduces short term operating earnings and cash flows. A hold strategic mission targets maintaining market share and achieving a minimum return on investment. A harvest strategic mission aims to maximize the short-term operating profit and cash flows, rather than increase market share. A divest strategic mission characterizes operating decisions to terminate operations.

Focusing on the rate of change of a firm's product portfolio and operating markets, Miles and Snow's (1978) theory classifies firms into four types based on their business strategy: (i) prospecting (i.e., innovative and exploratory firms), (ii) defending (i.e., firms focusing on efficiency), (iii) reacting (i.e., firms waiting for environmental signals), and (iv) analyzing (i.e., a mix of prospecting and defending). Each type of business strategy represents a different solution of the three broad problems of organizational adaptation: the entrepreneurial problem, the engineering problem, and the administrative problem (Miles et al., 1978).

Defenders typically have a narrow and stable product portfolio. Their critical business functions are finance, production, and engineering. They adopt an organizational structure characterized by high degree of formalization and centralized control. A defender focuses on achieving incremental growth and improving its economic efficiency in the production and distribution of goods and services. At an operational level, the economic efficiency in the current period is achieved through market penetration. This is realized through efficient cost management and effective usage of single core technology.

A firm characterized as a prospector is oriented toward economic growth, high innovation and risk taking through the exploitation of new products, and market opportunities. They attempt to increase environmental uncertainty for their competitors via innovation and change. Therefore, they invest a considerable portion of resources on activities related to R&D and marketing. This is done to achieve rapid response to environmental challenges and create a variety of technologies to support a diverse product portfolio that avoids long-term commitment to processes supported by a single technology. Maintaining industry leadership in product innovation is the primary strategic goal. The organizational structure of a prospector is decentralized with a low degree of formalization and complex coordination mechanisms. As a result, prospectors rarely achieve their maximum operating efficiency.

This study is anchored to Miles and Snow's strategic typology (1978). Within the context of accounting research designs, Miles and Show's typology (1978) is frequently employed (Ballas & Demirakos, 2018; Bentley et al., 2013) because it has certain theoretical and empirical research advantages. Their theory can be aligned with other strategic typologies, enabling researchers to achieve wider theoretical validity because it encompasses both strategic positioning and strategic mission-oriented typologies (Govindarajan & Shank, 1992; Langfield-Smith, 2007). A prospector's strategic profile matches with product differentiation and fits with the build strategic mission. A defender's strategic profile matches with cost leadership and fits with a hold or harvest strategic mission. In addition, Miles and Show's strategic typology is empowered by a specialized financial statement analysis instrument (Bentley et al., 2013) for diagnosing a firm's strategic orientation. This facilitates the implementation of quantitative research designs with a large scale of archival data (e.g., Ballas & Demirakos, 2018).

Following Bentley et al. (2013), we will focus on firms classified as either prospectors or defenders. Analyzers adopt a strategic position that combines elements from prospectors and defenders. Reactors have no coherent strategic orientation and they react to environmental events

without any serious intention or significant ability to influence those events. It is rather difficult to identify a specific pattern concerning reactors' financial profile and establish a rationale that aligns deliberate managerial resource-commitment decisions with a firm having no specific strategic orientation and intent. Thus, we exclude reactors from our analysis. Focusing on the two extremes of Miles and Snow's strategic continuum enables us to examine if changes on firm's strategic orientation affect cost asymmetry. To the extent that cross-sectional variations in the qualitative characteristics of firms clustered with similar strategic orientation can be quantified, further conclusions can be drawn for the relation of cost asymmetry with a firm's strategy.

2.2. Asymmetric Cost Behavior

Within the relevant range of activity, costs are separated as fixed or variable considering the changes in the quantity of goods or services produced or sold (Anderson et al., 2003; Noreen, 1991). The traditional view of cost behavior assumes a symmetric relationship between variable costs and sales. Adherents of cost asymmetry distinguish those cost items that respond mechanistically with changes in volume from those that are determined by the resources committed by managers (Anderson et al., 2003). Deliberate managerial commitment decisions associated with specific resources trigger the short run asymmetric cost response to activity changes (Balakrishnan et al., 2014; Banker & Byzalov, 2014). Thus, asymmetric cost behavior concerns the variable portion of a cost item and stems from short-run managerial choices.

Costs are classified as sticky (anti-sticky) if their increase in absolute terms, associated with an increase in a firm's level of economic activity, is higher (lower) than their decrease in absolute terms associated with an equivalent decrease in a firm's level of economic activity. Asymmetric cost behavior has been observed across different categories of operating costs (Anderson et al., 2003; Balakrishnan & Gruca, 2008; Chen et al., 2012; Kama & Weiss, 2013; Weiss, 2010), and across different countries (Banker & Byzalov, 2014).

Cost stickiness has been attributed to managerial decisions to bear the costs of temporary unused capacity. Banker and Byzalov (2014) propose a theory for interpreting cost asymmetry based on the interaction between managerial decisions and adjustment costs. They assume that adjustment costs are recorded separately from resource costs. Available resource capacity depends on the level of resources that are carried from the previous fiscal year. If current sales fall below available capacity, managers will reduce the slack capacity to an acceptable level. However, a decision to reduce idle resources is anchored with adjustment costs and thus managers will be engaged on a decision-making problem for the economic consequences between two alternatives: maintaining versus disposing unutilized resources. At intermediate sales levels, available resource capacity can handle the operating activity of current sales and, at the same time, the slack of unutilized resources is acceptably low (i.e., taking into consideration the level of adjustment costs). Banker and Byzalov (2014) argue that managerial decisions for resource commitments depend not only on current period's sales volume but also on: (i) the resource levels of prior periods, which determine the intensity and the level of adjustment costs, (ii) the anticipated level of the expected future sales volume, which affect the level of future adjustment costs, and (iii) the agency and behavioral factors which drive manager's actual choices.

Prior empirical evidence has identified several factors that affect cost asymmetry. When adjustment costs are higher, managers are less inclined to cut costs in the event of a revenue-decline to avoid adjustment costs (Anderson et al., 2003; Banker, Byzalov, et al., 2013; Calleja et al., 2006). Further, it seems that the asymmetric cost behavior increases (decreases) in the case of optimistic (pessimistic) expectations for the future sales revenues (Balakrishnan et al., 2004; Banker, Byzalov, Ciftci, et al., 2014; Banker & Byzalov, 2014; Subramaniam & Weidenmier, 2003). Other possible reasons for the emergence of cost asymmetry include the magnitude of economic

activity change, since relatively large changes in sales revenues interrupt the linear pattern of cost behavior (Balakrishnan et al., 2004) and introduction of fixed-price regulation (Holzhacker et al., 2015). Finally, personal considerations, earnings management intentions (Chen et al., 2012; Dierynck et al., 2012), and high level of intangible investments (Venieris et al., 2015) might lead to cost stickiness.

3. Motivation

Synthesizing the different views of strategic management accounting, Tayles (2011) coins the term 'strategy-constituted management accounting' for the body of management accounting knowledge concerned with the formulation of strategically oriented information for decision making and control. Strategically oriented information has been analyzed through various prisms such as (i) contemporary costing techniques (Bhimani et al., 2012; Bromwich, 1990; Heagy, 1991; Shields & Young, 1991), (ii) strategic costing (Guilding & Moorhouse, 1992; Shank & Govindarajan, 1988), and (iii) competitor cost accounting (Bromwich, 1990; Porter, 1985).

A firm's strategic positioning shapes its business model and affects its cost structure and the behavior of various costs items. A firm's business strategy shapes its primary cost items and cost structure (i.e., the relative proportion of fixed costs and variable costs) in the long term. Within a short-term horizon (i.e., relevant range of activity), we conjecture that a firm's business strategy determines the response of the variable cost items to activity changes. An underlying assumption of the strategy-constituted management accounting is that managers adopt a rational behavior pursuing the optimal allocation of entrepreneurial resources. Regardless of the potential dimensions (i.e., activity based, quality, life-cycle, etc.) or the organizational locus of cost analysis (i.e., internal versus competition), strategy-constituted management accounting information is operationalized within the traditional microeconomic rationalization that separates operating costs as fixed or variable regarding the changes observed in the activity volume (Anderson et al., 2003; Noreen, 1991).

Within the short term time horizon that shapes a firm's relevant range of activity, the assumption for optimal resource allocation managerial decision making should be examined with respect to the presence of deliberate managerial commitment decisions that trigger the short run asymmetric cost response to activity changes (Balakrishnan et al., 2014; Banker & Byzalov, 2014). Rather, incorporating the possibility of asymmetric cost behavior into strategic costing analysis will expand the decision usefulness of strategy-constituted management accounting information by taking into consideration cross sectional variability of optimal resource allocation managerial decisions.

Asymmetric cost behavior has been attributed to managerial choices in adjusting resources after volume declines. The documented factors that contribute to the intensity of asymmetric cost behavior (Anderson et al., 2003; Balakrishnan & Gruca, 2008; Banker & Byzalov, 2014; Chen et al., 2012; Kama & Weiss, 2013; Venieris et al., 2015), concern different aspects of managerial behavior (i.e., the magnitude of adjustment costs, the level of managerial expectations for future sales, etc.) or wider firm characteristics (i.e., employee or asset intensity, the level of managerial empire building behavior, etc.). A plausible assumption is that the idiosyncratic physiognomy of the aforementioned factors is shaped either as firms' reaction to environmental conditions or as a manifestation of its implemented strategic plan.

Prior research provides some empirical evidence for the relation between strategy and cost asymmetry. Balakrishnan and Gruca (2008) document the presence of cost asymmetry for costs associated with organizational core competency using a sample of acute care hospitals. Under the prism of the resource-based view of business strategy, the relation of an internal intangible

strategic resource (i.e., organizational capital) with SG&A cost stickiness can be interpreted as an indirect evidence of the relation between strategic resources and cost asymmetry. Yet, intangible resources represent an instance of a firm's palette of strategic resources whose intensity signifies the orientation of management towards relatively long-term performance (Venieris et al., 2015). In any case, neither the presence of high intensity of intangible investments nor managerial orientation towards long term performance, in isolation from wider firm characteristics, can signify a specific strategic profile. Thus, neither factors can serve as a theoretical point of departure for exploring, empirically, the relation between specific strategic profiles with asymmetric cost behavior. Most notably, Banker, Flasher, et al., (2013) provide empirical evidence that firms which pursue a differentiating strategy exhibit greater cost stickiness, on average, as compared to firms pursuing a cost leadership strategy. This relation is moderated by the optimistic or pessimistic expectations of managers for future sales.

We attempt to expand the empirical evidence provided by Banker, Flasher, et al., (2013) and Venieris et al. (2015). Following Banker, Flasher, et al., (2013), we seek, in the case of the SG&A expenses, for direct evidence about the relation of strategy with cost asymmetry beyond the relation of the latter with specific types of strategic resources (Venieris et al., 2015). More specifically, the research motivation of this study is to expand the empirical findings of Banker, Flasher, et al., (2013) by documenting that, in the case of the SG&A expenses, a firm's strategic positioning affects not only the intensity of asymmetric cost behavior but also its direction. For this reason, we will examine the following research question: Does a firm's strategic orientation affect the direction of cost asymmetry in the case of the SG&A expenses?

4. Research Hypotheses

4.1. Asymmetric Cost Behavior in Prospectors

We conjecture that firms classified as prospectors are expected to exhibit SG&A expenses stickiness. The presence of SG&A cost stickiness may be justified as a prospector is expected to (i) exhibit higher levels of strategic resources whose development is associated with previous period's SG&A expenses, and the presence of these costs increases the current level of adjustment costs,[1] and (ii) be associated with various agency and behavioral factors that affect the cost asymmetry of the SG&A expenses. In addition, the intensity of SG&A cost stickiness might be elevated by the managerial expectations for increased uncertainty concerning the anticipated level of future sales associated with the level of the current period's SG&A expenses. The managerial expectations for increased uncertainty of sales revenues are shaped beyond the demand uncertainty that their firms experience.

The effective implementation of a build strategic mission (Langfield-Smith, 2007) requires a prospector to develop specific strategic resources with the strategic intention to improve the future market share via innovation, product differentiation, and investments on intangible

[1]Banker and Byzalov (2014) argue that managerial decisions for resource commitments depend, amongst others, on: (i) the resource levels of prior period resource levels, which determine the intensity and the level of adjustment costs, and (ii) the anticipated level of the expected future sales volume which, in turn, affect the level of future adjustment costs. Under the current accounting regime, most of the economic sacrifices for the development and maintenance of strategic resources are not reported as assets but rather as SG&A expenses. Yet, the ability of strategic resources to generate sales in the current period is positively correlated with (i) their level, (ii) the amount of SG&A expenses associated with their development and maintenance, and (iii) the level of the associated adjustments costs (i.e., decline on current period's sales from the disposal of a strategic resource). In a similar line of reasoning, the level of strategic resources affects the firm's future sales and thus the level of associated adjustment costs.

resources. The underlining economic rationale of a prospector is to achieve a high rate of operating growth at the expense of short-term operating earnings. The dominance of innovation and marketing activities in the business model of the prospector directs managerial resource-commitment decisions to support the effective implementation of the above strategic enabling organizational activities, with a relatively high proportion of the firm's SG&A expenses. Balakrishnan and Gruca (2008) find that core, strategic enabling activities have higher adjustment costs. In addition, Venieris et al. (2015) provide empirical evidence that firms investing resources on the implementation of core activities for the development and maintenance of intangible strategic resources exhibit cost stickiness. Thus, in the case of a temporary decline in the current period's sales revenues, a prospector will tend to avoid a reduction of the SG&A expenses directed to core strategic enabling organizational activities because this reduction is aligned with high levels of the current period adjustment costs. These adjustment costs concern a possible deterioration (i) in the current period's sales generating efficiency of past investments on strategic core competencies, and (ii) in the firm's capability of competing effectively in the future.

Firms characterized as prospectors are likely to be associated with various agency and behavioral factors that elevate the intensity of cost asymmetry of the SG&A expenses. Prospectors employ specific types of human assets that are likely to be characterized by an intense empire building behavior, agency issues, and inelastic labor expenditures. Prior literature has documented an association between empire building behavior (Chen et al., 2012), and various managerial characteristics and behavioral biases (i.e., overconfident managers, managerial hubris, etc.) with cost asymmetry (Chen et al., 2015; Liang et al., 2015; Qin et al., 2015; Yang, 2015). Liu et al. (2019) report that employee-oriented firms exhibit greater cost stickiness attributed to agency issues. Innovation requires, amongst others, high levels of human capital that may have substantial adjustment costs even in the long run (Banker et al., 2018; Dierynck et al., 2012; Kong et al., 2015).

Another reason that prospectors are expected to exhibit increased SG&A cost stickiness is that their strategy orientation shapes managerial expectations for increased uncertainty of future sales relative to firms with different strategic orientation that operate within the same sector. Prior empirical evidence has documented that demand uncertainty affects the cost structure of firms. Firms that experience more intense demand uncertainty exhibit a more rigid short-run cost structure with higher fixed and lower variable costs (Banker, Byzalov, and Plehn-Dujowich, 2014). Managers prefer to commit sufficient capacity in advance to avoid excessive congestion costs due to strained capacity which might occur if their firms subsequently experience high demand (Banker et al., 1988; Banker, Byzalov, Ciftci, et al., 2014).

