

# ARTICLES

Submitted 08.26.2012. Approved 03.27.2013

Evaluated by double blind review. Scientific Editor: Ricardo Ratner Rochman

DOI: <http://dx.doi.org/10.1590/S0034-759020140303>

## EARNINGS MANAGEMENT AND ECONOMIC CRISES IN THE BRAZILIAN CAPITAL MARKET

*Gerenciamento de resultados e crises econômicas no mercado de capitais brasileiro*

*Gestión de resultados y crisis económica en lo mercado de capitales brasileño*

### ABSTRACT

The 2008 economic crisis challenged accounting, either demanding recognition and measurement criteria well adjusted to this scenario or even questioning its ability to inform appropriately entities' financial situation before the crisis occurred. So, our purpose was to verify if during economic crises listed companies in the Brazilian capital market tended to adopt earnings management (EM) practices. Our sample consisted in 3,772 firm-years observations, in 13 years – 1997 to 2009. We developed regression models considering discretionary accruals as EM proxy (dependent variable), crisis as a macroeconomic factor (dummy variable of interest), ROA, market-to-book, size, leverage, foreign direct investment (FDI) and sector as control variables. Different for previous EM studies two approaches were used in data panel regression models and multiple crises were observed simultaneously. Statistics tests revealed a significant relation between economic crisis and EM practices concerning listed companies in Brazil in both approaches used.

**KEY WORDS** | Earnings management, macroeconomic factors, economic crises, emerging capital markets, Brazil.

### RESUMO

A crise econômica de 2008 desafiou a contabilidade, demandando critérios de reconhecimento e mensuração ajustados a esse cenário, ou mesmo questionando a sua capacidade de informar adequadamente a situação econômico-financeira das entidades antes de sua ocorrência. Nesse trabalho verificamos se durante crises econômicas as empresas listadas no mercado de capitais brasileiro tendiam a adotar práticas de gerenciamento de resultados (GR). A amostra consistiu de 3.772 observações empresariais por ano, de 1997 a 2009. Desenvolvemos modelos de regressão com dados em painel, considerando accruals discricionários como uma proxy de GR, crise como um fator macroeconômico (variável de interesse), e ROA, market-to-book, tamanho, alavancagem, investimento estrangeiro direto e setor como variáveis de controle. Diferentemente de estudos anteriores sobre GR, duas abordagens foram utilizadas na construção dos modelos e múltiplas crises foram observadas simultaneamente. Os testes estatísticos revelaram, em ambas as abordagens, uma relação significativa entre crise e as práticas de GR.

**PALAVRAS-CHAVE** | Gerenciamento de resultados, fatores macroeconômicos, crises econômicas, mercado de capitais emergente, Brasil.

### RESUMEN

La crisis económica de 2008 ha desafiado a la contabilidad, exigiendo criterios de reconocimiento y evaluación apropiadamente ajustados a ese escenario, o incluso cuestionando su capacidad de informar adecuadamente sobre la situación económico-financiera de las entidades antes del comienzo de la crisis. Nuestro objetivo ha sido comprobar si durante las crisis económicas las empresas que cotizan en el mercado de capitales brasileño se inclinan a adoptar prácticas de gestión de resultados (GR). La muestra está formada por 3.772 observaciones por empresa/año, durante 13 años (de 1997 a 2009). Desarrollamos modelos de regresión, considerando los ajustes discrecionales (discretionary accruals) como proxy de GR (variable dependiente), la crisis como un factor macroeconómico (variable de interés), ROA, market-to-book, tamaño, impulso, inversión extranjera directa y sector como variables de control. Al contrario de los estudios anteriores sobre gestión de resultados, se han utilizado dos enfoques en los modelos de regresión de datos en panel y se observaron distintos escenarios de crisis simultáneamente. Las pruebas estadísticas revelaron, en ambos enfoques utilizados, una relación significativa entre la crisis y las prácticas de GR en las compañías presentes en Brasil.

**PALABRAS CLAVE** | Gestión de resultados, condiciones macroeconómicas, crisis económicas, mercados de capital emergentes, Brasil.

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## INTRODUCTION

During the 90s, the Brazilian economy, through a series of government measures, consolidated its pillars. The inflation control, currency stability, and GDP growth, among other factors, corroborated for the development and leverage of the Brazilian capital market.

