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Article

# Business Strategy, State-Owned Equity and Cost Stickiness: Evidence from Chinese Firms

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**Abstract:** This paper investigates the relationship between business strategy and cost stickiness under different ownership. Using the data from listed firms in China from 2002 to 2015, we find that first, firms with different strategies exhibit different cost behavior. The cost stickiness of choosing a differentiation strategy is higher than that of choosing a low-cost strategy. Second, management expectations will affect cost stickiness. Optimistic expectations will increase cost stickiness, while pessimistic expectations will reduce cost stickiness. Third, management expectations can adjust the relationship between business strategy and cost stickiness in terms of government-created advantages (GCAs). If management expectations tend to be optimistic, the cost stickiness is higher with a differentiation strategy than with a low-cost strategy. If management expectations tend to be pessimistic, then cost stickiness is higher with a low-cost strategy than with a differentiation strategy. Finally, the state-owned equity affects the extent of the effect of a differentiation strategy on cost stickiness. State-owned firms, which receive more GCAs than non-state-owned firms, have stronger cost stickiness than non-state-owned firms, even if both categories of firms use more differentiation strategy.

**Keywords:** business strategy; cost stickiness; state-owned firms; institutional advantages

## 1. Introduction

This study uses Porter's [1] business strategy typology to examine whether companies that follow different business strategies exhibit differences in asymmetric cost behavior and whether firms' business strategies are a factor in determining cost stickiness. By exploring the extent to which firms following particular business strategies are more likely to exhibit different cost stickiness, we provide evidence that increases our understanding of the underlying determinants of cost stickiness.

Traditional cost models assume that costs change symmetrically and proportionally with increases or decreases in activity [2]. However, recent empirical research demonstrates asymmetry in cost behavior — in other words, that costs increase more rapidly with activities than they decrease — which has been termed “cost stickiness” [3]. Recent studies have examined asymmetric cost behavior as a function of managerial deliberate cost adjustment [3–5], managerial optimism or pessimism [6], earnings management incentives [7,8], agency problem [9], earnings forecasts [10], capacity utilization [11], unemployment [12], product market competition [13], corporate social responsibility [14], conservatism [15], and whether or not the costs are related to the core operations of a firm [16].

However, most of these studies ignore the effect of business strategy on cost stickiness, especially due to management expectations and different state-owned equity—which particularly affects emerging economy firms that have been strongly influenced by their government-created advantages (GCAs). Porter's [1] business strategy typology is commonly used by companies and recognized as the dominant paradigm used in the literature related to competitive strategies, namely business cost leadership and differentiation strategies [17–21]. We address this gap in the literature by examining these associations in the context of an underlying determinant of firms' cost stickiness—their business strategies. Using strategy theory, we focus on the association between firms' business strategies and their cost stickiness. We begin by investigating the extent to which cost stickiness differs across business strategies. We then examine whether business strategy ultimately helps explain the observed variation in cost stickiness under different equity nature. This study is crucial since organizational theory (OT) delivers a framework for understanding how companies' business strategies can contribute to their competition by cost management.

In this paper, following strategy theory, we argue that managers will deliberately match a firm's cost structure to the firm's business strategy by intuitively adjusting how resources are committed depending on their expectation on the sales; in this case, the selection of business strategy will affect the firm's asymmetric cost behavior. Anderson et al. [3] and Banker and Chen [22] argue that costs will be adjusted when the manager selects a business strategy because managers will have to increase or decrease the necessary or slack resources. Balakrishnan and Gruca [16] find that cost stickiness is only reliable in costs associated with an organization's core services. Moreover, the cost stickiness of core services reliably exceeds that of ancillary and support services, which means that when an organization implements a differentiation strategy, the function representing the organization's core competency influences the stickiness of associated costs. Managers tend to be hesitant to cut costs in their core activity associated with direct patient care both due to the acute nature of those services to the organization's mission and due to the (greater) adjustment costs related to switching this capacity. As a contrast, it is substantially easier and less costly to adjust capacity degrees in outlying support services.

Porter's [1,23] generic business-level strategies, i.e., "overall cost leadership, differentiation, and focus", have turned into a major paradigm in the corporate business policy literature. Each of these represents "a fundamentally different approach to creating and sustaining a competitive advantage" since "usually a firm must make a choice between them or it will become stuck in the middle" [23]. Additionally, Porter stressed that "achieving cost leadership and differentiation are usually inconsistent because differentiation is usually costly" [23]. The two main business strategies—cost leadership and differentiation—require firms to establish matched cost structures. Achieving a successful differentiation strategy position requires that a firm pursue technology leadership or create a high degree of brand loyalty; differentiators must invest considerable resources in establishing this specialized ability. Consequently, when the market is in a slump, differentiators are reluctant to reduce these slack resources, which are useless for other firms but highly expensive to construct. On the contrary, cost leadership is used primarily to gain an advantage over competitors by reducing operation costs below those of others in the same industry, resulting in a lean cost structure and low adjustment costs. Consequently, the choice of business strategy may affect the cost structure as well as the cost stickiness.

In addition, governments tend to interfere in state-owned firms' decision-making procedures and demand corporate activities, which can be desirable from the socio-political view. For instance, in order to secure political support, politicians can request state-owned firms to avoid layoffs to mitigate unemployment rates. The varied purposes of state-owned firms, too, make it more difficult to monitor managerial behaviors, leading to larger managerial discretion and to the self-interest pursuit via empire-building behaviors. Not only state intervention but also managers' self-interests hinder them from laying employees off or cutting off investment when sales decrease, which may lead to greater cost stickiness. However, it is not clear how the interaction of business strategy and state ownership affects the cost stickiness.

Using the longitudinal panel data from listed companies in China from 2002 to 2015, our results support our predictions and show a significant relationship between business strategy and cost stickiness. First, different business strategies lead to different cost behaviors. The cost stickiness of choosing a differentiation strategy is higher than that of choosing a low-cost strategy. Second, different management expectations affect cost stickiness. Optimistic expectations will increase cost stickiness while pessimistic expectations reduce cost stickiness. Third, management expectations can adjust the relationship between corporate strategy and cost stickiness. If management expectations tend to be optimistic, the cost stickiness is higher with a differentiation strategy than with a low-cost strategy. If management expectations tend to be pessimistic, then cost stickiness is higher with a low-cost strategy than with a differentiation strategy. Finally, state-owned equity affects the extent of the effect of a differentiation strategy on cost stickiness. State-owned firms, which receive more GCAs than non-state-owned firms, have stronger cost stickiness than non-state-owned firms, even if both categories of firms use more differentiation strategy.

By linking three kinds of research literature, i.e., OT and market competition (MC) theory from management studies and cost management from the accounting research literature, our contributions are threefold. Firstly, we deliver the attestation that firms that follow dissimilar corporate strategies indeed present dissimilar degrees of cost stickiness, which extends the literature of cost stickiness in search through whether the corporate strategy is a basal determinant of earnings management. Secondly, although previous accounting studies have investigated corporate strategy as a determinant of compensation [24], budgetary usage [25], accounting control systems [26], and in the concurrent study as a determinant of tax aggressiveness [27] and financial reporting and auditing [28], this paper contributes to this stream of literature by providing attestation that corporate strategy has an even wider application to cost management than previously considered. Finally, this study shows how the interaction of business strategy and property will impact cost stickiness, which extends the literature of both property theory and cost management.

The remainder of this paper is as follows. Section 2 discusses the theoretical background and hypotheses development. Section 3 presents the research methodology and data. Section 4 illustrates empirical results, and Section 5 concludes this paper.

## 2. Theory and Hypotheses

### 2.1. Theoretical Background and Literature Review

The traditional cost behavior models, built-up in the accounting research literature, make a difference between variable and fixed costs concerning changes in the volume of activities. Variable costs tend to predict an increase by 1 percent for a 1 percent growth in activity and a decrease by 1 percent for an equal cutback in activity while fixed costs tend not to vary [29]. However, cost stickiness is the asymmetrical behavior of costs depending on the direction of the sales change. Meanwhile, Noreen and Soderstrom [30] argue the asymmetric cost behavior possibility as the ‘traditional belief’, recent studies provide proves that cost changes tend not to be inevitably proportional or even symmetric to changes in sales volume, yet to exhibit “stickiness”. In their influential study, Anderson et al. [3] build on the results of Noreen and Soderstrom [30,31] and empirically address the question of whether the relation of cost and volume depends on the direction of activity changes. They suggest a substitutable cost behavior model that makes the purpose of giving an explanation of the differentiated reactions to ascending and descending changes in sales activity. In the model, cost stickiness’s cause is established by two observations. Firstly, substantial costs increase since managers make their decisions for deliberate resource commitments. Secondly, switching committed resource degrees tend to be costly since it necessitates suffering resource adjustment costs, e.g., hiring and lay-off of employees, or disposal/installation costs for apparatus. They claim that as sales decline, managers would have a favor for retaining certain extents of excess capacity costs rather than to reduce the SG&A costs instantly and make and increase on the resources back at a subsequent time if sales bounce back in the future.