We conjecture that a firm's demand uncertainty is an environmental parameter that shapes a firm's strategy. This acts as a moderating variable that transfers the effects of demand uncertainty not only on its cost structure (i.e., the relation between fixed and variable costs), as Banker, Byzalov, and Plehn-Dujowich (2014) documented, but also on the manifestation of cost asymmetry of variable costs. Managerial perceptions for the future level of congestion costs are affected by both a firm's environmental conditions and its strategic positioning. Ceteris paribus, managers implementing a prospecting strategy shape a perception for higher level of congestion costs than the managers of the rival firms with different strategies experiencing the same level of demand uncertainty. Implementing a prospecting strategy increases the perceived idiosyncratic volatility of the firm's future sales revenues beyond the increase that might be attributed to environmental conditions. This is because a prospecting strategy attempts: (i) to develop and sustain a diverse product portfolio, rather than a narrow and stable product portfolio, and (ii) to accelerate the effects of the environmental uncertainty for competitors via innovation and change (Langfield-Smith, 2007). We expect that the strategic positioning of firms classified as prospectors affects

the intensity of cost stickiness of SG&A expenses above and beyond the effects of demand uncertainty on a firm's cost structure (i.e., the relation between fixed and variable costs).

Based on the analysis, we hypothesize that in the case of firms classified as prospectors, SG&A expenses will exhibit cost stickiness, and test the hypothesis:

H1: For firms classified as prospectors, SG&A expenses will exhibit cost stickiness.

4.2. Asymmetric Cost Behavior in Defenders

Defenders are anchored with the managerial intention to either maintain its market share, achieving a minimum return on investment, or maximizing short term operating profit at the expense of increased market share and operating performance in the future (Langfield-Smith, 2007). A managerial orientation on the short-term time horizon motivates managers to shape their short-term resource allocation decisions for the SG&A expenses concerning the evolution of the current period's sale revenues, rather than the potential effects of the volatility of SG&A expenses on the future level of sales.

In theory, defenders are expected to achieve the maximum operating efficiency signified by minimizing the average unit production cost. Decisions concerning the level of SG&A expenses do not affect the unit production cost. When sales increase, defenders might determine the proportion of SG&A expenses relative to sales to ensure a minimum return on investment. However, a part of current period's SG&A expenses might depend on managerial discretion. If managers observe or predict a decrease of the current period's activity, they will likely reduce the discretionary part of SG&A expenses to preserve the minimum return on investment. For instance, Holzhacker et al. (2015) documented that the introduction of fixed-price regulation in the German hospital industry reduced cost asymmetry. The explanation is that the presence of fixed-priced regulation is a negative demand shock which increased firms' risk of financial distress and motivated firms to reduce the extent of cost asymmetry to offset this increase in operating risk. Additional factors that might contribute on the emergence of the cost anti-stickiness behavior of the SG&A expenses can be identified within the context of the asymmetric cost behavior theory (Banker & Byzalov, 2014). We conjecture that defenders exhibit low prior resource levels associated with the past levels of SG&A expenses, which decrease the current level of adjustment costs. We also expect the managers of defenders to be anchored with relatively conservative expectations for future sales generating capability of the current period's level of the SG&A expenses which affects the (perceived) level of future adjustment costs.

The orientation of a defender towards the achievement of high economic efficiency in its operations is likely to motivate managers to avoid retaining idle resources associated with the SG&A expenses. Dierynck et al. (2012) and Kama and Weiss (2013) indicate that asymmetric cost behavior is lower when managers have incentive to manage earnings to avoid reporting a loss or a decrease on earnings.

Furthermore, a defender focuses in achieving incremental growth primarily through market penetration via a cost leadership strategy that minimizes operating risk and avoids the implementation of a product differentiation marketing-oriented strategy that boosts economic growth and risk (Porter, 1980). A product differentiation marketing-oriented strategy might increase the level of the SG&A expenses. On the contrary, the implementation of a cost leadership strategy requires managers to focus on the short-term effects of the SG&A expenses on the current period's sales revenues. It is likely that the managers might shape conservative expectations (relatively to the managers of a prospector) for the strategic significance and the ability of the current period's SG&A expenses to generate sales in future. As a result, a defender, compared to

a prospector, expects less intense downward effects on the future sales revenues caused by a certain reduction in the level of the current period's SG&A expense. More conservative managerial expectations lower the perceived level of the future adjustment costs of the SG&A expenses.

Based on the above analysis, we investigate the empirical validity of the hypothesis that:

H2: In the case of firms classified as defenders, SG&A expenses will exhibit cost anti-stickiness.

5. Data and Methods

5.1. Classification of Firm Strategy

Research initiatives within the context of strategy face the methodological issue of shaping appropriate variables to visualize a firm's strategic positioning, which is a qualitative and latent firm characteristic (Langfield-Smith, 2007).

To shape the classification variable for grouping the firms of our research design according to their strategic typology, we adopt the metric developed by Bentley et al. (2013). This variable, called STRATEGY, is constructed using financial statement data to classify firms in accordance to Miles and Snow's (1978) strategic typology because it assumes that a firm's strategic choices are reflected on its financial profile. The STRATEGY variable combines characteristics from the two most sophisticated approaches for visualizing strategy: multivariable analysis and typologies. It ranges from 6 to 30. Bentley et al. (2013), based on the values of the STRATEGY variable, classify firms as: defenders (STRATEGY variable = 6–12), analyzers (STRATEGY variable = 13–23) and prospectors (STRATEGY variable = 24–30). We rank and classify the firms of our sample as defenders or prospectors using the median value of the STRATEGY variable of each firm.

The detailed process of calculating the STRATEGY measure is presented in the online Appendix A (OA A). Adopting a backward-looking approach, the STRATEGY measure calculates financial ratios for each firm-year weighted by their rolling prior 5-year average value. The selected financial ratios focus on the level and behavior of financial items such as sales revenue, R&D expenses, number of employees, etc., to assess a firm's intensity to: (i) search for new products (ratio of R&D expenditures to sales), (ii) produce and distribute products and services efficiently (ratio of the number of employees to sales), (iii) achieve high growth rates (one year percentage change in total sales), (iv) exploit new products and services (the ratio of SG&A expenses to sales), (v) retain organizational stability (standard deviation of the number of employees), and (vi) maintain high capital intensity (the ratio of net PPE to total assets). A firm classified as a prospector (defender) is expected to exhibit high (low) intensity on the above strategic dimensions (except in the case of capital intensity which is a reversed variable).

The first four components are adopted from Ittner et al. (1997). They measure a firm's intension to implement a build strategic mission. A firm with high values on the first four components of the STRATEGY variable is assumed to be oriented towards improving market share and growth at the expense of short-term earnings and cash flows. This firm can be classified as a prospector. Low values on the first four components of the STRATEGY variable indicate that the firm has a hold or harvest strategic mission. This firm aims to achieve a minimum return within the context of a short-term time horizon at the expense of market share. Such a firm can be classified as a defender. The remedial components of the STRATEGY variable are added based on Bentley et al. (2013) to capture additional configurations of a firm's strategic positioning concerning organizational stability and capital intensity. Prospectors tend to exhibit higher organizational stability and lower capital intensity.

The use of the STRATEGY variable for investigating the relation between strategy and SG&A cost asymmetry poses three methodological issues. The first one stems from the fact that even within a group of firms classified as defenders or prospectors, variations on the strategic profile can be observed, which may not be captured by the variation on the value of the STRATEGY variable. The second one lies on the inherent skepticism for any sophisticated financial statement tool that aims to capture the value of a latent variable. The last one is that some components of the STRATEGY variable are mechanically related with the SG&A expenses, which are the depended variable of our research design. More specifically, the ratio of employees over sales and the ratio of the SG&A expenses over sales are seemingly related with the magnitude of the SG&A expenses.

The first two methodological issues have narrow effects on our research design. The primary research scope is to document if different strategic profiles affect cost asymmetry of the SG&A expenses. The research interest focuses on the two extremes of Miles and Snow's (1978) strategic typology, which correspond to the two tails of the distribution of the STRATEGY variable. This approach emphasizes the ability of the STRATEGY variable to discriminate the firms of our data sample into two groups of theoretically opposite strategic profiles, rather than on its ability to capture cross-sectional variations on the qualitative characteristics of firms clustered with similar strategic orientation. The discriminative power of the STRATEGY variable is expected to increase as the size of the data sample increases.

The last methodological issue that is related with the use of the STRATEGY variable is that some of its components are seemingly related with the magnitude of the SG&A expenses. The components of the STRATEGY variable are calculated in terms of five years rolling average which narrows their relationship with the level of annual SG&A expenses. To further narrow this relation, we calculate a modified measure for a firm's strategic positioning using the STRATEGY_M variable. It is calculated excluding the ratio of employees over sales and the ratio of SG&A expenses over sales. The STRATEGY_M variable ranges from 4 to 20. Based on its values, we classify firms as: defenders (STRATEGY_M variable = 4–8), analyzers (STRATEGY_M variable = 9–15) and prospectors (STRATEGY_M variable = 16–20). We rank and classify the firms of our sample as defenders or prospectors using the median value of STRATEGY_M variable of each firm.

5.2. Measuring Sticky Costs

We apply the standard methodology of Anderson et al. (2003), and utilize the econometric specification of the simple and the extended model for the asymmetric cost behavior reviewed by Banker and Byzalov (2014) to compare the cost asymmetry of the SG&A expenses across firms with different strategic positioning. The econometric specifications of the simple and the extended model are presented by Equations (1a) and (1b), respectively:

$$\log\left(\frac{SG\&A^{j}_{i,t}}{SG\&A^{j}_{i,t-1}}\right) = b_0 + b_1 \log\left(\frac{Rv^{j}_{i,t}}{Rv^{j}_{i,t-1}}\right) + b_2 d^{j}_{i,t} \log\left(\frac{Rv^{j}_{i,t}}{Rv^{j}_{i,t-1}}\right) + \varepsilon_{i,t} \quad (1a)$$

$$\log\left(\frac{SG\&A^{j}_{i,t}}{SG\&A^{j}_{i,t-1}}\right) = b_0 + c^{x}_{0} X^{j}_{i,t} + b_1 \log\left(\frac{Rv^{j}_{i,t}}{Rv^{j}_{i,t-1}}\right) + (b_2 + c^{x}_{2} X^{j}_{i,t}) d^{j}_{i,t} \log\left(\frac{Rv^{j}_{i,t}}{Rv^{j}_{i,t-1}}\right) + \varepsilon_{i,t} \quad (1b)$$

The main variables used in the models of Equations (1a) and (1b) are the log change in the level of the SG&A expenses ($SG\&A^{j}_{i,t}$) between years t and t-1 and the log change in the level of sales revenue ($Rv^{j}_{i,t}$) between years t and t-1 of firm i classified in industry sector j in year t. The

specification of the models of Equations (1a) and (1b) incorporates a dummy variable ($d^{j}_{i,t}$) for the direction (increase / decrease) of change in sales of firm i classified in industry j in year t. Dummy variable ($d^{j}_{i,t}$) equals 1 if $Rv^{j}_{i,t} < Rv^{j}_{i,t-1}$ and 0 otherwise. The empirical testing for SG&A cost asymmetry implies that $b_1 > 0$ and $b_2 < 0$ ($b_{1>} b_1 + b_2$).

In Equation (1b), $X^{j}_{i,t}$ represents the vector of the observable determinants of cost asymmetry. Prior literature includes the following in the vector $X^{j}_{i,t}$: (a) the log value of the ratio of number of employees ($Em^{j}_{i,t}$) to sales revenue ($Rv^{j}_{i,t}$) and the log value of the ratio of total assets ($Ass^{j}_{i,t}$) to sales revenue ($Rv^{j}_{i,t}$) f firm i classified in industry sector j in year t, defined by Anderson et al. (2003) as measures of employee and asset intensity, respectively; (b) managerial expectations for future sales modeled with the dummy variable $dr^{j}_{i,t}$ that takes the value of 1 if a firm's sales revenue decreases for two successive time periods, and 0 otherwise; (c) the influence of macroeconomic activity on the intensity of asymmetric cost behavior modeled by employing the variable $GrNP^{j}_{i,t}$, which represents the percentage growth rate in real GNP between years t and t–1; and (d) the effect of managerial empire building behavior on the cost asymmetry modeled with the variable $FrCF^{j}_{i,t}$, which represents the free cash flows of firm i classified in the j industry sector in year t and is measured as the level of free cash flows as the difference between cash flow from operating activities, and common and preferred dividends scaled by total assets (Chen et al., 2012). Banker, Byzalov, and Plehn-Dujowich (2014) argue that firms facing higher demand uncertainty have a more rigid short-run cost structure with higher fixed and lower variable costs. To incorporate the effects of demand uncertainty on a firm's cost structure in our research design for the cost behavior of SG&A expenses, we incorporate the variable $Uncert^{j}_{i,t}$, which equals to the standard deviation of log changes in sales of firm i classified in the j industry sector in year t.

The econometric specification of the extended model presented by Equation (1b) adopts the standard econometric approach of the asymmetric cost behavior literature, as it omits the lower order interactions of coefficient b_1 with determinants of cost asymmetry. This approach might be problematic from an econometric perspective. Omitting these interactions can induce significant results for higher-order interactions that disappear once the lower order interactions are included (Jaccard & Turrisi, 2003). To address this concern, the following econometric specification of the extended model with the lower order interactions will be estimated:

$$\log\left(\frac{SG\&A^{j}_{i,t}}{SG\&A^{j}_{i,t-1}}\right) = b_0 + c^{x}_{0}X^{j}_{i,t} + (b_1 + c^{x}_{1}X^{j}_{i,t})\log\left(\frac{Rv^{j}_{i,t}}{Rv^{j}_{i,t-1}}\right) + (b_2 + c^{x}_{2}X^{j}_{i,t})d^{j}_{i,t}\log\left(\frac{Rv^{j}_{i,t}}{Rv^{j}_{i,t-1}}\right) + \varepsilon_{i,t} \quad (1c)$$

The SG&A expenses aggregates different types of expenses which are governed by different accounting policies. Although some of them are unrelated with managerial resource allocation decisions, they can affect the intensity and direction of the cost asymmetry. We focus on two notable types of expenses: R&D expenses and depreciation. R&D expenditures are immediately expensed whereas depreciation is smoothed by accrual accounting. Shust and Weiss (2014) document that depreciation enhances the intensity of asymmetric cost behavior. Furthermore, firms with high levels of depreciation and intensive capital investments are expected to exhibit low level of R&D expenses. To mitigate any measurement error, we will estimate the regression models of Equations (1a), (1a), and (1c) using as dependent variable the log change in the level of the SG&A expenses ($SG\&A^{j}_{i,t}$) and the log change in the level of the modified SG&A expenses ($SG\&A\_M^{j}_{i,t}$) between years t and t-1. The variable $SG\&A\_M^{j}_{i,t}$ represents SG&A

expenses minus the depreciation and R&D expenses of firm i classified in industry sector j in year t.

Furthermore, we will focus on specific types of SG&A expenses that are more likely to exhibit certain patterns of cost behavior with specific types of strategic typologies. For instance, we expect that for prospectors, advertising expenses will exhibit cost stickiness. We will estimate the regression models of Equations (1a), (1a), and (1c) using as dependent variable the log change in the level of the advertising expenses ($Advert^{j}_{i,t}$) of firm i classified in industry sector j in year t between years t and t–1.

The log-linear specifications of the simple and the extended models of Equations (1a), (1a), and (1c) have been adopted by most empirical studies within the field of asymmetric cost behavior. The log-linear specification seems to have several econometric advantages. The log transformation makes variables more comparable across firms and industries, alleviates heteroscedasticity, and the estimated coefficients have a clear economic interpretation as percentage change in the dependent variable for a one percent change in the explanatory variable (Anderson et al., 2003; Banker et al., 2018).

