▪ Advances in Scientific and Applied Accounting, ▪ ISSN 1983-8611 ▪ São Paulo ▪ v.18, n.2 ▪ p. 048-060 ▪ May / Aug. 2025
ASAA
▪ DOI: 10.14392/asaa.2025180203

Influence of cost stickiness on return prediction in companies listed on B3

Laura Brandão Costa[1] **Marcelo Tavares**[2]

[1] Universidade Federal de Juiz de Fora (UFJF/GV), Governador Valadares, Minas Gerais, Brazil
[2] Universidade Federal de Uberlândia (UFU), Uberlândia, Minas Gerais, Brazil

[1]laura.costa@ufjf.br
[2]mtavares@ufu.br

Edited by:
Moacir Manoel Rodrigues Junior

Abstract

Objective: To evaluate the accuracy of return forecasts for investors in companies listed on B3, considering the asymmetric behavior of costs.
Method: A quantitative analysis was conducted using the financial statements of 103 companies over the period from 2010 to 2022, with data obtained from Economatica®. Econometric models were employed to identify the presence of cost stickiness and to examine its relationship with return predictability.
Results: Evidence of cost stickiness was observed among the firms analyzed, suggesting a prevailing optimism in the Brazilian market. This is based on the premise that companies are more inclined to allocate additional resources rather than reduce them, implying that expenditures are often made in anticipation of positive demand conditions. Both the presence and higher degrees of cost stickiness were found to be negatively associated with the predictability of future returns, thereby indicating that models incorporating this phenomenon may offer greater forecasting accuracy.
Contributions: This study underscores the importance of disclosing cost stickiness to capital market participants, as it may enhance their understanding of cost structure dynamics and their implications for the growth of operating assets and future revenue generation. Such insights contribute to a more robust interpretation of financial statements, particularly with respect to return forecasting.

Keywords: Cost stickiness; Return predictability; Signaling Theory.

How to Cite:

Costa, L. B., & Tavares, M. (2025). Influence of cost stickiness on return prediction in companies listed on B3. *Advances in Scientific and Applied Accounting*,18(2), 034–047/048. https://doi.org/10.14392/asaa.2024180203

Submitted: 31 January 2025
Revisions required on: 12 May 2025
Accepted: 17 September 2025

Introduction

Traditional cost accounting argues that costs directly follow the fluctuation in the level of operating activity (Banker, Ciftci & Mashruwala, 2008; Martins, 2018). However, the research by Anderson et al. (2003) argued, through the Sticky Costs Theory, that costs do not necessarily respond to changes in operating volume in this way.

Predicting cost behavior is an essential part of profit forecasting (Weiss, 2010; Xu & Sim, 2017). Investors, as external users, rely on published statements to presume information about the determinants of costs (Degenhart et al., 2021). Novák et al. (2017) argue that the lack of knowledge of cost behavior leads to errors in judgment.

It is known that sales revenues and expenses do not grow in the same proportions, since there are portions of fixed expenses that do not necessarily reflect the linear variation in revenues (Anderson et al., 2003; Kim & Prather-Kinsey, 2010). As external users do not have access to internal cost information, revenue and expense growth rates are used in equal proportions when forecasting earnings, which favors systematic errors (Kim & Prather-Kinsey, 2010).

It is argued that fixed expenses lead to asymmetric cost dynamics and could influence returns, as well as the predictability and accuracy of these forecasts, which would affect the assertiveness of decision-making based on accounting reports. In this sense, access to cost information, or even the lack of it, can be explained by the Signaling Theory (Conelly et al., 2011). This predicts that there is a signaling entity, which has a privileged view of internal information and makes it available in the form of signals to an environment, where there are several receivers. These will only have access to the information if it is properly signaled. The signals emitted will depend on different characteristics in order to be interpreted. Thus, in this research, the theory helps to explain that the lack of information on the cost stickiness phenomenon, which is not signaled by the companies, would allow for different interpretations in the Brazilian capital market, especially in investment analysis.

This research aims to assess the accuracy of return forecasts for investors in B3listed companies in relation to the asymmetric behavior of costs. This study argues that the investor is an external user interested in understanding cost stickiness. Once they understand this phenomenon, they would use this information incrementally when analyzing financial statements and forecasting returns, based on equity and historical elements.

Countries with emerging economies such as Brazil tend to have a greater volume of capital being traded (Ghysels, Plazzi & Valkanov, 2016). This research is justified by the need to disclose internal information to the market regarding costs and their influence on the predictability of returns. Han and Manry (2002) point out that voluntarily disclosed forecasts can be a signaling behavior to the market. It also seeks to highlight a reflection on the voluntary disclosure of forecasts to investors beyond the information published in the set of financial statements in line with the requirements of international accounting standards. Dainelli, Bini and Giuntta (2013) mention that indicators, figures and data in narratives are incremental elements to the information already available, which complements the requirements of the International Accounting Standards Board (IASB).

The insertion of return on net operating assets (RNOA) variables and the presence of cost stickiness are expected to provide relevant empirical results with greater explanatory power than the previous ones in terms of forecast accuracy. The study reinforces the Signaling Theory, in the view that there is a signaler (publicly traded companies in Brazil), which have a signal (presence or absence of cost stickiness), but do not make it available to their environment. Connelly et al. (2011) argue that signals have specificities that take on different meanings due to their various signaling agents.

The authors point out that the theory argues that problems of social selection in organizations can be tested empirically, given that the conditions of information are imperfect. It is therefore considered that the theoretical and conceptual aspects of this theory explain the findings of this research, as it is argued that cost stickiness is a possible signaling structure that can be informed to the market, especially as information to be interpreted by investors in the context of investment decisions in entities operating in the Brazilian capital market.

As practical contributions, the study seeks to highlight one of the assumptions of the Cost Stickiness Theory, which states that the phenomenon can be verified as a result of management decisions on the realization of new costs, which occurs internally within the entities. In view of this, this study makes it possible to verify what can compromise estimates of forecast results and returns for investor analysis.

