

# Analysis of the Influence of Income Smoothing over Earnings Persistence in the Brazilian Market\*

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## ABSTRACT

This study addresses the influence of income smoothing on earnings persistence in the Brazilian market. We argue that accounting choices made by firms in order to report stability can affect the informational level of performance reported to the market, and thus affect its usefulness, particularly for company valuations and fund allocating decisions. The sample was set based on open companies listed on the BM&FBOVESPA between 2004 and 2013. The firms in the sample were separated into two groups with regards to the presence of income smoothing, based on the EM1 and EM2 metrics from Leuz, Nanda, and Wysocki (2003). We then inserted a multiplicative dummy variable into the basic persistence model, to assess the effect of smoothing on persistence. The results show increased transience in the time series, caused by the presence of income smoothing, which denotes that reported stability, conveyed via a series of smooth earnings, decreased the sustainability of reported performance, captured by persistence of the series. Additional controls show a negative influence of smoothing on persistence for small firms and when incurring losses, and a positive one for operations in sectors with accounting regulation. We conclude that, at least for the firms in the sample, reporting of constant performance resulted in a loss in the sustainability of income as a form of information on which investors, fund providers, and administrators base their decisions.

**Keywords:** earnings persistence, income smoothing, time-series properties of earnings, quality of accounting information.

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## 1 INTRODUCTION

From the shareholder information perspective, this study focuses on profit as important accounting information, measured in a way that reflects company performance. Recent studies by Dichev, Graham, Harvey, and Rajgopal (2013, 2016) show that financial directors identify profit as a key metric, with its greatest importance being that of investor information for evaluating companies.

With the performance measurements in successive periods, time series of reported earnings are produced, which have specific temporal properties, such as persistence and smoothing, in which the latter is widely considered a form of earnings management. Schipper and Vincent (2003), Francis, LaFond, Olsson, and Schipper (2004), Dechow and Schrand (2004), and Dechow, Ge, and Schrand (2010) propose that persistence is a representative construct of the usefulness of earnings for investors, subject to the influence of income smoothing. This involves properties from the same series of information, but which measure its features differently, and the relationship between which this study aims to investigate.

Based on the central idea that performance reported as stable over time can affect the usefulness of the series of earnings for evaluating the company, the following research question was formulated: *What is the influence of income smoothing over earnings persistence in the Brazilian market?* The aim of the study was, therefore, to investigate how income smoothing influenced earnings

persistence in the Brazilian market.

Illustration of the influence of smoothing over persistence is interesting because it develops the idea that accounting choices made by firms in order to report stability can alter the informational level of performance reported to the market, affecting its usefulness for evaluating company value. In the Brazilian case, as well as investors, there are other parties that are interested in performance, such as banks, important sources of funding, and families, given their important role in company control. Thus, greater understanding regarding the sustainability of series of earnings also gives these users a better base on which to make fund allocating decisions.

Other studies address income properties in the Brazilian market, such as those by Almeida, Sarlo, Bastianello, and Moneque (2012), which compare conservatism and smoothing, and Paulo and Martins (2007), Cupertino (2010), and Takamatsu (2011), which investigate earnings persistence and its components. In other markets, Bao and Bao (2004), and Yueng (2009) link smoothing with earnings quality, as important information for investors. This paper contributes in showing the relationship between smoothing and persistence, something which is not addressed in previous studies. In addition, this study presents an income smoothing attribution approach based on the EM1 and EM2 metrics from Leuz, Nanda, and Wysocki (2003), directly associated with companies, unlike the original model.

## 2 THEORETICAL FRAMEWORK

### 2.1 Earnings Persistence

Earnings persistence is a feature of accounting information associated with contributing to future company income forecasts – assuming that persistent earnings are more useful in evaluating investments. As Dechow et al. (2010) explain, the logic behind persistence is intuitive: if Firm A presents more persistent earnings than Firm B in perpetuity, then Firm A's earnings are a more useful synthetic measure of future performance and annualizing its current earnings will result in fewer evaluation errors.

Different papers measure, by means of earnings persistence, the quality of information reported to external users. Miller and Rock (1985), Easton and Zmijewski (1989), Kormendi and Lipe (1987), and Lipe and Kormendi (1994) refer to persistence as the effect of innovations in earnings in the current period on the present value of revisions of expected future earnings, linking it with the impacts of innovations in earnings on expectations of market participants for future earnings.

Baginski, Lorek, Willinger, and Branson (1999) explain persistence based on the firm: companies make

operational and investment decisions, which create conditions for sustaining current earnings and increases in them, leaving traces that investors seek to observe, expecting them to generate earnings that persist. Thus, according to the authors, persistence captures how a current impact should affect the whole flow of future achievements of a series of earnings. The authors use Lev (1983) as a base, which in turn addresses persistence as synonymous with non-randomness in earnings behavior.

Persistence is presented by Schipper and Vincent (2003) in terms of sustainability, related to the perception of permanence and transience of changes in earnings, as a construct of quality of information, which results from its usefulness to the investor decision making process, specifically in evaluating companies.

From a similar perspective, Dechow and Schrand (2004) assume that earnings are of a high quality when they accurately represent firm value, also denominated “permanent earnings”, and that persistence is a significant parameter of quality when earnings reflect performance in the period and if this current performance per-

sists in subsequent periods.

Kothari (2001) discusses persistence denominating it by means reversion, in comparison with the random walk behavior of earnings. The author indicates reasons for its existence from some economic perspectives, such as unsustainable profitability above average earnings due

$$E_{t+1} = \alpha + \beta \cdot E_t + \varepsilon_t \quad \mathbf{1}$$

where:

$E_t$  is the measure of Earnings, in period  $t$ ;

$\alpha$  is the constant term;

$\beta$  is the persistence parameter, between 0 and 1;

$\varepsilon_t$  is the error term;

The limit between 0 and 1 for the persistence parameter is given by its own definition. At value 1, a random walk is assumed, which indicates that impacts on current earnings fully affect the future series. A zero value, on the other hand, indicates total transience of shocks, characterizing the absence of persistence.

Studies of the Brazilian market investigate earnings persistence from different perspectives. Paulo and Martins (2007) observe greater persistence in operating income in comparison to cash flows from operations. Sousa and Galdi (2013), Silva and Machado (2013), Takamatsu (2011), and Cupertino (2010) present evidence of greater persistence for cash flows in relation to accruals.