Despite the econometric merits of the log-linear specifications of Equations (1a), (1b), and (1c), Balakrishnan et al. (2014) argue that the standard log specification does not explicitly control for a firm's cost structure. The estimated log-linear coefficients are influenced by the magnitude of fixed or non-controllable costs. The presence of non-controllable or 'fixed' costs leads to a non-constant elasticity in the response and induces a bias in favor of finding sticky costs when we estimate separate coefficients for increases versus decreases in sales activity. This bias occurs due to the curvature of the log function. To address the above consideration in our empirical analysis for the effect of strategy on asymmetric cost behavior of the SG&A expenses, we will estimate the linear specification of Equation (2) proposed by Balakrishnan et al. (2014):

$$(SG\&A^{j}_{i,t} - SG\&A^{j}_{i,t-1})/Rv^{j}_{i,t-1} = b_0 + b_1(Rv^{j}_{i,t} - Rv^{j}_{i,t-1})/Rv^{j}_{i,t-1} + b_2 d^{j}_{i,t}(Rv^{j}_{i,t} - Rv^{j}_{i,t-1})/Rv^{j}_{i,t-1} + \varepsilon_{i,t} \quad (2)$$

5.3. Data

Our sample consists of 27,708 firm-year observations of US-listed firms (1991–2014) downloaded from the North America Compustat database. Financial firms (4-digit SIC codes 6000–6999) were excluded. Outliers were eliminated by winsorizing each individual data element to the 1st and 99th percentile of its corresponding sample distribution (Balakrishnan et al., 2004; Banker, Byzalov, et al., 2013). Following the standard asymmetric cost research methodology (Anderson & Lanen, 2009; Chen et al., 2012),[2] we discard the observations where (i) the level of the SG&A expenses is greater than the level of sales revenue, (ii) the sales revenue and SG&A expenses have no positive values, and (iii) the changes of sales revenue and SG&A expenses have opposite direction. Observations where the revenue changes by more than 50% within one year are also eliminated to remove the effects of mergers, acquisitions, and divestitures.

[2]Our research design has been replicated by employing the entire data sample without applying the standard data elimination procedure. The untabulated results are quite similar with the reported ones.

6. Results

6.1. Descriptive Statistics and Means Difference Analysis

To explore the underlying economics of firms with different strategic positioning that are assumed in the hypotheses' development of our research design, we perform various two-sample t-tests for difference in means of various variables for firms classified either as defenders or prospectors (Table 1 – Panel C).

The mean value of asset turnover is higher for defenders who also have higher mean value of gross profit over sales and lower mean value of cost of goods sold over sales than prospectors. This indicates that, ceteris paribus, a firm classified as defender aims to achieve maximum economic efficiency to minimize the long-term unit average production cost.

The mean values of the ratios of the SG&A, advertising, and R&D expenses over sales are higher for firms classified as prospectors than for firms classified as defenders. It seems that firms categorized as prospectors spend more resources to be more innovative and support resource demanding organizational activities with the intention to develop specific types of strategic resources that support the implementation of a build strategic mission.

Firms classified as prospectors have higher ROA than firms classified as defenders. When the economic activity declines (i.e., sales revenue), defenders report negative ROA due to a drastic decrease of both profit margin and asset turnover. Despite their efforts to maintain increased economic efficiency, a decrease of economic activity caused by an environmental factor may lead defenders in failing to achieve a minimum ROA. Prospectors exhibit increased resistance on a temporary sales decline, and they remain profitable. Probably, they are anchored with a diverse product and market portfolio which enables them to diversify the consequences of a sales decline.

Analyzing the percentage change on the mean values for the firm-years with decline in the economic activity, we obtain further insights towards the profitability behavior of firms with different strategic positioning. When sales decline, the mean ratio of cost of goods sold to sales increases for defenders by 48.68% and for prospectors by 10.85%. The mean ratio of gross profit over sales decreases for defenders by -17.55% and for prospectors by -6.85%. It seems that in case of a temporal sales decline, defenders are less able than prospectors to improve further the average production cost per unit sold (i.e., cost of goods sold). Thus, they will experience a decline on the gross and net profit margin. To sustain the minimum required return, a firm classified as defender must manage the managerial commitment decisions associated with the SG&A expenses. Even though in the case of a temporal sales decline the ratio of SG&A expenses over sales increases for defenders by 33.96% and for prospectors by 3.52%, the portion of SG&A expenses associated more with discretional managerial decisions exhibit a different behavior. The ratio of advertising expenses over sales decreases for defenders by -29.48% and increases for prospectors by 18.18%. The ratio of R&D expenses over sales increases more in the case of prospectors (24.77%) than in the case of defenders (14.62%).

The above preliminary analysis of cost behavior reveals that, in the case of a temporal sales decline, defenders are less able than prospectors to reduce the production cost per unit sold (i.e., cost of goods sold). Defenders attempt to manage the portion of SG&A expenses that it is associated more with discretional managerial decisions.

6.2. Strategy and Sticky Behavior of the SG&A Expenses

The regression models of Equations (1a), (1b), and (1c), are estimated assuming firm-clustered standard errors (Petersen, 2009) for both defenders and prospectors according to the STRATEGY

Table 1. Main variables, definitions and descriptive statistics

Panel A: Selection of data sample

	Observations eliminated	Observations remaining
Initial valid Compustat firm-year observations (1991–2014)	–	154,207
Elimination of firms operating in the financial sector	37,530	116,677
Elimination of the observations where the level of the SG&A expenses is higher than the level of the sales revenue and observations for firms that the sales revenues and the SG&A expenses have no positive value.	22,982	93,695
Elimination of firm-years with annual revenue changes by more than 50%	41,346	52,349
Eliminate firm-years where the level of the SG&A expenses moves in the opposite direction to the level of sales revenues	24,641	27,708

Panel B: Main variables and their description

	Number of observations	Mean	Median	Standard deviation	Min	Max
$SG\&A^{j}_{i,t}$	27,708	438.44	49.98	1,072.64	0.08	5,839.00
$Rv^{j}_{i,t}$	27,708	1,583.98	286.87	2,937.79	4.91	25,995
$Ass^{j}_{i,t}$	27,708	2,280.83	232.84	5,437.80	5.00	56,025
$GrNP^{j}_{i,t}$	27,708	2.90	2.80	3.25	− 5.75	8.57
$FrCF^{j}_{i,t}$	27,708	22.00	0.10	85.92	− 135.56	835.24

Panel C: Two-sample *t*-test for mean difference

	Full sample		Firm years with decrease in economic activity		Percentage change on the mean values for the firm-years with decrease in economic activity	
	Defenders	Prospectors	Defenders	Prospectors	Defenders	Prospectors
Return On Assets:	0.034	0.108	− 0.013	0.079	− 138.24%	− 26.85%
p-value:	0.027		0.023			
Profit Margin:	0.062	0.164	− 0.161	0.126	− 359.68%	− 23.17%
p-value:	0.028		0.021			
Asset Turnover:	0.792	0.281	0.351	0.245	− 55.68%	− 12.81%
p-value:	0.004		0.003			
$CoGS^{j}_{i,t}/Rv^{j}_{i,t}$:	0.265	0.387	0.394	0.429	48.68%	10.85%
p-value:	0.022		0.038			
$GrPr^{j}_{i,t}/Rv^{j}_{i,t}$:	0.735	0.613	0.606	0.571	− 17.55%	− 6.85%
p-value:	0.003		0.005			
$SG\&A^{j}_{i,t}/Rv^{j}_{i,t}$:	0.212	0.398	0.284	0.412	33.96%	3.52%
p-value:	0.012		0.016			
$Advert^{j}_{i,t}/Rv^{j}_{i,t}$:	0.168	0.209	0.189	0.247	− 29.48%	18.18%
p-value:	0.017		0.013			
$RD^{j}_{i,t}/Rv^{j}_{i,t}$:	0.171	0.214	0.196	0.267	14.62%	24.77%
p-value:	0.025		0.046			

and the STRATEGY_M variable.[3] In addition, they are estimated setting as dependent variable (a) the log change in the level the level of the SG&A expenses ($SG\&A^{j}_{i,t}$), (b) the log change in the level of the modified SG&A expenses ($SG\&A\_M^{j}_{i,t}$), or (c) the log change in the level of advertising expenses ($Advert^{j}_{i,t}$) between years t and t–1. Results are reported in Table 2. There are no multicollinearity issues (i.e., the variance inflation factor is less than 2.5).

For the model of Equation (1a), with dependent variable as the log change of SG&A expenses and firms characterized as prospectors according to the STRATEGY (STRATEGY_M) variable, the coefficient b_1 has an estimated value of 0.805 (0.885) which signifies that the level of the SG&A expenses increases by 0.805% (0.885%) per 1% annual increase in sales. The SG&A expenses exhibit cost stickiness since the estimated value of coefficient b_2 is -0.239 (-0.278). The sum of the estimated values of b_1 and b_2 ($b_1 + b_2$) is 0.566 (0.607) which indicates that the SG&A costs fall by 0.566% (0.607%) for a 1% decrease in sales. This is consistent with the findings reported by Anderson et al. (2003). This pattern is reversed in the case of firms characterized as defenders according to the STRATEGY (STRATEGY_M) variable and the SG&A expenses exhibit cost anti-stickiness behavior. The estimated value of b_1 of 0.214 (0.156) indicates that the SG&A costs rise by 0.214% (0.156%) for a 1% increase in sales. The estimated value of b_2 of 0.022 (0.068) provides empirical support of the SG&A cost anti-stickiness behavior. The sum of the estimated values of b_1 and b_2 ($b_1 + b_2$) is 0.236 (0.312) signifying that the SG&A costs decreased by 0.236% (0.312%) per 1% decrease in sales revenue. For the estimated models of Equations (1b) and (1c), with dependent variable the log change of SG&A expenses and firms characterized as prospectors or defenders according to the STRATEGY (STRATEGY_M) variable, the estimated coefficients b_1 and b_2 indicate cost stickiness for prospectors and cost anti-stickiness for defenders. Based on the above analysis, hypotheses 1 and 2 are not rejected.

For prospectors, the estimated coefficients for firms' employee intensity and managerial empire building behavior in the regression models of Equations (1b) and (1c) are significant and have a negative sign. It seems that the aforementioned factors increase the cost stickiness of the SG&A expenses. Prospectors are quite likely to employ highly skilled managers resulting in high levels of compensation, high levels of adjustment costs, and their expectations for future sales revenues significantly affect their decisions for cost allocations. Furthermore, for prospectors, the estimated coefficient for firm's asset intensity in models of Equations (1b) and (1c) has a positive sign. It seems that firms characterized as prospectors, which have considerable asset intensity, tend to reduce some part of the SG&A expenses more drastically when sales are reduced. A plausible explanation is that when sales decrease, prospectors tend to reallocate resources in favor of more strategically significant activities. For defenders, the estimated coefficients for firms' employee intensity and managerial anticipations for future sales are significant and have a negative sign. This finding indicates that the aforementioned factors increase the intensity of the SG&A cost stickiness and is consistent with previous empirical findings.

Based on the reported results on the Table 2, the modified SG&A expenses ($SG\&A\_M^{j}_{i,t}$) and the advertising expenses ($Advert^{j}_{i,t}$) seem to exhibit cost anti-stickiness (cost stickiness) if a firm is classified as defender (prospector) according to the value of the STRATEGY or of the

[3]The main variables of the regression model Equation (1a), Equation (1b), and Equation (1c) are the log change in the level of the SG&A expenses and in the level of sales. By taking the first difference of the primary explanatory variables of our models and estimating a fixed effect regression model with firm-clustered standard errors, we control for omitted variables attributed to any firm specific time invariant components. Firm specific time invariant components might affect the predictors of our models. Then, splitting our data sample into two groups of firms according to their strategic orientation and performing separate estimations enables us to examine the effects of business strategy on cost asymmetry by controlling the remedial firm specific time invariant components at the same time.

Table 2. Asymmetric cost behavior of SG&A expenses and strategic orientation

Panel A: Asymmetric cost behavior of SG&A expenses and strategic orientation according to STRATEGY measure

	Coefficient estimates (*t*-stat)																	
	DEFENDERS									PROSPECTORS								
	$SG\&A^{j}_{i,t}$			$SG\&A\_M^{j}_{i,t}$			$Advert^{j}_{i,t}$			$SG\&A^{j}_{i,t}$			$SG\&A\_M^{j}_{i,t}$			$Advert^{j}_{i,t}$		
Expense ($Exp^{j}_{i,t}$):	Basic	Ext-1	Ext-2	Basic	Ext-1	Ext-2	Basic	Ext-1	Ext-2	Basic	Ext-1	Ext-2	Basic	Ext-1	Ext-2	Basic	Ext-1	Ext-2
b_0: constant	0.006[b]	0.010[c]	0.010[c]	0.001	0.012	0.007	0.002[c]	0.003[b]	0.002	0.021[c]	0.021[c]	0.021	0.011[b]	0.019[c]	0.011	0.002[c]	0.009[c]	0.004
	(2.56)	(3.19)	(3.19)	(1.594)	(1.09)	(0.93)	(3.18)	(1.98)	(1.18)	(6.75)	(6.75)	(0.80)	(2.21)	(6.65)	(1.04)	(2.95)	(4.70)	(0.18)
Main Terms:																		
c^{1}_{0}: $\log(Em^{j}_{i,t}/Rv^{j}_{i,t})$		0.122[c]	0.123[c]		0.188[a]	0.184[c]		0.124[b]	0.124[c]		0.003[c]	0.006[c]		0.002	0.003		0.008	0.008
		(7.31)	(3.69)		(1.79)	(11.65)		(2.08)	(3.72)		(2.67)	(10.58)		(0.19)	(0.66)		(0.97)	(0.27)
c^{2}_{0}: $\log(Ass^{j}_{i,t}/Rv^{j}_{i,t})$		0.024[c]	0.024[c]		0.031[c]	0.031[c]		0.094[c]	0.094[c]		0.007[c]	0.008[c]		0.004	0.004		0.003	0.003
		(5.54)	(5.54)		(4.02)	(4.02)		(3.77)	(3.77)		(4.33)	(2.96)		(0.30)	(0.30)		(1.49)	(1.49)
c^{3}_{0}: $dr^{j}_{i,t}$		− 0.061[c]	− 0.061[c]		− 0.021[c]	− 0.021[c]		− 0.001	− 0.001		− 0.014[c]	− 0.014[c]		− 0.018[a]	− 0.018[a]		− 0.007	− 0.007
		(− 10.14)	(− 10.14)		(− 12.69)	(− 12.69)		(− 0.05)	(− 0.05)		(− 10.86)	(− 10.86)		(− 1.66)	(− 1.66)		(− 0.27)	(− 0.27)
c^{4}_{0}: $GrNP^{j}_{i,t}$		0.009[c]	0.009[c]		0.011[b]	0.011[b]		0.005	0.005		0.001[c]	0.001[c]		0.002[c]	0.002[c]		0.001[c]	0.001[c]
		(7.46)	(7.46)		(2.21)	(2.21)		(0.69)	(0.69)		(− 2.59)	(− 2.59)		(2.95)	(2.95)		(2.59)	(2.59)
c^{5}_{0}: $FrCF^{j}_{i,t}$		0.007	0.009		0.046	0.032		0.007	0.004		0.003[c]	0.004[c]		0.010[b]	0.016		0.005	0.005
		(1.41)	(0.39)		(0.47)	(1.11)		(1.41)	(1.51)		(2.67)	(8.45)		(2.21)	(0.01)		(0.69)	(1.42)
c^{6}_{0}: $Uncert^{j}_{i,t}$		− 0.011	− 0.007		− 0.005	− 0.003		− 0.074	− 0.080		0.001	0.003		0.057	0.020		0.064	0.052[a]
		(− 1.00)	(− 1.11)		(− 0.30)	(− 0.17)		(− 0.45)	(− 0.80)		(0.06)	(0.18)		(1.25)	(0.62)		(0.65)	(1.94)
b_1: $\log(Rv^{j}_{i,t}/Rv^{j}_{i,t-1})$	0.214[c]	0.117[c]	0.111[c]	0.250[c]	0.212[b]	0.236[c]	0.183[c]	0.182[c]	0.184[c]	0.805[c]	0.770[c]	0.749[c]	0.720[c]	0.665[c]	0.608[c]	0.485[c]	0.548[c]	0.535[c]
	(3.14)	(2.29)	(7.60)	(10.31)	(2.47)	(12.73)	(8.58)	(8.91)	(11.65)	(27.09)	(38.77)	(52.80)	(37.19)	(5.55)	(91.54)	(8.58)	(66.80)	(55.18)
b_2: $d^{j}_{i,t}$ [a] $\log(Rv^{j}_{i,t}/Rv^{j}_{i,t-1})$	0.022[c]	0.056[b]	0.060[b]	0.031[c]	0.037[c]	0.035[c]	0.021[c]	0.014[c]	0.020[c]	− 0.239[c]	− 0.340[c]	− 0.323[c]	− 0.147[c]	− 0.194[c]	− 0.182[c]	− 0.286[c]	− 0.273[c]	− 0.263[c]
	(8.20)	(2.12)	(2.19)	(3.42)	(6.40)	(6.40)	(8.57)	(2.85)	(3.14)	(− 4.00)	(− 9.35)	(− 29.64)	(− 5.55)	(− 5.37)	(− 7.94)	(− 3.09)	(− 6.38)	(− 10.57)
Interactions with $\log(Rv^{j}_{i,t}/Rv^{j}_{i,t-1})$:																		
c^{1}_{1}: $\log(Em^{j}_{i,t}/Rv^{j}_{i,t})$			0.053[a]			0.034[a]			0.004			0.006			0.005[a]			0.032
			(1.95)			(1.81)			(0.46)			(1.45)			(1.69)			(1.11)
c^{2}_{1}: $\log(Ass^{j}_{i,t}/Rv^{j}_{i,t})$			0.033[a]			0.031[b]			0.005[a]			0.018[b]			0.023			0.040
			(1.80)			(2.02)			(1.69)			(2.45)			(0.79)			(0.89)
c^{3}_{1}: $dr^{j}_{i,t}$			− 0.052[b]			− 0.054[b]			− 0.009			− 0.018			− 0.072			− 0.027
			(− 2.12)			(− 2.44)			(− 0.69)			(− 0.18)			(− 0.66)			(− 0.77)

(*Continued*)

Table 2. Continued.