2 Theoretical Framework

Cost stickiness has been studied for over 20 years. The study by Anderson et al. (2003) triggered different studies in different companies, sectors and countries. Ibrahim et al. (2002) state that the literature on the phenomenon is organized along three axes: evidence, determinants and consequences. The first verifies the presence of the

phenomenon in entities and countries. Research that seeks to highlight the explanatory factors of cost stickiness aims to identify the determinants of this behavior, in which different variables are tested to see what explains this phenomenon. Lastly, research aimed at investigating the consequences of cost stickiness on other elements is still a minority. Therefore, it is important to investigate the asymmetric behavior of costs in different economic sectors, especially to see if the regulation of certain sectors influences the presence of this phenomenon in companies.

The managers of entities decide whether to carry out or cut back on their activities, elements that make up the structure of cost stickiness (Banker, Byzalov & Plehn-Dujowichz, 2014). Managers are considered to be more optimistic than pessimistic about future sales. For this reason, they are willing to incur new costs that may impact operating activities, which results in asymmetric behavior (Banker et al., 2014).

Among the determinants of cost stickiness are resource adjustment costs (Cooper & Haltiwanger, 2006). These are the result of the reduction or occurrence of new costs, which do not necessarily follow operational demand linearly. This means that the cost does not grow or is not reduced in proportion to the volume, so that there is an elasticity of costs in relation to operational demand, thus showing cost stickiness (Subramaniam & Watson, 2016). The phenomenon can be observed in terms of its presence, as well as analyzed in levels and directions. The Anderson et al. (2003) model is used to verify these perspectives, and its presence is evidenced through the estimated behavior, given by the dependent cost variable, which is a function of changes in operating activity.

The levels of cost stickiness can be verified by adding up the estimated coefficients of the model, which generate results given in levels, which can be categorized into ranges. Pereira and Tavares (2020) classified the asymmetry levels into five: between 0.01 and 0.20 (range 1); 0.21 and 0.40 (range 2); 0.41 and 0.60 (range 3); 0.61 and 0.80 (range 4) and above 0.80 (range 5). The authors pointed out that the use of asymmetry levels in bands is based on Richartz, Borget and Lunkes (2014) and Subramaniam and Watson (2016), who showed that companies with higher levels of asymmetry were entities with higher shares of fixed costs in their structure.

Cost stickiness can also be analyzed according to the directions of elasticity, which are sticky and anti-sticky (Anderson et al., 2003). The former is when the magnitude of the increase in costs due to growth in volume is greater than the magnitude of the reduction in costs due to a fall in activity. In the anti-sticky direction, the opposite occurs, i.e. the magnitude of the reduction in costs with the decrease in operational sales activity is greater than the magnitude of the increase in costs with the maximization of volume.

The direction of the asymmetry reflects the economic expectations of the entities' managers (Banker & Byzalov, 2014; Weiss, 2010). It is argued that sticky behavior is expected when expectations are optimistic, but anti-sticky when expectations are pessimistic, i.e. when revenues or volume are reduced, pessimistic managers are willing to eliminate surplus resources to lower current operating costs.

It is assumed that the Brazilian capital market is optimistic, as it is conducive to new investments with the allocation of more resources. It is characterized as an emerging market with a large circulation of capital (Ghysels, Plazzi & Valkanov, 2016).

The Anderson et al. (2003) model allows new variables to be included, enabling them to interact in order to verify their effects. Given the possibility of cost asymmetry as a result of operational and financial variables, this research also considers the direction of change in operating volume, given expectations of demand. Considering that there are several sectors of economic activity in the capital market, entities may have different cost behaviors. The following hypotheses were therefore formulated:

H1: The phenomenon of cost stickiness is evident in B3listed companies.

It is expected that hypothesis H1will not be rejected, given the argument that in the Brazilian capital market there is a considerable volume of capital being invested (Ghysels et al. 2016), which allows for the occurrence of adjustment costs, which imply asymmetry in costs.

Stimolo and Porporato (2020) state that the cost stickiness literature is vast, but in markets with developed economies, unlike the Brazilian scenario. The authors investigated the behavior of fixed costs in companies in Argentina, a country with political and economic turbulence, and pointed out that this behavior depends on social, cultural and macroeconomic factors.

It is assumed that the Brazilian capital market is optimistic, which encourages new investments with the allocation of more resources. It is argued, however, that this action leads to adjustment costs which point in the direction of sticky, given the realization of new costs with positive expectations of future demands for companies.

H2: The companies listed in B3show the presence of cost stickiness in the sticky direction.

Hypothesis H2 is expected to be non-rejected, as it is assumed that regulation, established through provisions and policies, inhibits managers' decisions on adjustment costs. Banker, Byzalov and Chen (2013) pointed out that strict policies prevent decisions on resource adjustments, making it possible to affect the cost structure. Ibrahim et al. (2022) argue that the literature has already shown evidence that regulated sectors can mitigate managerial discretion, reducing cost asymmetry.

Ibrahim et al. (2022) point out that there is evidence that regulated sectors can mitigate managerial discretion. In order to empirically test whether companies belonging to regulated sectors in Brazil show lower levels of cost stickiness, arguing essentially that they have less discretion in allocating resources to be invested in their operations, H3was formulated:

H3: Regulated segments of companies listed on B3 have lower levels of cost stickiness.

It is expected that H3will not be rejected because, although these companies operate in the Brazilian capital market, where there is a considerable volume of investments, their regulatory characteristics lead to lower adjustment costs, inhibited by policies that can mitigate discretion and, therefore, reflect lower levels of cost asymmetry. On the other hand, this study considers that although a regulated sector is expected to have less discretionary power for certain actions within companies, it is possible that those managers who point to performance-based remuneration decide to carry out certain adjustment costs for their own benefit.

Given the expectations of the capital market, it is up to the analyst to estimate an accurate profit forecast (Weiss, 2010). However, Ciftci et al. (2016) argue that they do not consider the presence of the cost stickiness phenomenon in their forecasts, leading to errors. It is important to understand this behavior in decisions made internally within entities and for analysts, who depend on cost information to forecast profits.

There is a consensus in the literature that cost stickiness has an impact on the accuracy of analysts' earnings forecasts (Banker & Chen, 2006; Weiss, 2010). Martinez (2007) argues that forecasting and projecting results are fundamental in the investment evaluation process. For this reason, there is a need for studies on the consequences of the accuracy of forecasts. It is also necessary to understand the behavior of costs, as this is one of the most important aspects for analyzing profits (Banker & Chen, 2006).