As important factors for abnormal earnings persistence, Aguiar, Lopes, and Coelho (2007), and Coelho and Braga (2008) identify some company operating sectors, but not market participation; and Wuerges, Cupertino, Siqueira, and Costa (2009) show that more recent accounting data has more precise informational content regarding company situation, with good results impacting more heavily on results for the subsequent period. Pimentel and Aguiar (2012) address quarterly earnings, not finding significant evidence of persistence for the majority of companies, and they identify size and different corporate governance standards as important factors.

## 2.2 Income Smoothing

As one of the target aims of earnings management practices, smoothing went on to be discussed based on Hepworth (1953), which observed that companies, in reporting earnings without a historic record of peaks and valleys, maintain better continuity in their institutional relationships, in which investors and creditors feel more confident in the face of more stable results. Other authors share similar perspective, such as Copeland (1968), Imhoff (1977), and Eckel (1981).

In accordance with Dechow and Skinner (2000), and Martinez (2013), various studies are based on definitions given by Schipper (1989), and Healy and Wahlen

to competition; conservatism and litigation risk, leading to advance recognition of losses, which increase series transience when reverted; and recognition of transitory items and mark to market of assets and liabilities.

As presented by Dechow et al. (2010), the basic model for persistence is represented by Equation 1.

(1999), which in general place management as a purposeful administrative practice, with the intention of mislead users of information with regards to company performance.

It is worth noting, however, that Dichev et al. (2013) provide evidence of conflicting positions with regards to smoothing: on one hand, it is seen as a desirable feature of stability; on the other hand, it is interpreted as an opportunistic and misleading attitude. In accordance with Graham, Harvey, and Rajgopal (2005), executives worry about conveying business stability, with a strong perception that the market rejects uncertainty and values predictability of results.

In turn, Parfet (2000) and Arya, Glover, and Sunder (2003) claim that earnings management forms part of the features of managers, who, as internal agents, have a greater capacity to mitigate and isolate transitory variations regarding performance than external users, based on reported information.

Studies concerning the American market indicate differences in smoothing levels, related to company economic sector, when considered in conjunction with company size, as in Albrecht and Richardson (1990); larger companies tend to smooth their results more, according to Michelson, Jordan-Wagner, and Wootton (1995, 2000). However, for the Brazilian market, Martinez and Castro (2011) identified smoothing related to smaller companies, in contrast with the results found in the American and European markets. The authors explain this distinction via the possibility of risk perception offsetting behavior, in comparison with larger companies.

Torres, Bruni, Castro, and Martinez (2010) present evidence of the mitigation of smoothing by the presence of better corporate governance, indicating that firms with more concentrated capital can practice smoothing in order to meet the interests of majority and controlling shareholders, altering minority shareholders' perceptions of risk. Lyra and Moreira (2011) analyze smoothing related to corporate governance, focusing on special segments of the BM&FBOVESPA, and present evidence of a smaller proportion of companies with smoothing in the segment with greater governance.

Different authors relate smoothing to other factors, such as conservatism, in the case of Almeida et al. (2012), who observed greater difficulty for the market in recognizing losses in earnings in advance when there

is smoothing; the classification of risk, as Tonin (2012) showed, there being a greater likelihood of smoothing in companies that have ratings determined by agencies; and sector comparison, demonstrated by Baioco, Almeida, and Rodrigues (2013), in showing that sectors with specific accounting regulation exhibit a lower level of smoothing.

Leuz et al. (2003) link smoothing to earnings management practices, by studying various countries, according to market features. The authors find an inverse relationship between the level of minority investor protection and earnings management. They propose four management metrics, of which two are related to earnings smoothing and two measure discretion regarding

earnings. As this study specifically addresses smoothing, we opted to jointly adopt only the first two metrics from Leuz et al. (2003).

The first measure (EM1) relates the standard deviation of operating income with the standard deviation of cash flows from operations, as in Equation 2. It is argued that the process of income smoothing causes lower variability in operating earnings, in comparison with cash flows. The lower the value found for the measurement, the higher the level of smoothing attributed. As the difference between the two pieces of information results from accruals, this metric captures income smoothing via accounting adjustments, but not via decisions that also affect cash flow.

$$EM1 = \frac{\sigma(OpInc)}{\sigma(CFO)} \quad 2$$

where:

$\sigma(OpInc)$  is the standard deviation in Operating Income in the total period;

$\sigma(CFO)$  is the standard deviation in Cash Flow from Operations in the total period.

The other smoothing metric presented by the authors (EM2) is the correlation between variations in accruals and those in cash flow from operations, as in Equation 3, with the reason that accounting discretion can be used to hide impacts on cash flows, and so present smoothed income.

As well as Leuz et al. (2003), other researchers used this measure, such as Land and Lang (2002), and Myers, Myers, and Skinner (2007).

These authors explain that, in general, there is no surprise in finding negative levels of correlation, since accruals are considered to adjust to impacts on cash flows, that is, they temporarily accumulate result values that will be reverted in cash flow at another time. The dampening effect of earnings in relation to cash flows, when very strong, indicates income smoothing, resulting in more negative values for EM2.

$$EM2 = \rho(\Delta Accruals, \Delta CFO) \quad 3$$

where:

$\Delta Accruals$  is the variation in accruals over the period analyzed;

$\Delta CFO$  is the variation in Cash Flows from Operations over the period analyzed.

It is worth stressing that these measures are incapable of differentiating smoothing situations, when this results naturally from the earnings management process. Thus, this study views smoothing from a earnings management perspective, but without ceasing to also view it as a time-series property of earnings, the presence of which, as is argued, can influence another characteristic, which is persistence.

### 2.3 Influence of Persistence on Smoothing

Schipper and Vincent (2003), in classifying the time-series properties of reported income, treat persistence as an indicator of permanence of variations in income, inverse to the transience. The authors argue that the introduction of transitory components in earnings reduces

the quality of earnings measured by persistence, due to there being noise in the time series.

Additionally, Francis et al. (2004) highlight that smoothing helps in eliminating uncertainty regarding reported income; however, this can compromise the informational level with regards to the structure of company payments, which is of interest to investors. The authors offer a complementary perspective on the influence of smoothing over persistence, from the possibility of an increase in persistence, due to transitory fluctuations in series of earnings being mitigated.