Panel A: Asymmetric cost behavior of SG&A expenses and strategic orientation according to STRATEGY measure

	Coefficient estimates (*t*-stat)																	
	DEFENDERS									PROSPECTORS								
	$SG\&A^{j}_{i,t}$			$SG\&A\_M^{j}_{i,t}$			$Advert^{j}_{i,t}$			$SG\&A^{j}_{i,t}$			$SG\&A\_M^{j}_{i,t}$			$Advert^{j}_{i,t}$		
Expense ($Exp^{j}_{i,t}$):	Basic	Ext-1	Ext-2	Basic	Ext-1	Ext-2	Basic	Ext-1	Ext-2	Basic	Ext-1	Ext-2	Basic	Ext-1	Ext-2	Basic	Ext-1	Ext-2
c_1^4: $GrNP^{j}_{i,t}$			0.098			0.028			0.004			0.007			0.018			0.005
			(0.91)			(0.42)			(1.09)			(1.04)			(1.34)			(0.60)
c_1^5: $FrCF^{j}_{i,t}$			0.041			0.081			0.064[a]			0.019			0.012			0.065
			(0.92)			(0.85)			(1.78)			(1.04)			(0.76)			(1.35)
c_1^6: $Uncert^{j}_{i,t}$			− 0.005			− 0.070			− 0.082			0.016			0.010			0.024
			(− 0.49)			(− 0.18)			(− 0.31)			(0.01)			(1.13)			(1.12)
Interactions with $d^{j}_{i,t}$ [a] $\log(Rv^{j}_{i,t}/Rv^{j}_{i,\,t-1})$:																		
c_2^1: $\log(Em^{j}_{i,t}/Rv^{j}_{i,\,t})$		− 0.018[a]	− 0.018[a]		− 0.062[b]	− 0.061[c]		− 0.019[c]	− 0.016[b]		− 0.130[c]	− 0.172[c]		− 0.030[c]	− 0.030[c]		− 0.041[b]	− 0.045[b]
		(− 1.73)	(− 1.73)		(− 2.06)	(− 3.35)		(− 3.31)	(− 1.97)		(− 3.62)	(− 3.95)		(− 3.91)	(− 3.91)		(− 2.20)	(− 1.99)
c_2^2: $\log(Ass^{j}_{i,t}/Rv^{j}_{i,\,t})$		− 0.067[c]	− 0.062[c]		− 0.082[c]	− 0.093[c]		− 0.076[b]	− 0.074[c]		0.034[c]	0.032[c]		0.017	0.017		0.028[c]	0.024[c]
		(− 4.77)	(− 4.45)		(− 12.81)	(− 6.55)		(− 2.28)	(− 7.95)		(3.76)	(8.66)		(0.37)	(0.37)		(2.89)	(4.49)
c_2^3: $dr^{j}_{i,t}$		− 0.011[a]	− 0.011		− 0.018[a]	− 0.015		− 0.003[b]	− 0.006		− 0.014[a]	− 0.013		0.089[a]	0.092[b]		− 0.014[a]	− 0.013
		(− 1.74)	(− 1.00)		(− 1.66)	(− 1.63)		(− 2.44)	(− 3.07)		(− 1.71)	(− 1.02)		(1.91)	(1.98)		(− 1.71)	(− 0.10)
c_2^4: $GrNP^{j}_{i,t}$		0.014[c]	0.014[c]		0.011[b]	0.011[b]		0.015[c]	0.015[c]		0.036[c]	0.036[c]		0.003[b]	0.003[b]		0.027[c]	0.027[c]
		(3.08)	(3.08)		(2.21)	(2.21)		(2.87)	(2.87)		(4.15)	(4.15)		(1.99)	(1.99)		(14.94)	(14.94)
c_2^5: $FrCF^{j}_{i,t}$		0.001	0.001		0.015[b]	0.015[b]		0.001	0.001		− 0.003[b]	− 0.003[b]		− 0.015	− 0.015		− 0.021	− 0.021
		(0.09)	(0.09)		(2.45)	(2.45)		(0.09)	(0.09)		(− 2.44)	(− 2.44)		(− 0.69)	(− 0.69)		(− 0.31)	(− 0.31)
c_2^6: $Uncert^{j}_{i,t}$		− 0.005[b]	− 0.013[c]		− 0.097[c]	− 0.090[b]		− 0.003	− 0.012		0.049[b]	0.047[b]		0.004[a]	0.003[b]		0.003[a]	0.003[a]
		(− 2.21)	(− 5.48)		(− 5.10)	(− 2.19)		(− 1.00)	(− 0.17)		(2.35)	(2.28)		(2.00)	(2.06)		(2.03)	(1.94)
Number of Obs.:	1,715	1,694	1,687	1,254	1,128	1,114	1,056	956	951	2,089	2,021	2,002	1,642	1,638	1,629	1,029	1,024	1,018
Adj. R-Squared:	0.199	0.198	0.195	0.142	0.135	0.131	0.274	0.274	0.272	0.274	0.261	0.253	0.231	0.224	0.221	0.336	0.335	0.334

b_0: constant	0.007^{c}	0.007^{c}	0.010^{c}	0.010^{c}	0.010^{c}	0.019^{b}	0.007	0.011	0.018	0.001	0.001	0.001	0.014^{b}	0.012	0.016	0.006	0.006	0.007
	(4.53)	(4.53)	(9.24)	(4.09)	(4.09)	(2.02)	(0.72)	(1.08)	(1.34)	(0.04)	(0.04)	(0.04)	(2.52)	(1.09)	(1.63)	(1.59)	(1.59)	(1.04)
Main Terms:																		
c_0^1: $\log(Em^j_{i,t}/Rv^j_{i,t})$		0.001	0.001		0.171^{b}	0.172		0.012	0.012		0.006	0.006		0.007	0.007		0.009	0.009
		(1.594)	(1.594)		(2.01)	(1.42)		(0.68)	(0.68)		(1.59)	(1.59)		(0.72)	(0.72)		(0.89)	(0.89)
c_0^2: $\log(Ass^j_{i,t}/Rv^j_{i,t})$		0.019^{c}	0.019^{c}		0.037^{c}	0.038^{c}		0.026^{b}	0.020^{b}		0.001	0.001		0.003^{a}	0.003^{a}		0.005	0.005
		(15.45)	(15.45)		(6.40)	(4.06)		(2.53)	(2.08)		(1.594)	(1.594)		(1.83)	(1.83)		(1.30)	(1.30)
c_0^3: $dr^j_{i,t}$		− 0.003^{c}	− 0.003^{c}		− 0.013^{c}	− 0.017^{a}		− 0.001	− 0.001		− 0.047^{c}	− 0.041^{a}		− 0.033	− 0.033		− 0.002	− 0.002
		(− 3.50)	(− 3.50)		(− 11.61)	(0.08)		(− 0.30)	(− 0.30)		(− 9.76)	(− 1.80)		(− 0.75)	(− 0.75)		(− 0.53)	(− 0.53)
c_0^4: $GrNP^j_{i,t}$		0.015^{c}	0.017^{c}		0.011^{a}	0.016		0.009	0.009		0.012	0.013		0.005	0.005		0.004	0.004
		(3.11)	(3.08)		(1.81)	(1.63)		(1.57)	(1.57)		(0.68)	(0.31)		(1.48)	(1.48)		(0.03)	(0.03)
c_0^5: $FrCF^j_{i,t}$		0.046	0.049^{a}		0.019	0.018		0.002	0.001		0.026^{c}	0.027^{c}		0.002	0.002		0.006	0.006
		(0.26)	(1.82)		(0.55)	(1.34)		(1.13)	(0.62)		(6.01)	(22.96)		(0.84)	(0.84)		(1.38)	(1.38)
c_0^6: $Uncert^j_{i,t}$		− 0.022	− 0.032		− 0.003	− 0.001		− 0.005	− 0.003		0.018	0.016		0.081	0.082		0.096	0.097
		(− 0.38)	(− 0.45)		(− 0.48)	(− 0.13)		(− 0.72)	(− 0.39)		(1.34)	(1.63)		(0.85)	(0.95)		(0.32)	(0.91)
b_1: $\log(Rv^j_{i,t}/Rv^j_{i,t-1})$	0.156^{c}	0.154^{c}	0.152^{c}	0.146^{c}	0.147^{c}	0.147^{c}	0.147^{c}	0.104^{c}	0.108^{c}	0.885^{c}	0.791^{c}	0.798^{c}	0.448^{c}	0.661^{c}	0.676^{c}	0.470^{c}	0.447^{c}	0.430^{c}
	(4.68)	(14.97)	(10.34)	(7.88)	(3.41)	(6.10)	(8.85)	(3.13)	(6.83)	(50.59)	(161.90)	(157.0)	(8.11)	(5.51)	(92.26)	(4.38)	(46.58)	(18.39)
b_2: $d^j_{i,t}$ **a** $\log(Rv^j_{i,t}/Rv^j_{i,t-1})$	0.068^{b}	0.073^{c}	0.076^{c}	0.022^{c}	0.054^{c}	0.052^{c}	0.023^{c}	0.017^{b}	0.022^{c}	− 0.278^{c}	− 0.354^{c}	− 0.323^{c}	− 0.115^{c}	− 0.185^{c}	− 0.182^{c}	− 0.219^{c}	− 0.215^{b}	− 0.221^{c}
	(2.28)	(6.26)	(5.03)	(8.20)	(5.93)	(7.51)	(7.23)	(2.47)	(2.60)	(− 8.61)	(− 36.39)	(− 29.64)	(− 4.19)	(− 5.65)	(− 7.94)	(− 6.99)	(− 2.52)	(− 21.27)
Interactions with $\log(Rv^j_{i,t}/Rv^j_{i,t-1})$:																		
c_1^1: $\log(Em^j_{i,t}/Rv^j_{i,t})$			0.010			0.029			0.005			0.003			0.004			0.029
			(0.86)			(1.28)			(1.42)			(0.23)			(0.18)			(0.91)
c_1^2: $\log(Ass^j_{i,t}/Rv^j_{i,t})$			0.019^{a}			0.033^{b}			0.011			0.027^{b}			0.029			0.040
			(1.65)			(2.30)			(1.04)			(2.21)			(1.44)			(0.89)
c_1^3: $dr^j_{i,t}$			− 0.033^{b}			− 0.063^{b}			− 0.003			− 0.018			− 0.045			− 0.024^{b}
			(− 2.33)			(− 2.00)			(− 0.48)			(− 0.18)			(− 1.18)			(− 2.35)
c_1^4: $GrNP^j_{i,t}$			0.025			0.028			0.006			0.001			0.011			0.002

(*Continued*)

Table 2. Continued.

Panel B: Asymmetric cost behavior of SG&A expenses and strategic orientation according to STRATEGY_M measure

	Coefficient estimates (*t*-stat)																	
	DEFENDERS_M									PROSPECTORS_M								
	$SG\&A^{j}_{i,t}$			$SG\&A\_M^{j}_{i,t}$			$Advert^{j}_{i,t}$			$SG\&A^{j}_{i,t}$			$SG\&A\_M^{j}_{i,t}$			$Advert^{j}_{i,t}$		
Expense ($Exp^{j}_{i,t}$):	Basic	Ext-1	Ext-2	Basic	Ext-1	Ext-2	Basic	Ext-1	Ext-2	Basic	Ext-1	Ext-2	Basic	Ext-1	Ext-2	Basic	Ext-1	Ext-2
			(1.36)			(0.42)			(1.60)			(0.22)			(1.04)			(0.13)
c_1^5: $FrCF^{j}_{i,t}$			0.060[b]			0.004			0.024			0.018			0.019[a]			0.064[a]
			(2.19)			(0.18)			(1.13)			(1.34)			(1.67)			(1.70)
c_1^6: $Uncert^{j}_{i,t}$			− 0.007			− 0.011			− 0.035			0.013			0.010			0.026
			(− 1.11)			(− 1.00)			(− 1.33)			(1.19)			(1.13)			(1.55)
Interactions with $d^{j}_{i,t}$ $\log(Rv^{j}_{i,t}/Rv^{j}_{i,t-1})$:																		
c_2^1: $\log(Em^{j}_{i,t}/Rv^{j}_{i,t})$		− 0.003[b]	− 0.027[a]		− 0.006	− 0.010		− 0.011[a]	− 0.010		− 0.007[c]	− 0.018[b]		− 0.043[c]	− 0.055[c]		− 0.032[c]	− 0.040[a]
		(− 2.03)	(− 1.67)		(− 0.58)	(− 0.66)		(− 1.74)	(− 0.53)		(− 6.62)	(− 2.18)		(− 4.42)	(− 5.43)		(− 2.59)	(− 1.80)
c_2^2: $\log(Ass^{j}_{i,t}/Rv^{j}_{i,t})$		− 0.007[c]	− 0.004[a]		− 0.075[b]	− 0.074[c]		− 0.021	− 0.058		0.019[c]	0.017[c]		0.014[b]	0.019[c]		0.021	0.025
		(− 6.62)	(− 1.63)		(− 2.28)	(− 7.95)		(− 0.31)	(− 1.51)		(15.45)	(3.55)		(2.52)	(4.05)		(0.49)	(1.31)
c_2^3: $dr^{j}_{i,t}$		− 0.040	− 0.041[a]		− 0.024[b]	− 0.025[c]		− 0.021[c]	− 0.027[c]		− 0.040	− 0.047		− 0.006	− 0.008		− 0.015	− 0.022
		(− 1.60)	(− 1.90)		(− 2.41)	(− 4.11)		(− 12.69)	(− 3.68)		(− 1.60)	(− 1.20)		(− 0.58)	(− 0.47)		(− 0.69)	(− 0.97)
c_2^4: $GrNP^{j}_{i,t}$		0.006[b]	0.007[c]		0.019[c]	0.022[c]		0.010[b]	0.012		0.006	0.004		0.002[c]	0.008[b]		0.026[c]	0.025[c]
		(2.56)	(2.65)		(6.65)	(3.18)		(2.12)	(0.78)		(1.59)	(0.82)		(3.18)	(2.06)		(3.75)	(2.57)
c_2^5: $FrCF^{j}_{i,t}$		0.001	0.002		0.027	0.020		0.003	0.004		− 0.005[c]	− 0.005[a]		− 0.014	− 0.017		− 0.015	− 0.017
		(1.59)	(0.36)		(0.25)	(0.94)		(0.81)	(0.82)		(− 5.40)	(− 1.57)		(− 1.26)	(− 0.58)		(− 0.69)	(− 0.58)
c_2^6: $Uncert^{j}_{i,t}$		− 0.001[c]	− 0.010[c]		− 0.082[b]	− 0.086[b]		− 0.003	− 0.008		0.056[b]	0.058[b]		0.008[c]	0.010[c]		0.006[b]	0.007[c]
		(− 23.86)	(− 2.42)		(− 1.79)	(− 2.90)		(− 1.00)	(− 0.58)		(2.12)	(1.94)		(7.45)	(3.78)		(1.79)	(2.65)
Number of Obs.:	1,997	1,983	1,962	1,489	1,451	1,414	1,025	1,013	1,004	2,297	2,274	2,269	1,784	1,749	1,727	1,138	1,126	1,119
Adj. R-Squared:	0.212	0.209	0.197	0.197	0.193	0.186	0.283	0.281	0.274	0.284	0.274	0.272	0.264	0.257	0.249	0.357	0.346	0.338

Notes: This table presents the results of the regression analysis of the following models for firms classified as DEFENDERS_M or PROSPECTORS_M according to the STRATEGY_M variable:

Basic: $\log(Exp^{j}_{i,t}/Exp^{j}_{i,t-1}) = b_0 + b_1 \log(Rv^{j}_{i,t}/Rv^{j}_{i,t-1}) + b_2 d^{j}_{i,t} \log(Rv^{j}_{i,t}/Rv^{j}_{i,t-1}) + \varepsilon_{i,t}$.