A positive aspect of the Anderson et al. (2003) model is the possibility of including new variables, allowing them to interact in order to verify their effects. On the other hand, Fairfield and Yohn (2001) considered the RNOA in order to disaggregate it according to the Du Pont analysis. The aim of disintegrating this indicator was to improve forecasts of future profitability using simple decomposition techniques. The RNOA is broken down by asset turnover and profit margin, making it possible to provide insights into the growth in operating assets and the sales made by these in organizations. It is argued that asymmetric costs, resulting from adjustment costs, influence the accuracy of returns, as cost stickiness is a proxy for more volatile profits.

The predictability perspective of the RNOA will be the basis for analyzing the predictability of results in the face of the asymmetric behavior of sales, general and administrative costs (SG&A). RNOA is essential in the analysis of stock market investors (Fairfield & Yohn, 2001; Nissim & Penman, 2000; Soliman, 2008), since investors "buy" future profits in the face of current ones that indicate future earnings. Thus, in addition to reporting earnings, financial statements provide additional information that tells us about the quality of earnings for forecasting. It is expected that hypothesis H4will not be rejected:

H4: Companies listed in B3with higher levels of cost stickiness present return forecasts with higher errors.

It is assumed that this phenomenon is present in the capital market and that, when it is understood at higher levels, it can influence the accuracy of return forecasts, especially due to the adjustment costs resulting from fixed costs that do not follow changes in volume linearly. The dispersion of analysts' forecasts is useful in signaling the prospects of entities and can be summarized by return indicators. However, according to Han and Manry (2000), the market responds to this signal with a delay. Thus, voluntarily disclosed forecasts can be a signaling behavior to the market (Han & Manry, 2000).

Fairfield and Yohn (2001) argue that the literature is still inconclusive as to whether the disaggregation of indices makes the analysis of financial statements more useful. The authors argue that the predictability of profitability could be used based on the accounting information available, but suggest that further research could insert new variables into the models for different analyses. Therefore, this research includes the RNOA variable and cost stickiness to enable new contributions through the findings.

In this context, it can be seen that investors do not seem to consider some of the information available on the market in their analysis. Therefore, it is necessary to examine whether the participants in this environment use all the information available (Soliman, 2008). In

the Brazilian market, there is still low accuracy and bias in analysts' forecasts (Lima, 2013). It is understood that information on entities' costs is privileged and only known to managers and other internal users in organizations. It is therefore inferred that the understanding of cost asymmetry may not be known to the capital market.

The Signaling Theory argues that two parties have different access to information. The sender (signaler) must choose and define how to communicate information (signal), so that the receiving party can choose how to interpret it. The theory is concerned with reducing information asymmetry between the parties.

For entities, the signaler is the essence of the theory, comprising internal individuals with a privileged perspective who hold useful information about an organization that is not available to individuals outside it. Receivers are people outside the organization who don't have this information but would like to receive it. Both individuals may have conflicting interests and, therefore, the signaler must benefit from some action by the receiver (Connelly et al., 2011). For example, shareholders could profit from buying shares in organizations that signal more profitable future values (Certo et al., 2001).

The Signaling Theory is considered to explain the results of this research, as it is argued that, with the results shown, cost stickiness is a possible signaling structure that can be informed, especially as information to be interpreted by investors in investment decisions in entities operating in the Brazilian capital market.

3 Methodological Procedures

3.1 Sample and data collection

The population investigated in this research is comprised of publicly traded non-financial entities with active registration with the B3. The analysis covers the period from 2010 to 2022. International accounting standards have been required in Brazil since 2010 and the most recent data in the Economatica® database at the time of collection referred to the 2022 fiscal year. All the data refers to consolidated information, adjusted by the Extended National Consumer Prince Index (ENCPI), in millions of reais, reflecting current values, giving monetary uniformity and comparability between financial years.

Initially, there were 5,824 observations in the 13 periods with 448 companies with active registrations. Exclusion criteria were set for defining the final sample and applying it to the models. Companies with missing observations in consecutive periods; those with extreme variations in revenues and/or SG&A costs from one period to the next, which could indicate special operations; or containing negative data for the variables of revenues, costs and net operating assets were excluded. The final sample consisted of 103 companies with 1,339 observations. The number of entities by operating segment is shown in Table 1:

Table 1. Companies by operating segment

Sector	Quantity	Relative to total sample
Industrial goods	24	23,30%
Cyclical consumption	28	27,81%
Non-cyclical consumption	10	9,71%
Basic materials	9	8,74%
Oil, gas and biofuels	1	0,97%
Health	6	5,83%
Information technology	2	1,94%
Public utilities	23	22,33%

Source: Prepared by the authors.

It should be noted that the cyclical consumption sector is the most representative in the sample, with 28 companies.

3.2 Analysis procedures

In order to identify the cost stickiness phenomenon and, subsequently, its influence on the predictability of returns, different models were used to estimate the parameters using panel data regressions. The best model applicable to the sample was estimated using ordinary least squares. The assumptions of normality, multicollinearity, heteroscedasticity and autocorrelation of the residuals were met. It was also found that the most appropriate model for analyzing panel data was the fixed effects estimation model.

3.3 Measuring cost stickiness

In order to identify the asymmetric behavior of costs and their levels, the Anderson et al. (2003) model was used, identified as the ABJ model. The application of Equation 1 aims to identify the asymmetric behavior of costs. It is expected that the cost behavior to be estimated will be considered as a dependent variable and will be a function of changes in activity.

$$log\left\{\frac{VGA_{i,t}}{VGA_{i,t-1}}\right\} = \beta_0 + \beta_1 log\left\{\frac{RLV_{i,t}}{RLV_{i,t-1}}\right\} + \beta_2 * Dummy_{it} * log\left\{\frac{RLV_{i,t}}{RLV_{i,t-1}}\right\} + \varepsilon_{i,t}, \quad (1)$$

Where:

$SG\&A_{i,t}$: Sales, general and administrative costs (expenses) of company i in period t;

$SG\&A_{i,t-1}$: Sales, general and administrative costs (expenses) of company i in period t-1;

$NSR_{i,t}$: Net sales revenues of company i in period t;

$NSR_{i,t-1}$: Net sales revenues of company i in period t-1;

$Dummy_{i,t}$: Dummy variable that takes on a value of 1 when company i's net revenue in period t is less than net revenue in period t-1 and 0 otherwise;

β_0, β_1 e β_2: Estimated coefficients of the model;

ε, i, t: Represents the error.