Anderson et al. [3] and following studies emphasize the economic and agency drivers and behavioral sources for cost stickiness relatively recently. Firstly, diverse literature affirm the adjustment cost explanation of sticky costs based on empirical tests from proves of the association between the adjustment cost degree and the cost stickiness degree by utilizing dissimilar empirical adjustment proxies. Based on the data of hospital, Balakrishnan and Gruca [16] argue higher cost stickiness in the services for patients relative to support services because of higher adjustment costs in the core activities. Banker et al. [32] utilize the legislative provisions for employment protection in disparate countries as a proxy for labor adjustment costs and argue a statistically and economically significant relationship between cost stickiness at the company level and the employment security regulation strictness.

In addition, cost stickiness tends to be affected by managers' expectations. If sales have decreased in that period, but managers predict sales to be rebounded subsequently, they could abide by the supplemental capacities rather than suffer the adjustment costs of degrading and then re-adjusting the resources subsequently when sales augment anew. Empirical investigations for the managers' expectations for subsequent sales, as one of the sources for cost stickiness, are conducted. Anderson et al. [3] utilize revenue decrease in an anterior period and gross domestic product (GDP) excrescence as a proxy for managers' optimism. As predicted, they affirm the effect of managerial expectations for subsequent sales on the extent of cost stickiness. Using growth and recession industries to proxy with the optimism and pessimism, Banker et al. [6] find the cost stickiness of optimistic managers is stronger than that of pessimistic managers.

While adjustment costs and managerial expectations are the economic determinants of cost stickiness, managerial incentives have, too, been exhibited to trigger cost stickiness. Managers tend to draw private benefits out from deliberately postponing or abstaining from the abatement of committed resources, e.g., employees and given fixed assets, whilst it could be in the corporate attention to reduce those resources. Chen et al. [9] reveal that agency costs associated with empire-building is likely to bring managers on to abide by to exceed resources and augment cost stickiness. These empire-building incentives are driven, at least in part, by incentive-based compensation. Kama and Weiss [8] reveal that when managers encounter incentives to dodge losses or earnings decrement or to face financial analysts' earnings predictions, these managers cause descending acclimation of slack resources for sales abatements to happen faster. Those thoughtful decisions reduce the extent of cost stickiness.

## 2.2. Hypotheses Development

The different forms of corporate differentiation strategy mainly include customizing differentiated products according to consumer demand differences and maintaining product-specific technology and performance characteristics, among other forms [33]. Companies carry out specialized investments because they implement differentiation strategy, which gradually shapes the enterprise's intangible assets or specific assets in accounting. On the one hand, these specific assets enhance the companies' core competitiveness. However, companies are not free to sell or transfer all of their dedicated resources, such as their researchers' knowledge, workers with specialized production capacity, employees who are proficient in product marketing, and managers who are familiar with corporate culture and practices, as well as the construction of specialized machinery and equipment [34,35]. Therefore, during a sales downturn, companies following a differentiation strategy will face higher adjustment costs. These companies cannot cut costs; therefore, they will have to bring these remaining resources into the next period of production until the adjustment costs surpass the costs of the balance brought about by cutting resources. In addition, because the development of specialized assets requires considerable time due to investment and construction, and because it is difficult to make a one-time purchase in the factor market, the specialized assets formed by enterprise investment in the supply side lead to lack of flexibility, which is actually the threshold of a differentiation strategy. Both product innovation and service differentiation strategies require a large range of business cost adjustments. Once business shrinks and pre-research & development (R&D) investments cannot be efficiently digested, corporate cost control will be greatly impacted. When corporate sales decline, companies that choose differentiation strategy

are faced with higher upward adjustment costs rather than cutting their investment, which means that companies following differentiation strategy may show higher cost stickiness than others.

The low-cost strategy reduces operating costs through the implementation of the effective scale, which makes costs lower than competitors' costs. Companies that choose a low-cost strategy will do more to control costs in order to provide their products and services at a low price. Porter [1] argues that companies must build efficient, large-scale production facilities, go all-out to reduce costs, tightly control costs, and manage R&D, service, marketing, and advertising expenses as well as other costs. Therefore, when current sales decline, a low-cost strategist tends to cut costs in a timely manner in order to maintain or increase its market share. Therefore, companies that choose a low-cost strategy have lower adjustment costs and a more flexible cost structure. In summary, when corporate sales decline, companies implementing differentiation strategy will maintain the remaining production capacity, while those with low-cost strategy will quickly cut investments or reduce costs. Therefore, we test the following hypothesis:

**Hypothesis 1 (H1):** *Ceteris paribus, the cost stickiness of firms using a differentiation strategy, will be higher than that of firms using a low-cost strategy.*

The managerial expectation is generally divided into two states, optimism and pessimism. In the case of optimism, there may be two conditions. First, if future sales maintain growth and managerial expectation is optimistic, management will tend to expand the scale of production and increase the commitment to resources. Second, if the future sales volume declines, managers will consider this to be a temporary adjustment and will choose not to reduce a variety of committed resources because reducing committed resources will lead to higher adjustment costs [36]. As a result, cost stickiness is much higher when sales decline than when sales are meeting expectations. However, if sales continue to decline, managers will become pessimistic. Under such conditions, managers will significantly reduce investment and production capacity, which will lead to cost anti-stickiness. Therefore, our second hypothesis is:

**Hypothesis 2 (H2):** *Ceteris paribus, managers' optimism will result in cost stickiness, while managers' pessimism will result in cost anti-stickiness.*

Since management expectations may affect cost stickiness, it is possible to adjust the relationship between corporate strategy and cost stickiness. Based on the two-period sales situation, we analyze managers' investment decision-making behavior in firms that use different types of strategy. First, assuming that sales in year  $t-1$  increase, while sales in year  $t$  decrease, managers may still remain optimistic. In a firm using differentiation strategy, due to the characteristics of asset exclusivity and higher adjustment costs, managers will not reduce the scale of production but instead forward the excess production capacity to the next period. Therefore, companies that use differentiation strategy show higher cost stickiness than others. Firms that use low-cost strategy need to keep low adjustment costs and a flexible cost structure. In circumstances where manager expectations are optimistic, cost stickiness for companies using low-cost strategy will be much smaller than that of companies using differentiation strategy when current sales decline.

However, with two successive periods in which sales decline, managers may become pessimistic and may reduce the resources committed. Unlike in optimistic scenarios, in these pessimistic scenarios, companies that choose differentiation strategy will cut the excess capacity on a large scale. It is difficult to sell existing production capacity in a timely manner because asset exclusivity is too strong; in other words, valuable resources among companies that implement differentiation strategy may be less valuable for other businesses. Therefore, using differentiation strategy may lead to lower-cost anti-stickiness. For companies that choose a low-cost strategy, their lower adjustment cost and cost structure will lead them to significantly reduce their resource investment in order to reduce costs.

Therefore, when managers have pessimistic expectations, companies that have chosen a low cost strategy will exhibit stronger cost anti-stickiness. Thus, we test the following hypothesis:

**Hypothesis 3 (H3):** *Ceteris paribus, if management is optimistic, firms that choose differentiation strategy have higher cost stickiness than those who choose low-cost strategies (H3a); Ceteris paribus, if management is pessimistic, firms that choose a low-cost strategy have higher cost anti-stickiness than those who choose a differentiation strategy (H3b).*

Heterogeneous ownership types deliver differential incentives for owners to make commitments in cost-controlling activities, since ownership type commands how these activities' benefits are augmented to owners [37–39], resulting in differential cost behaviors of companies with differential owners [40,41].

Agency cost is the main reason behind cost stickiness. We argue that the different agency costs between state-owned firms and non-state-owned firms in China will affect managers' decisions when facing demand uncertainty. Due to differences in the appointment of managers, performance contracts, and management's goals, there should be greater agency conflict in state-owned firms than in non-state-owned firms, which would, therefore, result in higher cost stickiness in the former than in the latter.

Additionally, state-owned firms have a more social responsibility and more protection for employees, which leads to an inelastic cost structure. To be specific, when implementing differentiation strategy, which requires specialized equipment and employees, managers in state-owned firms find it more difficult to cut down costs by layoffs or selling specialized equipment than managers in non-state-owned firms do. Therefore, cost stickiness in the former is higher than in the latter. Holzhaecker et al. [42] investigated the impact of fixed-price regulation on the cost structures in the healthcare industry and found that a change to fixed-price regulation imposes cost pressures and increases operational risk because the firms' revenue function is much less related to the cost function. In response, firms will make two broad changes to their cost structures. The first is to increase cost elasticity, and the second is to decrease the extent of cost asymmetry.