The Brazilian Stock Exchange BM&FBovespa (formerly Bovespa) grew by 505% (from \$255,478.0 million to \$1,545,565.7 million) in domestic market capitalization from 1997 to 2010, while the New York Stock Exchange (NYSE, USA) and Tokyo Stock Exchange (TSE, Japan), the first and second in market capitalization in 1997 had, respectively, a 51% (from \$8,879,630.6 million to \$13,394,081.8 million) and a 77% (from \$2,160,584.8 million to \$3,827,774.2 million) increase over the same period. In December 2010, the BM&FBovespa reached the first position in Latin America, with a domestic market capitalization greater than the sum of the others (Argentina, Colombia, Peru, Chile, Bermuda and Mexico markets capitalization sum \$1,173,438.1 million) and 11th in the world (WFE, 2011).

With the expansion of this form of financing, accounting information for external users plays (or should play) a relevant role in reducing information asymmetry and thus make more efficient the present and future contracts.

Accounting practices for recognition, measurement and disclosure are sensitive to the environment in which they are applied, responding to stimuli arising from the legal systems, political and economic characteristics of users and preparers of financial statements, cultural values, and other sources.

Derived from this relationship, it was observed that during (and even after) economic crises, accounting has been questioned either by its ability to use instruments capable of recognizing and timely measuring the impact of crisis in the financial position of the entity and, whether by the omission (intentional or not) of firms' relevant information which could allow users to better investment evaluation (e.g. Barth & Landsman, 2010; Hopwood, 2009; Arnold, 2009).

Managers' opportunistic behaviour can affect negatively the quality of accounting information disclosed for external users. When there is a legally permitted range for discretion in choosing the practices for recognition and measurement of accounting elements, managers could deliberately choose the most favourable to their interests at the expense of the one that would represent a closer representation of the economic event.

Earnings management is usually characterized as an opportunistic manager's practice that aims to deceive the external user (non-controlling shareholders and stakeholders in gener-

al), using the permissibility in selecting accounting principles for recognition and measurement of elements (assets, liabilities, and revenues and expenses) within the limits of the rules, in order to deliberately inform misleading results.

Endogenous and exogenous factors can motivate positive or negative EM practices. Among the internal factors are corporate governance framework and mechanisms (e.g. supervisory board, audit committee, compensation policy, internal controls); organizational culture; internationalization; size; among others. Previous studies have also identified several exogenous factors that might affect the EM behavior, such as human and economic development, economic freedom (Riahi-Belkaoui, 2004); legal system, including the rules and their enforcement (Leuz, Nanda & Wysocki, 2003); cultural values (Han, Kang, Salter, & Yoo, 2010) and; audit quality (Tendeloo & Vanstraelen, 2008).

It is expected in that context that economic crises affect the EM behavior. An economic crisis can either stimulate or inhibit EM practices, depending on the intended purpose. The economic crisis motivates the EM when, for example, it is used as an "excuse" to drop losses from bad past management practices, thereby obscuring the poor performance of the manager that could lead to his dismissal; or even when to avoid any "political sanctions" (higher taxes, stricter regulation and supervision, withdrawal of incentives), profits that would be substantially larger than those of other companies and/or sectors of the economy are purposely reduced to an "acceptable" level. In companies heavily dependent on the stock market, in turn, it could be a motivation for EM in the post-crisis period, seeking to present positive results and encourage the return or permanence of the investor after a period of "bad news".

On the other hand, the crisis might inhibit the EM, especially when accounting practices were perceived as facilitators, as occurred in the post-Enron and subprime crises. For example, the recognition and measurement of revenues, derivatives, provisions and related party transactions contributed to cover up the real financial position, giving more "breath" not only to those companies, but mainly ensuring the permanence of their managers despite the poor performance. Consequently, to regain market confidence and achieve stability, severe measures were taken, reducing the room for value judgment on accounting choices, attributing greater responsibility to managers and boards, overseeing and punishing more rigorous undesirable behaviors, which leads to creating an unfavorable environment to EM.

Thus, our main purpose was to verify if during economic crises listed companies in Brazilian Stock Exchange tended to adopt earnings management practices.

We justified, therefore, the present study by: a) social relevance of economic crises and the need for research in accounting on the subject, b) lack of previous studies investigating the relationship between economic crises (macroeconomic factors) and earnings management with the approach proposed here (longitudinal data analysis allowing the simultaneous observation of multiple crises), c) differences in statistical treatment of data compared with previous studies of earnings management.

The paper is organized as follows: review of previous studies and hypothesis development (section 2); methodological procedure description, including variables, models and sample (section 3); main results with corresponding statistical tests and analysis (section 4); and summary, conclusions and suggestions for future research (section 5).

## LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Earnings management (EM) can be understood as the use of (legally allowed) discretion by managers in the selection practices of recognition and measurement of accounting elements to deliberately manipulate earnings – to increase or decrease – depending on their interests (e.g. Healy, 1985, Sweeney, 1994, Jones, 1991, Dechow & Skinner, 2000, Healy & Wahlen, 1999).

Since incentives to earnings management practices derive mainly from the environment in which managers operate – capital markets, contracts and political or regulatory costs (Healy & Wahlen, 1999; Watts & Zimmerman, 1978), it is expected that events affecting the environment, would change the conditions / incentives for EM practices. This is the case of economic crises.

Several previous studies have addressed the relationship between accounting (standards and/or practices) and economic crises, either questioning the role of accounting on detecting crises in advance (e.g. Barth & Landsman, 2010; Bezemer, 2010; Arnold, 2009) or; investigating changes in accounting information quality, the explanatory power of earnings (e.g. Davis-Friday & Gordon, 2005; Graham, King, and Bailes, 2000) and conservatism (e.g. Herrmann, Pornupatham, & Vichitsarawong, 2008) during and after crises, or even the impact of regulations on financial crises (e.g. Masood, Aktan, & Pariente, 2010).

Some trends in research can be explained by specific characteristics of crises. The 2007-2008 crisis, for example, given its origin in the credit crisis and the profound social impact of the resulting recession, encouraged the questioning of accounting role (e.g. Arnold, 2009; Hopwood, 2009), accounting predictive power (e.g. Bezemer, 2010), the adoption of fair value as measurement basis (e.g. Barth & Landsman, 2010; Boyer,

2007) and the alleged improvement in the information quality with IFRS – International Financial Reporting Standards adoption (Bhimani, 2008).

When questioning the role of accounting and its predictive power, the criticism usually ‘spill over’ academics and regulators. In this sense, Bezemer (2010, p. 686) argues that there is a “*discrepancy between official assessments and reality before and during the 2007–2008 credit crisis and ensuing recession [...] the sense of surprise at the credit crisis among academics and policymakers, giving rise to the view that ‘no one saw this coming’*”.

Currency crises originating from significant currency devaluation – as occurred in Mexico in 1994 (Davis-Friday & Gordon, 2005) and Thailand in 1997 (Graham, King, & Bailes, 2000) justify research about the relevance of accounting information. Previous research also addressed earnings management practices and economic crises. Like the other studies mentioned in this section, a crisis is usually chosen to analyze the relationship with accounting practices.

In the oil crises that occurred in the Gulf in the 90s, Han and Wang (1998) observed that the political costs were the main incentive for the practice of EM, seeking an earnings reduction. Johl, Jubb, and Houghton (2003), as well as Choi, Kim and Lee (2011) focused on the Asian crisis of 1997-1998, but with different approaches and scopes. Johl, Jubb, and Houghton (2003) evaluated the audit quality and the EM practices of firms listed in Malaysia; while Choi, Kim and Lee (2011) extended their sample to other Asian countries and, after observing the EM behaviour of listed firms, sought explanations for the results in weakness/strength of institutions in the analyzed countries. These studies used discretionary accruals as EM proxies (discussed in section 3 of this paper).

A change is expected in EM behaviour in crisis period because, as noted earlier, the crisis would affect the incentives for managers – pertaining to market incentives, contracts and political or regulatory costs in this direction.

Considering the analysis of previous studies in this section and, in particular, the results of the research by Han and Wang (1998) and Johl, Jubb, and Houghton (2003), which observed changes in earnings management behaviour in the oil crises of the 90s and the Asian crisis of 1997, respectively, the following research hypotheses, corresponding to the two crises scenarios were proposed for test:

H1: There is a statistically significant difference in discretionary accruals (used as proxies for earnings management behaviour) of companies listed in the Brazilian Stock Exchange in periods of economic crisis (1997-1999, 2003 and 2008) in relation to non-crisis (2000, 2002, 2004-2007) periods.

H2: There is a statistically significant difference in discretionary accruals (used as proxies for earnings management behaviour) of companies listed in the Brazilian Stock Exchange in periods of economic crisis (1997-1999, 2002 and 2008) in relation to non-crisis (2000, 2003, 2004-2007) periods.