Considering that this research included companies with different sectors and sizes, the ABJ model (Equation 1) uses the logarithm and ratio indicators, which are proposed to increase the comparability of variables between companies, sectors and mitigate the effects of heteroscedasticity (Anderson et al., 2003). Equation 1 was used to test H1and H3. To test H2, the ABJ model included a dummy identifying companies belonging to regulated sectors.

The ABJ model has as its dependent variable the variation in SG&A cost expenses and as control variables the variation in operating level or volume (here defined by the proxy NSR) and the categorical dummy variable interacting with the variation in volume. The literature uses NSR as a proxy for the level of operational activity, since it is internal information and this data is not publicly available (Anderson et al., 2003).

The phenomenon can be identified by the coefficients estimated in the ABJ model, β1 + β2, interpreted as the elasticity (asymmetry) of the cost for a 1% reduction in revenue. In addition to identifying the specifications inherent to measuring the phenomenon, such as the presence of the phenomenon, the direction and level of cost stickiness, classification bands were also considered to segregate the levels of asymmetry according to the definitions of Pereira & Tavares (2020) as a criterion for summarizing and organizing these degrees.

3.4 Measuring the predictability of returns

To investigate how the presence of cost stickiness behaves in relation to financial returns on asset investments, the Penman and Zhang (2002) model (RNOA model) was used. This was used because it considers that current growth in net operating assets stimulates the generation of sales, which are determining elements for future operating results (Penman & Zhang, 2002).

The model is suitable for verifying how the activities generated by the sale of assets determine the future operating results of entities, so the RNOA is consistent with this objective, as it is similar to invested capital (Nissim & Penmam, 2000; Penmam & Zhang, 2002). Information from the analysis of entities' returns can be considered a signal to the market (Han & Manry, 2000).

The RNOA model was applied and adapted into three other models, the purpose of which was to verify the influence of cost asymmetry in terms of its presence and the levels of cost stickiness on future returns on investments in assets, providing different analyses. Equation 2 refers to the general RNOA model, without adaptations, checking only how the profit margin and asset turnover variables are associated with RNOA predictability. Equations 3, 4 and 5 are the RNOA models with adaptations. These were made by including a dummy variable that identifies the presence of cost stickiness (Equation 3), as well as the level of the phenomenon (Equation 4). In Equation 5, both variables (presence and level of cost stickiness) were considered as independent variables. The adaptation of the RNOA model aims to include variables related to cost stickiness to see how they are associated with RNOA predictability:

$$\Delta RNOA_{t+1} = \beta_0 + \beta_1 RNOA_t + \beta_2 \Delta RNOA_t + \beta_3 \Delta PM_t + \beta_4 \Delta T_t + \varepsilon_1 \quad (2)$$

$$\Delta RNOA_{t+1} = \beta_0 + \beta_1 RNOA_t + \beta_2 \Delta RNOA_t + \beta_3 \Delta PM_t + \beta_4 \Delta T_t + \beta_5 Dummy_{CS} + \varepsilon_1 \quad (3)$$

$$\Delta RNOA_{t+1} = \beta_0 + \beta_1 RNOA_t + \beta_2 \Delta RNOA_t + \beta_3 \Delta PM_t + \beta_4 \Delta T_t + \beta_5 Level_{CS} + \varepsilon_1 \quad (4)$$

$$\Delta RNOA_{t+1} = \beta_0 + \beta_1 RNOA_t + \beta_2 \Delta RNOA_t + \beta_3 \Delta PM_t + \beta_4 \Delta T_t + \beta_5 Dummy_{CS} + \beta_6 Level_{CS} + \varepsilon_1 \quad (5)$$

Where Equations 2, 3, 4 and 5 show:

$\Delta RNOA_{t+1}$: Change in return on net operating assets in period t+1;

$RNOA_t$: Return on net operating assets in period t;

$\Delta RNOA_t$: Change in return on net operating assets in period t compared to period t-1;

ΔPM_t: Change in profit margin in period t compared to period t-1;

ΔT_t: Change in asset turnover in period t in relation to period t-1;

$Dummy_{CS}$: Dummy variable that takes on a value of 1 when there is cost stickiness in company i's VGA costs in

period t and a value of 0 otherwise;

$Level_{CS}$: Level of cost asymmetry of company i in period t;

β_0, β_1, β_2, β_3, β_4, β_5 e β_6: Estimated coefficients of the model;

ε_t: Represents the error.

Fairfield and Yohn (2001) argue that the decomposition of the RNOA predicts changes in profitability. Penman and Zhang (2002) define that the RNOA model is also used to verify the persistence of profits, so that the breakdown of this item into profit margin and asset turnover makes it possible to increase the explanatory power in the predictability of operating profits and, consequently, returns. The model uses elements of the financial statements to inform investors of their return, as a sign of the sustainability of profits.

The reason for including the variable 'DummyCS' to identify the presence of cost stickiness in the RNOA model is based on the argument of Penmam and Zhang (2002), who argue that it is possible to adapt the RNOA model by observing changes in expense ratios. It is assumed that the presence of asymmetric cost behavior results in less accurate predictability.

Equations 2, 3, 4 and 5 aim to test H4, so that it is possible to identify which model has greater explanatory power and which variable (PM, T, presence or level of cost stickiness) most influences the predictability of the RNOA. These equations are also used to test the accuracy of the forecasts.

The RNOA model suggests two interpretations. The first is from the perspective of asset turnover. Sales are seen as being generated by net operating assets, so net growth in these assets generates growth in sales. Higher sales growth would indicate the ability to make more sales that will persist, thus improving profitability (Penman & Zhang, 2002).

Another interpretation is from the perspective of profit margin. Growth in operating profit in relation to sales indicates that lower expenses will persist. This scenario is more likely to occur when costs and expenses are fixed. In this sense, it can be argued that there is a positive relationship between the rate of operating profit growth and the rate of sales growth (Penman; Zhang, 2002).