Our context of emerging market firms, particularly Chinese firms, is in line with Ramamurti and Hillemann's [43], (p. 40) argument that "[t]he government is not just another institution – it is a key institution that shapes many other institutions in the country ... that affect the international competitiveness of firms" since these firms are responsive to cost elasticity and cost asymmetry. Therefore:

**Hypothesis 4 (H4):** *Ceteris paribus, compared to non-state-owned firms, a differentiation strategy in state-owned firms has more impact on cost stickiness.*

### 3. Research Methodology and Data

#### 3.1. Econometrics Specification

Most studies in the literature adopt the cost stickiness model developed by Anderson et al. [3], which is based on a piecewise-linear relation (A piecewise linear function is a function defined on an (possibly unbounded) interval of real numbers, in a way that there is a collection of intervals on each of which the function is an affine function [44]. An affine function represents vector-valued functions of the form, such as  $f(x_1, \dots, x_n) = A_1x_1 + \dots + A_nx_n + b$  [45]. The coefficients can be scalars or dense or sparse matrices. The constant term is a scalar or a column vector.) between logarithm changes in costs and concurrent logarithm changes in sales.

$$\ln\left(\frac{cost_t}{cost_{t-1}}\right) = \beta_0 + \beta_1 \ln\left(\frac{Rev_t}{Rev_{t-1}}\right) + \beta_2 Dec \cdot \ln\left(\frac{Rev_t}{Rev_{t-1}}\right) + \varepsilon_t \quad (1)$$

where  $\ln\left(\frac{cost_t}{cost_{t-1}}\right)$  is the logarithm change in costs of firm  $i$  in year  $t$ ,  $\ln\left(\frac{Rev_t}{Rev_{t-1}}\right)$  is the logarithm change in sales revenue, the cost is the sum of selling, general and administrative (SG&A) costs, and operating cost.  $Rev$  is the sales revenues of firm  $i$  in year  $t$ .  $Dec$  is a dummy variable taking the value 1 if sales revenue decreases relative to it in the last year and zero otherwise, and  $\varepsilon$  is an error term.

The slope coefficient  $\beta_1$  approximates the percentage change in costs for a one percent sales increase, characterizing the relative importance of variable costs. The coefficient  $\beta_2$  captures the degree of asymmetry in cost response to sales decreases versus increases. Therefore,  $(\beta_1 + \beta_2)$  represents the extent of the change in costs with a one-unit decrease in sales. If a firm exhibits cost stickiness,  $\beta_2$  is expected to be negative because managers with optimistic expectations may not restrict slack resources as they believe the decreased sales will not last long, and the adjusted cost may exceed earnings due to the reduction of these slack resources. However, some companies with pessimistic managers may appear “anti-stickiness”. When managers initially realize that sales are declining and are pessimistic about subsequent sales, they will significantly cut back on costs when sales decrease in the current period, which makes  $\beta_2$  positive.

To test our hypothesis H1 and H4, we modified model (1) by adding a strategy variable and other control variables. Anderson et al. [3] argue that the macroeconomic environment, denoted by the economic growth, as well as firm-specific characteristics such as asset intensity (ratio of total assets to sales revenue) and employee intensity (ratio of number of employees to sales revenue), will impact the degree of cost stickiness.

$$\begin{aligned} \ln\left(\frac{cost_t}{cost_{t-1}}\right) = & \beta_0 + \beta_1 \ln\left(\frac{Rev_t}{Rev_{t-1}}\right) + \beta_2 Dec_t \cdot \ln\left(\frac{Rev_t}{Rev_{t-1}}\right) \\ & + \beta_3 Strategy_t \cdot \ln\left(\frac{Rev_t}{Rev_{t-1}}\right) + \beta_4 Dec_t \cdot \ln\left(\frac{Asset_t}{Rev_t}\right) \cdot \ln\left(\frac{Rev_t}{Rev_{t-1}}\right) \\ & + \beta_5 Dec_t \cdot \ln\left(\frac{Rev_t}{Rev_{t-1}}\right) \cdot \ln\left(\frac{Emp_t}{Rev_t}\right) + \beta_6 Dec_t \cdot Suc\_Dec_t \cdot \ln\left(\frac{Rev_t}{Rev_{t-1}}\right) \\ & + \beta_7 Dec_t \cdot GDP_t \cdot \ln\left(\frac{Rev_t}{Rev_{t-1}}\right) + \varepsilon_t \end{aligned} \quad (2)$$

where  $Strategy_t$  is the strategy position.  $Asset_t$ ,  $Emp_t$ , and  $GDP_t$  represent the total asset, the number of employees, and the growth rate of GDP in year  $t$ , respectively.  $Suc\_Dec_t$  is the successive sales revenue decrease for two years.

We also incorporate the strategy variable to investigate its indirect impact on the cost change for robustness as follows:

$$\begin{aligned} \ln\left(\frac{cost_t}{cost_{t-1}}\right) = & \beta_0 + \beta_1 \ln\left(\frac{Rev_t}{Rev_{t-1}}\right) + \beta_2 Strategy_t + \beta_3 Dec_t \cdot \ln\left(\frac{Rev_t}{Rev_{t-1}}\right) + \beta_4 Dec_t \\ & \cdot Strategy_t \cdot \ln\left(\frac{Rev_t}{Rev_{t-1}}\right) + \beta_5 Dec_t \cdot \ln\left(\frac{Asset_t}{Rev_t}\right) \cdot \ln\left(\frac{Rev_t}{Rev_{t-1}}\right) \\ & + \beta_6 Dec_t \cdot \ln\left(\frac{Rev_t}{Rev_{t-1}}\right) \cdot \ln\left(\frac{Emp_t}{Rev_t}\right) \\ & + \beta_7 Dec_t \cdot Suc\_Dec_t \cdot \ln\left(\frac{Rev_t}{Rev_{t-1}}\right) + \beta_8 Dec_t \cdot GDP_t \cdot \ln\left(\frac{Rev_t}{Rev_{t-1}}\right) + \varepsilon_t \end{aligned} \quad (3)$$

where  $Dec_t$  is a dummy variable and equals 1 if the sales revenue decreases in year  $t$  compared to  $t-1$ , and otherwise equals 0. Therefore,  $\beta_1$  in formula (2) and  $\beta_2$  in (3) measure the change of cost relative to the sales revenue increase of 1%; in other words, when sales increase by 1%, costs will rise by  $\beta_1\%$  in (1) or  $\beta_2\%$  in (2).  $(\beta_1 + \beta_2)$  represents the percentage of decrease in costs when sales decline 1 unit; when sales fall 1%, the costs go down  $(\beta_1 + \beta_2)\%$ . When costs exhibit stickiness, then  $\beta_2 > \beta_1 + \beta_2$  and  $\beta_1 < 0$ ; when costs exhibit anti-stickiness, then  $\beta_2 < \beta_1 + \beta_2$  and  $\beta_1 > 0$ . Based on H1,  $\beta_3$  in the model (2) and  $\beta_4$  in (3) capture the impact of strategy on cost stickiness. When these coefficients increase, the impact of differentiation strategy likewise increases. In that case, we expect these parameters to be negative. To test our H4, we divide the sample into two sub-samples, state-owned firms and non-state-owned firms. We then run regressions (2) and (3) within these two sub-samples and compare the magnitude of the main coefficients between them.

To test H2, H3a, and H3b, following Banker et al. [46], we construct a model to investigate the impact of strategy on cost stickiness under different managerial expectations:

$$\begin{aligned} \ln\left(\frac{\cos t_t}{\cos t_{t-1}}\right) = & \beta_0 + \beta_1^{PInc} \cdot I_{t-1} \cdot \ln\left(\frac{Rev_t}{Rev_{t-1}}\right) + \beta_2^{PInc} \cdot Dec_t \cdot I_{t-1} \cdot \ln\left(\frac{Rev_t}{Rev_{t-1}}\right) \\ & + \beta_3^{PInc} \cdot Dec_t \cdot I_{t-1} \cdot Strategy_t \cdot \ln\left(\frac{Rev_t}{Rev_{t-1}}\right) + \beta_1^{PDec} \\ & \cdot D_{t-1} \cdot \ln\left(\frac{Rev_t}{Rev_{t-1}}\right) + \beta_2^{PDec} \cdot Dec_t \cdot I_{t-1} \cdot \ln\left(\frac{Rev_t}{Rev_{t-1}}\right) \\ & + \beta_3^{PDec} \cdot Dec_t \cdot Dec_{t-1} \cdot Strategy_t \cdot \ln\left(\frac{Rev_t}{Rev_{t-1}}\right) + \varepsilon_t \end{aligned} \quad (4)$$

