The Relation between Income Smoothing, Earnings Persistence and IFRS Adoption
(A Relação entre Suavização, Persistência e a Adoção dos IFRS)

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Abstract
This research approaches the influence of smoothing on persistence, two time-series properties of the same earnings stream, considering the adoption of International Financial Reporting Standards (IFRS), in Brazil. This influence is interesting from the possibility of the disclosure to inform stability to influence the information quality for valuation. The objective was to investigate whether the IFRS adoption modified the smoothing-persistence relation. We inserted dummies in autoregressive models, to identify the influence of smoothing on persistence regarding different accounting environments. The findings show that (i) the IFRS adoption increased the quality of earnings; (ii) the IFRS shifted the role of smoothing, that previously increased and then decreased the persistence; and (iii) the smoothing suppressed the benefits for information quality brought by IFRS adoption. We conclude that IFRS increased the informational level of earnings, evidencing that interferences to mitigate impacts on reported income ceased to increase and started to decrease its usefulness.

Keywords: Time-series properties, Persistence, Smoothing, IFRS.

JEL Codes: G32, M21, M4.
Resumo

Essa pesquisa aborda a influência da suavização sobre a persistência, duas propriedades temporais do mesmo fluxo de lucros, considerando a adoção dos padrões internacionais de divulgação financeira IFRS, no Brasil. Essa influência é interessante pela possibilidade da divulgação para informar estabilidade e influenciar na qualidade da informação para avaliação das empresas. O objetivo foi investigar se os IFRS modificaram a relação suavização-persistência. Inserimos variáveis binárias em modelos autorregressivos, para identificar a influência da suavização na persistência nos diferentes ambientes contábeis. Os resultados mostram que (i) a adoção dos IFRS aumentou a qualidade dos lucros; (ii) os IFRS mudaram o papel da suavização, que antes aumentava e depois diminui a persistência; e (iii) a suavização suprimiu os benefícios para a qualidade da informação trazidos pela adoção dos IFRS. Concluímos que os IFRS aumentaram o nível informacional dos lucros, evidenciando que interferências para mitigar impactos no lucro reportado passaram a reduzir sua utilidade.

Palavras-Chave: Propriedades de séries temporais, Persistência, Suavização, IFRS

1. Introduction

This research approaches the influence of income smoothing on persistence of the earnings reported by firms, considering the adoption of International Financial Reporting Standards (IFRS), in Brazilian market. As time series properties, smoothness and persistence capture changes and effects of impacts on earnings differently but relatedly, since they are distinct properties of a same reported earnings stream. Consequently, accounting choices directed to reduce the time series volatility, which denotes an income smoothing behavior, may affect the other property the persistence, representative of earnings usefulness for valuation (Schipper & Vincent, 2003; Dechow & Schrand, 2004; Francis, LaFond, Olsson & Schipper, 2004; Dechow, Ge & Schrand, 2010).

Additionally, during the generation of the earnings time series, through the successive financial reporting process, exogenous factors can change the established temporal properties and their relation, such as the adoption of the IFRS. With it, we study the influence of smoothing behavior on persistence in Brazil, with focus on how IFRS adoption affected this relation.

The persistence of earnings is interesting because this is a time-series property related to the usefulness of this information for valuation, affecting the decision making of investors and external users. Empirical
studies in Brazilian market evidence that IFRS adoption increased the relevance of reported earnings (Lima, 2010; Macedo, Araújo & Braga, 2012; Macedo, Machado, Machado & Mendonça, 2013; Gonçalves, Batista, Macedo & Marques, 2014). Related to this, we seek to clarify whether the reported results, identified as more relevant under IFRS in comparison to former domestic standards, are effectively more informative, from persistence perspective.

A direct approach shows a decrease of persistence by income smoothing, in Brazilian market, for 2004-2013 period as a whole (Kolozsvari and Macedo, 2016). Given that, we intend to clarify this relation, considering the different accounting environments due IFRS, in Brazil. Therefore, we propose the following research question: Which was the impact of IFRS adoption for the influence of income smoothing on earnings persistence, in Brazilian market?

Brazil adopted the international standards lately, initially after 2008 and fully after 2010, while for several other countries, it was mandatory since 2005. With that, most of the empirical researches related to IFRS adoption effects developed so far occurred before the Brazilian convergence process, which gives the opportunity for this study.

Our general objective was to investigate whether the IFRS adoption modified the influence of income smoothing on earnings persistence, in Brazilian market; and specifically, if the differences relate to initial adoption and full adoption, for persistence itself and for the relation smoothing-persistence.

We found evidences of increase in persistence for both steps of IFRS adoption, which complement the increase in relevance from previous studies. For the smoothing-persistence relation, the results show a shift of income smoothing role, regarding the IFRS adoption – in BRGAAP (IFRS) environment, the smoothing increased (decreased) the persistence.

We conclude that the IFRS adoption in Brazilian market increased the quality of reported earnings, in terms of its usefulness for valuation, and the interferences from accounting choices in order to reduce the variability in reported income stream, passed to reduce the capacity of external users in estimate the future performance.
2. Background and Hypotheses Development

2.1 IFRS adoption for the quality of accounting information and the Brazilian market

The adoption of IFRS around the world comes progressively, in different moments. Brazil started to use the international standards after 2008, and the total convergence happened in 2010, with the full adoption (IFRS Foundation, 2015). This process was one of the significant advances of Brazil to strengthen accounting during the last decade (World Bank, 2013).

This process is justified by arguments of improvement in the quality of reported information by companies to external users, since the former Brazilian standards intended for more tax compliance than financial reporting. This change of focus, to a principle-based system leads to new disclosure incentives and accounting practices, an opportunity for managers to improve the informative news of earnings, but also to manipulate earnings with accrual accounting (Cavalier-Rosa and Tiras, 2013).

The reported numbers are of higher quality when they reflect better the economic situation and performance of the firm, because they offer higher basement for investment decisions. Thus, a change of accounting standards that limits the opportunistic discretion of managers and/or allows better adherence of numbers to the economic reality of the firm increases the quality of the information. The voluntary adoption of international accounting standards in several countries, shows lower levels of earnings management and higher value relevance, improving the quality of reported information (Barth, Landsman & Lang, 2008).

The mandatory IFRS adoption in Europe and Australia reduced earnings management, including income smoothing, with mixed evidences of decrease / no effects over the value-relevance of reported information and increase in persistence (Zeghal, Chtourou & Fourati, 2012; Jaweuner & Mounira, 2014).

For Brazilian market, the evidences of IFRS adoption show that the earnings management by accruals decreased, but it increased when by operational decisions (Cupertino, 2013), with restrictive effects over discretionary appropriations by full IFRS adoption (Pelucio-Grecco, Geron, Grecco & Lima, 2014). In turn, findings also show no relation between IFRS and the level of discretionary accruals (Joia & Nakao, 2014).
Income Smoothing, Earnings Persistence and IFRS Adoption

and an increase in smoothing practices after the IFRS adoption (Klann & Beuren, 2015). Additionally, the initial IFRS adoption increased the value relevance of earnings and equity (Lima, 2010; Macedo et al., 2012), and the full IFRS adoption increased the relevance of earnings, but not the equity (Macedo et al., 2013; Gonçalves et al., 2014). These findings generally reflect more adequate representations of economic reality in international standards than in former Brazilian domestic standards, with a greater indicative of earnings as useful information.