Dechow and Schrand (2004) explain that earnings quality, captured by persistence, can be increased when impacts that are not relevant to company value are smoothed, but it is reduced when important changes are smoothed. Dechow et al. (2010) reinforce the idea that hiding relevant impacts worsens earnings quality, since they would be useful in the investor decision-making process.

Concentrating on the American market, Bao and Bao (2004) link smoothing to quality of information, finding



evidence that the relevance of reported results derives as much from quality of information as from both of the features together, but not from income smoothing alone; and they propose that the two factors should be taken into account in company evaluations. Yueng (2009) addressed the relationship between smoothing and quality in a similar way for various countries in the European market, finding consistent evidence.

From the use of smoothing as a earnings manage-

ment practice, suggested by the literature, and its possible interference with persistence, as discussed in Schipper and Vincent (2003), Francis et al. (2004), Dechow and Schrand (2004), and Dechow et al. (2010), as well as evidence from Bao and Bao (2004) and Yueng (2009) on the effect of smoothing together with earnings quality, in its usefulness as information to investors, the following study hypothesis was formulated: *Income smoothing reduces earnings persistence in the Brazilian market.*

### 3 METHODOLOGY

The scope of this study is limited to publicly traded companies that operated in the Brazilian market between 2004 and 2013. The choice of this interval is justified by the balance around the process of adopting international accounting standards, an important normative change for the Brazilian market. Given that use of more recent data alone would lead to a very short time series for attributing smoothing and carrying out a consistent analysis of persistence, we sought to widen the study period in a way that equally covers the full use of domestic

Brazilian standards, from 2004 to 2007, and international ones, from 2010 to 2013.

Using the Economática® database, we searched for all the companies with shares traded on the BM&FBOVESPA between December 2003 and December 2013. The beginning of the interval in December 2003 was considered as an initial value for 2004, and therefore the interval 2004-2013 comprises the complete years. In Table 1 the composition of the research model is presented.

**Table 1** Sample composition

Sample composition	Number of companies
Companies present in the whole study period	275
(-) Removal of companies	
with accounting peculiarities (holding and financial)	(76)
with missing data	(44)
<i>Final sample</i>	<i>155</i>

Source: Developed by the authors.

In this study, the analyzed panel is balanced, that is, with observations for all of the cross elements over each period; and short, since the number of companies is greater than that of the time periods. As in Kothari (2001), the persistence measurement is affected by survival bias, in expecting that surviving firms revert to bad performance, which leads to an increase in transience. Thus, it

is possible to argue that the persistence parameters can be underestimated due to the survival bias, reducing its statistical significance.

To carry out the study, various variables were collected from the Economática® database in order to develop the persistence and smoothing models adopted. The variables are presented in Table 2.

**Table 2** Study variables

Application	Collected variables	Interval
Persistence	Total Assets	2003-2013
Parameters	Net Income	2004-2013
CFO	EBIT	2003-2013
Accruals	Current Assets, Cash and equivalents, Current Liabilities, Short-term debts and Taxes Due	2004-2013
	Depreciation and Amortization	2004-2013

Source: Developed by the authors.

The basic persistence model, represented in Equation 2, serves as a starting point for the investigation of persistence as a quality of earnings. For the presence of smoo-

thing, the two quantities were measured, in accordance with the EM1 and EM2 metrics from Leuz et al. (2003), given by Equations 2 and 3.

The Cash Flow from Operations was calculated from the difference between Operating Income (EBIT) and estimated accruals, since the reporting of Cash Flow Statements only became compulsory after Regulation nº 11638/07, and

this study includes previous periods. Thus, accruals were estimated via the balance sheet approach, as in Equation 4, an approach attributed to Jones (1991) and used by various empirical studies, including Leuz et al. (2003).

$$Accruals_{it} = (\Delta CA_{it} - \Delta Cash_{it}) - (\Delta CL_{it} - \Delta STD_{it} - \Delta Tax_{it}) - Dep_{it} \quad 4$$

where:

$\Delta CA_{it}$  is the variation in Current Assets for firm  $i$  in period  $t$ ;

$\Delta Cash_{it}$  is the variation in Cash and Cash Equivalents for firm  $i$  in period  $t$ ;

$\Delta CL_{it}$  is the variation in Current Liabilities for firm  $i$  in period  $t$ ;

$\Delta STD_{it}$  is the variation in Short Term Debts for firm  $i$  in period  $t$ ;

$\Delta Tax_{it}$  is the variation in Tax Due for firm  $i$  in period  $t$ ;

$Dep_{it}$  are Depreciation and Amortization expenses for firm  $i$  in period  $t$ ;

To separate the companies with regards to smoothing, the logic attributed to the EM1 and EM2 metrics by Leuz et al. (2003) was assumed in Equations 2 and 3. In that particular paper, both metrics are used at market level, that is, calculated for companies belonging to previously determined groups, and compared between these groups. In this study, these measures are used as a grouping criterion, so that the set attributed to the presence of smoothing is formed of companies that exhibit both metrics statistically significant in this sense.

To determine the presence of smoothing through metric EM1, the p-value from the Levene’s test is estimated, comparing each company’s operating income and cash

flow from operations variances for the study period. Classification of companies into the group with the presence of smoothing met two criteria: (i) the ratio of the standard deviation in operating income to the standard deviation in cash flows from operations should be lower than the unit; and (ii) half of the p-value of the Levene’s test should be less than 0.05, which was the set level of significance.

Determining the presence of smoothing via metric EM2 was done by comparing the Pearson correlation values of the variations in accruals and cash flows from operations between 2005 and 2013, with the critical  $r$  value of 0.5822 – obtained for nine pairs of observations and a unilateral level of significance of 0.05. To determine the presence of smoothing, the correlation should be statistically lower than zero: (i) should be negative; and (ii) should have a higher absolute value than critical  $r$ .

Thus, if Operating Income exhibit a statistically lower standard deviation than that of Cash Flows from Operations over the period analyzed, there is an indication of financial smoothing from the logic of the EM1 metric. In a similar way, if the correlation of the EM2 measure, between the variations in Accruals and those in Cash Flows from Operations, is statistically negative, that is less than zero, smoothing is inferred. So, it is possible to attribute a dummy variable SD for those cases in which the two measures indicate the presence of smoothing, as related in Table 3.