According to the theory of business cycles (e.g. Banerji & Dua, 2011; Chauvet, 2002; Burns & Mitchell, 1946, Mitchell, 1927), we considered that 1997, 1998, 1999, 2003 and 2008 were years of crisis in the Brazilian economy. Consistently with this criterion, years in which the Brazilian economy moved away from its historical trend of growth were treated as ‘crisis year’.

It was also noticed, among the selected years, that 2003 features distinguished it from the others, which can be explained by the earlier turbulence in 2002. In 2002, due to the expectation of opposition victory in presidential election (Lula – Luis Inácio Lula da Silva was the opposition candidate), fear of economic change and concerns about the ability (and willingness) of the future government to honour its commitments largely affected the financial market. This led us to build a second scenario replacing 2003 by 2002, in which there a situation closer to the other selected periods was found. The two scenarios were included – as the ‘crisis’ variable – in the models and statistical tests.

The next section presents the models, variables, data collection and other methodological choices to test the proposed hypotheses.

## RESEARCH DESIGN

In this section, we present the methodological procedures for the development of the research. Initially we present the operational definition of the variables, followed by the models of earnings management used and the sample selection.

### Operational definition of variables

In order to develop our models and establish the sample selection criteria, we first defined the operational variables in three groups: dependent variable (earnings management), explanatory variables: interest (crisis) and control.

### Earnings management proxies – dependent variable

Because the discretion in the choice of practices for recognition and measurement of accounting elements is almost always included in the EM concept, most of the research on earnings man-

agement has been associated with accruals. The use of accruals is also justified as a proxy for the difficulty in practice to reliably classifying a practice (normally permitted under law) as EM.

The most common ways to identify EM practices through accruals are: (i) technique of frequency distributions (e.g. McNichols & Wilson, 1988), (ii) analysis of specific accruals (e.g. Petroni, 1992; Marquardt & Wiedman, 2004), (iii) models for aggregate accruals.

In the technique of frequency distribution – the simplest of the three – an analysis of cross-sectional data is used to observe variations in the results considering a specific event (e.g. a regulatory change). The analysis of specific accumulations, in turn, has been employed to evaluate practices of EM in the recognition and measurement of specific items and restricted by sectors (e.g. claim loss reserves in insurance companies – Petroni, 1992).

The analysis of accruals aggregate seeks to identify the EM behaviour by obtaining the accruals totals and their subsequent segregation between discretionary and nondiscretionary, the latter considered a proxy of EM. For our study we chose the latter approach because: a) our sample covers 19 different sectors; b) it is not possible to reliably identify specific accounts more prone to EM, c) evaluation of the aggregates allows to better deal with the effects of specific events (as regulation). The first models known for identification of EM through discretionary accruals (accrual total – accruals non-discretionary) are DeAngelo (1986) and Healy (1985), which might explain the prominence of positivist theory (Watts & Zimmerman, 1986) during this period. However, it was in the 90s that EM studies of with this approach proliferated, highlighting the models proposed by Jones (1991); Dechow, Sloan, and Sweeney (1995), known as Jones (1991) modified; and Kang and Sivaramakrishnan (1995).

Since the proposition of these models, several studies have adopted them to identify EM practices and/or motivational factors associated to them in, different countries or groups of countries, especially: (i) Jones (1991) model – e.g. Beneish (1997); Erickson and Wang (1999); (ii) Jones modified model by Dechow, Sloan, and Sweeney (1995) – e.g. Momen (2003); Gill-de-Albornoz and Illueca (2005); (iii) Kang and Sivaramakrishnan (1995) model – e.g. Yoon and Miller (2002); and (iv) two or three of them compared – e.g. McNichols (2000); Kothari, Leone, and Wasley (2005). Several also the proposed modifications to these models, mostly with the inclusion of variables in the model originally proposed by Jones (1991) and modified by Dechow, Sloan, and Sweeney (1995).

Despite the differences in conceptual premises, variables and statistical treatment, in these models, the discretionary ac-

cruals (and therefore EM evidence) are not subject to direct observation and, therefore, are estimated by regressions. In these regressions, the discretionary accruals are the portion “unexplained” (error) of total accruals. In its abundant replication in subsequent studies, several changes were proposed in these models, especially with regard to “purify” the portion associated with discretionary accruals with the inclusion of control variables.

To test the hypotheses of our study, we developed models based on Jones (1991) modified model proposed by Dechow, Sloan, and Sweeney (1995), with adjustments to include the explanatory variables of crisis (in the interest of research) and control variables. A detailed analysis of models and their changes are made in sections 3.1.3 and 3.2.