The evidences of value relevance and earnings management are interesting to this research, as they are strictly related to time-series properties of persistence and smoothness. The value relevance relates to persistence, since it represents the usefulness of earnings stream for valuation purposes. Smoothness, in turn, is frequently associated to earnings management practices – i.e. income smoothing, being also another time-series property, inverse to volatility.

2.2 Persistence

Persistence is a time-series property sensitive to transitory variations – the higher the transience the lower the persistence (Schipper & Vincent, 2003). Similarly, persistence is a synonym of non-randomness in the behavior of reported earnings (Lev, 1983). From an internal perspective of the company, the persistence reflects how much a change in current earnings remains in future earnings (Baginski, Lorek, Willinger & Branson, 1999). From the perspective of external users, especially investors, persistence is a measure of how much current earnings effectively represent future earnings, in order to be useful for valuation (Dechow et al., 2010).

For several countries, there are evidences of no differences in the persistence of earnings reported under international and non-U.S. domestic standards, or for association of earnings and future cash flows (Atwood, Drake, Myers & Myers, 2011). For Greece, the IFRS did not systematically raised the informative content of reported earnings (Doukakis, 2010). For Germany, the voluntary adoption of international standards shows evidences of loss of value relevance. That, associated to a significant decrease of the series autocorrelation, leads to the conclusion for transience, in comparison to persistence in the former standards (Hung & Subramanyam, 2007). But, also, a non-significant difference of value
relevance, with a significant increase in persistence, when measured directly (Gassen & Sellhorn, 2006).

Additionally, eliminating the reconciliation of IFRS and U.S. GAAP, to foreign companies in American market, increased the persistence in weaker investor protection countries, and had no effect on stronger countries. This leads to the conclusion that companies from weaker environments had a greater incentive to show information quality by voluntarily improving the disclosure quality (Kang, Krishnan, Wolf & Yi, 2012).

Thus, there is not a consensus about the impacts of IFRS adoption over persistence. However, since previous Brazilian accounting practices focused in tax compliance, while IFRS is more shareholder-oriented (Cavalier-Rosa and Tiras, 2013; Hung and Subramanyam, 2007), from a weak legal system environment, with efforts to strengthen accounting (Kaufmann, Kraay & Mastruzzi, 2009; World Bank, 2013), we expect a more representative reported information about financial position and fundamental performance from the companies. Accordingly, we formulate the following hypothesis related to IFRS adoption impacts over persistence:

H1 The adoption of IFRS increased the persistence of reported earnings, in Brazilian market.

2.3 Influence of income smoothing on persistence

Smoothness, another time-series property of reported earnings, captures variations in a general approach, independently if they are transitory or permanent. It is also defined as lack of variability in the time-series (Schipper & Vincent, 2003; Francis et al., 2004; Dechow et al., 2010).

Another sense to smoothness is as result of earnings management, specified as income smoothing. For companies, it is interesting to report earnings without abrupt variations, in a moderate fluctuation stream, in order to pass a message of stability in business development to the market and other external users of information (Hepworth, 1953; Copeland, 1968; Imhoff, 1977; Eckel, 1981; Leuz et al., 2003).
On the other hand, meeting goals, maintaining stability in business and reporting information more consistent with reality, are also managerial assignments. Thus, managers have higher capacity of mitigate and isolate transitory variations over performance, because they are insiders, in comparison to external users, receivers of reported information (Parfet, 2000; Arya, Glover and Sunder, 2003).

Smoothing can influence persistence, since they are time-series properties differently sensitive to impacts over the reported earnings stream. It is possible for managers to introduce transitory components in earnings to reduce variability, which will lead to higher smoothness, but will reduce persistence and the ability of earnings to inform about the pay-off structure of the company (Schipper & Vincent, 2003; Francis et al., 2004). In this sense, the informative content of earnings decreases when accruals hide value-relevant changes in cash flows, since they can hide or delay measurements of changes in performance that would be useful if revealed (Dechow & Schrand, 2004; Dechow et al., 2010).

In contrast, managers can also improve earnings quality when accruals smooth out value-irrelevant changes in cash flows and transitory fluctuations leading to a more representative earnings number of future income, hence, a more useful information (Dechow & Schrand, 2004; Francis et al., 2004, Dechow et al. 2010).

Consistently with previous findings, we assume that the quality of information reported under IFRS increased in comparison to former domestic Brazilian standards. In this sense, we expect that smoothing may have its influence over earnings persistence decreased, and formulate, therefore, the second research hypothesis:

H2 The adoption of IFRS decreased the influence of income smoothing on the persistence of reported earnings, in Brazilian market.

3 Method Development

3.1 Sample definition

The research period comprehends the complete years 2003-2014, so we collected the financial information of open capital in Brazilian stock market, BM&FBovespa, from 2002 to 2014, at Economática® database. This total period is compound by 5 years after the full IFRS adoption, 2010-2014; an equal period, before the initial adoption, with use only of

Empirical inconsistencies may be related to the Transition period, since it coincided with a worldwide economic financial crisis (Lima, 2010; Klann & Beuren, 2015), so we opted to explicitly recognize it. Thus, the total research period 2003-2014 approaches the two accounting standards used in Brazilian market, before and after IFRS adoption, and covers 12 years in total.

From the 254 companies that remained in the market in the complete period, we identified 56 as holdings or from financial activities, companies with accounting particularities, so we removed them. From these 198 companies, 53 did not have enough available data, lasting 145 companies in the sample.

We formed a balanced panel data, with the same group of companies along the complete study period. For this research, the survivorship bias leads to a higher transience for earnings, since, according to Kothari (2001), the behavior of surviving firms when anticipate losses is exhibit reversals, decreasing estimated persistence. In consequence, we consider that this sample may show higher transience levels in reported earnings, affecting down our estimates. Nevertheless, especially from the evidences found, we understand that such bias do not significantly affect our conclusions.

3.2 Persistence and the influence of IFRS on persistence

At first, we departed from the basic autoregressive model for persistence (Dechow et al. 2010), to estimate the persistence for the full period. In the sample, since there were companies with different sizes, which is a highly persistent feature and directly related to earnings, we removed this characteristic from reported earnings. Thus, we used net income adjusted by the average total assets of the respective period, from variables of net income, for 2003-2014, and total assets, from 2002 to 2014.

We represent in Equation 1 the first model for persistence estimation, that we named Model A.
\[ N_{it}^{adj} = \alpha_1 + \beta_1 \cdot N_{it-1}^{adj} + \varepsilon_{it} \]  

where

- \( N_{it}^{adj} \) is adjusted Net Income, for firm \( i \) in year \( t \);
- \( \alpha_1 \) is constant term;
- \( \beta_1 \) is the persistence parameter, defined between 0 and 1;
- \( \varepsilon \) is error.

Since the total period covers different accounting environments, we separated each specific period with dummy variables. We represent these variables in Figure 1.

In sequence, we inserted the dummies in the basic model, two each time. Firstly, with DBRGAAP and DIFRS, we separated the three accounting environments, in Model B – Equation 2.

\[ N_{it}^{adj} = \alpha_1 + \alpha_2 \cdot DBRGAAP + \alpha_3 \cdot DIFRS 
+ (\beta_1 + \beta_2 \cdot DBRGAAP + \beta_3 \cdot DIFRS) \cdot N_{it-1}^{adj} 
+ \varepsilon_{it} \]  

where

- \( \beta_1 \) measures persistence for Transition period;
- \( \beta_1 + \beta_2 \) measures persistence for BRGAAP period;
- \( \beta_1 + \beta_3 \) measures persistence for Full IFRS period;
- \( DBRGAAP \) is dummy for BRGAAP period;
- \( DIFRS \) is dummy for Full IFRS period;

In Model B, \( \beta_1 \) represents the persistence to Transition period, and \( \beta_1 + \beta_2 \) represent the persistence for BRGAAP period. Therefore, \( \beta_2 \) represents the difference of persistence between these two periods. Similarly, \( \beta_3 \) represents the difference of persistence between Transition period and Full IFRS period.