**Table 3** Criteria for the smoothing dummy SD

Smoothing models (Eq. 2 and 3):	EM1= $\frac{\sigma(Oplnc)}{\sigma(CFO)}$	EM2= $\rho(\Delta Accruals, \Delta CFO)$
If $EM1 \geq 1$ or $EM2 \geq 0$	then	DS=0
If $EM1 < 1$ and $EM2 < 0$	then	DS=1

Source: Developed by the authors.

From the criteria defined in Table 3, undefined cases are absorbed by the group without the presence of smoothing. This attribution implies assuming that none of the metrics is sufficient to infer smoothing on its own, but that both are for non-smoothing, and with this, a conservative position is assumed in attributing the presence of smoothing to the companies. The main implication of absorbing cases without clear definition, in one or the other group, is to impair the group boundaries, classifying similar companies into separate groups – in this case, not attributing the presence of smoothing to a company that presents smoothed results.

To determine the earnings persistence feature, the basic model represented by Equation 1 was adopted, with a first order lag in relation to company net income. With the aim of mitigating the “size” effect on the sample, the earnings attri-

buted to each company were adjusted by their Average Total Assets corresponding to each period. Average measurement of assets was chosen to attenuate variations in size over the accounting period, as opposed to the alternative of treating size as a simpler measure of total assets at the beginning of the period. Robustness analyses showed stronger evidence of persistence when the average value measurement was used, without alterations for the study’s conclusions.

Next, a multiplicative dummy variable was attributed to the basic model’s autoregressive term, which allows the presence of smoothing to be related to the earnings persistence parameter (SD). As the focus of the study is the influence of smoothing over persistence, and persistence is measured by the estimated coefficient of the autoregressive term, it is highlighted, in this case, that insertion of the dummy varia-



ble should be carried out only in a multiplicative way, with there being no sense in also inserting it in an additive way.

The study model thus followed which can be described by Equation 5.

$$NI_{it}^{adj} = \beta_0 + (\beta_1 + \beta_2.SD) NI_{i,t-1}^{adj} + \varepsilon_{it} \quad 5$$

where:

$NI_{it}^{adj}$  is the Adjusted Net Income of company  $i$  in period  $t$ ;

$\beta_0$  is the constant term;

$\beta_1$  is the persistence parameter without the presence of smoothing;

$\beta_1 + \beta_2$  is the persistence parameter in the presence of smoothing;

$SD$  is the dummy variable, which represents the presence of smoothing;

$\varepsilon$  is the error term.

The persistence parameters provide sensitivity to the model with regards to the presence of smoothing, in which the  $\beta_1$  term applies to the group of companies for which the presence of smoothing was not attributed and  $\beta_1 + \beta_2$  to those companies with the presence of smoothing. So,  $\beta_2$  represents the difference between the groups and its statistical significance indicates the influence of the presence of smoothing over earnings persistence. In the case of a positive sign, an increase in persistence attributed to smoothing is indicated, that is, its presence improves the quality of information; otherwise, with a negative sign, it is inferred that smoothing worsens quality.

## 4 RESULTS AND ANALYSES

In Table 4 the Adjusted Net Income of the companies that comprise the total sample is statistically described and with separation with regards to the presence of smoothing.

Adjusted Net Income is a measure that is representative of performance, in which the aim is to reduce the influence of company size. Cupertino (2010) reminds us that as the size of balance sheet items varies between diffe-

rent companies, comparison with standardized variables is a widely used practice in studies that use cross-sectional data. An additional point in relation to the persistence parameter estimations is that there is a specific interest in removing the “size of income” effect as a measure of performance. This is because size is a highly constant feature, influencing persistence of performance measured by reported income directly.

**Table 4** Adjusted Net Income in the sample

Sample	Obs.	Mean	Standard Deviation	Median	Minimum	Maximum	Asymmetry	Kurtosis
Total	1,550	0.0021	0.4755	0.0437	-8.4206	2.0652	-12.8874	194.1146
With smoothing	410	0.0431	0.1430	0.0416	-0.6584	2.0652	5.8735	103.5961
Without smoothing	1,140	-0.0126	0.5470	0.0444	-8.4206	0.9347	-11.4704	149.2426

Source: Developed by the authors.

The statistical description of Adjusted Net Income shows a mean that is very close to zero and a standard deviation that indicates a large data spread. In relation to the minimum, maximum, and median values, accentuated asymmetry is observed, with the median closer to the maximum value and greater than the mean. Asymmetry to the left and an accentuated curvature of distribution are reflected in the negative value of the asymmetry measure and in the high value of the kurtosis, even though normal distribution is not a requisite for the Adjusted Net Income variable.

In the grouping in which there is the presence of income smoothing, it is observed that the central measures, mean and median, are close to zero, while the standard deviation is greater in the group without smoothing and lower in the group with smoothing. Mann-Whitney tests show that the group means do not have statistical difference, with p-value = 0.8743, but the spread in income is greater in the group

without smoothing, with p-value = 0.0001. This difference in spread is compatible with the smoothing attribution process itself. Moreover, the lowest value for the variable is found in the group without smoothing and the highest in the group with smoothing, which is reflected in the different signs of the asymmetry measures.

Determining the presence of smoothing was based on the EM1 and EM2 ratios, in the work of Leuz et al. (2003), as in Equations 2 and 3, and was carried out based on the criteria indicated in Table 3. The composition of the sample formed based on the attribution of the smoothing dummy variable criteria is detailed in Table 5.

From the classification based on the EM1 metric, 42 companies indicated the presence of smoothing, while 113 did not. It is observed that, for no case, operating income were shown to be more spread than the respective cash flows from operations, given that the maximum of

this measure resulted in 0.9976. The classification carried out for the EM2 metric resulted in 128 companies indicating the presence of smoothing and 27 without smoothing. For both the EM1 and EM2 metrics, Mann-Whitney tests

indicate there being significant differences in the value of the grouping measures with regards to smoothing, with p-values < 0.0001. In this way, the groups formed can be considered distinct.