Ext-1: $\log(Exp^{j}_{i,t}/Exp^{j}_{i,t-1}) = b_0 + c_0^{x} X^{j}_{i,t} + b_1 \log(Rv^{j}_{i,t}/Rv^{j}_{i,t-1}) + (b_2 + c_2^{x} X^{j}_{i,t}) d^{j}_{i,t} \log(Rv^{j}_{i,t}/Rv^{j}_{i,t-1}) + \varepsilon_{i,t}$.

Ext-2: $\log(Exp^{j}_{i,t}/Exp^{j}_{i,t-1}) = b_0 + c_0^{x} X^{j}_{i,t} + (b_1 + c_1^{x} X^{j}_{i,t}) \log(Rv^{j}_{i,t}/Rv^{j}_{i,t-1}) + (b_2 + c_2^{x} X^{j}_{i,t}) d^{j}_{i,t} \log(Rv^{j}_{i,t}/Rv^{j}_{i,t-1}) + \varepsilon_{i,t}$.

The models are estimated by using firm-clustered standard errors to control for autocorrelation and heteroscedasticity (Petersen, 2009). Firm level variables are defined in Appendix A. **a**, **b** and **c** represent significance levels of 10, 5, and 1 percent, respectively (two-tailed).

STRATEGY_M variable. This empirical evidence is confirmed by all econometric specifications of the estimated models of Equations (1a–1c). The cost stickiness of the advertising expenses ($Advert^{j}_{i,t}$) for prospectors provides evidence for the discriminative power of the STRATEGY and STRATEGY_M variables. Prospectors are expected to exhibit cost stickiness in the case of the advertising expenses. It seems that both the STRATEGY and STRATEGY_M variables can effectively separate firms according to their strategic orientation in a consistent fashion.

When estimating the model of Equation (1c), lower order interactions of the coefficient b_1 of the log change of sales revenues with the determinants of cost asymmetry are included. This specification allows us to evaluate their moderating effects on the relation between the log change of expenses and the log change of sales revenues. For prospectors, most of the estimated coefficients of the interactions of the log change of sales revenues with the determinants of cost asymmetry are not statistically significant.

For prospectors, according to the STRATEGY variable, the level of a firm's asset intensity and the level of employee intensity increases the effects of the log change of sales revenues on the log change of the $SG\&A^{j}_{i,t}$ and the $SG\&A\_M^{j}_{i,t}$ expenses respectively. For prospectors, according to the STRATEGY_M variable, the level of a firm's asset intensity increases the effects of log change of sales revenues on the log change of the $SG\&A^{j}_{i,t}$ expenses and the level of managerial expectations decreases the effects of log change of sales revenues on the log change of the advertising expenses.

For defenders, according to the STRATEGY variable, a firm's asset intensity increases the effects of log change of sales revenues on the log change of the $SG\&A^{j}_{i,t}$, $SG\&A\_M^{j}_{i,t}$, or advertising expenses. Further, the level of employee intensity (managerial expectations) increases (decreases) the effects of log change of sales revenues on the log change of the $SG\&A^{j}_{i,t}$ and the $SG\&A\_M^{j}_{i,t}$ expenses. The effects of log change of sales revenues on the log change of advertising expenses is positively affected by the level of asset intensity and the level of empire building behavior. For defenders, according to the STRATEGY_M variable, the level of asset intensity (managerial expectations) increase (decreases) the effects of log change of sales revenues on the log change of the $SG\&A^{j}_{i,t}$ and $SG\&A\_M^{j}_{i,t}$.

The positive moderating effect of the level of asset and/or employee intensity on the relation between the log change of expenses and the log change of sales revenues indicates that higher levels of asset and/or employee intensity increase the percentage change of the corresponding expense for a given percentage change on sales revenues. A plausible explanation is that firms with higher levels of asset and/or employee intensity mobilize more production resources to satisfy demand requirements. This leads to more intense volatility on the level of expenses. The negative moderating effect of the managerial expectations on the relation between log change of expenses and log change of sales might be explained as pessimistic managerial expectations for the future sales might motivate managers to manage the volatility on the level of expenses to reduce the risk of the operating income.

The positive moderating effect of the level of asset and/or employee intensity and the negative moderating effect of level of the managerial expectations on the relation between the log change of expenses and the log change of sales revenues indicate that the levels of asset intensity, employee intensity, and managerial expectations might have effects on a firm's short-run cost structure. This may result in elevating or lowering the level of fixed costs relatively to the level of total costs. This finding might stimulate the concerns for the effects of fixed costs on the cost behavior and their potential bias on the estimation of the log linear coefficients in favor of the presence of asymmetric cost behavior. In the next section, we will try to address these concerns by estimating the linear specification of Equation (2) proposed by Balakrishnan et al. (2014).

Table 3. Asymmetric cost behavior of SG&A expenses and strategic orientation (linear specification)

Panel A: Baseline estimations

	Coefficient estimates (*t*-stat)																										
	Unrestricted sample									|VC| < 5										|VC| < 1								
	DEFENDERS			PROSPECTORS			Whole sample			DEFENDERS			PROSPECTORS			Whole sample			DEFENDERS			PROSPECTORS			Whole sample		
	b_0	b_1	b_2	b_0	b_1	b_2	b_0	b_1	b_2	b_0	b_1	b_2	b_0	b_1	b_2	b_0	b_1	b_2	b_0	b_1	b_2	b_0	b_1	b_2	b_0	b_1	b_2
	0.011[a]	0.279[c]	0.047[b]	0.002[c]	0.490[c]	− 0.096[c]	0.026[b]	0.467[c]	− 0.056[c]	0.001	0.134[c]	0.019[a]	0.010	0.436[c]	− 0.033[c]	0.025	0.416[c]	− 0.026[c]	0.003	0.140[b]	0.011[a]	0.017	0.420[c]	− 0.021[c]	0.013	0.319[c]	− 0.014[c]
	(1.81)	(8.58)	(2.40)	(3.18)	(29.10)	(− 3.04)	(2.53)	(8.97)	(− 2.69)	(0.65)	(7.01)	(1.65)	(0.86)	(43.76)	(− 3.01)	(0.51)	(54.44)	(− 2.70)	(0.98)	(3.82)	(0.07)	(0.43)	(9.10)	(− 6.77)	(0.06)	(3.12)	(− 8.95)
Number of Obs.:			1,715			2,089			6,974			1,495			1,743			6,614			1,119			1,264			5,216	
Adj. R-Squared:			0.204			0.281			0.297			0.186			0.269			0.274			0.153			0.217			0.251	

Panel B: Estimations by size (revenue) decile (sd)

	Coefficient estimates (t - stat)																										
	Unrestricted sample									|VC| < 5										|VC| < 1								
	DEFENDERS			PROSPECTORS			Whole Sample			DEFENDERS			PROSPECTORS			Whole Sample			DEFENDERS			PROSPECTORS			Whole Sample		
(sd)	b_0	b_1	b_2	b_0	b_1	b_2	b_0	b_1	b_2	b_0	b_1	b_2	b_0	b_1	b_2	b_0	b_1	b_2	b_0	b_1	b_2	b_0	b_1	b_2	b_0	b_1	b_2
1	0.000	0.367	0.003	0.006	0.347	− 0.093	0.023	0.184	− 0.036	0.001	0.111	0.017	0.071	0.206	− 0.046	0.002	0.025	− 0.038	0.002	0.157	0.013	0.077	0.235	− 0.047	0.003	0.023	− 0.035
	(0.11)	(1.17)	(0.95)	(1.05)	(1.26)	(− 1.27)	(1.59)	(1.46)	(− 1.42)	(0.12)	(1.13)	(0.51)	(1.56)	(1.29)	(− 0.23)	(0.03)	(0.54)	(− 1.78)	(0.03)	(1.20)	(0.06)	(0.83)	(0.814)	(− 1.04)	(0.05)	(1.32)	(− 0.23)
2	0.003	0.209	0.006	0.001	0.133	− 0.018[a]	0.023	0.206	− 0.018	0.002	0.123[c]	0.014	0.003	0.293[b]	− 0.019[c]	0.003	0.080	− 0.009	0.005	0.115[c]	0.022	0.004	0.245[c]	− 0.022[a]	0.005	0.080	− 0.004
	(0.23)	(1.43)	(1.05)	(0.35)	(0.85)	(− 1.66)	(1.32)	(1.29)	(− 0.17)	(0.86)	(3.69)	(1.14)	(0.15)	(2.07)	(− 6.41)	(0.05)	(1.16)	(− 0.76)	(0.50)	(2.70)	(1.32)	(1.18)	(2.62)	(− 1.84)	(0.40)	(1.16)	(− 0.34)
3	0.002	0.148[a]	0.009[b]	0.003	0.367	− 0.057[c]	0.034	0.337[a]	− 0.020	0.003	0.148[a]	0.022	0.005	0.326[c]	− 0.026	0.008	0.110	− 0.024	0.004	0.162[b]	0.003[a]	0.009	0.364[b]	− 0.023	0.010	0.153	− 0.019
	(1.03)	(1.81)	(2.59)	(0.95)	(1.17)	(− 3.01)	(0.80)	(1.87)	(− 0.50)	(0.03)	(1.81)	(0.81)	(0.81)	(3.94)	(− 0.62)	(0.30)	(1.39)	(− 0.76)	(1.18)	(2.15)	(1.96)	(0.28)	(2.06)	(− 0.61)	(0.95)	(1.33)	(− 0.77)
4	0.029	0.188[a]	0.007	0.004[a]	0.249[c]	− 0.013[c]	0.007[b]	0.025	− 0.037[a]	0.006	0.100[c]	0.049[a]	0.013[a]	0.184	− 0.018	0.043	0.154	− 0.014	0.005	0.107[c]	0.041[b]	0.016	0.173[c]	− 0.011	0.029	0.102[c]	− 0.017
	(1.44)	(1.79)	(0.14)	(1.70)	(8.94)	(− 11.61)	(2.04)	(1.36)	(− 1.69)	(1.47)	(2.79)	(1.66)	(1.78)	(1.46)	(− 0.17)	(1.47)	(1.05)	(− 0.76)	(1.30)	(4.01)	(2.08)	(1.61)	(4.97)	(− 1.13)	(0.91)	(4.91)	(− 0.26)
5	0.001	0.178[c]	0.019[c]	0.001	0.046	− 0.024[c]	0.016	0.046	− 0.033[b]	0.006	0.133	0.028	0.029	0.432[c]	− 0.029[c]	0.029	0.460[c]	− 0.050[b]	0.008	0.165	0.082	0.028	0.476[c]	− 0.042[c]	0.016	0.434[c]	− 0.040[c]
	(0.73)	(5.76)	(6.65)	(0.28)	(0.47)	(− 6.20)	(0.75)	(1.32)	(− 2.53)	(1.05)	(0.85)	(1.18)	(0.91)	(9.51)	(− 3.36)	(0.97)	(17.74)	(− 2.36)	(0.37)	(1.17)	(0.59)	(1.18)	(9.12)	(− 2.73)	(1.61)	(6.38)	(− 3.72)
6	0.008	0.231	0.023[c]	0.007	0.259[c]	− 0.062[b]	0.016[b]	0.026	− 0.027[a]	0.005	0.157	0.025	0.020	0.337[a]	− 0.036	0.046	0.173[a]	− 0.036	0.012	0.135	0.017	0.003[a]	0.306[a]	− 0.028	0.011	0.190	− 0.010
	(0.22)	(1.60)	(3.39)	(1.06)	(5.86)	(− 2.06)	(2.33)	(0.58)	(− 1.67)	(1.30)	(1.20)	(1.31)	(0.94)	(1.87)	(− 1.00)	(1.32)	(1.88)	(− 1.00)	(1.26)	(0.81)	(0.17)	(1.89)	(1.93)	(− 0.19)	(1.80)	(0.717)	(− 1.24)

7	0.013	0.142^{c}	0.031^{c}	0.005^{a}	0.368^{c}	− 0.023^{b}	0.032^{c}	0.380^{c}	− 0.018	0.004	0.147^{c}	0.013^{a}	0.029	0.470^{c}	− 0.022^{c}	0.009	0.321^{c}	− 0.069^{c}	0.005	0.156^{c}	0.070^{b}	0.010	0.458^{c}	− 0.024^{c}	0.004	0.383^{c}	− 0.013^{c}
	(1.19)	(3.19)	(4.02)	(1.80)	(5.61)	(− 2.40)	(3.88)	(25.33)	(− 0.88)	(1.18)	(3.41)	(1.78)	(0.91)	(4.10)	(− 7.13)	(0.28)	(11.90)	(− 6.28)	(0.27)	(2.78)	(2.30)	(0.95)	(3.90)	(− 3.72)	(0.23)	(4.82)	(− 8.26)
8	0.004	0.240^{c}	0.032^{c}	0.009	0.477^{c}	− 0.046^{c}	0.018	0.575^{c}	− 0.034^{b}	0.002	0.142^{c}	0.016^{a}	0.012	0.321^{c}	− 0.018^{c}	0.028	0.408^{c}	− 0.032^{b}	0.003^{b}	0.130^{c}	0.010^{c}	0.014	0.286^{c}	− 0.016^{c}	0.010	0.360^{b}	− 0.007^{c}
	(0.88)	(6.18)	(3.88)	(0.89)	(9.87)	(− 5.07)	(0.74)	(39.87)	(− 2.44)	(0.80)	(3.19)	(1.75)	(0.44)	(11.90)	(− 3.13)	(1.18)	(11.56)	(− 1.97)	(1.99)	(3.71)	(4.09)	(1.00)	(3.14)	(− 3.05)	(0.93)	(2.41)	(− 11.04)
9	0.005	0.280^{c}	0.053^{c}	0.003^{c}	0.420^{c}	− 0.082^{c}	0.013^{c}	0.420^{c}	− 0.044^{c}	0.002^{c}	0.293^{b}	0.014^{b}	0.010	0.477^{c}	− 0.032^{c}	0.016	0.470^{c}	− 0.026^{c}	0.002^{c}	0.265^{b}	0.016^{b}	0.013	0.392^{b}	− 0.035^{c}	0.006	0.449^{c}	− 0.018^{c}
	(0.81)	(7.31)	(4.38)	(4.22)	(9.10)	(− 12.81)	(9.99)	(9.10)	(− 2.65)	(3.18)	(2.07)	(2.13)	(0.95)	(13.56)	(− 3.91)	(1.61)	(13.83)	(− 2.70)	(3.18)	(1.97)	(2.44)	(0.33)	(2.26)	(− 9.96)	(0.81)	(13)	(− 6.34)
10	0.003	0.227^{b}	0.055^{c}	0.004^{c}	0.496^{c}	− 0.081^{c}	0.012^{c}	0.460^{c}	− 0.051^{c}	0.008	0.139^{c}	0.029^{b}	0.014	0.408^{c}	− 0.062^{b}	0.043	0.490^{c}	− 0.028^{c}	0.007	0.163^{b}	0.025^{c}	0.006	0.477^{c}	− 0.079^{c}	0.002	0.315^{c}	− 0.036^{b}
	(0.23)	(2.21)	(22.94)	(4.84)	(14.59)	(− 8.99)	(9.17)	(17.74)	(− 3.14)	(0.37)	(3.82)	(2.46)	(1.14)	(11.56)	(− 2.06)	(1.47)	(34.75)	(− 2.62)	(1.33)	(1.98)	(4.42)	(1.33)	(9.87)	(− 7.62)	(0.40)	(7.32)	(− 2.20)

Notes: This table presents the results of the regression analysis of the following models for firms classified as DEFENDERS or PROSPECTORS according to the STRATEGY variable: $(SG\&A^{j}_{i,t} - SG\&A^{j}_{i,t-1})/Rv^{j}_{i,t-1} = b_0 + b_1(Rv^{j}_{i,t} - Rv^{j}_{i,t-1})/Rv^{j}_{i,t-1} + b_2 d^{j}_{i,t}(Rv^{j}_{i,t} - Rv^{j}_{i,t-1})/Rv^{j}_{i,t-1} + \varepsilon_{i,t}$. The models are estimated by using firm-clustered standard errors to control for autocorrelation and heteroscedasticity (Petersen, 2009). Firm level variables are defined in Appendix A. **a**, **b** and **c** represent significance levels of 10, 5, and 1 percent, respectively (two-tailed). Panel A exhibits the baseline estimations and Panel B the estimations by size decile.