In order to capture directly the difference between BRGAAP and Full IFRS periods, we substituted DBRGAAP for DTransition, in compliment to Model B, which we called B2. In this new model, \( \beta_2 \) informs the change of persistence from BRGAAP period to Transition period; and \( \beta_3 \) measures directly the difference from BRGAAP to Full IFRS periods.

In this first step, we sought to investigate the persistence and the changes due to IFRS adoption in Brazilian market. The dummies allowed extracting the persistence and its differences, directly and with statistical significance, to test the first research hypothesis (\( H1 \): The adoption of IFRS increased the persistence of reported earnings, in Brazilian market).
Figure 1. Dummies for Accounting Environments

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>DBRGAAP</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>DTransition</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>DIFRS</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Source: Developed by the authors.

Figure 2. Assignment of Income Smoothing Presence

<table>
<thead>
<tr>
<th>EM1</th>
<th>EM2</th>
<th>SD = 0</th>
<th>SD = 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥ 1</td>
<td>&lt; 0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 1</td>
<td>≥ 0</td>
<td></td>
<td></td>
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<tr>
<td>SD</td>
<td>SD</td>
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</tbody>
</table>

Source: Developed by the authors.

Additionally, we considered this hypothesis under two sections related to the different IFRS adoption stages. We formulate two specific hypotheses:

H1a The partial IFRS adoption increased the persistence of reported earnings, in Brazilian market.

The confirmation for this first hypothesis comes from a significant and negative difference in persistence from Transition period to BRGAAP period, represented by $\beta_2$ in Model B. The expected sign is negative because Model B assumes differences from Transition period to BRGAAP and Full IFRS periods, which reverses the expected sign for positive impacts by partial IFRS adoption.

H1b The full IFRS adoption increased the persistence of reported earnings, in Brazilian market.
The confirmation for this second hypothesis comes from a significant and positive difference in persistence from Transition period to Full IFRS period, represented by $\beta_3$ in Model B.

At last, we tested the general hypothesis H1 from Model B2, which directly compares BRGAAP period and Full IFRS period. A significant and positive $\beta_3$ confirms H1.

### 3.3 Influence of income smoothing on persistence and impacts of IFRS adoption on this relation

In a similar development of previous Model B from Model A, we sought to estimate the influence of income smoothing on earnings persistence inserting a dummy variable in the basic model. To do this, we segregated the firms according to income smoothing presence, following Leuz et al. (2003). They establish four metrics representatives of earnings management, from which we focused on the two oriented to smoothing, as indicated in Equations 3 and 4.

\[
EM_1 = \frac{\sigma(OI)}{\sigma(CFO)} \quad (3)
\]

\[
EM_2 = \rho(\Delta Accruals, \Delta CFO) \quad (4)
\]

where

- $\sigma(OI)$ is standard deviation of Operating Income;
- $\sigma(CFO)$ is standard deviation of Cash Flows from Operations;
- $\Delta Accruals$ is change in Accruals;
- $\Delta CFO$ is change in Cash Flows from Operations.

To represent Operating Income, we obtained the EBIT for the 2003-2014 period and we determined Cash Flows from Operations by the difference between the income and accruals. In turn, we estimated accruals from balance, as represented in Equation 5. The main reason is that the publication of cash flows became mandatory in Brazil only after 2008, with Law n. 11638/2007, and we looked for treatment consistency for the full research period. We collected the balance variables for 2002-2014 period, and the result variables, for 2003-2014 period.
\[ \text{Accruals}_{it} = (\Delta CA_{it} - \Delta Cash_{it}) - (\Delta CL_{it} - \Delta STD_{it} - \Delta IT_{it}) - Dep_{it} \] (5)

where

- \( \Delta CA_{it} \) is change in Current Assets, for firm \( i \) in year \( t \);
- \( \Delta Cash_{it} \) is change in Cash and cash equivalents, for firm \( i \) in year \( t \);
- \( \Delta CL_{it} \) is change in Current Liabilities, for firm \( i \) in year \( t \);
- \( \Delta STD_{it} \) is change in Short-Term Debit, for firm \( i \) in year \( t \);
- \( \Delta IT_{it} \) is change in Income Taxes payable, for firm \( i \) in year \( t \);
- \( Dep_{it} \) are Depreciation and amortization expenses, for firm \( i \) in year \( t \).

From the determination of EM1 and EM2 values, we attributed the presence income smoothing for each firm. Leuz et al. (2003) relate these measures to smoothness in market level, and relatively – the smaller EM1 and the more negative EM2, the stronger income smoothing is. In contrast, we determined income smoothing presence in firm level, using the statistical significance of each metric.

We attributed presence of smoothing to firms with: (i) ratio of the dispersion of Operating Income and dispersion of Cash Flows from Operations statistically lesser than one; (ii) correlation between change in Cash Flows from Operations and change in Accruals statistically negative. For the first measure, we used the lower one-sided p-value of robust Levene’s test; for the second, we used the lower one-sided p-value of the correlation. We established a significance of 5% for both tests, and approached the full research period to attribute presence of income smoothing.

Although we have established arbitrarily the cut criteria, it was under an intuitive logic that there is a role of accruals in smooth cash flows impacts, but when this happens significantly, it is indicative of income smoothing in reported earnings. Even so, we pursued a conservative position to attribute smoothing presence, for which both measures EM1 and EM2 should indicate for income smoothing.

At last, we determined a dummy variable of smoothing SD, with value 1 for firms with presence of income smoothing, and 0 for absence of income smoothing, as we present in Figure 2.

In sequence, to develop the second step of the study, we inserted the smoothing dummy in the basic model – Model A, Eq. 1 – in order to
observe the influence of the presence of income smoothing on earnings persistence. We present this Model C in Equation 6.

\[
NI_{it}^{adj} = \alpha_1 + \alpha_2 \cdot SD + (\beta_1 + \beta_2 \cdot SD) \cdot NI_{it-1}^{adj} + \epsilon_{it} \tag{6}
\]

where

\[
\begin{align*}
\beta_1 & \quad \text{measures persistence for non-smoothers;} \\
\beta_1 + \beta_2 & \quad \text{measures persistence for smoothers;} \\
DS & \quad \text{is the Smoothing Dummy;}
\end{align*}
\]

As previously, in Model C, \(\beta_1\) measures persistence for the group of firms with absence of income smoothing, and \(\beta_1 + \beta_2\) measures the persistence under the presence of income smoothing. Consequently, \(\beta_2\) informs the difference resulting from the presence of income smoothing, for the total study period.