## Economic crisis proxies – explanatory variables of interest

In the scope of economic science, we can say that the theme ‘economic crisis’ is closely linked to the existence of economic cycles. These cycles were determined originally by the fluctuating production levels of a given economy over time. The literature that is currently designated for business cycles goes back to very remote periods in the literature of economics. A seminal work in this area is due to Mitchell (1927) who observed the fluctuations of the U.S. economy. Other economists like Kuznets (1926) and Schumpeter (1982) also dedicated themselves to understand the oscillation movements of production levels. Currently, as shown by Banerji and Dua (2011), consideration should be given to a set of macroeconomic variables in order to identify the formation of economic cycles and not just the production level as a way to identify variations in aggregate economic activity.

The most widely used definition of business cycles dates back to the seminal work of Mitchell. According to Burns and Mitchell (1946):

*Business cycles are a type of fluctuation found in the aggregate economic activity of nations that organize their work mainly in business enterprises: a cycle consists of expansions occurring at about the same time in many economic activities, followed by similarly general recessions, contractions and revivals that merge into the expansion phase of the next cycle; this sequence of changes is recurrent but not periodic.*

This definition has been widely used since then. Even more contemporary definitions – like that of Lucas Jr. (1977), which defined the economic cycle as deviations of aggregate real product from its tendency – are similar to the original vision. In this con-

text, one can consider that periods of crisis would be the times of recession of product level generated in a given economy. The determination of these periods considers, therefore, empirical evaluation criteria, basically analysis of time series, in which the fluctuations are observed but, this assessment is not trivial.

In the evaluations made for Brazil, there were long periods where there is a product growth. This movement occurred primarily to the mid-70s of last century. In contrast, the two final decades of the century show a reversal of this cycle. They are periods when the national product has short cycles of growth followed by larger cycles of decline. Chauvet (2002) adopted NBER (National Bureau of Economic Research) definition of recessions that correspond to general reductions in various economic sectors lasting at least 6 months, in order to avoid the influence of short-term events.

According to Chauvet (2002), between 1997 and 1999, there were moments of descent in the Brazilian business cycle. In 2001 and 2003 there was also a decrease of activity in Brazil (Chauvet & Morais, 2010). Thus, for the purposes intended here, these were identified as years of crisis in the Brazilian economy.

Since studies mentioned in this section do not consider the year 2008 in their research, this was not initially marked initially as a year of crisis. However, due to the extent of the crisis around the world, we decided to consider it a crisis year.

Accordingly to our hypotheses, the explanatory variables of interest are the crisis variables, defined as dummy. The variable CRISESI denotes a dummy variable which equals 1 for years defined as a crisis (1997-1999, 2001, 2003 and 2008), and 0 for non-crisis years (2000, 2002, 2004-2007 and 2009).

As explained in introduction (section 1), since 2003 presents some different characteristics from the other ‘crisis periods’, we constructed another scenario, replacing 2003 for 2002, which is justified by the strong economic turbulence in a pre-election period. This second scenario demanded another crisis variable: CRISESII which equals 1 for years defined as a crisis (1997-1999, 2001, 2002 and 2008), and 0 for non-crisis years (2000, 2003, 2004-2007 and 2009).

## Control explanatory variables

In addition to the explanatory variables of interest, we used control variables associated with changes in discretionary accruals pointed in previous studies. Specifically, we included the company sector (SECTOR) according to the classification of Economática® database (19 sectors). This variable was used to control differences in levels of accruals due to the regulatory environment (Burgstahler, Hail, & Leuz, 2006; Johl, Jubb, & Houghton, 2003; Han, Kang, Salter, & Yoo, 2010).

Previous studies (Othman & Zeghal, 2006; Stubben, 2010; Han, Kang Salter, & Yoo, 2010) also suggested that large firms tend to exercise less discretion in accounting results, due to stronger monitoring by the stock market. Thus, the natural logarithm of total assets (divided by one billion) in the current year was used as a control variable for firm size (SIZE). This procedure allowed the variable to be used with the same scale of measurement of model variables.

Other studies pointed out that measures of discretionary accruals are misspecified for firms with extreme levels of performance (e.g. Dechow, Sloan, & Sweeney, 1995; McNichols, 2000; Larcker & Richardson, 2004; Kothari, Leone, & Wasley, 2005). We used the term return on assets (ROA) to control firm performance. This variable was obtained by the database Economática® and represent the ratio of the net income over total assets, following the recommended by McNichols (2000), Kothari, Leone, and Wasley (2005), and Jones, Krishnan, and Melendrez (2008). Furthermore, according to McNichols (2000), Larcker and Richardson (2004), Burgstahler, Hail, and Leuz (2006) and Othman and Zeghal (2006), companies presenting growth in their operations, tend to have large values of accruals. So, the market-to-book (MTB) variable, calculated by the market capitalization at the end of the fiscal year divided by the book value of common equity and obtained at the database Economática®, was chosen as a proxy for growth opportunity of the company's operations.