where  $I_{t-1}$  and  $Dec_{t-1}$  are dummy variables.  $I_{t-1}$  equals 1 when sales increase in year t-1 and otherwise 0.  $Dec_{t-1}$  takes the value 1 if sales decrease in year t-1 and otherwise 0. In model (4),  $\beta_1^{PInc}$  captures the percentage of cost increase when sales go up 1% in an optimistic management scenario.  $(\beta_1^{PInc} + \beta_2^{PInc})$  represents the percentage of cost decrease if sales decline 1 unit in an optimistic management scenario.  $\beta_1^{PDec}$  measures the percentage of cost increase when sales increase 1% in a pessimistic management scenario.  $(\beta_1^{PDec} + \beta_2^{PDec})$  represents the percentage of cost decrease if sales decline 1 unit in a pessimistic management scenario. H2 expects that a firm will exhibit cost stickiness if managers are optimistic about the future. Therefore, if  $\beta_1^{PInc} > (\beta_1^{PInc} + \beta_2^{PInc})$ , then  $\beta_2^{PInc} < 0$ ; in other words,  $\beta_2^{PInc}$  is expected to be significantly negative while costs will appear anti-stickiness under a pessimistic scenario in which  $\beta_1^{PDec} < (\beta_1^{PDec} + \beta_2^{PDec})$  and then  $\beta_2^{PDec} > 0$  and  $\beta_2^{PDec}$  is expected to be significantly positive. If  $\beta_1^{PInc}$  and  $\beta_1^{PDec}$  are significantly positive, we anticipate  $\beta_1^{PInc} > \beta_1^{PDec}$ , which implies that the managers with different expectations about the future have different preferences regarding investment. Under H3a and H3b, we expect  $\beta_3^{PInc}$  and  $\beta_3^{PDec}$  to be significantly negative.

### 3.2. Variables and Data

#### 3.2.1. Variables

There are essentially two ways to measure the cost stickiness, a direct way, and an indirect way. The direct way was developed by Weiss [47] and adopted by Kama and Weiss [8], Balakrishnan et al. [48], and others. This method measures cost stickiness on a rolling basis as the difference between the mean of the quarterly cost function slope under upward adjustment made over quarters t-8 through t and the mean of the quarterly cost function slope under downward adjustments made over the same period. The stickiness measure reflects the difference between the rate of cost decreases for quarters with decreasing sales, and the rate of cost increases for quarters with increasing sales. If costs are sticky, meaning that they decrease less when sales fall than they increase when sales rise by equivalent amounts, then the stickiness variable will have a positive value, with a higher value representing stickier cost behavior.

However, most prior literature has adopted the indirect measurement of cost stickiness, which uses the percentage of cost change. Considering that cost change might vary with many other factors such as a managerial decision or cost management, we intend to use the percentage of the sale and administration cost change along with the percentage of operating cost change to measure cost stickiness.

The first dependent variable is a business strategy (Strategy). Existing literature identify business strategies using two main methods. The first method is the questionnaire that surveys corporate strategy. For example, Dess and Davis [49] used a questionnaire to identify a firm's strategy. On the other hand, some articles use existing data to construct an index that allows them to recognize a firm's strategy position. In our paper, following Bentley et al. [28], we construct a discrete Strategy composite measure, which proxies for the organization's business strategy. Higher Strategy scores represent companies with differentiation strategies and lower scores represent companies with low cost strategies. Similar to Bentley et al. [28], we utilize the following features for the composite measure for Strategy, i.e., first, "the ratio of research and development (R&D) to sales", second, "the ratio of employees to sales", third, "a historical growth measure (one-year percentage change in total sales)",

fourth, “the ratio of marketing (SG&A) to sales”, fifth, “a measure of employee fluctuations (standard deviation of total employees)”, and, sixth, “a measure of capital intensity (net PPE scaled by total assets)”, respectively.

The second dependent variable is state-owned enterprises (SOEs). Following the literature such as Hall [40], Anderson et al. [3], the dummy variable SOE equivalent to 1 if the government owns a certain percentage of the firm’s shares while 0 otherwise.

And then following the Anderson et al. [3], we use a dummy variable Dec that equals 1 if sales decrease in the current year and 0 otherwise to define the sales decrease and use Suc\_Dec<sub>t</sub> which equals 1 if sales revenue declined in the preceding period; otherwise 0 to define the preceding sales revenue decline.

We, too, include control variables common in the literature which may affect the cost stickiness such as (1) China annual real growth rate (GDP) captured by the effect of macroeconomic growth, (2) employee intensity (Emp) represented by the ratio of the number of employees to sales revenue, (3) asset intensity (Cap) captured by the ratio of assets to sales revenue, (4) industrial effect (Indy) and year effect (Year). These control variables are commonly used in many studies, which indicate they have effects on cost stickiness. All the variables are defined in Table 1.

**Table 1.** Variable definitions.

Variable	Variable Definition
Independent variables	$\log\left(\frac{SGA_{i,t}}{SGA_{i,t-1}}\right)$ The logarithm of change in selling, general and administrative (SG&A) costs
	$\ln(Opex_t / Opex_{t-1})$ The logarithm of change in operating costs Bentley, Omer and Sharp’s [28] strategy measures
Dependent variables	$\ln\left(\frac{Rev_t}{Rev_{t-1}}\right)$ Logarithm of change in sales revenue
	Dec <sub>t</sub> Dummy variable, equals 1 when the sales of a firm in year <i>t</i> decrease compared to the sales in the prior year <i>t</i> -1; otherwise, 0
	Suc_Dec <sub>t</sub> Dummy variable, equals 1 for firm-year observations when sales revenue declined in the preceding period; otherwise, 0.
	SOEs Dummy variable SOE equals 1 if the government owns a certain percentage of the firm’s shares, while 0 otherwise.
Control variables	Emp Defined as the ratio of the number of employees to sales revenue
	Cap Defined as the ratio of the total assets to sales revenue.
	GDP Defined as the annual growth rate of China’s real gross domestic product
	IND Industrial dummy variable for 72 three-digit SIC industries

### 3.2.2. Sample Selection and Data Sources

This paper uses annual data from the Wind database and the China Stock Market & Accounting Research (CSMAR) database nonfinancial listed firms for the years 2002–2015. In line with Borisova et al. [50], the present paper defines direct state ownership to involve ownership by provincial or municipal governments, such as non-central government entities, and entities built-up particularly to maneuver the central government’s funds. In doer to secure the accurateness and validity for our data, we collect information regarding the companies’ state shareholders from annual reports as well as websites. The verification proceeding spans all available annual reports for all the firms. If there is no information regarding corporate shareholders, this paper depends on the CSMAR data. Following Anderson et al. [51] and Banker et al. [52], the paper delete firm-year data s with missing, zero, or negative values for revenues, labor costs and total assets, as well as firms with sales increase greater than 50% or decrease more than 33%, since such large changes may indicate mergers and divestitures [52]. Moreover, we delete firms with missing values regarding state ownership and require that firms utilize the same reporting standard within two previous years. Lastly, continuous variables are winsorized at the 1% and 99% levels. As a result, lastly, we obtain 20,945 firm-year observations.

Table 2 reports the descriptive statistics of our main variables. The average SG&A (Selling, General and Administrative Expenses) cost is 17.54% of sales, with a standard deviation of 18.29% and a median of 12.68%. The average operating cost is 92.35% of sales revenue, with a standard deviation of 19.92% and a median of 92%. Average Dec is 0.265, which implies that 26.5% of firms' sales experiences decrease while most firms gain an increase in sales between Year 2002 and 2015. The average strategy score is 18 (the maximum is 30 and the minimum equals 6), indicating that most companies choose differentiation strategy.

**Table 2.** Descriptive statistics.

Variable	Mean	P50	Sd	Min	Max
Sales revenue	64.80	11.50	585.00	0.00	28400.00
Selling, general, and administrative costs	5.36	1.40	34.40	0.01	1480.00
Operating costs	58.00	10.20	504.00	0.02	25600.00
SG&A costs as a percentage of sales revenue	17.54	12.68	18.29	1.664	131.2
Operating costs as a percentage of sales revenue	92.35	92	19.92	47.22	212.5
$\ln\left(\frac{Rev_t}{Rev_{t-1}}\right)$	0.128	0.122	0.346	-1.121	1.55
$\log\left(\frac{SGA_{it}}{SGA_{i,t-1}}\right)$	0.145	0.135	0.317	-0.997	1.343
$\ln(Opex_t/Opex_{t-1})$	0.139	0.128	0.32	-0.978	1.398
Strategy	18	18	4.596	6	30
Dec	0.265	0	0.441	0	1

Note: Sales and SG&A costs are in millions of RMB.