Lastly, we investigated if the IFRS adoption affected the smoothing-persistence relation, in compliance with the research objectives. For that, we simultaneously introduced smoothing and accounting environments in the basic model, through the elaborated dummies. We named this final model, Model D, and represent it in Equation 7.

\[
NI_{it}^{adj} = \alpha_1 + \alpha_2 \cdot SD + \alpha_3 \cdot DBRGAAP + \alpha_4 \cdot SD \cdot DBRGAAP + \alpha_5 \cdot DIFRS + \alpha_6 \cdot SD \cdot DIFRS \\
+ (\beta_1 + \beta_2 \cdot SD + \beta_3 \cdot DBRGAAP + \beta_4 \cdot SD \cdot DBRGAAP) \cdot NI_{it-1}^{adj} + \epsilon_{it} \tag{7}
\]

where

\[
\begin{align*}
\beta_1 & \quad \text{measures persistence in Transition period, for non-smoothers;} \\
\beta_1 + \beta_2 & \quad \text{measures persistence in Transition period, for smoothers;} \\
\beta_1 + \beta_3 & \quad \text{measures persistence in BRGAAP period, for non-smoothers;} \\
\beta_1 + \beta_2 + \beta_3 & \quad \text{measures persistence in BRGAAP period, for smoothers;} \\
\beta_1 + \beta_4 & \quad \text{measures persistence in Full IFRS period, for non-smoothers;} \\
\beta_1 + \beta_5 & \quad \text{measures persistence in Full IFRS period, for smoothers;} \\
\beta_1 + \beta_2 + \beta_5 + \beta_6 & \quad \text{measures persistence in Full IFRS period, for smoothers;}
\end{align*}
\]
With this, \( \beta_3 \) captures the difference of persistence between Transition period and BRGAAP period, and \( \beta_5 \) captures the difference of persistence between Transition period and Full IFRS period – both for the firms with absence of income smoothing. In turn, \( \beta_3 + \beta_4 \) and \( \beta_5 + \beta_6 \) capture analogous differences, under income smoothing presence. Thus, \( \beta_4 \) and \( \beta_6 \) capture the interaction of income smoothing and IFRS adoption process.

Like in the first step of this research, we elaborated complementary variations of Model D. In a variation named D2, we substituted DBRGAAP for DTransition, which allowed capturing directly the difference in persistence from BRGAAP period to Full IFRS period, considering the presence of income smoothing. With this, we tested the second research hypothesis (*H2: The adoption of IFRS decreased the influence of income smoothing on the persistence of reported earnings, in Brazilian market*). A significant and negative \( \beta_6 \) in D2 confirms this hypothesis.

By the two stages of IFRS adoption in Brazil, we also split this hypothesis in two sections:

**H2a**  
*The partial IFRS adoption decreased the influence of income smoothing on the persistence of reported earnings, in Brazilian market.*

The confirmation of this first specific hypothesis comes from a significant and negative \( \beta_4 \) in Model D, which measures the difference of the influence of income smoothing presence on persistence between Transition period and BRGAAP period. Analogous to H1a, the expected signal is negative, since Model D also assumes differences from Transition period to BRGAAP and IFRS periods, which reverses the expected signs related to the interpretation of impacts by partial IFRS adoption.

**H2b**  
*The full IFRS adoption decreased the influence of income smoothing on the persistence of reported earnings, in Brazilian market.*

The confirmation for this hypothesis comes from a significant and positive \( \beta_6 \) in Model D, which represents the difference of the influence of income smoothing presence on persistence, between Transition period and IFRS period.
3.4 General overview of models and their variations

We elaborated a closed set of persistence parameters, estimated from Models A, B, C and D. To estimate persistence in general level, we used Model A. We used Model B to investigate persistence in the different accounting environments, and for persistence under the influence of income smoothing presence, Model C. At last, in Model D, we considered both factors influencing the quality of reported performance of firms. We provide a general overview in Figure 3.

Since these models conjunctly give estimates, we elaborated complementary variations, to obtain persistence estimates directly and with statistical significance. Besides the dummy substitution related to the different accounting environments, we also reverted attributed values for the dummies. We present in Figure 4 the summary of the four models and their variations.
Figure 4. Research Models and Variations

<table>
<thead>
<tr>
<th>Models and Variations</th>
<th>Smoothing Dummy</th>
<th>Dummies for Accounting Environments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model A (Eq. 1): ( N_{it}^{adj} = \alpha_i + \beta_i N_{t-1}^{adj} + \varepsilon_t )</td>
<td>( \beta_i )</td>
<td>-</td>
</tr>
<tr>
<td>Model B (Eq. 2): ( N_{it}^{adj} = \alpha_i + \alpha_s DBRGAAP + \alpha_s DIFRS ) (+ (\beta_1 + \beta_2 DBRGAAP + \beta_4 DIFRS) N_{t-1}^{adj} + \varepsilon_t )</td>
<td>( \beta_i ) ( \beta_1 ) ( \beta_2 )</td>
<td>DBRGAAP DIFRS</td>
</tr>
<tr>
<td>Model C (Eq. 6): ( N_{it}^{adj} = \alpha_i + \alpha_s SD + (\beta_1 + \beta_2 SD) N_{t-1}^{adj} + \varepsilon_t )</td>
<td>( \beta_i ) ( \beta_1 ) ( \beta_2 )</td>
<td>SD</td>
</tr>
<tr>
<td>Model D (Eq. 7): ( N_{it}^{adj} = \alpha_i + \alpha_s SD + \alpha_s DBRGAAP + \alpha_s SD DBRGAAP + \alpha_s DIFRS + \alpha_s SD DIFRS ) (+ (\beta_1 + \beta_2 SD + \beta_4 SD DBRGAAP + \beta_4 SD DIFRS + \beta_6 DIFRS + \beta_6 SD DIFRS) N_{t-1}^{adj} + \varepsilon_t )</td>
<td>( \beta_i ) ( \beta_1 ) ( \beta_2 )</td>
<td>SD</td>
</tr>
</tbody>
</table>

Source: Developed by the authors.

\( ' \) Indicates reversion in value attributed for each dummy:

SD' = 0 for smoothing presence / SD' = 1 for smoothing absence
DBRGAAP' = 0 for BRGAAP period / DBRGAAP' = 1 for non-BRGAAP period
DTransition' = 0 for Transition period / DTransition' = 1 for non-Transition period
DIFRS' = 0 for Full IFRS period / DIFRS' = 1 for non-Full IFRS period

4 Results and Analyses

4.1 Sample description

To estimate persistence, we used the net income of firms, adjusted by average total assets of the period, which originated the adjusted net income variable. We considered the different accounting environments and the income smoothing presence to describe the variable broadly and independently aggregated in Table 1, and under related groups in Table 2.

In general, 145 firms composed the sample, followed by 12 years, which originated 1740 observations. In these 12 years, 5 relates to the BRGAAP period, with 725 observations; 2 years form the Transition period, with 290 observations; and 5 correspond to Full IFRS period, with 725 observations. Under the income smoothing perspective only, 113 firms
Table 1. Description of Adjusted Net Income: General and in Independent Groups

<table>
<thead>
<tr>
<th></th>
<th>General Sample</th>
<th>Accounting Environments</th>
<th>Income Smoothing</th>
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<tbody>
<tr>
<td></td>
<td>BRGAAP</td>
<td>Transition</td>
<td>Full IFRS</td>
</tr>
<tr>
<td>Period (years)</td>
<td>12</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Number of firms</td>
<td>145</td>
<td>145</td>
<td>145</td>
</tr>
<tr>
<td>Observations</td>
<td>1740</td>
<td>725</td>
<td>290</td>
</tr>
<tr>
<td>Mean</td>
<td>-0.013</td>
<td>0.015</td>
<td>-0.019</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>0.701</td>
<td>0.266</td>
<td>0.704</td>
</tr>
<tr>
<td>Median</td>
<td>0.042</td>
<td>0.043</td>
<td>0.046</td>
</tr>
<tr>
<td>Maximum</td>
<td>0.955</td>
<td>0.488</td>
<td>0.935</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>605.018</td>
<td>197.452</td>
<td>118.518</td>
</tr>
</tbody>
</table>

Note. Source: Developed by the authors.

were associated to absence of income smoothing, and 32 with presence of income smoothing, which resulted in 1356 and 384 observations, respectively.