We also included the leverage as a control variable, obtained as the ratio of loans and financing over total assets. The leverage variable was used in logarithmic scale (denoted by LEV) in order to linearize its relation with the accruals. It is appropriate to include this variable in the models because the leverage of the company might encourage managers to manipulate earnings, for example, to prevent the violation of debt covenants (e.g. Sweeney, 1994; Dichev & Skinner, 2002) or to maintain/raise a good credit rating in order to achieve more favourable conditions from creditors (e.g. Charitou, Lambertides, & Trigeorgis, 2007; DeAngelo, DeAngelo, & Skinner, 1994). However, the presence of creditors could be important for inhibiting opportunistic behaviour of managers, as noted Jensen (1986). Thus, some studies have found a tendency for earnings management practices in firms with low levels of leverage (Dechow & Skinner, 2000; Jelinek, 2007).

Finally, a control variable for foreign direct investment (FDI) was inserted to address, at least partially, the firms' dependence of foreign funding and, consequently, their exposure

to the economic crises, accordingly to their origin (external or internal) and extent. Moreover, as observed in previous studies (e.g. Nobes, 1998; Zarzeski, 1996), the sources of financing can affect the accounting practices.

## Earnings management models

The models most commonly used in earnings management previous studies (as mentioned in section 3.1.1) are based on measures of aggregate total accruals, where discretionary accruals are used as a proxy for EM (Jones, 1991; Dechow, Sloan, & Sweeney, 1995; McNichols, 2000).

In our estimated models, the dependent variables used were the total accruals ( $TA$ ) in the current period deflated by total assets in the previous period ( $A$ ). Total accruals were calculated as the difference between the change in current assets and the change in cash and cash equivalents, less the difference between the change in current liabilities and the variation in provision for IRPJ and CSLL (both income taxes to which Brazilian companies are subject), less depreciation and amortization. So, we use as explanatory variables in developing the total accruals model the following variables: a) the inverse of the total assets ( $INVAT$ ); b) the difference between the change in gross revenues and the change in accounts receivable ( $\Delta REVC$ ) and; c) fixed assets ( $PPE$ ).

In this study, we adjusted Dechow, Sloan, and Sweeney (1995) EM model, also known as Jones modified model, including more partitioning variables such as proposed in previous studies (e.g. McNichols, 2000; Kothari, Leone, & Wasley, 2005; Han, Kang, Salter, & Yoo, 2010; Choi, Kim, & Lee, 2011), in order to make it more robust for testing the research hypotheses. Thus, to study the effect of crises in discretionary accruals, we use this adjusted model through two distinct approaches, here referred to: (i) two-step (partitioning variables), first estimating discretionary accruals (earnings management) controlled by performance ( $ROA$ ) and then testing its relation with crisis variable and the remaining control variables; (ii) one-step, using a unique model to estimate discretionary accruals including both crisis variable and the control variables.

## Two-step approach

The model used in the first approach (*two-step*) considered the decomposition of total accruals ( $TA$ ) in non-discretionary accruals ( $NDAC$ ) and discretionary accruals ( $DAC$ ) as:

$$\frac{TA_{it}}{A_{it-1}} = \beta_0 + \beta_1 \ln INVAT_{it} + \beta_2 \frac{\Delta REVC_{it}}{A_{it-1}} + \beta_3 \frac{PPE_{it}}{A_{it-1}} + \beta_4 ROA_{it} + \varepsilon_{it} \quad (1)$$

Where  $TA_{it}$  represents total accruals of firm  $i$  in year  $t$ , deflated by total assets in year  $t - 1$ ; represents the total assets of firm  $i$  in year  $t - 1$ , and  $INVAT$ ,  $\Delta REVC_{it}$ ,  $PPE_{it}$  and  $ROA_{it}$ , represent, respectively, for firm  $i$  in year  $t$ , the inverse of total assets, the difference between the change in gross revenues and the change in accounts receivable ( $\Delta REV_{it} - \Delta REC_{it}$ ), the fixed assets and the return on assets ( $ROA$ , as a proxy for the control variable, firm performance).