3.5 Measuring the accuracy of predictability

Considering the possible occurrence of cost stickiness and the investigation of its influence on the predictability of future returns for entities, the research analyzed the so-called Absolute Prediction Error (APE) to identify the accuracy of return forecasts. According to Fairfield and Yohn (2001), the APE is the absolute value between the actual value and the predicted value of the dependent variable of the RNOA model (ΔRNOAt+1) , with the median values of both being taken into account for this calculation, the difference between which is given by modulus. According to Fairfield and Yohn (2001), when calculating the APS, the actual and predicted value of the predictive variable is taken into account. The median was taken because it is the central value and best represents the data set. The value of the absolute standard error close to 0 indicates a more accurate model, i.e. with a lower level of error in the estimates (Fairfield & Yohn, 2001), as shown in Equation 6:

$$EPA = \left| Md\Delta RNOA_{t+1} - Md\Delta\widehat{RNOA}_{t+1} \right| \quad (6)$$

Where:
$MdRNOA_{t+1}$: Median of the actual value in ΔROA_{t+1};

$Md\Delta\widehat{RNOA}_{t+1}$: Median of the predicted value in $\Delta RNOA_{t+1}$.

It should be noted that we only analyzed the APE values for the RNOA models that presented variables with statistical significance in relation to the dependent variable, since this would justify comparing the values of the models' residuals to check the accuracy of the predictability between them.

According to Weiss (2010), a greater amount of information available specific to a company would reduce the forecasting error. It is therefore argued that the aforementioned comparison would indicate the model with the greatest accuracy (precision) in predicting returns, i.e. the model with APE closest to 0 is considered the most appropriate model in terms of predicting financial returns on investments in assets, therefore with greater accuracy and lower error. Equations 2, 3, 4 and 5 were considered for this analysis, complementing the test of H4. Therefore, the accuracy test of the models aims to identify the one that predicts RNOA with the lowest error value, in other words, it seeks to confirm whether cost stickiness variables negatively influence the predictability of returns.

4 Results and Discussion

4.1 Descriptive analysis

The statistical analysis of the variables used in the models shows high values for standard deviation and coefficient of variation, emphasizing that, with the exception of profit margin, there is a high degree of variability in the data, mainly due to the diversity of economic segments (Table 2).

Table 2. Descriptive statistics of the variables

Variable	Obs	Ave	Min	Max	S.D.	C.V. (%)
Net sales revenue (NSR)	1.339	12642,00	10,11	388000,00	33884,00	268,03
Selling, general and administrative costs (SG&A)	1.339	1406,00	0,00	37634,00	3378,00	240,26
Net operating assets (AOL, NOA)	1.339	12019,00	0,72	383400,00	33708,00	280,46
Operating profit (OP)	1.339	10874,00	-1499,00	351900,00	29951,00	275,44
Return on net operating assets (RNOA)	1.339	1,175	-0,8696	20,76	1,252	71,54
Profit margin (PM)	1.339	0,7918	-4,1117	1,250	0,2807	35,45
Asset turnover (T)	1.339	1,438	0,0726	20,22	1,452	100,97

Source: Survey results.
Legend: Obs.: number of observations. SD: standard deviation. C. V.: coefficient of variation. NOA: net operational asset.

Before starting to discuss the asymmetric behavior of costs, it is important to present descriptive analyses of the proportion of SG&A costs in relation to operating volume (proxy NSR). On average, 17.19% of the sample's net revenue is consumed by SG&A costs. It should be noted that this amount is impacted by the higher average of the 'cyclical consumption' segment, whose entities reported a 24% consumption of NSR by SG&A costs. According to Degenhart et al. (2016), these entities need to hold a large volume of stock, which can also have its performance affected by falling consumption and the fact that their companies are dependent on importing inputs and selling on foreign markets (Jacques et al., 2020).

4.2 Cost stickiness analysis

Medeiros et al. (2005) argue that in order to accept the condition of asymmetric cost behavior, the regression applied to the ABJ model must indicate $\beta_1 > 0$, $\beta_2 < 0$, $\beta_1 + \beta_2 < 1$. It should be noted that the coefficients obtained are average values from the sample (Table 3):

Table 3. Cost asymmetry

Analysis	β0	β1	β2	β1+β2	R2 adjusted	Direction	Range
All companies	0,018	0,361	-0,041	0,320	0,204	Sticky	2

Source: Research results.

When companies from all sectors are analyzed together, the asymmetric behavior of costs is identified (Table 3). The explanatory power of the model (adjusted R2) was 20.4%, showing that the behavior of the dependent variable 'SG&A costs' can be, albeit relatively low, explained by variations in the behavior of volume (proxy SG&A) and by the dummy representing periods when SG&A fell. It should be noted that the low value of the adjusted R2may be due to the diversity of the sectors and the representativeness of the values observed. The results in Table 3 show that the value of 0.361 obtained for β1 indicates that SG&A costs increase by 0.36% for every 1% increase in NSR. The value of 0.04 obtained for β2 is negative and indicates strong evidence of asymmetric costs. The combined value of β1 and β2 indicates that SG&A costs decreased by 0.32% for every 1% reduction in revenue, suggesting that these costs were not proportional to the change in volume (Anderson et al. 2003). Hypothesis H1is therefore not rejected.

The asymmetry of SG&A costs is classified in band 2 (0.21 - 0.40), indicating a degree of 0.32 in the sticky direction, as classified by Pereira and Tavares (2020). Therefore, it is assumed that in Brazil, these companies apply more resources than they cut, indicating investments.

To test hypothesis H2, a more specific analysis was considered, in which sectors were broken down into segments, starting with an analysis in which companies were identified as 'regulated' and 'unregulated'. Regulated' companies are those that comply with specific reporting requirements to their regulatory bodies and may suffer more institutional pressure than others. In this study, only the regulated sectors 'electricity' and 'oil, gas and biofuels' were considered. To identify the companies belonging to these sectors, dummy variables were included which took on the value 1 if they were 'regulated', and 0 otherwise.

After applying the ABJ model with the dummy identifying regulated companies, cost asymmetry was not identified, and the combined coefficients were not statistically significant. According to Ibrahim et al. (2022) there is evidence that regulated sectors can mitigate managerial discretion, and as a result reduce the asymmetric behavior of costs. Thus, it is assumed that regulated segments better adjust their costs in relation to volume. In view of the findings, hypothesis H2is rejected, since cost asymmetry

in the 'regulated' sectors was not identified at any level.