6.3. Alternative Specifications of Asymmetric Cost Behavior

Table 3 exhibits the estimation results of the linear specification of Equation (2) proposed by Balakrishnan et al. (2014) to account for the effects of fixed costs on the cost behavior. In Panel A, the baseline estimations of the linear specification of Equation (2) are reported for three data samples: (i) the unrestricted data sample, (ii) the data sample which includes only the firm-year observations for which the absolute change of the ratio of SG&A expenses to revenues is less than 5% ($|VC| < 5$), and (iii) the last one which includes only the firm-year observations for which the absolute change of the ratio of SG&A expenses to revenues is less than 1% ($|VC| < 1$).[4] In all data samples, the estimated value of the coefficient b_2 is negative for the whole sample (i.e., the data sample that includes firm-year observations regardless of the firm's strategic positioning). This empirical evidence is not consistent with the empirical findings of Balakrishnan et al. (2014). However, the estimated value of the coefficient b_2 is negative (positive) for firms classified as prospectors (defenders), which indicates SG&A cost stickiness (anti-stickiness). Based on the above analysis, hypotheses 1 and 2 are not rejected, even though we take into consideration the effects of fixed costs on the cost behavior.

Furthermore, Balakrishnan et al. (2014) find that the estimated coefficients of the linear specification might vary across (revenue) size deciles. In Panel B, estimation results by size decile are reported for all three data samples: (i) the unrestricted data sample, (ii) the data sample which includes only the firm-year observations for which the absolute change of the ratio of SG&A expenses to revenues is less than 5% ($|VC| < 5$), and (iii) the last one which includes only the firm-year observations for which the absolute change of the ratio of SG&A expenses to revenues is less than 1% ($|VC| < 1$). For all data samples, in the case of prospectors (defenders), the estimated values of the coefficient b_2 are negative (positive) in all size deciles and statistically significant in the higher deciles. In addition, the estimated value of the coefficient b_2 is negative in all size deciles and statistically significant in the higher deciles for the whole sample (i.e., the data sample that includes firm-year observations regardless of the firm's strategic positioning). The corresponding empirical results reported by Balakrishnan et al. (2014) for the firm year observations within which the absolute change of the ratio of SG&A expenses over revenues is less either than 5% ($|VC| < 5$) or 1% ($|VC| < 1$) indicate anti-sticky results for small firms and insignificant results for the large firms. The contradiction between our empirical evidence and those reported by Balakrishnan et al. (2014) might be attributable to differences on the size and time coverage of the data samples employed by each study.[5] Nevertheless, the main empirical finding of this study that a firm's strategic positioning affects the direction of cost asymmetry of the SG&A expenses holds even if we control for a firm's cost structure.

Following the econometric approach of Banker, Flasher, et al. (2013) for examining the relation of strategy with asymmetric cost behavior, we estimate the model of Equation (1c) by introducing the explanatory variable $STR^{j}_{i,t}$ (which equals to the variable STRATEGY or STRATEGY_M) as interacting variable. Firms pursuing a prospector's strategic positioning exhibit greater cost stickiness as compared to firms pursuing a defender's strategic positioning (see Table 4). This result is consistent with Banker, Flasher, et al. (2013).

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[4]Balakrishnan et al. (2014) estimated the linear specification of Equation (2) per (revenue) size decile employing two data sample of firm-year observations: one for which the absolute change of the ratio of SG&A expenses to revenues is less than 5% ($|VC| < 5$ and another for which the absolute change of the ratio of SG&A expenses to revenues is less than 1% ($|VC| < 1$).

[5]Balakrishnan et al. (2014) employed a data sample of firms from Compustat over the period 1980–2004 including 132,745 firm-year observations whereas this study employed a data sample of firms from Compustat over the period 1991–2014 including 27,708 firm-year observations. Further, the calculation of STRATEGY variable imposed additional data eliminations.

Table 4. Asymmetric cost behavior of SG&A expenses and strategic orientation (STR variable included)

	Coefficient estimates (*t*-stat)					
	STRATEGY			STRATEGY_M		
	$SG\&A^{j}_{i,t}$	$SG\&A\_M^{j}_{i,t}$	$Advert^{j}_{i,t}$	$SG\&A^{j}_{i,t}$	$SG\&A\_M^{j}_{i,t}$	$Advert^{j}_{i,t}$
b_0: constant	0.032[c]	0.001[a]	0.007[c]	0.037[c]	0.010[c]	0.008[c]
	(3.88)	(1.85)	(4.33)	(6.40)	(4.09)	(2.64)
Main Terms:						
c_0^1: $\log(Em^{j}_{i,t}/Rv^{j}_{i,t})$	0.003[c]	0.004	0.017[b]	0.003[c]	0.004	0.010[c]
	(2.67)	(0.82)	(−2.47)	(2.67)	(0.82)	(4.09)
c_0^2: $\log(Ass^{j}_{i,t}/Rv^{j}_{i,t})$	0.007[c]	0.052[a]	0.067[b]	0.007[c]	0.089[a]	0.067[b]
	(10.45)	(1.70)	(−2.49)	(10.45)	(1.91)	(−2.49)
c_0^3: $dr^{j}_{i,t}$	−0.015[c]	−0.035[c]	−0.015[c]	−0.015[c]	−0.035[c]	−0.015[c]
	(−8.95)	(−8.09)	(−8.95)	(−8.95)	(−8.09)	(−8.95)
c_0^4: $GrNP^{j}_{i,t}$	0.001[a]	0.006	0.001[a]	0.001[a]	0.006	0.004
	(1.85)	(1.34)	(1.85)	(1.85)	(1.34)	(0.82)
c_0^5: $FrCF^{j}_{i,t}$	0.003[c]	0.007	0.004[a]	0.003[c]	0.007	0.007
	(2.67)	(1.33)	(1.70)	(2.67)	(1.33)	(1.33)
c_0^6: $Uncert^{j}_{i,t}$	0.004	0.006	0.008[a]	0.014	0.020	0.023
	(0.70)	(0.68)	(1.34)	(0.28)	(0.56)	0.64
c_0^7: $STR^{j}_{i,t}$	−0.056[c]	−0.032[c]	0.017[b]	−0.076[b]	−0.052[c]	0.027
	(−7.63)	(−2.59)	(2.72)	(−2.28)	(−13.94)	(0.25)
b_1: $\log(Rv^{j}_{i,t}/Rv^{j}_{i,t-1})$	0.812[c]	0.725[c]	0.455[c]	0.812[c]	0.725[c]	0.455[c]
	(39.74)	(30.87)	(17.99)	(39.74)	(30.87)	(17.99)
b_2: $d^{j}_{i,t}$ [a] $\log(Rv^{j}_{i,t}/Rv^{j}_{i,t-1})$	−0.336[c]	−0.316[c]	−0.283[c]	−0.336[c]	−0.316[c]	−0.283[c]
	(−9.95)	(−10.27)	(−10.59)	(−9.95)	(−10.27)	(−10.59)

(*Continued*)

Table 4. Continued.

	Coefficient estimates (*t*-stat)					
	STRATEGY			STRATEGY_M		
	$SG\&A^{j}_{i,t}$	$SG\&A\_M^{j}_{i,t}$	$Advert^{j}_{i,t}$	$SG\&A^{j}_{i,t}$	$SG\&A\_M^{j}_{i,t}$	$Advert^{j}_{i,t}$
Interactions with $\log(Rv^{j}_{i,t}/Rv^{j}_{i,t-1})$:						
c_1^1: $\log(Em^{j}_{i,t}/Rv^{j}_{i,t})$	0.007	0.005[a]	0.003	0.004	0.005	0.010
	(1.04)	(1.69)	(0.76)	(0.18)	(0.95)	(1.29)
c_1^2: $\log(Ass^{j}_{i,t}/Rv^{j}_{i,t})$	0.013[b]	0.014[b]	0.013[a]	0.027[a]	0.013	0.002
	(1.82)	(1.87)	(1.63)	(1.59)	(1.55)	(0.36)
c_1^3: $dr^{j}_{i,t}$	−0.020	−0.019	−0.010[b]	−0.075	−0.064	−0.038
	(−0.35)	(−0.41)	(−2.22)	(−1.17)	(−0.76)	(−1.78)
c_1^4: $GrNP^{j}_{i,t}$	0.001	0.003	0.002	0.017	0.022	0.080
	(0.26)	(0.76)	(0.35)	(0.21)	(0.61)	(1.16)
c_1^5: $FrCF^{j}_{i,t}$	0.040[a]	0.045[a]	0.032	0.011[a]	0.017	0.024
	(1.33)	(1.52)	(0.46)	(1.63)	(0.96)	(1.06)
c_1^6: $Uncert^{j}_{i,t}$	0.017	0.016	0.014	0.006	0.007	0.012[a]
	(0.21)	(0.01)	(0.28)	(0.11)	(1.04)	(1.83)
c_1^7: $STR^{j}_{i,t}$	−0.050[b]	−0.044[b]	−0.069[c]	−0.049[c]	−0.025[c]	−0.023[c]
	(−2.36)	(−2.92)	(−6.28)	(−24.56)	(−6.06)	(−5.58)
Interactions with $d^{j}_{i,t}$ $\log(Rv^{j}_{i,t}/Rv^{j}_{i,t-1})$:						
c_2^1: $\log(Em^{j}_{i,t}/Rv^{j}_{i,t})$	0.054[c]	0.015[b]	0.054[c]	0.054[c]	0.089[a]	0.065[c]
	(5.93)	(2.44)	(5.93)	(−5.93)	(1.91)	(4.73)
c_2^2: $\log(Ass^{j}_{i,t}/Rv^{j}_{i,t})$	0.037[c]	0.006	0.034[c]	0.037[c]	0.027	0.034[c]
	(6.40)	(1.34)	(3.76)	(6.40)	(0.25)	(3.76)
c_2^3: $dr^{j}_{i,t}$	−0.018[a]	−0.014	−0.018[a]	−0.018[a]	−0.003[c]	−0.018[a]
	(−1.66)	(−1.34)	(−1.66)	(−1.66)	(−2.95)	(−1.66)

c_2^4: $GrNP_{i,t}^j$	0.035**c**	0.066**b**	0.035**c**	0.035**c**	0.066**b**	0.035**c**
	(4.17)	(2.49)	(4.17)	(4.17)	(2.49)	(4.17)
c_2^5: $FrCF_{i,t}^j$	− 0.013**c**	− 0.008**c**	− 0.015**c**	− 0.013**c**	− 0.008**b**	− 0.015**c**
	(− 11.68)	(− 5.81)	(− 8.95)	(− 11.68)	(− 2.00)	(− 8.95)
c_2^6: $Uncert_{i,t}^j$	0.009**c**	0.003**b**	0.011**a**	0.010**c**	0.008**c**	0.006**c**
	(3.64)	(2.06)	(1.63)	(3.19)	(2.53)	(4.82)
c_2^7: $STR_{i,t}^j$	− 0.194**c**	− 0.108**b**	− 0.122**c**	− 0.061**c**	− 0.052**c**	− 0.108**b**
	(− 5.37)	(− 2.493)	(− 11.49)	(− 10.14)	(− 13.94)	(− 2.49)
Number of Obs.:	6,493	5,987	3,664	6,846	6,327	3,863
Adj. R-Squared:	0.614	0.583	0.611	0.629	0.614	0.627

Notes: This table presents the results of the regression analysis of the following model: $\log(Exp_{i,t}^j/Exp_{i,t-1}^j) = b_0 + c_0^x X_{i,t}^j + (b_1 + c_1^x X_{i,t}^j)\log(Rv_{i,t}^j/Rv_{i,t-1}^j) + (b_2 + c_2^x X_{i,t}^j)d_{i,t}^j \log(Rv_{i,t}^j/Rv_{i,t-1}^j) + \varepsilon_{i,t}$, including The model is estimated by using firm-clustered standard errors to control for autocorrelation and heteroscedasticity (Petersen, 2009). Firm level variables are defined in Appendix A. **a**, **b** and **c** represent significance levels of 10, 5, and 1 percent, respectively (two-tailed).

Examining the lower order interaction of coefficient b_1 of the log change of sales revenues with the variable $STR^{j}_{i,t}$, it seems that a firm's strategic positioning has a negative moderating effect on the relation between log change of expenses and log change of sales revenues. As a firm alters its strategic positioning from defender to prospector, the percentage change of the corresponding expense for a given percentage change on sales revenues tends to decrease.

A possible reason for this empirical evidence is that defenders are more likely than prospectors to shape their short-term resource allocation decisions for the SG&A expenses concerning the evolution of the current period's sale revenues. After achieving the minimum desired return on capital, a defender that experiences a demand increase might decide to finance current period's discretionary SG&A expenses from the increase in the current period's sales revenue. On the contrary, prospectors are more likely than defenders to shape their short-term resource allocation decisions for the discretionary SG&A expenses concerning the potential effects of their volatility on the future level of sales. Thus, in the case of prospectors, discretionary SG&A expenses are less sensitive to increases on the current period's sales revenues than in the case of defenders.

We also analyze our data using the methodological approach of Weiss (2010) (see Online Appendix C – OA C) to calculate a direct measure of cost stickiness. It seems, that even if we adopt the methodological approach of Weiss (2010), a firm classified as defender (prospector) exhibits anti-sticky (sticky) cost behavior.