For central and dispersion measures, the mean of all cases is near zero, as the median, and the standard deviation varies through accounting environments and income smoothing. The maximum does not exceed the unit in any case, but the minimum reaches very low values, which can be associated to events of great losses in relatively small companies. These are isolated cases, as we observe from histograms, which show high concentration of the variable near zero and left tails that reflect the skewness and kurtosis values for each group.

The income behavior is very similar when associated to accounting environments, with higher aggregation of positive values over negatives. Due the high concentration around zero, we show a more detailed graph, in Figure 5. The dark dots represent the income from firms with income smoothing presence, and the light dots, from smoothing absence. We observe a greater spread from non-smooth earnings, matching the very definition of smoothing.
Table 2. Adjusted Net Income: Accounting Environments and Income Smoothing

<table>
<thead>
<tr>
<th></th>
<th>General Sample</th>
<th>Accounting Environments</th>
<th>Income Smoothing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>BRGAAP</td>
<td>Transition</td>
</tr>
<tr>
<td>Period (years)</td>
<td>12</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Number of firms</td>
<td>145</td>
<td>145</td>
<td>145</td>
</tr>
<tr>
<td>Observations</td>
<td>1740</td>
<td>725</td>
<td>290</td>
</tr>
<tr>
<td>Mean</td>
<td>-0.013</td>
<td>0.015</td>
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<tr>
<td>Standard deviation</td>
<td>0.701</td>
<td>0.266</td>
<td>0.704</td>
</tr>
<tr>
<td>Median</td>
<td>0.042</td>
<td>0.043</td>
<td>0.046</td>
</tr>
<tr>
<td>Maximum</td>
<td>0.935</td>
<td>0.488</td>
<td>0.935</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>605.018</td>
<td>197.452</td>
<td>118.518</td>
</tr>
<tr>
<td>Histogram</td>
<td><img src="image" alt="Histogram" /></td>
<td><img src="image" alt="Histogram" /></td>
<td><img src="image" alt="Histogram" /></td>
</tr>
</tbody>
</table>

Note. Source: Developed by the authors.

Broadly, the variable concentrates between -0.5 and 0.5, and under smoothing presence, the income concentrates more heavily between -0.25 and 0.25. Within these zones, we observe higher concentration of values representing small profits, between 0 and 0.25, than small losses, between -0.25 and 0, even in absence or presence of income smoothing. This is consistent to the histograms’ distributions.

To estimate the differences of mean and dispersion across groups, we performed Wilcoxon signed-rank tests, for the groups related to accounting environments; and to compare the absence and presence of income smoothing, we used Mann-Whitney tests.

The results show no differences regarding IFRS adoption stages (p-values > 0.1000). The only significant result was for means comparison at the full IFRS adoption, a significant increase from Transition to Full IFRS period (p-value = 0.0116).

These results differ from Table 1, that shows lower means related to IFRS adoption stages. Nevertheless, such values represent the variable in a single set, while the tests consider the sample pairing, a relevant distinction for analysis. Besides, the mean, as a general measure, is more sensitive to lower values, whereas the statistic test is more robust to these cases.
Figure 5. Adjusted Net Income by Firm, around Zero

Regarding the statistical difference, the income brings an economic meaning of performance, and the Transition period comprehends a worldwide financial crisis. In addition, there was no difference between BRGAAP and Full IFRS periods. Accordingly, we associate the increase in earnings from Transition to Full IFRS period, to a much stronger evidence of economic recovery than to impacts related to normative changes.

For the income smoothing presence, the results show a non-difference of means between the groups (p-value = 0.7458), which suggests that the presence of income smoothing is not related to a higher or lower reported performance. The difference of dispersion between the groups is significant (p-value = 0.0106), which is consistent with the process of assigning income smoothing, and corroborates the observations in Figure 5.

So far, the present evidences disregard the grouping under the joint consideration of accounting environments and smoothing presence. Therefore, we present in Table 2 the adjusted net income description for each group.

By Table 2, the behavior of adjusted income is homogenous across the accounting environments, but different under smoothing presence. In
general, the mean fluctuates around zero and the median shows positive and near zero values, reflecting the occurrence of small profits. Markedly, the mean is lowered by great relative losses, similarly to previous analyses. Either, the histograms show high aggregation of values near zero, with isolated cases of big losses, which generate left tails and affect the measures of skewness and kurtosis.

With Wilcoxon tests, we compared central and dispersion measures of the different accounting environments, with the sample divided by smoothing presence or absence. The means and the standard deviations behave very similarly through groups, not showing major statistical differences.

The significant difference is at full IFRS adoption, when the group without smoothing shows evidences of increased income, while the smoothing group shows no difference (p-values = 0.0066 and 0.9702, respectively). As previously, we maintain the arguments of the differences in earnings means from economic factors and not from accounting changes. Moreover, for the group with absence of income smoothing this effect is more intense, in contrast to the smoothing group, which did not show impacts from the crisis. This reinforces the income smoothing as earnings management perspective.

We discussed that the higher flexibility gives the opportunity to more intense earnings management practices (Cavalier-Rosa and Tiras, 2013), thus this could lead to higher levels of income smoothing. Our approach to smoothing was for 2003-2014 period as a whole, and we did not perform direct measures that permit specific conclusions related to a more or less intense smoothing. We highlight that we did not identify evidences of income smoothing presence leading to a lower dispersion of income related to IFRS adoption stages, at least for the companies in the sample, despite the evidences of higher levels of income smoothing, after IFRS adoption (Klann & Beuren, 2015).

We also compared the mean and dispersion in each accounting environment, regarding income smoothing with Mann-Whitney tests. The mean does not show significant differences in any period (p-values > 0.1000), similarly to the general approach. This reinforces that income smoothing did not lead to higher or lower income, independently of accounting standards.

On the other hand, the dispersion, also similarly to the general approach, is significantly higher in absence of income smoothing than in presence, in all the three accounting environments. This evidence is strongest in BRGAAP period (p-value = 0.0099), less strong in Full IFRS period (p-value = 0.0442) and weakest in Transition period (p-value =
Income Smoothing, Earnings Persistence and IFRS Adoption

0.0571). This can reflect a higher income concentration associated to the presence of income smoothing before IFRS adoption than after, but we do not consider this as enough evidence to conclude for a less intense income smoothing behavior.

In general, we conclude that for the research periods, both the means and standard deviations of reported earnings do not show significant changes related to different accounting environments, especially under the consideration of the economic impacts due the financial crisis in Transition period. Regarding the income smoothing presence, the dispersion is significantly lower when compared to the non-smooth group, which simply reflects the segregation method of the sample.

4.2 Persistence and the influence of IFRS on persistence

To observe the influence of IFRS adoption on the quality of reported earnings, we initially estimated the persistence for the sample in the total period, from Model A, and then we separated accounting environments, with Model B. We show the persistence estimates, for these periods and their differences, in Table 3.

For models A and B, we approached the panel data by Fixed Effects (Hausman test p-values < 0.0001, for both models). Model A is significant, with F = 47.83 (p-value < 0.0001) and adjusted R² of 0.1985. Model B shows F = 202.10, also significant (p-value < 0.0001), and adjusted R² of 0.2247.