After applying the ABJ model to all the companies together, equation 1 was applied individually to each entity, so that it was possible to check the direction and level of asymmetry for each one. Of the 103 companies in the sample, 49 were found to have cost stickiness. In general, 18 companies are classified in band 1 with an asymmetry level between 0.01 and 0.20 and only 1 (which operates in the yarn and fabrics sector, a cyclical consumption segment) is in band 5, which indicates a higher level of asymmetric behavior (above 0.80). With regard to the direction of the asymmetry, of all the companies identified with the presence of the phenomenon, only six pointed to the anti-sticky direction, indicating that for some companies there is more cost reduction with a drop in volume. Thus, 43 companies pointed to the sticky direction, in which the magnitude of the increase in costs is greater when volume grows. It can be seen that 39% of the companies with the presence of the cost stickiness phenomenon belong to the 'cyclical consumption' sector (19 companies).

The hypothesis H3is therefore not rejected. It is argued, based on Weiss (2010) and Banker and Byzalov (2014) that this direction reflects the economic expectations of entities, including in the Brazilian scenario. It is inferred that managers are more optimistic and maintain resources with positive expectations regarding operating volume and demand.

Bearing in mind that the sticky direction was predominant in the findings, in addition to verifying that of the 43 companies with this direction belong to the 'cyclical consumption' sector, it is estimated that these companies point to a more optimistic view of managers, in which faced with positive expectations they are more willing to increase the application of resources in new expenses in the face of a growth in operating volume. According to Degenhart et al. (2016), entities in this segment depend on importing inputs and selling on foreign markets (Jacques et al., 2020).

Ibrahim (2015) argues that anti-sticky behavior can be justified by the pessimistic decisions of managers in periods of economic recession. Managers quickly withdraw unused resources because they believe that demand will decrease for a longer period. The companies that showed asymmetry in this direction belong to the 'cyclical consumption', 'industrial goods' and 'basic materials' segments. For those entities in which the presence of this phenomenon was not identified, it should be noted that it is quite likely that they have better adjusted their costs in proportion to revenues.

4.3 Analysis of the predictability of returns

To analyze the predictability of returns, whether or not the cost stickiness variables were taken into account, Equations 2, 3, 4 and 5 were applied to all the companies together. Table 4 shows that the general and adapted RNOA models are useful for predicting future RNOA values, with similar adjusted R2values. It should be noted that the diversity of sectors in the sample is likely to be a factor affecting the explanatory power of the models, especially with regard to the variables related to cost stickiness (presence and level).

Table 4. RNOA predictability models

Model		Intercept	RNOAt	ΔRNOAt	ΔPMt	ΔTt	DummyCS	LevelCS	R2adjust
General RNOA	Coefficient	-0,7408	0,6328	0,2878	0,1142	-0,2025			0,4289
	p-value	0,0000***	0,0000***	0,0000***	0,1173	0,0000***			
RNOA with the presence of cost stickiness	Coefficient	-0,1077	0,1427	0,3807	0,2141	-0,3214			0,2199
	p-value	0,0034***	0,0000***	0,0000***	0,0085***	0,0000***			
RNOA and cost stickiness levels	Coefficient	-0,1205	0,1499	0,3741	0,2151	-0,3203		-0,2979	0,2227
	p-value	0,0002***	0,0000***	0,0000***	0,0081***	0,0000***		0,0014***	
RNOA, presence and levels of cost stickiness	Coefficient	-0,1151	0,1497	0,3748	0,2148	-0,3203	-0,0187	-0,2725	0,2222
	p-value	0,0018***	0,0000***	0,0000***	0,0082***	0,0000***	0,753	0,0274**	

Source: Research results.
Legend: **Significant at 1%; ***Significant at 10%.

Table 4 shows that the general RNOA model has greater explanatory power (42.89%) when compared to the others. When analyzing the independent variables, it can be seen that all of them, with the exception of ΔPM, were found to have a significant positive association in predicting future RNOA, when cost stickiness variables are not taken into account. It suggests that as the current RNOA increases, there is an expectation that the future RNOA will also increase. It is worth noting that this positive association is an important signal for investors, since RNOA is considered a similar item to return on invested capital (Nissim & Penman, 2001).

On the other hand, it was pointed out that when the RNOA model is adapted with the inclusion of variables related to cost stickiness, the adjusted R2values decrease, due to the diversity of the sample composition and the cost asymmetry variables in the models, which was already expected.

The RNOA model with the identification of the presence of cost stickiness indicated that the latter, responsible for adapting the models (DummyCS) , showed a negative and significant coefficient, i.e. the presence of cost stickiness suggested a reduction in the RNOA predictive variable. The same result could be seen in relation to the level of asymmetry, which was negatively associated with the value of future RNOA, indicating that higher levels of cost asymmetry tend to indicate lower values of future returns on net operating assets. Finally, the last adapted RNOA model, which considered both the presence and levels of asymmetry, showed that only the degrees of cost stickiness are statistically significant in the predictability of future RNOA.

It is suggested that the levels of cost stickiness are an essential characteristic to consider in entities, as they are a fundamental signal for reflecting profitability and future returns. These results suggest that greater degrees of cost asymmetry are associated with lower future RNOA values.

The RNOA predictability models applied, considering or not the specificities of cost stickiness, generally indicated that the variables RNOAt, ΔRNOAt, ΔPM(t)and ΔTt are positively associated with predicting future RNOA. It is argued that profitability variables disaggregated into PM and T show a positive association with changes in current profitability compared to the forecast one year ahead, providing information on future profitability (Fairfield & Yohn, 2001).

It can be seen that decomposition is useful for increasing information on the predictability of future RNOA. This supports the argument that stock market investors should use accounting information, examining it both immediately and in the future, and checking returns based on this (Soliman, 2008). Bearing in mind that the Brazilian market is marked by analysts' forecasting bias and there is low accuracy in predictability (Lima, 2013), it can be seen that the information resulting from the increase in the variables of changes in RNOA, PM and T, are potential signals that enable investors to understand the forecast of future results, reducing the informational asymmetry between entities and the capital market (Conelly et al., 2011).

Considering the Brazilian capital market as a signaling environment, in the context of Signaling Theory, it should be noted that information about the cost stickiness phenomenon, which could influence the predictability of future returns, is not signaled in this environment to its recipients. The signaling environment, which also includes accounting regulators with their various disclosure requirements, does not favor the reduction of information asymmetry between entities and capital market investors.