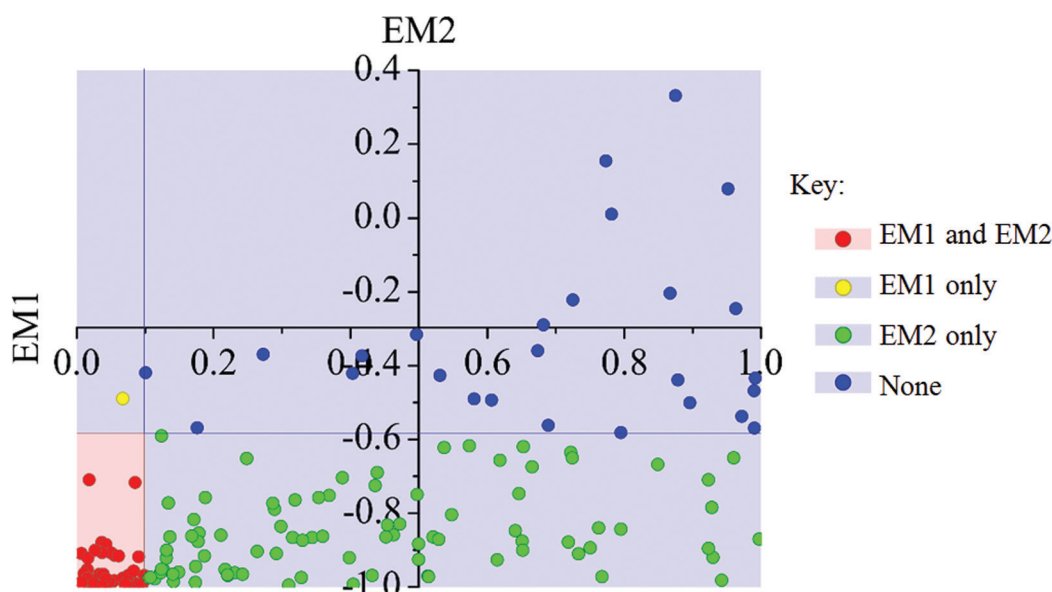
**Table 5** Sample distribution in relation to smoothing

	With smoothing			Without smoothing		
	EM1	EM2	Combined Sample	EM1	EM2	Combined Sample
Criteria	$EM1 < 1$	$EM2 < 0$	"and"	$EM \geq 1$	$EM2 \geq 0$	"or"
Dummy variable		$DS = 1$			$DS = 0$	
No of companies	42	128	41	113	27	114
Average	0.0467	- 0.8828	-	0.4910	- 0.3410	-
Standard Deviation	0.0265	0.1087	-	0.2781	0.2355	-
Minimum	0.0069	- 0.9991	-	0.1008	- 0.5813	-
Maximum	0.0985	- 0.5908	-	0.9976	0.3319	-

**Note.** Smoothing models (Eq. 2 and 3):  $EM1 = \frac{\sigma(Oplnc)}{\sigma(CFO)}$  e  $EM2 = \rho(\Delta Accruals, \Delta CFO)$ .  
Source: Developed by the authors.

To determine the presence of smoothing in the combined sample, it was set that both metrics should point in the direction of income smoothing. This was the case for 41 companies, the same ones that comprised the group with the presence of smoothing via the EM1 metric – that is, all the companies that showed the presence of smoothing for EM1 also did so for EM2, with the exception of one company, which exhibited the presence of smoothing through EM1, but without smoothing through EM2.

Consequently, 26 companies classified as without smoothing by the EM1 and EM2 metrics joined the group without the presence of smoothing from the combined sample, plus the 88 with divergent classification (classified as without smoothing via EM1 and with smoothing via EM2), totaling 114 companies – the whole composition of the group without smoothing via the EM1 metric, plus one company classified without smoothing only via the EM2 metric. The distribution of the companies can be observed in Figure 1.



**Figure 1** Distribution of companies according to smoothing attribution via EM1 and EM2.  
Source: Developed by the authors.

A higher concentration in lower values in both the measures stands out, in which company incomes were classified as smoothed, in the pink region; and a greater spread as the EM1 and EM2 values increase, in the blue

region. The correlation between both measures is 0.5635 (p-value < 0.001), showing a significant relationship between the variables.

Observing the large number of companies for whi-



ch the presence of smoothing was attributed solely by EM2, it is recognized that this measure has acquired a less conservative character, which can be attributed to the argument that companies exhibit a naturally negative correlation of variances between accruals and cash flows. Thus, a critical  $r$  value set based on a zero parameter results in a higher limit to an  $r$  value obtained based on a parameter below zero, which would become more representative of this naturally negative correlation and reduce the sample cut-off point criteria.

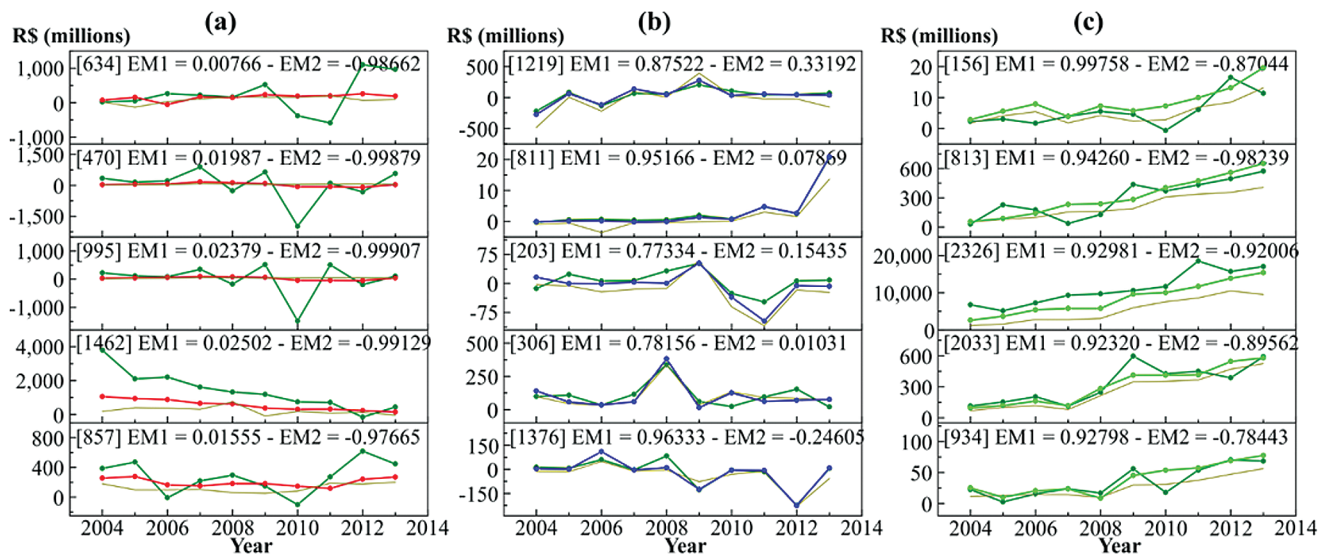
It also is possible to perceive an absence of companies distributed for higher values of EM2 and lower values of EM1 from the analysis of Figure 1. Because they are metrics that capture smoothing in a distinct way, the behavior of earnings should be analyzed more carefully.