Using the model (1), the discretionary accruals ( $DAC_{it}$ ) are estimated by residuals, where they are the difference between total accruals and the estimated mean of non-discretionary accruals ( $NDAC_{it}$ ). In this case, the effect crisis variable in discretionary accruals is estimated by the regression between discretionary accruals  $DAC_{it}$  and the crisis variables ( $CRISESI$  e  $CRISESII$ ), previously defined in section 3.1.2; considering the assumption of control variables, i.e.,

$$DAC_{it} = \beta_0 + \beta_1 MTB_{it} + \beta_2 SIZE_{it} + \beta_3 LEV_{it} + \beta_4 FDI_{it} + \sum_{j=5}^{23} \beta_j SECTOR_{it} + \beta_{24} CRISES_{it} + \omega_{it}. \quad (2)$$

This approach is commonly adopted in earnings management studies (e.g. Defond & Subramanyam, 1998; McNichols, 2000; Lacker & Richardson, 2004; Kothari, Leone, & Wasley, 2005; Othman and Zeghal, 2006; Han, Kang, Salter, & Yoo, 2010).

## One-step approach

The model used in the second approach (*one-step*) considered that the effect of crisis variables on discretionary accruals can be directly estimated by the relation between total accruals and crisis variables (e.g. Han & Wang, 1998). Thus, when the control variables were added, the regression model was given by:

$$\frac{TA_{it}}{A_{it-1}} = \beta_0 + \beta_1 INVAT_{it} + \beta_2 \frac{\Delta REVC_{it}}{A_{it-1}} + \beta_3 \frac{PPE_{it}}{A_{it-1}} + \beta_4 ROA_{it} + \beta_5 MTB_{it} + \beta_6 SIZE_{it} + \beta_7 LEV_{it} + \beta_8 FDI_{it} + \sum_{j=9}^{27} \beta_j SECTOR_{it} + \beta_{28} CRISE_{it} + \varepsilon_{it}. \quad (3)$$

In model (3), we added control variables  $MTB$ ,  $SIZE$ ,  $LEV$ ,  $FDI$  and  $SECTOR$  – which represent, respectively, market-to-book, company size, leverage, foreign direct investment and sector of business activity – to previous total accruals model (1). Therefore, the hypotheses of difference in discretionary accruals due to the occurrence of crisis can be tested by the inclusion of crisis variables ( $CRISESI$  and  $CRISESII$ ) previously defined in section 3.1.2. The effect of crisis variable can be estimated by the coefficient  $\beta_{28}$  associated with the variable  $CRISES_{it}$ .

The models (1 and 2) and (3) were estimated using the regression methodology for panel data, according to Wooldridge (2002) and Othman and Zeghal (2006).

## Sample selection and data

In order to evaluate and validate the research hypotheses, we considered a sample of 445 companies listed on Brazilian stock exchange – BM&FBOVESPA during the period 1997 to 2009, which consisted initially of a panel with 3,941 firm-years observations in the study period (13 years).

Companies' data, i.e. all the variables required for the construction of empirical models of aggregate accruals, beyond the control variables described in section 3.1.2, were extracted from Economatica® database.

From the initial sample, we excluded companies: *i*) that did not have data on at least four years in the series; *ii*) with missing data for depreciation and amortization, assets and liabilities, due to their impact on aggregate accruals measure; *iii*) with missing data for fixed assets  $PPE$ . To mitigate the effects of outliers in the sample, we winsorized the variables: total accruals ( $TA$ ),  $INVAT$ ,  $DREVC$ ,  $PPE$ ,  $ROA$ ,  $MTB$  and  $LEV$ , using percentiles of 0.5% and 99.5%. The final sample consisted of the unbalanced panel, therefore of 3,772 of firm-years observations.

## RESULTS

In this section we present the results of data analysis. Initially, we conducted a descriptive analysis to show the behaviour of the variables used in the models. Then the results of the regres-

sion models with panel data (unbalanced data) used to evaluate the hypotheses of discretionary accruals in periods of crisis are presented. Finally, we perform inferences with discretionary accruals estimates based on models (1) and (2), described in section 3.2, to assess how they behave in relation to crisis variables.