The entities analyzed operate in the capital markets and therefore need to comply with accounting standards, including the publication of financial reports. These documents provide information that can affect decisions (Conelly et al., 2011). The Signaling Theory argues that the process of acquiring more information that reduces informational asymmetry between the various parties is costly, making the process of issuing signals costlier (Connelly et al., 2011).

Given the results, it is likely that the cost structure of the entities included in the sample is largely defined by fixed cost elements. It is argued that the phenomenon of cost stickiness can influence the prediction of returns which tend to reduce in the face of its presence and/or level. It is argued that this consequence is not subject to a cause and effect relationship, but suggests that the phenomenon may reflect on other variables and, in this case, on future returns.

4.4 Analysis of forecast accuracy

The APE values were calculated according to Fairfield and Yohn (2001) and were analyzed using descriptive statistics. Table 5 shows the results of the APE values for the general and adapted RNOA models, since for the latter, the variables of interest related to cost stickiness showed statistical significance. The analysis of the APE values for the four models is aimed at comparing and identifying the one with the highest predictive accuracy.

Table 5. APE values

RNOA model	EPA
Model 1: RNOA	0,04726
Model 2: RNOA + DummyCS	0,03885
Model 3: RNOA + LevelsCS	0,03586
Model 4: RNOA + DummyCS+ LevelsCS	0,03598

Source: Research results.

Table 5 shows that the RNOA model with the highest accuracy, whose APE value was closest to 0, refers to model 3, being the one with the lowest level of error in the predictability of future RNOA. It takes into account the level of cost asymmetry when estimating future returns, with an explanation adjustment coefficient of 22.22%. It is argued that for publicly traded non-financial companies in Brazil, the future RNOA predictability model that takes into account the levels of cost asymmetry appear to be the most accurate for estimating future forecasts.

In general terms, the results of the research show that the phenomenon of cost stickiness is present in non-financial companies listed in Brazil. It is possible to suggest, therefore, that the phenomenon has a negative effect on the predictability of future results. However, it is understood that macroeconomic factors in the Brazilian context itself, management decisions in specific periods resulting from crises and even specific characteristics of each sector, lead to adjustment costs that determine cost stickiness.

5 Final Considerations

The models showed that 49 publicly traded non-financial entities in Brazil indicated the presence of cost stickiness, at different levels. The results indicate positive expectations on the part of the entities with regard to the volume of production and sales, since they showed evidence of the application of resources, with the inclusion of new costs, in the face of optimistic expectations.

In addition, both the level of cost asymmetry and its presence in the entities are negatively associated with return predictability, indicating that the existence of cost stickiness or its increase indicates lower future RNOA values. This finding later showed that, although cost stickiness variables are associated with lower predicted returns, the model that uses the level of asymmetry to predict returns was the most accurate, as it is incremental information in investment analysis.

The results may be based on the following arguments: 1) the entities analyzed may have a structure with higher shares of fixed costs, making it difficult to reduce costs in general (Richartz & Borgert, 2020); 2) the entities are optimistic and managers are prone to not reducing costs, even when faced with a reduction in volume (Banker et al., 2014); 3) cost stickiness should be strategically signaled to the market as a phenomenon that can negatively influence the forecasting of returns; 4) by considering the levels of asymmetry in the predictability of returns, more accurate estimates are possible.

The historical information disclosed in the entities' accounting and financial reports does not indicate any signs of cost stickiness and its possible impact on future returns. Therefore, by considering information on cost elasticity in the future predictability of returns, it would be possible to increase the usefulness of the financial statements. This study differs from previous ones in that it showed that cost stickiness can influence the prediction of returns, considering the context in which investors only have public information disclosed by entities in line with regulatory bodies.

This research makes a number of contributions. The adaptation of the RNOA model to predict future returns showed that the inclusion of variables related to cost stickiness proved to be useful in predicting returns. The analysis of APS values stands out as a methodological contribution, as this procedure has not been used in similar research in Brazil before. Unlike previous studies, this research used only public data

Recommendations are suggested to the standard-setting and regulatory bodies that decide on the required content of accounting information for entities in the market when it comes to disclosing policies that can improve transparency and disclosure related to cost stickiness in the Brazilian financial market. It is advisable to issue NBC TG 26, which deals with the presentation of accounting statements, with adjustments to the content of the explanatory notes on the disclosure of the possibility of the presence of cost stickiness in the cost structure of companies.

Management decisions can result in adjustment costs, which, given discretionary aspects, would favor the presence of cost stickiness. It is considered valid to develop studies on the financial motives related to expectations in the decision to make adjustment costs, especially behavioral aspects. It is also suggested that qualitative research be carried out on the determinants in the decision-making process of discretionary elements, since this phenomenon is present in entities.

It would be useful to analyze other indicators related to profitability and return for entities or investors from the Du Pont perspective, especially in the sense of financial leverage, which has not been dealt with here. This would make it possible to verify the influence of cost stickiness in relation to financing obligations in their operations, which also depend on management decisions.

References

Anderson, M. C., Banker, R. D. & Janakiraman, S. N. (2003). Are selling, general, and administrative costs "sticky"? Journal of Accounting Research, 41(1), 47-63.

DOI: 10.1111/1475-679X.00095.

Banker, R. D., Ciftci, M., & Mashruwala, R. (2008). Managerial optimism, prior period sales changes, and sticky cost behavior. Social Science Research Network. DOI: 10.2139/ssrn.1599284.

Banker, R. D., & Byzalov, D. (2014) Asymmetric cost behavior. Journal of Management Accouting Research, 26(2), 43-79. DOI: 10.2308/jmar50846.

Banker, R. D., & Chen, L. T. (2006). Predicting earnings using a model based on cost variability and cost stickness. The Accounting Review, 81(2), 285-30. DOI: 10.2308/accr.2006.81.2.285.

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

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

Conelly, B. L., Certo. S., T., Ireland, R. D., & Reutzel, C. R. (2011). Signaling theory: a review and assessment. Journal of Management, 31(1), 39-67. DOI: 10.1177/0149206310388419.

Cooper, R. W., & Haltiwanger, J. C. (2006). On the nature of capital adjustment costs. The Review of Economic Studies, 73(3), 611-633. DOI: 10.1111/j.1467-937X.2006.00389.x.

Degenhart, L., Lunardi, M. A., Zonatto, V. C. S., & Dal Magro, C. B. (2021). Effect of financial restriction on sticky costs: empirical evidence from brazil. Revista de Negócios, 26(1), 6-21. DOI: 10.7867/1980-4431.2021v26n1p6-21.