In Figure 2, the aim was to compare the extremes, considering the lowest values for EM1 and EM2 simultaneously, characterizing the sample with the presence of smoothing (a); and higher for both measures, characterizing the absence of smoothing (b). In a complementary analysis, a third extreme appears with high values for EM1, lower values for EM2, cases associated with non-income smoothing, from a conservative position (c). The five most extreme cases in each situation were chosen, in which the companies are identified by the Econo-

mática numbering and the operating income were compared to the cash flows from operations and net income.

In the comparison between the three situations in Figure 2, the behavior of income is shown in relation to cash flows with regards to the extreme cases in which income smoothing (a) and non-smoothing (b) and (c) was considered. In the comparison between the two most distant extremes – low EM1 and EM2 values vs. high values for both – it is possible to clearly perceive the detachment of operating income and net income series from cash flows from operations in the first case (a), in contrast with the monitoring of income in the second case (b).

Observation in conjunction with the behavior of income in the third extreme (c) allows for a better distinction than each metric captures. For cases (b) and (c), the EM1 measures are closer to the maximum value, and in (a) to the minimum value, reflecting its sensitivity to the variation in income in relation to cash flows as an external measure of magnitude. Conversely, the EM2 measurements are closer to the maximum value in (b) and to the minimum in (a) and (c), and the behavior of income in relation to cash flows contrasts with regards to following or breaking from the time series in each stage, which reflects an internal sensitivity of this metric.



**Figure 2** Behavior of Income and Cash Flows in external cases

- Cash Flow from Operations
- Operating Income – (a) low EM1 and EM2, extreme with smoothing
- Operating Income – (b) high EM1 and EM2, extreme without smoothing
- Operating Income – (c) high EM1 and low EM2, extreme without smoothing due to conservative position
- Net Income

Source: Developed by the authors.

Thus, the significant correlation of the metrics suggests a common income smoothing feature, as also observed by Leuz et al. (2003), but with different abilities to capture the behavior of earnings, in comparison with cash flows. In this study, the conservative position option consists of considering that both metrics should indicate

the presence of income smoothing; however it is ignored that the correlation of EM2 would naturally be negative, accepting the zero value as a parameter for defining the cut-off criteria. Refinement of such positions could be carried out in future studies.

Once the panel data was obtained, it was necessary to

choose an approach used for the regression. The choice of the data approach came about via the results of the Chow test, with p-value < 0.001, indicating completion of the Hausman test, with p-value < 0.001, supporting the Fixed Effects treatment. With this, it is accepted that there are factors that are not recognized in the model, which are significantly correlated to reported income, which are in-

variant and different between companies.

Next the persistence of adjusted net income parameters was estimated, as indicated in Table 6. In Model A, the presence of smoothing in the sample was ignored (Eq. 1), and in Model B, the model developed to investigate the influence of the presence of smoothing over persistence (Eq. 5) was used.

**Table 6** Estimation of Persistence Parameters

	Regression				$\beta_0$			$\beta_1$			$\beta_2$		
	F	sig.	R <sup>2</sup>	adj. R <sup>2</sup>	Coef.	t	sig.	Coef.	t	sig.	Coef.	t	sig.
[A]	10.15	0.0018	0.7469	0.1724	-0.0021	-3.95	<0.001	0.3967	3.19	0.002	–	–	–
[B]	8.07	0.0005	0.7579	0.1843	0.0021	2.32	0.022	0.4146	3.92	<0.001	-0.3764	-3.29	0.001

**Notes.**

1. [A] Basic model, ignoring the presence of smoothing, based on Eq. 1:  $NI_t^{adj} = \beta_0 + \beta_1 NI_{t-1}^{adj} + \varepsilon_t$

2. [B] Smoothing model, as in Eq. 5:  $NI_t^{adj} = \beta_0 + (\beta_1 + \beta_2 \cdot SD) NI_{t-1}^{adj} + \varepsilon_t$

3. Residuals: (a) not normal (Shapiro-Wilk with approximation from Royston, p-value <0.001),

(b) heteroskedastic (Wald modified, p-value <0.001) and

(c) without autocorrelation (Cumby-Huizinga with robustness to heteroskedasticity, p-value = 0.4657).

4. Estimations robust to heteroskedasticity.

5. Additional robustness tests:

(a) Control by year: no significant year. Without impact for the estimated parameters.

(b) Adjustment by TA at the beginning of the period: Same persistence behaviors, but with small losses in the statistical significance of the estimated parameters – Coefficients (t): [A]  $\beta_1 = 0.2141$  (1.92), p-value = 0.054, significant only to the level of 10%; [B]  $\beta_1 = 0.2392$  (2.31), p-value = 0.022 and  $\beta_2 = -0.2376$  (-2.17), p-value = 0.032, both significant only to 5%.

Source: Developed by the authors.

As can be observed, the values of the F statistic = 10.15 and 8.07, with p-values = 0.0018 and 0.0005, from models A and B being significant, with an explanatory power of 74.69% and 75.79%, as in the R<sup>2</sup> presented in Table 6. When the adjusted R<sup>2</sup> values of 0.1730 and 0.1855 are considered, excluding the quantity of variables effect, the contribution of the smoothing dummy variable to the explanatory power of the model also becomes evident. The  $\beta_0$  intercept represents the averages of individualized intercepts and is significant and negative for the basic model, but that for the model with smoothing can be considered significant to 5%, but not to 1%, and exhibits a positive sign.

The  $\beta_1$  coefficient from model A is significant, with t statistic = 3.19 and p-value = 0.002, which indicates that the sample is persistent when the presence of smoothing is ignored. This result shows that persistence is a feature that is present in the companies in the sample, and therefore in the Brazilian market for the period studied. Previous studies also identify earnings persistence in their different facets, such as Paulo and Martins (2007), Cupertino (2010), Takamatsu (2011), Silva and Machado (2013), Sousa and Galdi (2013), for operating income; and Aguiar et al. (2007), Coelho and Braga (2008), and Wuerges et al. (2009) for residual income.