7. Robustness Tests

7.1. Cost Asymmetry, Strategy, and Intangible Resources

Our primary research hypothesis is that a firm's strategic orientation affects managerial resource allocation decisions, and hence, the intensity and the direction of the SG&A cost asymmetry. The other direction of causality may also be plausible, that is, firms with a sticky cost structure might choose a strategic orientation that is suitable for their cost structure and behavior. In addition, firms with high levels of intangible resources tend to exhibit SG&A cost stickiness (Venieris et al., 2015). Intangible resources are valuable strategic resources for firms classified as prospectors. Thus, an alternative explanation of the observed cost stickiness of the SG&A expenses in the case of firms classified as prospectors is that these firms tend to exhibit high intensity of intangible resources which might be the cause of the observed cost stickiness of the SG&A expenses.

To examine the relation between a firm's strategic orientation and its intensity on intangible resources,[6] we focused on a firm's level of managerial ability. The level of managerial ability is a specialized dimension a firm's level of organizational capital closely associated with effective implementation of a firm's strategy.

We employed the MA-Score (Demerjian et al., 2012) as a measure of a firm's level of managerial ability. Demerjian et al. (2012) propose MA-Score as a quantitative measure of a firm's level of managerial ability. The level of managerial ability is a specialized dimension a firm's level of organizational capital closely associated with effective implementation of a firm's strategy. The value of MA-Score is calculated by employing a two-stage methodology for deriving

[6]According to Lev et al. (2009) intangible resources are sources of future economic benefits that lack a physical embodiment. In endeavoring to examine the relation of intangible resources with economic phenomena, prior literature focused on specific dimensions of intangible resources. For instance, Venieris et al. (2015) focused on a specialized dimension of intangible resources, that is the level of a firm's organizational capital, to examine the relation of intangible resources with asymmetric cost behavior in the case of the SG&A expenses. We choose a more specialized dimension of organizational capital (and intangible resources), such as the level of the managerial ability in order to improve the validity of the empirical examination of the relation between a firm's strategic orientation and its intensity on intangible resources.

Table 5. Causality testing for strategy, organizational capital intensity, managerial ability and SG&A asymmetric cost behavior

Panel A: Panel vector autoregressive models

	Dependent Variables		
	Model 1	Model 2	Model 3
Independent Variables	$STICKY^{j}_{i,t}$	$STR^{j}_{i,t}$	$MA-Score^{j}_{i,t}$
$STICKY^{j}_{i,t-1}$	0.044	0.040	0.017
	(0.88)	(0.36)	(0.23)
$STR^{j}_{i,t-1}$	0.225[c]	0.011[a]	0.041
	(2.63)	(1.63)	(0.49)
$MA-Score^{j}_{i,t-1}$	0.040[a]	0.032	0.008[a]
	(1.33)	(0.46)	(1.34)
Number of Observations:	12.895	12.125	11.949

Panel B: Granger causality (Wald tests)

Model 1	Excluded	(Prob > F)
$STICKY^{j}_{i,t}$	$STR^{j}_{i,t}$	0.021
$STICKY^{j}_{i,t}$	$MA-Score^{j}_{i,t}$	0.085
$STICKY^{j}_{i,t}$	All	0.013
Model 2	**Excluded**	**(Prob > F)**
$STR^{j}_{i,t}$	$STICKY^{j}_{i,t}$	0.120
$STR^{j}_{i,t}$	$MA-Score^{j}_{i,t}$	0.150
$STR^{j}_{i,t}$	All	0.143
Model 3	**Excluded**	**(Prob > F)**
$MA-Score^{j}_{i,t}$	$STICKY^{j}_{i,t}$	0.117
$MA-Score^{j}_{i,t}$	$STR^{j}_{i,t}$	0.113
$MA-Score^{j}_{i,t}$	All	0.120

Notes: This table presents the results of the Granger causality testing for strategy, managerial ability and SG&A asymmetric cost behavior. Firm level variables are defined in Appendix A. **a**, **b** and **c** represent significance levels of 10, 5, and 1 percent, respectively (two-tailed).

a proxy of a firm's managerial ability. First, a data envelopment analysis (DEA) with a single output and seven inputs[7] is used to calculate a firm's relative efficiency (for details see OA B). The second stage includes an estimation of a Tobit regression model including year fixed effects and clustering standard errors by firm and year to control for cross-sectional and inter-temporal correlation. According to Demerjian et al. (2012), the residual of the Tobit regression model is the level of the managerial ability $MA-Score^{j}_{i,t}$. of firm i classified in industry j in year t.

Table 5 (Panel A) reports the eswtimation results of various panel VAR models (Gujarati, 2004). As a measure of the SG&A cost asymmetry, we employed the STICKY variable of

[7]The seven inputs are: (i) net property, plant, and equipment; (ii) capitalized operating lease;, (iii) net research and development (R&D); (iv) goodwill reported on the balance sheet; (v) other than goodwill acquired and capitalized intangibles, also reported on the balance sheet; (vi) cost of goods sold; and (vii) SG&A expenses.

Equation (3) and the STRATEGY variable without excluding firms characterized as analyzers.[8] The lag values of the STRATEGY variable and the MA-score contain information that enables predicting the level of the STICKY variable beyond the information contained in the past values of the STICKY variable. In contrast, the lag value of the STICKY variable has no significant effect on the level of the STRATEGY variable or on the level of a firm's intensity on intangible investments in the current period.

We performed Granger causality tests for the variables STICKY, STRATEGY, and MA – Score. It seems that STRATEGY does not Granger cause STICKY. These results suggest that the cost asymmetry of SG&A expenses is an expression of a firm's strategic orientation. The effects of strategic decisions on the asymmetric cost behavior of the SG&A expenses are independent from firm's intensity on intangible resources in the sense that past decisions on the level of intangible resources seem not to have significant effects on strategic decisions in the present. A firm' strategic orientation shapes the SG&A cost behavior and this relationship emerges independently from the past profile of intangible investments.

We enrich the aforementioned empirical evidence that a firm's strategic orientation affects managerial resource allocation decisions and hence the intensity and the direction of the SG&A cost asymmetry by drawing a difference-in-differences (DD) approach for testing causality (Armstrong & Kepler, 2018; Ferri et al., 2018). A DD approach compares changes over time in a group of subjects affected by a policy change to changes in a group of subjects unaffected by the policy change (Lechner, 2011; Leledakis & Pyrgiotakis, 2019). In our research design, we focus on strategic changes. Thus, we select two data samples of firms that each one consists of two subgroups of firms. The first group corresponds to the control group and consists of firms that retain the same strategic position (defenders or prospectors) though the time horizon of our research design. The second one corresponds to the treatment group and consists of firms that initially had the same strategic orientation with the control group, and at a certain point of time point their strategic positioning has changed for the remedial time horizon of our research design.

Table 6 exhibits the estimation results for Equation (1c) and the linear specification of Equation (2) including the variables $dc^{j}_{i,t}$ and $dy^{j}_{i,t}$, and their interaction term (i.e., $dc^{j}_{i,t}xdy^{j}_{i,t}$). Variable $dc^{j}_{i,t}$ is a dummy variable which equals 1 for firms that they have changed their strategic positioning from prospector to defender (column P) or from defender to prospector (column D), and 0 otherwise. The variable $dy^{j}_{i,t}$ is a dummy variable which equals 1 for the time period beginning the year that the change on the strategic positioning of firm i in industry j has occurred, and 0 otherwise. The coefficient c^{6}_{2} of the interaction term between $dc^{j}_{i,t}$ and $dy^{j}_{i,t}$ is the DD estimator in the case of the regression model of Equation (1c) and the coefficient b^{3}_{2} is the DD estimator in the case of the regression model of the linear specification of Equation (2). The sign of the DD estimator indicates whatever the direction and the intensity of cost stickiness changes if a firm makes a radical change on it strategic positioning. We expect the DD estimator to have a significant negative (positive) value in the case of group consists of firms that are classified defenders (prospectors) during the time horizon of our research design and firms that changed from defenders (prospectors) to prospectors (defenders).

Panel A of Table 6 presents the estimation results for Equation (1c) including the variables $dc^{j}_{i,t}$ and $dy^{j}_{i,t}$, and the DD estimator. In column D (P) of Panel A (Table 6), the coefficient c^{6}_{2} (DD estimator) has a significant negative (positive) value indicating that firms that changed from defenders (prospectors) to prospectors (defender) decreased their SG&A cost anti-stickiness

[8]If we exclude analyzers, the STRATEGY variable will receive values from 6 to 12 and from 24 to 30. In that case, the estimated coefficients of STRATEGY variable might be inconsistent.

Table 6. Difference-in-differences regressions: asymmetric cost behavior of SG&A expenses and changes on the strategic orientation

Panel A: Log linear specification

	Coefficient estimates (*t*-stat)			
	$dy^j_{i,t} = 1$ in the year of strategy change		$dy^j_{i,t} = 1$ in one year after strategy change	
	D: Defenders and Defenders that changed to Prospectors	P: Prospectors and Prospectors that changed to Defenders	D: Defenders and Defenders that changed to Prospectors	P: Prospectors and Prospectors that changed to Defenders
b_0: constant	0.041	0.015	0.007	0.005
	(29.06)	(9.61)	(0.93)	(0.95)
Main Terms:				
c^1_0: $\log(Em^j_{i,t}/Rv^j_{i,t})$	0.002	0.006	0.006[a]	0.006
	(0.59)	(1.05)	(1.66)	(1.05)
c^2_0: $\log(Ass^j_{i,t}/Rv^j_{i,t})$	0.011	0.095[b]	0.011	0.011[c]
	(1.59)	(2.06)	(1.59)	(8.51)
c^3_0: $dr^j_{i,t}$	− 0.012	− 0.029	− 0.012	− 0.029
	(− 1.24)	(− 0.98)	(− 1.24)	(− 0.98)
c^4_0: $GrNP^j_{i,t}$	− 0.008	− 0.001	− 0.003	− 0.004
	(− 1.26)	(− 1.44)	(− 1.43)	(− 1.28)
c^5_0: $FrCF^j_{i,t}$	0.017	0.002	0.022	0.004[a]
	(0.37)	(0.01)	(0.69)	(1.70)
c^6_0: $dc^j_{i,t}$	0.002	0.013	0.007	0.013
	(1.13)	(0.62)	(1.34)	(0.62)
c^7_0: $dy^j_{i,t}$	0.006	− 0.005[a]	0.005	− 0.005
	(0.14)	(− 1.89)	(1.30)	(− 0.30)
c^8_0: $dc^j_{i,t} * dy^j_{i,t}$	− 0.026	0.005	− 0.001	0.006
	(− 0.76)	(1.30)	(− 0.73)	(0.14)
c^9_0: $Uncert^j_{i,t}$	− 0.075	− 0.003	− 0.040	− 0.003
	(− 1.17)	(− 0.92)	(− 0.82)	(− 0.92)
b_1: $\log(Rv^j_{i,t}/Rv^j_{i,t-1})$	0.581[c]	0.690[c]	0.589[c]	0.624[c]
	(70.63)	(22.32)	(43.03)	(38.88)
b_2: $d^j_{i,t}$ [a] $\log(Rv^j_{i,t}/Rv^j_{i,t-1})$	0.031[c]	− 0.056[c]	0.025[b]	− 0.060[c]
	(4.02)	(− 2.69)	(1.99)	(− 2.55)
Interactions with $\log(Rv^j_{i,t}/Rv^j_{i,t-1})$:				
c^1_1: $\log(Em^j_{i,t}/Rv^j_{i,t})$	0.004	0.012	0.011[a]	0.015
	(1.37)	(0.47)	(1.63)	(1.21)
c^2_1: $\log(Ass^j_{i,t}/Rv^j_{i,t})$	0.059[a]	0.031[c]	0.017	0.056[b]
	(1.86)	(9.84)	(0.21)	(2.12)
c^3_1: $dr^j_{i,t}$	− 0.006[a]	− 0.019	− 0.005[a]	− 0.041[a]
	(1.54)	(− 0.41)	(− 1.57)	(− 1.90)
c^4_1: $GrNP^j_{i,t}$	0.007	0.010	0.020	0.015
	(0.85)	(1.14)	(8.44)	(9.61)
c^5_1: $FrCF^j_{i,t}$	0.022	0.020	0.016	0.012
	(31.52)	(8.44)	(20.04)	(0.47)

(*Continued*)

Table 6. Continued.

Panel A: Log linear specification

	Coefficient estimates (*t*-stat)			
	$dy^j_{i,t} = 1$ in the year of strategy change		$dy^j_{i,t} = 1$ in one year after strategy change	
	D: Defenders and Defenders that changed to Prospectors	P: Prospectors and Prospectors that changed to Defenders	D: Defenders and Defenders that changed to Prospectors	P: Prospectors and Prospectors that changed to Defenders
c^6_1: $Uncert^j_{i,t}$	− 0.002	0.006	− 0.012	0.003
	(− 1.33)	(0.41)	(− 0.17)	(0.37)
c^7_1: $dc^j_{i,t}$	0.006	0.016	0.010[a]	0.007
	(0.16)	(0.75)	(1.86)	(1.06)
c^8_1: $dy^j_{i,t}$	0.003	− 0.006	0.025	0.011
	(0.03)	(− 0.58)	(0.60)	(1.08)
c^9_1: $dc^j_{i,t}$*$dy^j_{i,t}$	− 0.046	0.050	− 0.018[a]	0.013
	(− 0.23)	(0.21)	(− 1.66)	(0.62)
Interactions with $d^j_{i,t}$ $\log(Rv^j_{i,t}/Rv^j_{i,t-1})$:				
c^1_2: $\log(Em^j_{i,t}/Rv^j_{i,t})$	− 0.006	− 0.009[a]	− 0.002	− 0.009[a]
	(− 0.58)	(− 1.76)	(− 0.75)	(− 1.76)
c^2_2: $\log(Ass^j_{i,t}/Rv^j_{i,t})$	− 0.029	− 0.005[a]	− 0.023	− 0.005[a]
	(− 0.98)	(− 1.89)	(− 0.92)	(− 1.89)
c^3_2: $dr^j_{i,t}$	0.014[b]	0.011[b]	0.016[b]	0.007[b]
	(2.52)	(2.21)	(2.47)	(2.01)
c^4_2: $GrNP^j_{i,t}$	0.013	0.010	0.012[b]	0.010[a]
	(0.62)	(0.86)	(2.33)	(1.74)
c^5_2: $FrCF^j_{i,t}$	0.007	− 0.067[a]	0.005	− 0.060[c]
	(0.85)	(− 1.71)	(1.39)	(− 2.55)
c^6_2: $dc^j_{i,t}$	− 0.006[b]	0.046[c]	− 0.002	0.053[c]
	(− 2.23)	(3.18)	(− 0.75)	(5.28)
c^7_2: $dy^j_{i,t}$	− 0.050[b]	0.056[b]	− 0.044[c]	0.056[c]
	(− 2.36)	(2.12)	(− 14.12)	(4.68)
c^8_2: $dc^j_{i,t}$*$dy^j_{i,t}$	− 0.062[b]	0.068[b]	− 0.048[b]	0.073[c]
	(− 2.06)	(10.35)	(− 2.22)	(5.13)
c^9_2: $Uncert^j_{i,t}$	− 0.006[b]	0.001[a]	− 0.001[c]	0.001[a]
	(− 2.23)	(1.85)	(− 2.95)	(1.85)
Number of Obs.:	1,281	1,547	1,278	1,544
Adj. R-Squared:	0.234	0.229	0.232	0.222

(*Continued*)

(stickiness) since the estimate value of the coefficient b_2 is 0.031 (− 0.056) and the estimated value of the coefficient c^6_2 is − 0.062 (0.068). Panel B of Table 6 illustrates the estimation results for the linear specification of Equation (2) including the variables $dc^j_{i,t}$ and $dy^j_{i,t}$, and the DD estimator. In column D (P) of Panel B (Table 6), the coefficient b^3_2 (DD estimator) has a significant negative (positive) value indicating that firms that changed from defenders (prospectors) to

Table 6. Continued.