Degenhart, L., Vogt, M., Kaveski, I. D. S., Fank, O. L., & Scarpin, J. E. S. (2016). Análise dos fatores determinantes do desempenho das empresas familiares brasileiras de capital aberto listadas na BM&FBovespa do setor de consumo cíclico. ConTexto, 16(33), 74-89. Recuperado em 26 de agosto de 2024, de https://seer.ufrgs.br/index.php/ConTexto/article/view/62860.

Fairfield, P. M., & Yohn, T. L. (2001). Using asset turnover and profit margin to forecast changes in profitability, Review of Accounting Studies, 6, 371-385. DOI: 10.1023/A:1012430513430.

Fairfield, P. M., Sweeney, R. J., & Yohn, T. L. (1996). Accounting classification and the predictive content of earnings. American Accounting Association, 71(3), 337-355. Recuperado em 26 de setembro de 2025, de http://www.jstor.org/stable/248292?origin=JSTOR-pdf.

Fávero, L. P., & Belfiore, P. (2017). Manual de análise de dados: estatística e modelagem multivariada com Excel®, SPSS® e Stata®. Elsevier Brasil.

Ghysels, E., Plazzi, A., & Valkanov, R. (2016). Why invest in emerging markets? The role of conditional return asymmetry. The Journal of Finance, 71(5), 2145-2192. DOI: 10.1111/jofi.12420.

Han, B. H., & Manry, D. (2000). The implications of dispersion in analysts' earnings forecasts for future roe and future returns. Journal of Business Finance & Accounting, 27(1), 99-125. DOI: 10.1111/1468-5957.00307.

Ibrahim, A. E. A. (2015). Economic growth and cost stickiness: evidence from Egypt. Journal of Financial Reporting and Accounting, 13(1), 119–140. DOI: 10.1108/JFRA-06-2014-0052.

Ibrahim, A. E. A., Ali, H. & Aboelkheir, H. (2022). Cost stickiness: a systematic literature review of 27 years of research and a future research agenda. Journal of International Accounting, Auditing and Taxation, 46. DOI: 10.1016/j.intaccaudtax.2021.100439.

Jacques, K. A. S., Borges, S. R. P., & Miranda, G. J. (2020). Relações entre os indicadores econômico-financeiros e as variáveis macroeconômicas dos segmentos empresariais da B3. RACEF – Revista de Administração, Contabilidade e Economia da Fundace, 11(1), 40-59. DOI: 1 0.13059/RACEF.V11I1.642.

Kim, M., & Prather-Kinsey, J. (2010). An additional source of financial analysts' earnings forecast errors: imperfect adjustments for cost behavior. Journal of Accounting, Auditing & Finance, 25(1), 27-51. DOI: 10.1177/0148558X1002500102.

Krisnadewi, K. A., Niroula, B., & Singh, S. K. (2022). Research on cost stickiness in international journals: a bibliometric study. AKRUAL: Jurnal Akuntansi, 13(2). DOI: 10.26740/jaj.v13n2.p144-158.

Lima, G. A. S. F. (2013). A relação do acompanhamento dos analistas com caracterísitcas de valuation das empresas brasileiras. [Tese de Doutorado, Universidade de São Paulo]. Biblioteca Digital de Teses e Dissertações da USP. https://teses.usp.br/teses/disponiveis/livredocencia/12/tde-14112014-151023/pt-br.php.

Martins, E. (2018). Contabilidade de custos. (11a ed). São Paulo: Atlas.

Malik, M. (2012). A review and synthesis of cost stickiness' literature. Social Science Research Network. DOI: 10.2139/ssrn.2276760.

Medeiros, O. R., Costa, P. S., & Silva, C. A. T. (2005). Testes empíricos sobre o comportamento assimétrico dos custos nas empresas brasileiras. Revista Contabilidade & Finanças, 16(38), 47-56. DOI: 10.1590/S1519-70772005000200005.

Nissim, D., & Penman, S. H. (2001). Ratio analysis and equity valuation: from research to practice. Review of Accounting Studies, 6, 109–154. DOI: 10.1023/A:1011338221623.

Novák, P., Dvorský, J., Popesko, B. & Strouhal, J. (2017). Analysis of overhead cost behavior: case study on decision-making approach. Journal of International Studies, 10(1), 74-91. DOI: 10.14254/2071-8330.2017/10-1/5.

Pereira, N. A., & Tavares, M. (2020). Assimetria de custos no gerenciamento de resultados. Advances in Scientific and Applied Accounting, 13(1). DOI: 10.14392/ASAA.2020130106.

Penman, S. H., & Zhang, X. (2002). Modeling sustainable earnings and P/E ratios with financial statement analysis. Social Science Research Network. DOI: 10.2139/ssrn.318967.

Richartz, F., Borgert, A., & Lunkes, R. J. (2014). Comportamento assimétrico dos custos nas empresas brasileiras listadas na BM&FBOVESPA. Advances in Scientific and Applied Accounting, 7(3), 339-361. DOI: 10.14392/ASAA.2014070302.

Soares, E. R., & Galdi, F. C. (2011). Relação dos modelos DuPont com o retorno das ações no mercado brasileiro. Revista Contabilidade & Finanças, 22(57), 279-298. DOI: 10.1590/S1519-70772011000300004.

Soliman, M. T. (2008). The use of Du Pont analysis by market participants. The Accounting Review, 83(3), 823-853. DOI: 10.2308/accr.2008.83.3.823.

Stimolo, M. I., & Porporato, M. (2020). How different cost behaviour is in emerging economies? Evidence from Argentina. Journal of Accounting in Emerging Economies. DOI: 10.1108/JAEE-05-2018-0050.

Subramaniam, C., & Watson, M. W. (2016). Additional evidence on the sticky behavior of costs. Advances in Management Accounting, 26, 275-305. DOI: 10.1108/S1474-787120150000026006.

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

Xu, J., & Sim, J. W. (2017). Are costs really sticky and biased? Evidence from manufacturing listed companies in China. Applied Economics, 49(55), 2017. DOI: 10.1080/00036846.2017.1316823.

Yasukata, K., & Kajiwara, T. (2011). Are sticky costs' the result of deliberate decision of managers? Social Science Research Network. DOI: 10.2139/ssrn.1444746.