The residuals presented non-normality, according to Shapiro-Wilk test, with Royston’s approximation (p-value < 0.0001, for both models), with skewness values of -13.0206 and -14.1723, and kurtoses of 195.6042 and 222.3620, for models A and B, respectively. The heteroskedasticity is characterized by increasing dispersion as the greater distance from the origin and confirmed by modified Wald test (p-values < 0.0001, for both models). For autocorrelation, Cumby-Huizinga tests identified significance at 1st order (p-values = 0.0066 and 0.0119), and non-significant after 2nd order at 5% (p-values = 0.0936 and 0.1331, for models A and B, respectively). Thus, we show robust estimates to heteroskedasticity and autocorrelation of error terms.
### Table 3. Persistence Estimates for the Full Period and for Each Accounting Environment

<table>
<thead>
<tr>
<th>Models and Variations</th>
<th>Dummies</th>
<th>$\beta_1$</th>
<th>$\beta_2$</th>
<th>$\beta_3$</th>
<th>$\beta_4$</th>
<th>$\beta_5$</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>-</td>
<td>0.8545***</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(6.92)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>DBRGAAP</td>
<td>0.6401***</td>
<td>-0.5101***</td>
<td>0.1919***</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(18.42)</td>
<td>(-4.69)</td>
<td>(3.41)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>B1</td>
<td>DBRGAAP</td>
<td>0.8319***</td>
<td>-0.5101***</td>
<td>-0.1919***</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>DIFRS</td>
<td>(10.12)</td>
<td>(-4.69)</td>
<td>(-3.41)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(2.29)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B2</td>
<td>DTransition</td>
<td>0.1300</td>
<td>0.5101***</td>
<td>0.7020***</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>DIFRS</td>
<td>(1.21)</td>
<td>(4.69)</td>
<td>(5.21)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note.** Source: Developed by the authors.

Model A (Eq. 1): $N_{it}^{adj} = \alpha_1 + \beta_1 N_{i,t-1}^{adj} + \varepsilon_{it}$

Model B (Eq. 2): $N_{it}^{adj} = \alpha_1 + \alpha_2 \cdot DBRGAAP + \alpha_3 \cdot DIFRS + (\beta_1 + \beta_2 \cdot DBRGAAP + \beta_3 \cdot DIFRS) \cdot N_{i,t-1}^{adj} + \varepsilon_{it}$

Residuals: Non-normality, heteroskedasticity and autocorrelation of 1st order. Robust estimates.

*Indicates reversion in value attributed for each dummy.

***represents significance at 1%. We inform the $t$ statistics between parentheses.

The results of Model A show a significant persistence for the sample firms in the period as a whole (p-value of $\beta_1$ in A < 0.001). However, when considered the different accounting environments, in Model B and variations, the persistence is not significant for all periods.

Evidences show no persistence for BRGAAP period (p-value of $\beta_1$ in B2 = 0.227), but persistence for the Transition period (p-value of $\beta_1$ in B < 0.001). The difference between these periods, given by $\beta_2$ in model B and its variations, is significant (p-value < 0.001) and negative in B and B1, and positive in B2, meaning an increase in persistence from BRGAAP to Transition period. Therefore, we observe evidences of positive impacts for the quality of accounting information by IFRS adoption in Brazilian market, in its first moment, which confirms the section H1a of the first hypothesis of this research.

The Full IFRS period also shows persistence (p-value of $\beta_1$ in B1 < 0.001) with increase from Transition period (p-value of $\beta_3$ in B and B1= 0.001). These are evidences of increase in persistence at the second stage of IFRS adoption to the quality of reported information, which confirms H2a.

At last, from direct estimate of the differences in persistence between BRGAAP and Full IFRS periods, we conclude that the change of accounting environments was significantly positive for persistence,
broadly (p-value of $\beta_3$ in B2 < 0.001). This reinforces the observation that there were no persistence for the sample in domestic Brazilian standards environment, but it changed from international standards adoption. Therefore, this confirms the hypothesis H1.

These evidences align to the arguments of change in focus from tax compliance to an international context of financial report (Cavalier-Rosa and Tirás, 2013), and reinforce the perception that reported earnings became more informative to valuation (Lima, 2010; Macedo et al., 2012; Macedo et al., 2013; Gonçalves et al., 2014).

### 4.3 Influence of income smoothing on persistence and impacts of IFRS adoption on this relation

We also estimated the influence of income smoothing on persistence in a general approach, by Model C. Then, we determined how IFRS affected this relation smoothing-persistence, with Model D. We present the results of these models and its variations in Table 4.

For models C and D, we approached the panel data by Fixed Effects (Hausman test p-values < 0.0001, for both models). Model C is significant, with $F = 83.42$ (p-value < 0.0001) and adjusted $R^2$ of 0.1988. Model D shows $F = 147.86$, also significant (p-value < 0.0001), and adjusted $R^2$ of 0.2230.

The residuals presented non-normality, according to Shapiro-Wilk test, with Royston’s approximation (p-value < 0.0001, for both models), with skewness values of -13.1038 and -14.2329, and kurtoses of 197.3336 and 223.6255, for models C and D, respectively. The heteroskedasticity is characterized by increasing dispersion as the greater distance from the origin and confirmed by modified Wald test (p-values < 0.0001, for both models). For autocorrelation, Cumby-Huizinga tests identified significance at 1st order (p-values = 0.0068 and 0.0120), and non-significant after 2nd order at 5% (p-values = 0.0940 and 0.1333, for models C and D, respectively). Thus, we show robust estimates to heteroskedasticity and autocorrelation of error terms.
Table 4. Persistence Estimates under the Influence of Income Smoothing for the Full Period and for each Accounting Environment

<table>
<thead>
<tr>
<th>Models and Variations</th>
<th>Dummies</th>
<th>( \beta_1 )</th>
<th>( \beta_2 )</th>
<th>( \beta_3 )</th>
<th>( \beta_4 )</th>
<th>( \beta_5 )</th>
<th>( \beta_6 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>C SD</td>
<td>0.8609*** -0.4644***</td>
<td>(7.14)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>C1 SD</td>
<td>0.3964*** 0.4644***</td>
<td>(10.76)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>D SD DBRGAAP</td>
<td>0.6434*** -0.4142*** -0.5160*** 0.7807*** 0.1915*** -0.0081</td>
<td>(19.29)</td>
<td>(-4.40)</td>
<td>(-4.83)</td>
<td>(5.43)</td>
<td>(3.38)</td>
<td>(-0.08)</td>
</tr>
<tr>
<td>D1.1 SD DBRGAAP</td>
<td>0.2292** 0.4142*** 0.2646*** -0.7807*** 0.1996** 0.0081</td>
<td>(2.61)</td>
<td>(4.40)</td>
<td>(2.75)</td>
<td>(5.43)</td>
<td>(2.40)</td>
<td>(0.08)</td>
</tr>
<tr>
<td>D1.2 SD DBRGAAP</td>
<td>0.1274   0.3665*** 0.5160*** -0.7807*** 0.1915*** -0.0081</td>
<td>(1.17)</td>
<td>(3.01)</td>
<td>(4.83)</td>
<td>(-5.43)</td>
<td>(3.38)</td>
<td>(-0.08)</td>
</tr>
<tr>
<td>D1.3 SD DBRGAAP</td>
<td>0.4939*** -0.3665*** -0.2646*** 0.7807*** 0.1996** 0.0081</td>
<td>(9.00)</td>
<td>(-3.01)</td>
<td>(-2.75)</td>
<td>(5.43)</td>
<td>(2.40)</td>
<td>(0.08)</td>
</tr>
<tr>
<td>D1.4 SD DBRGAAP</td>
<td>0.8349*** -0.4061*** -0.5160*** 0.7807*** -0.1915*** 0.0081</td>
<td>(10.31)</td>
<td>(-4.60)</td>
<td>(4.83)</td>
<td>(5.43)</td>
<td>(-3.38)</td>
<td>(0.08)</td>
</tr>
<tr>
<td>D1.5 SD DBRGAAP</td>
<td>0.4288*** 0.4061*** 0.2646*** -0.7807*** -0.1996** -0.0081</td>
<td>(12.24)</td>
<td>(4.60)</td>
<td>(2.75)</td>
<td>(5.43)</td>
<td>(-2.40)</td>
<td>(-0.08)</td>
</tr>
<tr>
<td>D2 SD Transition</td>
<td>0.1274   0.3665*** 0.5160*** -0.7807*** 0.7075*** -0.7726***</td>
<td>(1.17)</td>
<td>(3.01)</td>
<td>(4.83)</td>
<td>(-5.43)</td>
<td>(5.37)</td>
<td>(-5.39)</td>
</tr>
<tr>
<td>D2.1 SD Transition</td>
<td>0.4939*** -0.3665*** -0.2646*** 0.7807*** -0.0650** 0.7726***</td>
<td>(9.00)</td>
<td>(-3.01)</td>
<td>(-2.75)</td>
<td>(5.43)</td>
<td>(-1.15)</td>
<td>(5.39)</td>
</tr>
</tbody>
</table>