For model B, coefficient  $\beta_1$  is also statistically significant, with t = 3.92 and p-value < 0.001, in the application of Equation 5. When the presence of smoothing by accounting means in the model is considered, there is the indication that the companies without smoothing are

significantly persistent.

Coefficient  $\beta_2$  shows that the difference in persistence between the companies with regards to smoothing is statistically significant and negative, with t statistic = -3.29 and p-value = 0.001. This result indicates that the presence of smoothing influences the persistence of adjusted earnings, reducing it.

With these results, the hypothesis of this study, stated as *Income smoothing reduces earnings persistence in the Brazilian market*, is thus confirmed by observation of the statistical significance of  $\beta_2$  and its negative sign, in model B, through the application of Equation 5. Thus, it is observed that the presence of smoothing reduced earnings persistence, impairing the quality of reported information.

In accordance with the explanations from Schipper and Vincent (2003), Dechow and Schrand (2004), and Dechow et al. (2010), observation of a negative contribution of the presence of smoothing over persistence can be explained by the increase in transience of the series. This effect could be the effect of a higher level of transitory components, which dampen fluctuations in reported results, but bring greater transience to the series, and/or of the removal of permanent components, which would be informative when reported, but which would bring greater variability to the time series.

For refinement of the conclusions of this study, additional controls were tested, in search of possible factors that could influence the smoothing-persistence relationship, notably size, level of corporate governance, ac-



counting regulation, and reporting of losses. Considering the grouping of companies by their different features, the

persistence parameters estimated are represented in panels A, B, C, and D in Table 7.

**Table 7** Additional approach to the smoothing-persistence relationship

	No. companies	Total Sample	Without smoothing	With smoothing	Difference
		Total (smooth.)	Coef. (t)	Coef. (t)	Coef. (t)
<b>Panel A: Size (Quartiles)</b>					
I	39 (7)	0.3962*** (3.30)	0.4296*** (4.23)	0.0229 (0.62)	-0.4068*** (-3.79)
II	39 (8)	0.1071 (0.99)	0.0993 (0.92)	0.3577 (1.48)	0.2585 (1.03)
III	39 (13)	0.3659*** (7.70)	0.3728*** (6.87)	0.3349*** (3.97)	-0.0379 (-0.38)
IV	38 (13)	0.3662*** (3.86)	0.4299*** (3.38)	0.2379*** (3.04)	-0.1921 (-1.30)
<b>Panel B: List of Special Segments of the BM&amp;FBOVESPA</b>					
Traditional Market	99 (25)	0.3826*** (3.10)	0.4137*** (3.83)	0.0274 (0.73)	-0.3863*** (-3.38)
Level 1	19 (4)	0.1927 (1.12)	0.1650 (0.89)	0.4842* (2.74)	0.3191 (1.32)
Level 2	7 (3)	0.4096** (2.67)	0.4066*** (3.71)	0.4148 (0.97)	0.0083 (0.02)
New Market	30 (9)	0.5742*** (6.04)	0.6428*** (7.60)	0.2816*** (3.98)	-0.3611*** (-3.33)
<b>Panel C: Sectorial Regulation</b>					
Non-regulated	115 (31)	0.4267*** (4.72)	0.4635*** (7.46)	0.0348 (0.83)	-0.4288*** (-5.74)
Regulated	40 (10)	-0.3308*** (-5.27)	-0.3429*** (-6.47)	0.2963*** (4.39)	0.6392*** (7.65)
<b>Panel D: Occurrence of Loss (in years)</b>					
0	74 (21)	0.1091 (1.25)	0.0707 (0.82)	0.4579*** (7.83)	0.3872*** (3.73)
01 – 10	81 (20)	0.3889*** (3.25)	0.4210*** (4.06)	0.0285 (0.75)	-0.3925*** (-3.56)
01 – 04	52 (16)	0.2920*** (3.73)	0.3069*** (3.37)	0.2179* (1.94)	-0.0890 (-0.62)
05 – 10	29 (4)	0.3906*** (3.19)	0.4229*** (4.01)	0.0212 (0.55)	-0.4016*** (-3.62)

**Note.** \*\*\*, \*\* and \* indicate statistical significance to 1%, 5% and 10%, respectively. Source: Developed by the authors.

In Panel A, the grouping by size is observed, captured by assets in logarithmic scale. A greater presence of smoothing in larger companies is noted, unlike what was observed by Martinez e Castro (2011). Persistence is significant, independent of size in the general sample and in the group without smoothing. Thus, while Pimentel and Aguiar (2012) identify a relationship between persistence and size for quarterly income, in this study this relationship appears only with the presence of income smoothing. With regards to the influence of smoothing over persistence, the control for size refines the general result of this study in presenting evidence that it is sig-

nificant only for the smallest companies in the sample – first quintile.

In Panel B, comparing the New Market and the Traditional Market, it is observed that for both segments the companies exhibit persistence when the sample as a whole and that for the group without income smoothing are considered. This evidence is similar to that found by Pimentel e Aguiar (2012). With regards to the presence of smoothing, the Traditional Market exhibited a proportion of 30%, greater than the New Market, with 25% of the companies with smoothing, indicating that the additional listing requirements do not inhibit smoo-

thing. In contrast, Lyra and Moreira (2011) identify less smoothing in the New Market in comparison to Levels 1 and 2 and conclude with an inverse relationship between the level of smoothing and the strictness of special segments. However, the authors did not compare them with the Traditional Market. Even though for both segments – New Market and Traditional Market – a significantly negative influence of smoothing over persistence is observed, only in the group with the presence of smoothing do the companies in the Traditional Market cease to exhibit persistence, which could reflect a greater sensitivity of this segment to the influence of smoothing.

In Panel C the companies are segregated with regards to operation in sectors with accounting regulation – Electric power, Oil and gas, Telecommunications and Transport, in accordance with Baioco et al. (2013). The negative influence of smoothing over persistence is similar to the previous observations in the absence of regulation, but it appears as positive for the companies in regulated sectors. However, the companies in these sectors without the presence of smoothing show negative persistence parameters, without economic significance. It is observed that Aguiar et al. (2007) identified a negative influence of the Transport sector for the persistence of residual income, while the other regulated sectors did not exhibit significant influence. In the face of this, it can be accepted that regulation in itself does not increase the quality of reported earnings, but when it leads to smoothing, it also contributes to companies reporting persistent earnings. An important observation is that this increase in persistence would not be related to internal company choices in the sense mentioned by Parfet (2000) and Arya et al. (2003), but to normative sector requirements that are external to the companies.