#### 4. Empirical Results

We first investigate the effect of strategy on cost stickiness. We regress our model using two alternative dependent variables: SA&G and Cost. In Table 3, we estimate three different models using the GLS method (In order to avoid estimation biases, we used the generalized least squares (GLS) regression [53] to examine our hypotheses regarding the pattern of the data. Our data have the pattern of a time-series database, which violates the traditional ordinary least squares (OLS) assumptions, including homoscedasticity and no autocorrelation of the error term assumption [54]. In this case, OLS and weighted least squares can be statistically inefficient or even inferred misleading). The results are listed in Column I through Column III. The estimated result in Column I is based on the model used by Anderson et al. [3], which shows a  $\beta_1$  of 0.427 and a  $\beta_2$  of -0.211. The results are similar to Anderson et al. [3], Zheng and Hao [55], and Lei et al. [56]. Its economic meaning is that SA&G costs will increase by 43.7% when sales are up 1%, while they decrease only by 21.6% (equals 43.7% minus 21.1%) when sales are down 1%. The results in Column II and III are for Models (2) and (3). The strategy coefficient  $\beta_3$  is -0.015 and -0.012, both significant at 5% and 10%, respectively. This supports our first hypothesis that cost stickiness increases with the level of a differentiation strategy. We further regress Models (2) and (3) using fixed effects regression (A fixed effects regression model is a statistical model in which the model parameters are fixed or non-random quantities [57]. Random effects and mixed regression models in which all or some of the model parameters are considered as random variables are contrasting with this fixed effect regression model [57]) in Column IV and V. The results are similar to GLS estimates, but the coefficients are slightly smaller. The cost stickiness coefficient  $\beta_2$  is -0.359 and -0.430, both significant at 5% and 10%, respectively. The strategy coefficient  $\beta_3$  is -0.017 and -0.015, both significant at 1%. Once again, these results support H1. In this study, the GLS and

fixed effects regression procedures were performed in STATA 15 by using the program's xt family of commands, which are suitable for handling longitudinal panel data.

$$\text{Model I: } \ln\left(\frac{\text{cost}_t}{\text{cost}_{t-1}}\right) = \beta_0 + \beta_1 \ln\left(\frac{\text{Rev}_t}{\text{Rev}_{t-1}}\right) + \beta_2 \text{Dec} \cdot \ln\left(\frac{\text{Rev}_t}{\text{Rev}_{t-1}}\right) + \varepsilon_t \quad (5)$$

$$\begin{aligned} \text{Model II: } \ln\left(\frac{\text{cost}_t}{\text{cost}_{t-1}}\right) = & \beta_0 + \beta_1 \ln\left(\frac{\text{Rev}_t}{\text{Rev}_{t-1}}\right) + \beta_2 \text{Dec}_t \cdot \ln\left(\frac{\text{Rev}_t}{\text{Rev}_{t-1}}\right) + \\ & \beta_3 \text{Strategy}_t \cdot \ln\left(\frac{\text{Rev}_t}{\text{Rev}_{t-1}}\right) + \beta_4 \text{Dec}_t \cdot \ln\left(\frac{\text{Asset}_t}{\text{Rev}_t}\right) \cdot \ln\left(\frac{\text{Rev}_t}{\text{Rev}_{t-1}}\right) + \\ & \beta_5 \text{Dec}_t \cdot \ln\left(\frac{\text{Rev}_t}{\text{Rev}_{t-1}}\right) \cdot \ln\left(\frac{\text{Emp}_t}{\text{Rev}_t}\right) + \beta_6 \text{Dec}_t \cdot \text{Suc\_Dec}_t \cdot \ln\left(\frac{\text{Rev}_t}{\text{Rev}_{t-1}}\right) + \\ & \beta_7 \text{Dec}_t \cdot \text{GDP}_t \cdot \ln\left(\frac{\text{Rev}_t}{\text{Rev}_{t-1}}\right) + \varepsilon_t \end{aligned} \quad (6)$$

$$\begin{aligned} \text{Model III: } \ln\left(\frac{\text{cost}_t}{\text{cost}_{t-1}}\right) = & \beta_0 + \beta_1 \ln\left(\frac{\text{Rev}_t}{\text{Rev}_{t-1}}\right) + \beta_2 \text{Strategy}_t + \beta_3 \text{Dec}_t \cdot \ln\left(\frac{\text{Rev}_t}{\text{Rev}_{t-1}}\right) + \\ & \beta_4 \text{Dec}_t \cdot \text{Strategy}_t \cdot \ln\left(\frac{\text{Rev}_t}{\text{Rev}_{t-1}}\right) + \beta_5 \text{Dec}_t \cdot \ln\left(\frac{\text{Asset}_t}{\text{Rev}_t}\right) \cdot \ln\left(\frac{\text{Rev}_t}{\text{Rev}_{t-1}}\right) + \\ & \beta_6 \text{Dec}_t \cdot \ln\left(\frac{\text{Rev}_t}{\text{Rev}_{t-1}}\right) \cdot \ln\left(\frac{\text{Emp}_t}{\text{Rev}_t}\right) + \beta_7 \text{Dec}_t \cdot \text{Suc\_Dec}_t \cdot \ln\left(\frac{\text{Rev}_t}{\text{Rev}_{t-1}}\right) + \\ & \beta_8 \text{Dec}_t \cdot \text{GDP}_t \cdot \ln\left(\frac{\text{Rev}_t}{\text{Rev}_{t-1}}\right) + \varepsilon_t \end{aligned} \quad (7)$$

**Table 3.** The relationship between strategy position and cost stickiness: using the logarithm of the change in SG&A (Selling, General and Administrative Expenses) as a dependent variable.

D.V	GLS			Fixed Effects	
	I	II	III	IV	V
Ln(Rev <sub>t</sub> /Rev <sub>t-1</sub> )	0.427*** (26.66)	0.413*** (47.00)	0.409*** (45.93)	0.423*** (42.69)	0.418*** (41.20)
Dec*Ln(Rev <sub>t</sub> /Rev <sub>t-1</sub> )	-0.211*** (-7.66)	-0.377* (-1.79)	-0.434** (-2.06)	-0.359* (-1.75)	-0.430* (-1.85)
Dec*Strategy *		-0.015***	-0.012***	-0.017***	-0.015***
Ln(Rev <sub>t</sub> /Rev <sub>t-1</sub> )		(-4.25)	(-3.32)	(-4.52)	(-3.76)
Dec*Asset*		-0.036**	-0.037***	-0.042***	-0.043***
Ln(Rev <sub>t</sub> /Rev <sub>t-1</sub> )		(-2.57)	(-2.66)	(-2.67)	(-2.72)
Dec*Emp*		-0.037***	-0.038***	-0.035***	-0.038***
Ln(Rev <sub>t</sub> /Rev <sub>t-1</sub> )		(-3.04)	(-3.11)	(-2.62)	(-2.80)
Dec*Suc_Dec*		0.112***	0.112***	0.125***	0.127***
Ln(Rev <sub>t</sub> /Rev <sub>t-1</sub> )		(4.89)	(4.91)	(5.09)	(5.16)
Dec*Gdp		-0.001*	-0.001*	-0.001*	-0.001*
		(-1.71)	(-1.77)	(-1.79)	(-1.76)
Strategy			0.001*** (3.07)		0.002** (2.45)
_cons	0.077*** (24.80)	0.084*** (25.78)	0.059*** (6.71)	0.074*** (20.30)	0.036** (2.29)
N	20945	20945	20945	20945	20945
r2_a	0.154	0.160	0.160	0.036	0.036
Industries effect	No	No	No	Yes	Yes
Year effect	No	No	No	Yes	Yes

Notes: t-statistics in parentheses. \*, \*\*, \*\*\* indicate significance at 10%, 5%, and 1% levels, respectively, in two-tailed tests. The sample is collected from China Stock Market & Accounting Research (CSMAR) database from 2002–2015 winsorized at the 1% and 99%. The industries effect means industry-fixed effects (with industry dummies). Following the previous literature such as Banker and Chen [22], Kitching et al. [58], Li and Zheng [59], and Prabowo et al. [60], we use the Standard Industrial Classification (SIC) to control for industry effects on firms' cost behavior across all firms in each industry. To be specific, the SIC3 industry classification used for industry fixed effects is based on three-digit SIC codes. Seventy-two industries in total are controlled across all models such as A01 professional technical service industry, B11 agriculture, C22 furniture manufacturing, E48 power, heat production and supply industry, and so on. Also, the dependent variable is the logarithm of change in SG&A (Selling, General and Administrative Expenses). Three different models are estimated using the generalized least squares (GLS) regression method, and the results are listed in Column I through III. To handle fixed effects, we further regress Models II and III using generalized least squares (GLS) and fixed effects regression with the results in Columns IV and V.