Note. Source: Developed by the authors.

Model C (Eq. 6): \( NI_{it}^{adj} = \beta_0 + (\beta_1 + \beta_2 \cdot SD) NI_{it-1}^{adj} + \epsilon_{it} \)

Model D (Eq. 7): \( NI_{it}^{adj} = \alpha_1 + \alpha_2 \cdot SD + \alpha_3 \cdot DBRGAAP + \alpha_4 \cdot SD \cdot DBRGAAP + \alpha_5 \cdot DIFRS + \alpha_6 \cdot SD \cdot DIFRS + (\beta_1 + \beta_2 \cdot SD + \beta_3 \cdot DBRGAAP + \beta_4 \cdot SD \cdot DBRGAAP + \beta_5 \cdot DIFRS + \beta_6 \cdot SD \cdot DIFRS) NI_{it-1}^{adj} + \epsilon_{it} \)

Residuals: Non-normality, heteroskedasticity and autocorrelation of 1st order. Robust estimates.

\( \dagger \) Indicates reversion in value attributed for each dummy.

*, ** and *** represent significance at 10%, 5% and 1%, respectively. We inform the \( t \) statistics between parentheses.
From Model C, we observe that the income smoothing negatively affected the persistence for the total period (p-value of $\beta_2 < 0.001$). Yet, both groups present significant persistence (p-values of $\beta_1$ in C and C1 < 0.001), with lower value for the group with income smoothing presence. Such evidences align to Kolozsvari and Macedo (2016), and we highlight that smoothing, for the total period in this research, reduced the persistence, but not destroying it.

Analyses of Model D lead to a more careful approach of the role of income smoothing for persistence, related to the different accounting environments. The persistence estimates for each group – regarding income smoothing presence or absence, in each period – identified from $\beta_1$ in Model D and its variations, show significance of almost all cases, with exception for smoothing absence in BRGAAP period, which present non-significant persistence (p-value = 0.243 in D1.2 and D2; p-value = 0.010, in D1.1; and p-values < 0.001 for all other cases).

The coefficients $\beta_2$ represent the influence of income smoothing on persistence, for each period, and are significant for all cases, but with different signals. The evidences indicate positive influence of smoothing on persistence, in BRGAAP period (p-value of $\beta_2$ in D1.2, D1.3, D2 and D2.1 = 0.003), and negative influence for Transition and Full IFRS periods (p-value of $\beta_2$ in D, D1.1, D1.4 and D1.5 < 0.001).

Thus, before IFRS adoption, we identify that firms with no income smoothing showed also non-persistence, and started to present persistence after the first stage of IFRS adoption. In contrast, the firms under smoothing presence showed significant persistence in all accounting environments. Consistently, we found positive influence of smoothing on persistence, leading firms under smoothing presence to present, also, persistence.

In Transition period, both groups show significant persistence estimate $\beta_1$, in D for non-smoothing group, and in D1.1, for smoothers; and with negative influence of smoothing on persistence, according to $\beta_2$ analyses. This complements the conclusion that, at the initial adoption of IFRS, the role of income smoothing shifted to decrease the quality of reported earnings, yet not destroying it.

For the Full IFRS period, both groups present persistence, as $\beta_1$ in D1.4 and D1.5 indicate, with negative influence of smoothing on persistence, from $\beta_2$. Thus, after the full IFRS adoption, the role of income smoothing remains as a reducer of information quality, also not destroying it.
When we approach the change of accounting environments, considering the income smoothing presence or absence, differences in persistence behavior emerge.

The group with no income smoothing show positive changes in persistence from BRGAAP to Transition period and from Transition to Full IFRS period (p-values of $\beta_3$ and $\beta_5 < 0.001$ and 0.001, respectively, in D1.2 and D1.4). In direct comparison, the difference in persistence from BRGAAP to Full IFRS period is also positive and significant (p-value of $\beta_5$ in D2 < 0.001). These evidences show that the international standards process in Brazilian market, for both stages and in general, increased the quality of reported earnings, for firms with absence of income smoothing.

The smoothing group show different impacts of IFRS adoption stages. From BRGAAP to Transition period, the difference in persistence is negative (p-value of $\beta_3$ in D1.1, D1.3, D1.5 and D2.1 = 0.007), while from Transition to Full IFRS period, the difference is positive and significant at 5% (p-value of $\beta_5$ in D1.1, D1.3 and D1.5 = 0.018). From BRGAAP to Full IFRS period, there is no significant difference in persistence (p-value of $\beta_5$ in D2.1 = 0.250).

Therefore, when we consider the firms under the presence of income smoothing, we identify for the first stage of IFRS adoption a decrease in persistence, and for the second stage, an increase. However, we observe no evidences of general impacts on earnings quality, by IFRS adoption process, for these companies.

At last, we analyzed the interaction between the influence of income smoothing and the stages of IFRS adoption on persistence. The coefficient $\beta_4$ captures the relation of smoothing presence-absence with BRGAAP-Transition periods, in Model D and variations D1 and D2; and $\beta_6$ reflects the relation for smoothing presence-absence with Transition-Full IFRS periods, in variations D1, and the relation with BRGAAP-Full IFRS periods in variations D2.

Firstly, we identify a destructive relation between smoothing and the first stage of IFRS adoption (p-value of $\beta_4 < 0.001$). Previously, we observed that the smoothing behavior was to increase persistence, shifting to a decrease role, and that the partial IFRS adoption increased persistence in absence of income smoothing and decreased under smoothing presence. In this sense, we conclude that the interaction smoothing-first stage of IFRS adoption results in a destructive effect – the partial IFRS adoption shifted the role of income smoothing and the smoothing mitigated the benefits of partial IFRS adoption, for persistence.

Although the signal of $\beta_4$ leads to the destructive effect conclusion, we do not interpret this as a decrease in influence of smoothing on
persistence, by partial IFRS adoption. That because the role of income
smoothing shifted, so we cannot state for a higher or lower influence – e.g.
if there was a significant influence before, that became non-significant
later, we could conclude for decrease in influence, as if the influence was
non-significant and became significant, it would indicate increase in
influence. Since the influence of income smoothing on persistence shows
significance for both BRGAAP and Transition periods, we shall not
conclude for a higher or lower level of influence. Thus, we do not confirm
or reject the research hypothesis H2a.