Panel B: Linear specification

	Coefficient estimates (*t*-stat)			
	$dy^j_{i,t} = 1$ in the year of strategy change		$dy^j_{i,t} = 1$ in one year after strategy change	
	D: Defenders and Defenders that changed to Prospectors	P: Prospectors and Prospectors that changed to Defenders	D: Defenders and Defenders that changed to Prospectors	P: Prospectors and Prospectors that changed to Defenders
b_0: constant	0.001	0.002	0.004	0.006
	(0.65)	(1.18)	(0.29)	(1.44)
b_1: $(Rv^j_{i,t} - Rv^j_{i,t-1})/Rv^j_{i,t-1}$	0.134[c]	0.171[c]	0.130[c]	0.219[c]
	(7.01)	(−4.34)	(5.96)	(10.31)
b_2: $d^j_{i,t}$ [a] $\log(Rv^j_{i,t}/Rv^j_{i,\,t-1})$	0.095[b]	−0.093[c]	0.059[c]	−0.063[c]
	(2.06)	(−3.92)	(3.00)	(−8.43)
Interactions with $(Rv^j_{i,t} - Rv^j_{i,t-1})/Rv^j_{i,t-1}$:				
b^1_1: $dc^j_{i,t}$	0.043	0.002[c]	−0.018[a]	0.016
	(0.65)	(2.95)	(−1.66)	(0.75)
b^1_1: $dy^j_{i,t}$	−0.062[b]	0.006	0.010[a]	−0.018[a]
	(−2.06)	(1.05)	(1.86)	(−1.66)
b^1_1: $dc^j_{i,t} * dy^j_{i,t}$	−0.024[b]	0.032	−0.011[a]	0.019
	(−2.40)	(0.31)	(−1.86)	(0.55)
Interactions with $d^j_{i,t}(Rv^j_{i,t} - Rv^j_{i,t-1})/Rv^j_{i,t-1}$:				
b^1_2: $dc^j_{i,t}$	−0.003[c]	0.021[b]	−0.012[c]	0.025[c]
	(−3.26)	(2.05)	(−5.28)	(11.33)
b^2_2: $dy^j_{i,t}$	−0.050[b]	0.030[c]	−0.082[b]	0.061[c]
	(−2.36)	(3.56)	(−3.53)	(2.73)
b^3_2: $dc^j_{i,t} * dy^j_{i,t}$	−0.044[c]	0.042[c]	−0.097[c]	0.086[c]
	(−8.43)	(2.96)	(−5.10)	(3.91)
Number of Obs.:	1,528	1,896	1,522	1,891
Adj. *R*-Squared:	0.241	0.276	0.238	0.246

(*Continued*)

prospectors (defender) decreased their SG&A cost anti-stickiness (stickiness) since the estimate value of the coefficient b_2 is 0.095 (−0.093) and the estimated value of the coefficient b^3_2 is −0.044 (0.042).

A change on a firm's strategic positioning might require a time frame to affect a firm's business model and its cost behavior. For this reason, we replicate the analysis of Table 6 setting as a hypothetical treatment period (i.e., time point that a change on the strategic positioning is observed) one year ahead, that is the variable $dy^j_{i,t}$ equals 1 for one year ahead the year that the change on the strategic positioning. The replicated analysis confirms that a change on strategic positioning alters the direction of SG&A asymmetry.

A critical assumption of the DD approach for testing causality within the context of the regression analysis is the parallel trend assumption. This assumption requires that, in the absence of treatment, the difference between the control and the treatment group is constant over time.

Table 6. Continued.

Panel C: Difference-in-differences estimators for hypothetical treatment periods

	Coefficient Estimates (*t*-stat)			
	D: Defenders and Defenders that changed to Prospectors		P: Prospectors and Prospectors that changed to Defenders	
Hypothetical treatment period	Log linear Model	Lineal Model	Log linear Model	Lineal Model
t–1	−0.067[a]	−0.035	0.062[a]	0.021
	(−1.71)	(−0.23)	(1.67)	(1.54)
t–2	−0.061	−0.033	0.023	0.012
	(−1.01)	(−0.75)	(1.59)	(0.24)
t–3	−0.004	−0.024	0.022	0.015
	(−0.81)	(−0.76)	(1.32)	(0.75)
t–4	−0.009	−0.001	0.006	0.011
	(−1.03)	(−1.44)	(0.14)	(1.59)

Notes: Panel A presents the results of the DID regression analysis of the log linear specification of cost behavior: $\log(SG\&A^{j}_{i,t}/SG\&A^{j}_{i,t-1}) = b_0 + c^{x}_{0}X^{j}_{i,t} + (b_1 + c^{x}_{1}X^{j}_{i,t})\log(Rv^{j}_{i,t}/Rv^{j}_{i,t-1}) + (b_2 + c^{x}_{2}X^{j}_{i,t})d^{j}_{i,t}\log(Rv^{j}_{i,t}/Rv^{j}_{i,t-1}) + \varepsilon_{i,t}$. Panel B presents the results of the DID regression analysis of the linear specification of cost behavior:

$$(SG\&A^{j}_{i,t} - SG\&A^{j}_{i,t-1})/Rv^{j}_{i,t-1} = b_0 + b_1(Rv^{j}_{i,t} - Rv^{j}_{i,t-1})/Rv^{j}_{i,t-1} + b^{1}_{1}dc^{j}_{i,t}(Rv^{j}_{i,t} - Rv^{j}_{i,t-1})/Rv^{j}_{i,t-1} + b^{2}_{1}dy^{j}_{i,t}(Rv^{j}_{i,t} - Rv^{j}_{i,t-1})/Rv^{j}_{i,t-1} + b^{3}_{1}dc^{j}_{i,t}{*}dy^{j}_{i,t}(Rv^{j}_{i,t} - Rv^{j}_{i,t-1})/Rv^{j}_{i,t-1} + b_2d^{j}_{i,t}(Rv^{j}_{i,t} - Rv^{j}_{i,t-1})/Rv^{j}_{i,t-1} + b^{1}_{2}d^{j}_{i,t}dc^{j}_{i,t}(Rv^{j}_{i,t} - Rv^{j}_{i,t-1})/Rv^{j}_{i,t-1} + b^{2}_{2}d^{j}_{i,t}dy^{j}_{i,t}(Rv^{j}_{i,t} - Rv^{j}_{i,t-1})/Rv^{j}_{i,t-1} + b^{3}_{2}d^{j}_{i,t}dc^{j}_{i,t}{*}dy^{j}_{i,t}(Rv^{j}_{i,t} - Rv^{j}_{i,t-1})/Rv^{j}_{i,t-1} + b_2d^{j}_{i,t} + \varepsilon_{i,t}.$$

Panel C examines the parallel trends hypothesis for hypothetical treatment periods. The models are estimated by using firm-clustered standard errors to control for autocorrelation and heteroscedasticity (Petersen, 2009). Firm level variables are defined in Appendix A. **a**, **b** and **c** represent significance levels of 10, 5, and 1 percent, respectively (two-tailed).

Within the context of regression analysis that operationalizes a DD approach for testing causality, the parallel trend assumption is evaluated by (i) defining different hypothetical treatment periods when a firm changes its strategic positioning, and (ii) testing if the corresponding DD estimator is insignificant. Panel C of Table 6 exhibits the DD estimators for hypothetical treatment periods that expand up to a period of four years before the year that a firm changes its strategic positioning. Only the DD estimator for the estimated model of Equation (1c) is significant at 10% assuming that the strategic shift has taken place in the year before. All other DD estimators for hypothetical treatment periods that expand up to a period of four years before the year that a firm changes its strategic positioning are insignificant. Thus, we conjecture that parallel trend assumption holds.

7.2. Additional Analysis: Cost Asymmetry, Market Concentration, Optimistic and Pessimist Scenario

Li and Zheng (2017) have examined the effects of product market competition, which is a critical dimension of the external business environment, on the asymmetric cost behavior of the operating costs. They argue that when firms face intense competition, they regularly spend resources to strengthen their competitive positions in their product market and such expenditures may manifest themselves in the form of cost stickiness. The empirical results of this study were tested considering the intensity of market competition. Strategy is (or should be) shaped as a response to

environmental challenges. We calculate the Herfindahl–Hirschman Index as a measure of market concentration.

Results are reported in the on-line Appendices (OA D) and indicate that both in the case of defenders and that of prospectors, a decrease in competition increases (decreases) the degree of cost stickiness (anti-stickiness). Our empirical results are in the opposite direction of those reported by Li and Zheng (2017). A possible reason is the use of different measure for quantifying market concentration. Yet, it seems that our main empirical evidence for the relationship of strategy with cost asymmetry is not affected by introducing in our analysis the degree of market competition.

Finally, as suggested in Banker, Flasher, et al. (2013), we examine the relation between cost asymmetry and strategy under optimistic and pessimistic scenarios. Results, reported in the online Appendices (OA E), show that defenders exhibit a systematic cost anti-stickiness behavior both under the optimistic and the pessimistic scenario. In the case of prospectors, there is a systematic cost stickiness behavior under both scenarios. Therefore, strategy affects the direction of cost asymmetry regardless of the scenario that managers experience.

8. Conclusions

The current study contributes to the strategic cost management literature by examining the relation between the sticky cost phenomenon and business strategy. An emerging stream of management accounting examines the role of managerial, deliberate commitment decisions on cost behavior. We expand this understanding by investigating the role of business strategy on intensity and direction of cost asymmetry in the case of SG&A expenses.

Our findings support Anderson et al.'s (2003) fundamental insight that cost stickiness reflects deliberate resource commitment decisions made by managers. Our analysis focuses on a significant determinant of managerial resource commitment decisions, a firm's strategic positioning. We explore the relation between strategy and cost asymmetry beyond the relation of intangible resources and cost stickiness (Venieris et al., 2015). Further, the current study expands on the results reported by Banker, Flasher, et al. (2013) in the sense that it provides theoretical and empirical evidence that a firm's strategic position determines not only the intensity of asymmetric cost behavior (Banker, Flasher, et al., 2013) but also its direction. We document that firms categorized as prospectors exhibit SG&A cost stickiness whereas firms classified as defenders exhibit SG&A cost anti-stickiness. We use a strategy classification (Miles and Show's typology), which – in the context of accounting and finance research – facilitates the implementation of quantitative research designs (Bentley et al., 2013).

To test the robustness of our empirical results, we provide further insights that, in the case of the SG&A expenses, the presence of asymmetric cost behavior does not Granger cause a firm's strategic positioning or its intensity on intangible evidence. A DD approach for testing causality reveals that a change on a firm's strategic positioning alters the direction of SG&A asymmetric cost behavior. Additional robustness tests concerning the degree of market concentration indicate that strategy remains a significant contributing factor of the SG&A cost asymmetry expenses under the presence of different levels of market concentration.

Documenting the relation of SG&A cost asymmetry with strategy is also timely in the context of strategy-constituted management accounting. An analysis of the SG&A cost behavior and its economic consequences on a firm's operating performance must take into consideration the firms' intent to be innovative market leaders compared with firms that maintain a narrow and stable product focus to compete on the basis of price, service, or quality. SG&A cost stickiness (anti-stickiness), in a temporally sales decline, seems to be a proper cost reaction in the case of prospectors (defenders) to be consistent with its strategic orientation and maintain adequate

levels of operating performance in the future. Further, it seems that within each firm's strategy type, the managers' ability to be more knowledgeable about the firm and the industry as well as to be better able to synthesize information into reliable forward-looking estimates, is crucial regarding their deliberate commitment decisions that affect cost stickiness.

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Supplemental Data and Research Materials

Supplemental data for this article can be accessed on the Taylor & Francis website, doi:10.1080/09638180.2020.1813601.
Appendix OA A. Firm strategy classification
Appendix OA B. Estimation of MA-Score
Appendix OA C. Examination of cost asymmetry using the methodological approach of Weiss (2010)
Appendix OA D. Cost asymmetry, strategy and market concentration
Appendix OA E. Cost asymmetry, strategy, optimistic and pessimist scenario

ORCID

Apostolos Ballas http://orcid.org/0000-0001-9375-7421

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Appendix. Variables definition

Variable	Description
STRATEGY	The STRATEGY variable ranges from 6 to 30 and it is employed to classify firms as: defenders (STRATEGY variable = 6–12), analyzers (STRATEGY variable = 13–23) and prospectors (STRATEGY variable = 24–30). We rank and classify the firms of our sample as defenders or prospectors using the median value of STRATEGY variable of each firm. The value of the STRATEGY variable of i firm in year t calculated using the methodology proposed by Bentley et al. (2013). For more details see On-line Appendix B.

(*Continued*)

Variable	Description
STRATEGY_M	The STRATEGY_M variable ranges from 4 to 20 and it is employed to classify firms as: defenders_m (STRATEGY_M variable = 4-8), analyzers_m (STRATEGY_M variable = 9-15) and prospectors_m (STRATEGY_M variable = 16-20). We rank and classify the firms of our sample as defenders_m or prospectors_m using the median value of STRATEGY_M variable of each firm.
DEFENDERS	Firms with a median value of its STRATEGY variable ranging from 6 to 12.
PROSPECTORS	Firms with a median value of its STRATEGY variable ranging from 24 to 30.
DEFENDERS_M	Firms with a median value of its STRATEGY_M variable ranging from 4 to 8.
PROSPECTORS_M	Firms with a median value of its STRATEGY_M variable ranging from 16 to 20.
$SG\&A^{j}_{i,t}$	The level of the SG&A expenses of firm i classified in the j industry sector in year t.
$SG\&A\_M^{j}_{i,t}$	The level of the SG&A expenses minus depreciation and R&D expenses of firm i classified in the j industry sector in year t.
$Advert^{j}_{i,t}$	The level of the advertising expenses of firm i classified in the j industry sector in year t.
$Exp^{j}_{i,t}$	The annual SG&A or Advert expenses of firm i operating in industry j in year t.
$STICKY^{j}_{i,t}$	The intensity of cost asymmetry calculated applying the Weiss' s (2010) methodology.
$X^{j}_{i,t}$	A vendor of observable determinants of cost asymmetry such as $Rv^{j}_{i,t}$, $Em^{j}_{i,t}$, $Ass^{j}_{i,t}$, $dr^{j}_{i,t}$, $FrCF^{j}_{i,t}$, $GrNP^{j}_{i,t}$, $STR^{j}_{i,t}$ and $MC^{j}_{i,t}$.
$Rv^{j}_{i,t}$	Sales revenues of firm i operating in j industry in year t.
$d^{j}_{i,t}$	A dummy variable which equals 1 if sales of firm i in j industry in year t decreased in year t and 0 otherwise.
$Uncert^{j}_{i,t}$	The standard deviation of log changes in sales of firm i classified in the j industry sector in year t.
$Em^{j}_{i,t}$	Number of employees of firm i operating in j industry in year t.
$Ass^{j}_{i,t}$	The total assets of firm i classified in the j industry sector in year t.
$dr^{j}_{i,t}$	A dummy variable that takes the value of 1 if firm's sales revenue decreases for two consecutive periods, and 0 otherwise.
$FrCF^{j}_{i,t}$	Free cash flows of firm i classified in the j industry sector in year t.
$GrNP^{j}_{i,t}$	The percentage growth in real Gross National Product during year t.
$GrPr^{j}_{i,t}$	The gross profit of firm i classified in the j industry sector in year t.
$STR^{j}_{i,t}$	A variable ranging from 6 to 30 (0–20) that equals to the STRATEGY or STRATEGY_M variable.
$RD^{j}_{i,t}$	The level of the research and development expenses of firm i classified in the j industry sector in year t.
$dc^{j}_{i,t}$	A dummy variable which equals 1 if the strategic positioning of firm i in j industry has changed from defenders to prospectors or from prospectors to defenders and 0 otherwise.
$dy^{j}_{i,t}$.	A dummy variable which equals 1 the year that the strategic positioning of firm i in j industry has changed from defenders to prospectors or from prospectors to defenders and 0 otherwise.
$MA-Score^{j}_{i,t}$	The value of the MA-score of i firm operating in the j industry in year t calculated using the methodology proposed by Demerjian et al. (2012). For more details see Appendix D.