Considering that SA&G costs fall under the category of period expenses that are sensitive to the volume of business activities, we then re-examine the association between strategy position and cost stickiness of Model (2) and Model (3) using the logarithm of operating costs as the dependent variable. We use both GLS and fixed effect regressions and report our results in Table 4. The coefficient of strategy is  $-0.008$  and  $-0.01$ , both significant at 5% under GLS regression. The coefficient becomes slightly smaller at  $-0.012$  and  $-0.013$ , respectively. Both are significant at 1%. These results imply that the differentiation strategy in the first quartile is 7.2% ( $0.012 \times 6 = 0.072$ ) in Column IV, or 7.8% ( $0.013 \times 6 = 0.078$ ) in Column V, greater than in the third quartile. The difference in cost stickiness between the first quartile and the third quartile is up to 0.288 (equals  $0.012 \times 24$ ) in column IV, or 0.312 ( $0.013 \times 24$ ) in Column V, which further supports our first hypothesis. The signs of other variables are consistent with those in Table 3.

**Table 4.** The relationship between strategy position and cost stickiness: using the logarithm of the change in the operating costs as a dependent variable.

D.V	GLS			Fixed Effects	
	I	II	III	IV	V
Ln(Rev <sub>t</sub> /Rev <sub>t-1</sub> )	0.872*** (104.22)	0.858*** (93.06)	0.860*** (95.65)	0.859*** (91.01)	0.861*** (92.25)
Dec*Ln(Rev <sub>t</sub> /Rev <sub>t-1</sub> )	-0.117*** (-6.75)	-0.646*** (-3.02)	-0.621*** (-2.91)	-0.731*** (-3.23)	-0.702*** (-3.10)
Dec*Strategy *		-0.008**	-0.010**	-0.012***	-0.013***
Ln(Rev <sub>t</sub> /Rev <sub>t-1</sub> )		(-2.19)	(-2.45)	(-2.90)	(-3.09)
Dec*Asset*		-0.035**	-0.034**	-0.030	-0.029
Ln(Rev <sub>t</sub> /Rev <sub>t-1</sub> )		(-2.01)	(-1.98)	(-1.60)	(-1.58)
Dec*Emp*		-0.061***	-0.061***	-0.071***	-0.070***
Ln(Rev <sub>t</sub> /Rev <sub>t-1</sub> )		(-4.68)	(-4.66)	(-5.08)	(-5.02)
Dec*Suc_Dec*		-0.045*	-0.045*	-0.027	-0.028
Ln(Rev <sub>t</sub> /Rev <sub>t-1</sub> )		(-1.89)	(-1.90)	(-1.15)	(-1.18)
Dec*Gdp		-0.000***	-0.000***	-0.000	-0.000
		(-3.05)	(-3.01)	(-1.08)	(-1.06)
Strategy			-0.001***		-0.001*
			(-2.69)		(-1.81)
_cons	0.019*** (12.39)	0.027*** (13.82)	0.038*** (7.94)	0.024*** (10.62)	0.039*** (4.42)
N	20947	20945	20945	20945	20945
r2_a	0.806	0.813	0.813	0.805	0.805
Industries effect	No	No	No	Yes	Yes
Year effect	No	No	No	Yes	Yes

Notes: t-statistics in parentheses. \*, \*\*, \*\*\* indicate significance at 10%, 5%, and 1% levels, respectively, in two-tailed tests. The sample is collected from CSMAR database from 2002–2015 winsorized at the 1% and 99%.

The dependent variable is the logarithm of the change in operating costs. Three different models are estimated using the GLS regression method and the results are presented in Column I through III. To handle fixed effects, we further regress Models II and III using GLS and fixed effects regression with results reported in Column IV and V.

$$\text{Model I: } \ln\left(\frac{\text{cost}_t}{\text{cost}_{t-1}}\right) = \beta_0 + \beta_1 \ln\left(\frac{\text{Rev}_t}{\text{Rev}_{t-1}}\right) + \beta_2 \text{Dec} \cdot \ln\left(\frac{\text{Rev}_t}{\text{Rev}_{t-1}}\right) + \varepsilon_t \quad (8)$$

$$\begin{aligned} \text{Model II: } \ln\left(\frac{\text{cost}_t}{\text{cost}_{t-1}}\right) = & \beta_0 + \beta_1 \ln\left(\frac{\text{Rev}_t}{\text{Rev}_{t-1}}\right) + \beta_2 \text{Dec}_t \cdot \ln\left(\frac{\text{Rev}_t}{\text{Rev}_{t-1}}\right) + \\ & \beta_3 \text{Strategy}_t \cdot \ln\left(\frac{\text{Rev}_t}{\text{Rev}_{t-1}}\right) + \beta_4 \text{Dec}_t \cdot \ln\left(\frac{\text{Asset}_t}{\text{Rev}_t}\right) \cdot \ln\left(\frac{\text{Rev}_t}{\text{Rev}_{t-1}}\right) + \\ & \beta_5 \text{Dec}_t \cdot \ln\left(\frac{\text{Rev}_t}{\text{Rev}_{t-1}}\right) \cdot \ln\left(\frac{\text{Emp}_t}{\text{Rev}_t}\right) + \beta_6 \text{Dec}_t \cdot \text{Suc\_Dec}_t \cdot \ln\left(\frac{\text{Rev}_t}{\text{Rev}_{t-1}}\right) + \\ & \beta_7 \text{Dec}_t \cdot \text{GDP}_t \cdot \ln\left(\frac{\text{Rev}_t}{\text{Rev}_{t-1}}\right) + \varepsilon_t \end{aligned} \quad (9)$$

$$\begin{aligned}
 \text{Model III: } \ln\left(\frac{\text{cost}_t}{\text{cost}_{t-1}}\right) = & \beta_0 + \beta_1 \ln\left(\frac{\text{Rev}_t}{\text{Rev}_{t-1}}\right) + \beta_2 \text{Strategy}_t + \beta_3 \text{Dec}_t \cdot \ln\left(\frac{\text{Rev}_t}{\text{Rev}_{t-1}}\right) + \\
 & \beta_4 \text{Dec}_t \cdot \text{Strategy}_t \cdot \ln\left(\frac{\text{Rev}_t}{\text{Rev}_{t-1}}\right) + \beta_5 \text{Dec}_t \cdot \ln\left(\frac{\text{Asset}_t}{\text{Rev}_t}\right) \cdot \ln\left(\frac{\text{Rev}_t}{\text{Rev}_{t-1}}\right) + \\
 & \beta_6 \text{Dec}_t \cdot \ln\left(\frac{\text{Rev}_t}{\text{Rev}_{t-1}}\right) \cdot \ln\left(\frac{\text{Emp}_t}{\text{Rev}_t}\right) + \beta_7 \text{Dec}_t \cdot \text{Suc\_Dec}_t \cdot \ln\left(\frac{\text{Rev}_t}{\text{Rev}_{t-1}}\right) + \\
 & \beta_8 \text{Dec}_t \cdot \text{GDP}_t \cdot \ln\left(\frac{\text{Rev}_t}{\text{Rev}_{t-1}}\right) + \varepsilon_t
 \end{aligned}
 \tag{10}$$

We further conduct an empirical analysis of the relationship between managerial expectation and cost stickiness. To test our second hypothesis, we regress Model (5) with the logarithm change in SA&G costs as a dependent variable, using the GLS and fixed effect regressions, respectively. The results are reported in Column I through III in Table 5. The two types of managerial expectation coefficients are measured by the coefficient of  $\beta_1^{\text{PInc}}$  (0.471, significant at 1%) and  $\beta_1^{\text{PDec}}$  (0.365, significant at 1%), respectively. Costs increase 0.471%, with sales rising 1% under the optimistic scenario, while costs increase 0.365%, with sales rising 1% under the pessimistic scenario, which implies that marginal change in costs due to optimistic managers is 0.006% (0.471%–0.365%). Meanwhile,  $\beta_2^{\text{PInc}}$  is –0.27, significant at 5%, and  $\beta_2^{\text{PDec}}$  is 0.237, significant at 1%. Additionally,  $(\beta_1^{\text{PInc}} + \beta_2^{\text{PInc}}) = 0.2$ , which is (0.471–0.270), and  $(\beta_1^{\text{PDec}} + \beta_2^{\text{PDec}}) = 0.602$ , which is (0.365 + 0.237). The former means that costs decrease by 0.2% if sales decline 1% under the optimistic scenario, while the latter indicates that costs decline 0.602% if sales decrease 1% under the pessimistic scenario. Because  $(\beta_1^{\text{PInc}} + \beta_2^{\text{PInc}}) < (\beta_1^{\text{PDec}} + \beta_2^{\text{PDec}})$  and  $\beta_2^{\text{PInc}} < 0$ ,  $\beta_2^{\text{PDec}} > 0$ , optimistic managerial expectations will result in cost stickiness, while pessimistic managerial expectations will result in cost anti-stickiness. We reexamine the results with the logarithm of the change in operating costs as the dependent variables using GLS and fixed effect regressions. We find that  $\beta_2^{\text{PInc}}$  equals –0.288 and –0.374, respectively and both are significant at 1% while  $\beta_2^{\text{PDec}}$  is 0.460 and 0.482, both significant at 1%, which furthers our second hypothesis.