Finally, in Panel D, the aim was to find evidence of the influence of smoothing by observing companies reporting of losses. At the general level and in the group without smoothing, there is persistence only for the companies that present losses, while the companies that present only profits only show persistence when under the influence of smoothing. This evidence seems to contradict Kothari (2001), in accepting that companies that present losses tend to revert them, increasing the transience of the series – it would be expected that

companies with losses, especially in a non-recurrent way (between 1 and 4 years), would exhibit less persistence in comparison to companies that presented losses to be reverted. This result also appears contradictory to Wuerges et al. (2009), who observed negative abnormal earnings persistence with less intensity than that of positive, interpreting that good news more strongly impacts subsequent results. With regards to the influence of smoothing, it is observed, finally, that in the case of the companies with profits, smoothing also leads to greater sustainability of the series, while the negative influence of smoothing had a stronger impact on the occurrence of constant losses.

In this study the basic persistence model was adopted with a first order lag. The addition of other orders in the model can be carried out in a complementary way to the analyses, in a similar procedure to the insertion of the presence of smoothing in the simpler model, seeking to widen the investigation of the relationship for further impact horizons, as in Lipe and Kormendi (1994), and Baginski et al. (1999). Other treatments of reported performance can also be observed, with quarterly or abnormal earnings. Another possibility is an approach with a greater theoretical basis of possible factors that determine the influence of smoothing over persistence, carried out merely in a complementary way in this study, including observing joint effects of these factors.

Finally, we investigated the behavior of the Brazilian market between 2004 and 2013, a period that involved economic impacts over the companies, such as the global financial crisis of 2008, and in accounting, with the adoption of the international accounting standards (IFRS), partially from 2008, and totally from 2010 onwards. Although, for operationalization of the grouping of companies and estimation of the persistence parameters, matching the old Brazilian standards to the new international standards has been possible, the investigation of possible changes in company behavior, in a more essential order, did not compose the scope of this study. With this, a comparative study regarding persistence and income smoothing for different accounting environments would be possible, not only for the Brazilian market but also in other countries, with diverse economic environments.

## 5 CONCLUSIONS

The aim in this study was to observe, in an empirical way, the relationship between the presence of income smoothing and persistence in the time series, focusing on the Brazilian market between 2004 and 2013. While persistence is seen in terms of the quality of information in reported income for company evaluations, smoothing has an ambiguous connotation, in which it is a desirable feature for reflecting stability in the development of businesses, but is, primarily, recognized as the fruit of earnings management.

Theoretical arguments raised by researchers such

as Schipper and Vincent (2003), Francis et al. (2004), Dechow and Schrand (2004), and Dechow et al. (2010) propose that smoothing can influence persistence, a temporal property capable of capturing transience. Thus, the hypothesis that income smoothing reduces earnings persistence in the Brazilian market was formulated.

For persistence, the basic, autoregressive model was used, with first order lags in net income, and the establishment of the presence of smoothing was based on the relationship between reported earnings and its cash

flow and accrual components. Based on the statistical model, which allowed statistical differences derived from the presence of income smoothing over parameters of estimated persistence to be observed, the study hypothesis was confirmed.

From the results obtained, it is observed that the presence of smoothing reduced the persistence of reported earnings, lowering the quality of accounting information. This can be explained not only by the insertion of elements which make the time series smoother, but which are transitory, and therefore reduce persistence, but also by the mitigation of permanent changes in the series, that is, by the removal of important impacts for the quality of information, but which increase its variability.

This observation leads to the finding that market aversion to uncertainty, which favors the reporting of income with less variability, and which are therefore smoother, leads to a loss in sustainability of the information itself that is reported by companies. With this, it is evident that constancy and permanence are distinct dimensions of reported earnings, that is, that the message of stability in businesses does not imply the absence of transience in performance – the opposite effect was even observed, with a significant reduction in persistence caused by the presence of smoothing.

Thus, it is concluded that the result considered smoother presented by the companies was less informative for investors to calculate company value. Earnings that show a smooth, but not persistent performance are permeated with transitory elements, and investors, led by a message of greater stability, make decisions based on information without sustenance. In other words, what the results of the study indicate is that, in valuing the reporting of constant performance, less useful information can be reported, generating a reverse effect, which can go unnoticed.

There are aspects of the Brazilian market which require complementary considerations, such as a high shareholder concentration and the presence of families in the control and management of companies, which raises the importance of fund providers and administrators as users of reported financial information. Such features lead to lower minority shareholder participation, not only in the composition of capital and supply of funds, but also in internal company decisions, in comparison to other markets, such as the American one, from which the theories used in this study were based and developed.

An implication of this difference is that there is greater bank participation in raising companies funds based on loan agreements. With regards to the evidence found in this study, the presence of income smoothing can be explained as a reflection of company behavior projecting stability information, given that the banking sector shows interest in low risk capital financing – a feature directly associated with the absence of volatility in return on investments, thus a higher level of smoothing.

Moreover, the negative influence of smoothing over persistence has important consequences for fund providers, since this calculation applies to pricing and credit approval decisions, by being based on accounting figures supplied by companies, even though other sources of information are used. This is because creating the ability to pay, notably in the long run, involves effectively sustainable performance, which is reflected in persistence of the earnings stream, and which ceases to be communicated in favor of mitigating volatility, leading fund providers to make decisions supported by poorer quality information.

When the information generated and used by the company itself is considered, investment decisions based in conjunction with other information occur, through monitoring business development, that is, the earnings stream itself that is generated by the company. Thus, the influence of smoothing over persistence, which ends up reducing the informative content of the earnings stream, can lead to inadequate internal resource allocation decisions.

Additional analyses indicate smoothing as a negatively influencing factor for persistence in companies with some small sized features, which suffer from losses and which operate in sectors without accounting regulation; and a positive influence in regulated sectors and in the reporting of profits alone. It is worth noting that such factors could be interrelated, which was not investigated in this study.

Implications on two main fronts could be followed up on: this study could be widened for the Brazilian market, in search of a link between factors that determine the relationship between persistence and smoothing under different sector-related conditions or company characteristics; and studies could be developed in the international arena, such as in more developed markets or with other perspectives and positions with regards to the accounting information reported, in order to verify whether this influence remains in different economic and accounting environments.

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