For the relation between smoothing and full IFRS adoption, there is
evidence of no significant influence (p-value of β6 in D and D1 = 0.936).
Considering that the income smoothing maintained as reducer of
persistence, and the change from Transition to Full IFRS period increased
persistence, independently of smoothing, we conclude that the full
adoption of IFRS did not bring significant impacts to the influence of
smoothing on persistence. Thus, we also do not confirm the research
hypothesis H2b.

At last, for the interaction between smoothing presence and before-
after IFRS environments, there is evidence of significant and negative
relation (p-value of βc in D2 and D2.1 < 0.001), which means that the
change from BRGAAP standards to a Full IFRS environment negatively
affected the influence of income smoothing on persistence. This evidence
is consistent to the shift of smoothing role, by partial IFRS adoption,
reinforcing it mitigated the benefits for persistence due IFRS adoption.

Therefore, we conclude that the IFRS adoption in Brazilian market
affected negatively the influence of income smoothing on persistence,
although this does not confirm the research hypothesis H2, by the reasons
explained before.

4.4 General overview of evidences and conclusions

At last, we present our results in a general overview, in Figure 6, and
a summary of the hypotheses tested for our main conclusions, in Figure 7.
Figure 6. General Overview of Persistence Estimates

<table>
<thead>
<tr>
<th>Accounting Environments</th>
<th>BRGAAP</th>
<th>Transition</th>
<th>Full IFRS</th>
<th>Smoothing Influence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absence</td>
<td>0.1274</td>
<td>0.5160***</td>
<td>0.6434***</td>
<td>0.1915***</td>
</tr>
<tr>
<td></td>
<td>0.3965***</td>
<td>-0.7807***</td>
<td>-0.4124***</td>
<td>-0.0881***</td>
</tr>
<tr>
<td>Presence</td>
<td>0.4939***</td>
<td>-0.2646***</td>
<td>0.2292***</td>
<td>0.1996**</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.4288***</td>
<td>-0.0650</td>
</tr>
<tr>
<td>IFRS Influence</td>
<td>0.1300</td>
<td>0.5101***</td>
<td>0.6401***</td>
<td>0.1919***</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.8320***</td>
</tr>
</tbody>
</table>

Source: Developed by the authors.
*, ** and *** represent significance at 10%, 5% and 1%, respectively.

Figure 7. General Overview of Hypotheses and Conclusions

<table>
<thead>
<tr>
<th>Hypotheses</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>The adoption of IFRS increased the persistence of reported earnings, in Brazilian market.</td>
</tr>
<tr>
<td>H1a</td>
<td>The partial IFRS adoption increased the persistence of reported earnings, in Brazilian market.</td>
</tr>
<tr>
<td>H1b</td>
<td>The full IFRS adoption increased the persistence of reported earnings, in Brazilian market.</td>
</tr>
</tbody>
</table>

**Evidences and conclusions:**
Significant and positive differences between the persistence estimates of each environment. The IFRS adoption positively affected the persistence, in both stages and in general.

<table>
<thead>
<tr>
<th>IFRS Adoption x Influence of Income Smoothing on Persistence</th>
</tr>
</thead>
<tbody>
<tr>
<td>H2</td>
</tr>
<tr>
<td>H2a</td>
</tr>
<tr>
<td>H2b</td>
</tr>
</tbody>
</table>

**Evidences and conclusions:**
Significant influence of income smoothing on persistence for the three accounting environments. Non-significant changes in influence only for full IFRS adoption. The evidences do not confirm the hypotheses, but show a shift in smoothing role after the first stage of the normative change.

Source: Developed by the authors.
5. Summary And Conclusions

In this research, we investigated the behavior of persistence and the influence of income smoothing on persistence, regarding the change from former domestic Brazilian accounting standards (BRGAAP) to international standards (IFRS). This process occurred in two stages, initially in partial adoption in 2008, and then a total adoption in 2010.

When analyzed the earnings persistence, property that captures the quality of the time series as useful information to investors, we departed from a general approach, identifying persistence in 2003-2014, total period of the research; that came to exist after IFRS adoption, in 2008. This evidence endorse the argument that the normative change brought greater economic representativeness to accounting numbers, increasing the informational level of reported earnings (Lima, 2010; Macedo et al., 2012; Macedo et al., 2013; Gonçalves et al., 2014).

We also observed a negative influence of smoothing on persistence, for 2003-2014 period (Kolozsvari & Macedo, 2016). However, under different accounting environments, we evidenced changes in the role of income smoothing for persistence, throughout the IFRS adoption process.

For 2003-2007 period, we identified income smoothing as a factor that increased persistence, as a positive influence. This can be explained by the tax-orientation of BRGAAP, in which accounting adjustments that lead to a higher level of smoothness, also mitigated transitory impacts on earnings stream. In complement, accounting adjustments that did not result in a smooth stream, also kept transience, leading to non-persistent earnings for firms with absence of income smoothing (Schipper & Vincent, 2003; Dechow & Schrand, 2004; Francis et al. 2004; Dechow et al., 2004). We do not assume, for BRGAAP environment, the position defended by Parfet (2000) and Ayra et al. (2003) related to the capacity of managers to mitigate transitory impacts, since the previous Brazilian regulation directed the accounting choices with focus on taxable profits, and not with focus for establishing communication with the market (Cavalier-Rosa & Tirras, 2013).

After the IFRS adoption, we identified a change in the influence of smoothing on persistence: the accounting adjusts that increased the persistence, started to decrease it. Moreover, for firms attributed to smoothing absence, the persistence showed significance only after IFRS adoption. This behavior reinforces the arguments of greater adherence of accounting to economic reality of operations under international standards, in comparison to previous Brazilian regulation.
One limitation in this research is that we considered income smoothing only for the full period, and therefore, we do not discuss about IFRS adoption related to the quality due to higher discretion levels of accounting choices. We disregard the possible changes in smoothing behavior related to IFRS mainly because we perceived that using only 5 data per firm – for 2003-2007 and 2010-2014 periods – could lead to an inconsistent attribution of smoothing presence. Therefore, we reinforce our conservative position to associate income smoothing by extending the classification requirements for the complete research period, 2003-2014.

We also explored one market, so our conclusions are limited to it. Different evidences can emerge from studies directed to other markets, with different economic characteristics and accounting environments. Additionally, the period of partial IFRS adoption, which we approached as a Transition period, overlapped a worldwide financial crisis, with economic consequences over the accounting numbers reported by the firms. However, we pursued to show this possibility whenever it was pertinent.

Additionally, the Brazilian market has its own traits that regards our research. With high levels of family concentration in property and managerial positions, and financing activities through banks, the users of reported accounting information are not only shareholders and market financiers. Specifically for Brazil, an increase of sustainability in the reported earnings series provides greater basis for decision-making of managers and financiers, important users of reported earnings.

At last, the evidences show that: (i) the IFRS adoption significantly increased the quality of the performance reported by firms, regarding the persistence of the earnings stream; (ii) the IFRS shifted the role of income smoothing on earnings persistence, previously increasing and then decreasing persistence; and (iii) the income smoothing suppressed the benefits for information quality brought by IFRS adoption. We conclude that IFRS adoption in Brazilian market increased the informational level of reported earnings stream, evidencing that, interferences that mitigate impacts on reported income ceased to increase and started to decrease its usefulness.
References