**Table 5.** The relationship between strategy position, managerial expectation, and cost stickiness.

D.V	Ln(SGAt/SGAt-1)			Ln(OPEct/OPEct-1)	
	I	II	III	IV	V
	OLS	OLS	FE	OLS	FE
$I_{t-1} \cdot \ln(\text{Rev}_t/\text{Rev}_{t-1})$	0.496*** (30.9)	0.488*** (30.21)	0.471*** (26.27)	0.905*** (133.05)	0.899*** (117.92)
$D_{t-1} \cdot \ln(\text{Rev}_t/\text{Rev}_{t-1})$	0.357*** (15.89)	0.352*** (15.54)	0.365*** (15.71)	0.824*** (63.8)	0.828*** (62.61)
$I_{t-1} \cdot D_t \cdot \ln(\text{Rev}_t/\text{Rev}_{t-1})$	–0.313*** (–9.12)	–0.258** (–2.49)	–0.270** (–2.26)	–0.288*** (–5.72)	–0.374*** (–6.99)
$D_{t-1} \cdot D_t \cdot \ln(\text{Rev}_t/\text{Rev}_{t-1})$	0.126*** (3.41)	0.348*** (2.61)	0.237*** (3.6)	0.460*** (5.52)	0.482*** (5.36)
$I_{t-1} \cdot D_t \cdot \text{Strategy}^*$ $\ln(\text{Rev}_t/\text{Rev}_{t-1})$		–0.029*** (–5.58)	–0.032*** (–5.43)	–0.019*** (–6.73)	–0.025*** (–8.39)
$D_{t-1} \cdot D_t \cdot \text{Strategy}^*$ $\ln(\text{Rev}_t/\text{Rev}_{t-1})$		–0.022*** (–3.51)	–0.020*** (–2.88)	–0.028*** (–6.43)	–0.030*** (–6.35)
_cons	0.073*** (24.12)	0.076*** (24.63)	0.073*** (19.55)	0.020*** (14.31)	0.020*** (10.97)
N	20947	20947	20947	20947	20947
r2_a	0.159	0.164	0.143	0.813	0.805
Industries effect	No	No	No	Yes	Yes
Year effect	No	No	No	Yes	Yes

Notes: t-statistics in parentheses. \*, \*\*, \*\*\* indicate significance at 10%, 5%, and 1% levels, respectively, in two-tailed tests. We regress Model (5) with the the logarithmic change in SA&G costs as dependent variables using fixed effects regressions.

Next, we provide empirical analysis on the association between strategy position, cost stickiness and managerial expectations. Since managerial expectations affect cost stickiness, this may moderate the relationship between strategy position and cost stickiness. To test this hypothesis, we re-estimate the models and report the results in Table 5. The coefficient of  $I_{t-1} \cdot D_t \cdot \text{strategy}^* \cdot \ln(\text{Rev}_t/\text{Rev}_{t-1})$ ,  $\beta_3^{\text{PInc}}$ ,

is  $-0.029$  and  $-0.032$  in Column II and III, respectively, while the coefficient of  $I_{t-1} * D_t * \text{Ln}(\text{Rev}_t/\text{Rev}_{t-1})$ ,  $\beta_2^{\text{PInc}}$ , is  $-0.258$  and  $-0.270$ , respectively. Therefore, the absolute value of  $(\beta_3^{\text{PInc}} + \beta_2^{\text{PInc}})$  is greater than the absolute value of  $\beta_2^{\text{PInc}}$ . These results imply that optimistic managerial expectations will strengthen cost stickiness with more differentiation, which supports H3a. When cost stickiness of a firm choosing a differentiation strategy is greater than that of a firm choosing cost leadership strategy, optimistic managers will view sales decreases as temporary adjustments, and thus they will be reluctant to cut back costs. Therefore, optimistic managerial expectations will increase cost stickiness.

In addition, the coefficient of  $D_{t-1} * D_t * \text{Strategy} * \text{Ln}(\text{Rev}_t/\text{Rev}_{t-1})$ ,  $\beta_3^{\text{PDec}}$ , is  $-0.022$  and  $-0.02$  (significant at 1%), respectively.  $\beta_2^{\text{PDec}}$  is  $0.348$  and  $0.237$  in Column II and III, and  $(\beta_2^{\text{PDec}} + \beta_3^{\text{PDec}})$  is  $0.326$  and  $0.217$ , respectively. These results indicate that pessimistic managerial expectations will decrease cost stickiness, which supports hypothesis H3b. Similarly, we test the results using the logarithm of the change in operating costs and the estimators in Column IV and V, respectively. These results are consistent with our previously stated results. For example,  $\beta_3^{\text{PInc}}$  is  $-0.019$  and  $-0.025$  (both significant at 1%), while  $\beta_3^{\text{PDec}}$  is  $-0.028$  and  $-0.030$  (both significant at 1%). The results provide further robust evidence supporting H3b.

Finally, H4 argues that equity will affect cost stickiness under different strategies. To test this hypothesis, we divide the full sample into two sub-samples, state-owned, and non-owned firms. We run regressions using robust standard error based on model (2) and model (3), and the results are reported in Table 6. We want to test how equity affects the effect of differential strategy on cost stickiness; hence, we have to merge the equity data into the sample. Therefore, the value of the variable state is 1 when firms are state-owned and 0 if not. The equity data is only available from 2003 to 2014; therefore, our observations are reduced to 14,273, with 8,174 state-owned firms and 6,099 non-state-owned firms.

**Table 6.** The relationship between strategy and cost stickiness under state-owned and non-state-owned firms.

D.V	I	II	III	IV
	State-Owned Firms		Non-State-Owned Firms	
lnRev	0.876*** (87.61)	0.994*** (121.58)	0.818*** (56.65)	0.975*** (92.79)
Dec*Ln(Rev <sub>t</sub> /Rev <sub>t-1</sub> )	-0.625*** (-4.33)	-0.409*** (-3.01)	-0.918*** (-4.67)	-0.075 (-0.45)
Dec*Strategy * Ln(Rev <sub>t</sub> /Rev <sub>t-1</sub> )	-0.004** (-2.85)	-0.003** (-2.92)	-0.003* (-1.82)	-0.002* (-1.81)
DecAssetlnRev	-0.039** (-2.35)	-0.025* (1.90)	-0.039* (-2.01)	-0.026** (-2.11)
DecEmplnRev	-0.043*** (-4.20)	-0.023** (-2.32)	-0.073*** (-5.25)	-0.010* (-1.86)
DecSuchnRev	0.039* (1.87)	0.057*** (3.00)	-0.029** (-1.99)	-0.009 (-0.42)
DecGdp	-0.001** (-2.45)	0.001 (0.02)	-0.001** (-1.98)	0.001* (1.78)
Strategy		-0.001* (-1.83)		-0.001* (-1.88)
_cons	0.016*** (9.03)	0.004 (1.58)	0.024*** (8.52)	0.002 (0.32)
Industries effect	YES	YES	YES	YES
Year effect	YES	YES	YES	YES
N	8174	8174	6099	6099
r2_a	0.878	0.894	0.814	0.874
F	3009.598	3542.113	1789.908	3551.244

Notes: t-statistics in parentheses. \*, \*\*, \*\*\* indicate significance at 10%, 5%, and 1% levels, respectively, in two-tailed tests. We regress Model (2) and (3) with the a logarithm change in operating costs as dependent variable using ordinary least squares (OLS) regressions.

The results in Columns I and III control for the strategy, and Columns II and IV incorporate the strategy. First, the coefficients of Dec \* Strategy \* Ln(Rev<sub>t</sub>/Rev<sub>t-1</sub>) is  $-0.004$  in state-owned firms and  $-0.003$  in non-state-owned firms, respectively, and both are significant at 1% without incorporating

the sole strategy. The magnitude of these results is 33.3% greater in the state-owned sample than in the non-state-owned sample. We then control for the strategy, and the coefficients of  $\text{Dec} * \text{Strategy} * \text{Ln}(\text{Rev}_t/\text{Rev}_{t-1})$  are  $-0.003$  in state-owned firms and significant at 1% but reduced to  $-0.002$  in a non-state-owned sample and significant at 10%. This means that strategy has a stronger effect on cost stickiness in state-owned firms than in non-state-owned firms, which supports our fourth hypothesis.

This study conducts several robustness checks. First, this paper uses balanced panel data and runs GLS and fixed-effects regressions. Second, differences between SOEs and private firms may increase a possible bias in the estimates, due to the potentially mis-specified relation between the dependent and independent variables [61]. The paper, therefore, uses a propensity score matching (PSM) to match SOEs with comparable private firms by selecting the private firms that are most similar to SOEs, according to the distribution of observed covariates [62]. The paper alters Borisova et al.'s [50] procedure and utilizes size, sales growth, return on assets, leverage, stock value traded as a percentage of GDP, and industry to fit the observations for SOEs with them of private firm. This study reruns the regression Equation on our PSM observations. Third, cost behavior tends to change during economic crises [32]. Thus, we rerun the regression until the year 2007, which was before the latest financial crisis. Finally, to address the problematic possibility of endogeneity that leads to inconsistent regression estimation, this study utilizes an alternative estimation method known as instrumental variables or equivalently two-stage least squares (2SLS) [63]. Accordingly, we introduce an instrument variable inducing changes in the explanatory variable but has no independent impact on our dependent variable; thus, allowing us to reveal the causal effect of the explanatory variable on our dependent variable [63]. Yet, we find that the results are similar to our previous empirical results. Although the level of significance may be decreased using the balanced panel data, the signs of the coefficients are consistent and the similarity with the significance level, which further illustrates that our results are robust.

In Table 7, we summarize the results of the regression analyses from hypotheses 1 to 4. We find that all the hypotheses are supported except for H3b.

**Table 7.** Summary of the results of the regression analyses: Hypotheses 1–4.

Hypotheses	Hypotheses	Main Findings	
H1	<i>The cost stickiness of firms using differentiation strategy will be higher than that of firms using low-cost strategy.</i>	The cost stickiness of firms choosing differentiation strategy is higher than that of those choosing a low-cost strategies.	Support
H2	<i>Managers' optimism will result in cost stickiness, while managers' pessimism will result in cost anti-stickiness.</i>	Optimistic management expectations will strengthen cost stickiness, while pessimistic expectations will weaken cost anti-stickiness.	Support
H3a	<i>If management is optimistic, firms that choose differentiation strategy have higher cost stickiness than those that choose low-cost strategies</i>	If management is optimistic, cost stickiness of firms choosing a differentiation strategy is higher than that of those choosing a low-cost strategy	Support
H3b	<i>If management is pessimistic, firms that choose a low-cost strategy have higher cost anti-stickiness than those that choose a differentiation strategy</i>	Do not find evidence.	Reject
H4	<i>Compared to non-state-owned firms, a differentiation strategy in a state-owned firms has a more impact on cost stickiness.</i>	State-owned firms have stronger cost stickiness than non-state-owned firms adopting a differentiation strategy.	Support

## 5. Conclusion and Implications

### 5.1. Conclusions

Following a competitive strategy for business development is the key to a business's success. Based on data of China A-share listed companies in Shanghai and Shenzhen in 2002–2015, we investigate the relationship between a firm's competitive strategy and cost stickiness, and we find the following results.

First, the results show that the cost stickiness of firms that choose differentiation strategy is higher than that of those choosing low-cost strategies. This is because following differentiation strategy maintains or increases a high-profit margin by providing quality products or services to customers through a centralized competition [33], which requires companies to invest massively in crucial areas such as product development, brand building, and advertising. On the other hand, cost strategy requires more effort to control costs in order to provide products or services with the lowest possible price, which means that firms using cost strategy must focus on improving yield and capacity utilization and minimize indirect costs and other expenses, based on the actual cost of competitors.

Second, when managers make decisions about whether and how to adjust their resource capacity, they will make appropriate investment decisions based on current and future sales. Therefore, a manager's expectations for the future will affect firm investment decisions and costs. To be specific, optimistic management expectations will strengthen cost stickiness, while pessimistic expectations will weaken cost anti-stickiness. If the management is optimistic, the cost stickiness of companies choosing a differentiation strategy will be higher than that of those choosing a low-cost strategy. Conversely, if the management is pessimistic, the cost anti-stickiness of companies choosing a low-cost strategy will be higher than that of firms choosing a differentiation strategy.

Finally, state-owned equity affects the extent of the effect of differentiation strategy on cost stickiness. State-owned firms, which hold more GCAs than non-state-owned firms, have stronger cost stickiness than non-state-owned firms, even if both categories of firms use differentiation strategy more.

### 5.2. Theoretical and Managerial/Policy Implications

This paper has some theoretical implications. First, this paper is one of the limited studies that connect OT and MC theory to accounting studies for cost management research. Second, the paper makes a validation for the fact that different business strategists indeed present dissimilar levels of cost stickiness, and this reveals if the corporate strategy is a crucial factor for earnings management. Third, the present study proves the validation that corporate strategy has an even wider application to cost management than anteriorly regarded. Lastly, but not least, this paper exhibits how the interplay of corporate strategy and property tends to influence cost stickiness as an extension of both the property theory and the cost management literature.

This study also has several managerial and policy implications. Both the corporate strategy chosen and the ownership are core factors that influence cost stickiness. The corporate strategy of firms will influence managers' decisions about resource commitment and further reflect how cost management is controlled. Therefore, this internal mechanism can provide some microcosmic action reference for companies to implement cost management and improve the corporate governance mechanism.

Adding to the existing literature's understanding of these mechanisms, at the level of policy operation, our study provides a new way of cognition to explore the effectiveness and rationality of strategic positioning and management expectations. In addition, it provides innovative ideas for a further strategic selection, investment decision, and cost control. The empirical results show that different corporate strategies and ownership will produce different cost behaviors. Therefore, to enhance the strategic positioning of companies and the effectiveness and rationality of management expectations, managers must correctly understand changes in the firm's external environment, thereby achieving effective controls of costs. Simultaneously, firms should guide and standardize the business process, actively play their roles in the market, and further optimize and improve their internal and external environment, thus allowing them to sustain harmonious and healthy development.

Another way our study contributes to the literature is that it addresses government-created institutional advantages, which are considered “probably the most important variable suggested by the research” on internationalizing emerging market firms, in particular Chinese firms [43], (p. 42). This type of institutional advantage “is relevant in most emerging economies because governments usually play a strategic role in developing economies.” The various “channels through which GCAs work are available to all government, even if other countries are not as big as China or not as competent at using these policy levers,” and the prominent role of state-owned firms among internationalizing Chinese firms is just one aspect of China’s institutional advantages [43], (p. 42). Chinese firms’ business strategy, state-owned equity, and cost stickiness are meaningful in China’s institutional aspects linked to GCAs.

Finally, as an extension of our findings, we need to speculate that cost stickiness can be directly and indirectly related to economic growth [64], political uncertainty [65], and credit risk [66]. Managers at internationalizing emerging market firms, particularly Chinese firms, should think over how these factors can be related to their institutional advantages.

### 5.3. Limitations and Future Research

This study has meaningful theoretical and managerial/policy implications, but there are also some limitations, thus launching further research. First, this paper examines the relationship between corporate strategy and cost stickiness under different managerial expectations in the companies in China. However, it does not test our hypothesis in the contexts and samples of other countries, such as other developed and emerging economies. For example, traditionally, companies from American and Western European countries have evolved with the different corporate strategies and cost stickiness under different managerial expectations from companies in China as well as in other emerging markets, such as Brazil, Russia, India, and South Africa. Even, in the representative emerging markets, China and India have very different corporate histories and corporate governances [67,68] that might have affected these factors. Hence, comparative studies among these dissimilar countries are needed to compare our findings with others.

Second, our sample firms are all listed companies. However, even in China, there are many non-listed firms, particularly small and medium-sized private firms that have metamorphosed as the creative innovators in both domestic and global markets [69,70]. Hence, the comparative study between listed and non-listed companies, particularly small and medium-sized non-listed enterprises, is necessary as future research.

Third, although there are differences between industry sectors, this study does not investigate our hypotheses in the comparison between industry sectors. For example, the energy, transportation, and waste sectors [71] can have different connotations from the manufacturing sector using digital platforms [72]; thus, they can have quite heterogeneous industry effects in our sample. Hence, as future research, we need to cover the agenda of the different industrial sectors.

Fourth, since large emerging markets, such as China, are rapidly internationalizing markets where domestic and foreign multinational enterprises (MNEs) operate based on both inward and outward foreign direct investments (FDIs) [73,74], the internationalizing companies’ strategic choices are crucial due to how it affects cost structure and cost stickiness. However, this study does not catch the essence of these MNEs’ strategic choices and their influences on cost structure and cost stickiness well. Hence, future research needs to cover this important issue.

Finally, due to our data accessibility limitedness, we could not include more control variables dealing with some issues such as corporate governance, political stability, regulations, and economic issues. Nevertheless, this paper splits the full sample into the subsamples of state-owned and non-state-owned firms, so in this way, we cover corporate governance of listed companies in China. Also, we control for the annual GDP growth rate, so we cover at least one economic issue. However, during our sample period, at least in China, political stability and regulations have not significantly changed [75,76], and further, our sample country is only one so that this paper could not include these

control variables that covers political stability and regulations. Yet, as future studies, with the larger sample of various countries, we may add these more control variables.

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