## Descriptive statistics

Table 1 shows the descriptive statistics of total accruals (*TA*) for the total sample and by crisis variables (*CRISESI* and *CRISESII*). Results indicate an average value of -0.0509 for total accruals besides a high variability (0.1938). It is noticed that total accruals averages by crisis variables are lower in periods of crisis when compared to non-crisis periods. The *t* test indicates that, statistically, the *TA* average in periods of crisis is lower than the *TA* average in non-crisis periods (p-value <0.01) when considering both crisis variables (*CRISESI* and *CRISESII*).

TABLE 1. Descriptive statistics of total accruals, explanatory and control variables.

Variables	Crisis indicator	Company-year	Mean	Standard Deviation	t test p-value
<i>TA</i>	-	3,941	-0.0509	0.1938	-
$\Delta REVC$	-	3,935	0.0985	0.2911	-
<i>PPE</i>	-	3,943	0.4027	0.2808	-
<i>ROA</i>	-	3,922	-1.7790	22.2860	-
<i>MTB</i>	-	3,935	1.5893	3.7301	-
<i>SIZE</i>	-	3,941	-0.1950	2.0044	-
<i>LEV</i>	-	3,828	-1.1588	0.7353	-
<i>FDI</i>	-	2,941	0.0258	0.0082	-
<i>TA by CRISESI</i>	0 (No)	2,201	-0.0420	0.1992	3.450
	1 (Yes)	1,740	-0.0630	0.1861	0.001†
<i>TA by CRISESII</i>	0 (No)	2,191	-0.0383	0.1973	4.620
	1 (Yes)	1,750	-0.0670	0.1881	0.000†

Levels of significance: \*\*\* 10% \*\* 5% † 1%.

Table 2 presents the correlation matrix between variables – which will be used in models (1) and (2) – based on the Spearman correlation (a measure of non-parametric correlation does not imply the existence of linear relationship between the variables under study). Correlations indicate that the total accruals (*TA*) are positively correlated with *ROA* and *MTB*, and negatively with *IN-VAT*, *PPE* and *LEV*.



TABLE 2. Spearman correlation matrix between models' variables.

Variables	TA	INVAT	DREVC	PPE	ROA	MTB	SIZE	LEV
INVAT	-0.030 *0.059	-						
$\Delta$ REVC	0.002 0.923	-0.010 0.528	-					
PPE	-0.222 †0.000	-0.074 †0.000	0.161 †0.000	-				
ROA	0.261 †0.000	-0.228 †0.000	0.211 †0.000	-0.093 †0.000	-			
MTB	0.047 †0.003	-0.348 †0.000	0.138 †0.000	-0.065 †0.000	0.331 †0.000	-		
SIZE	0.022 0.172	-0.988 †0.000	0.051 †0.002	0.094 †0.000	0.248 †0.000	0.367 †0.000	-	
LEV	-0.216 †0.000	-0.128 †0.000	-0.038 *0.0190	-0.333 †0.000	-0.305 †0.000	-0.060 †0.001	-0.135 †0.000	-
FDI	-0.009 0.579	-0.044 †0.005	-0.029 0.073	-0.023 0.143	0.045 †0.005	0.113 †0.000	0.056 †0.000	-0.063 †0.000

Levels of significance: \*\* 5% † 1%.

## Results of regression

The models in section 3.2 were developed under the regression approach (longitudinal) for panel data, according to Wooldridge (2002). The models were adjusted using the R<sup>®</sup> software (version 2.13). In order to adjust the models we used the methodology of models with random effects for two reasons: a) the test results of Breusch-Pagan Lagrange multiplier (Wooldridge, 2002), which indicated the presence of unobserved heterogeneity (therefore, the use of panel regression technique is appropriate), b) the existence and inclusion of control variables that do not vary over time (*SECTOR*).

Initially, we developed the model described in (1) according to the so-called two-step approach here. The results are presented in Table 3.

TABLE 3. Panel data regression with random effects for TA.

Model – Dechow, Sloan, and Sweeney (1995) extended model:

$$\frac{TA_{it}}{A_{it-1}} = \beta_0 + \beta_1 INVAT_{it} + \beta_2 \frac{\Delta REVC_{it}}{A_{it-1}} + \beta_3 \frac{PPE_{it}}{A_{it-1}} + \beta_4 ROA_{it} + \varepsilon_{it}.$$

Variables	Coefficient	standard error	t value	p-value	
Constant	0.0091	0.0063	1.4481	0.1477	
INVAT	-345.6200	291.7400	-1.1847	0.2362	
$\Delta$ REVC	-0.0340	0.0159	-2.1304	0.0332	*
PPE	-0.1230	0.0144	-8.5627	< 0.0000	†
ROA	0.0026	0.0006	3.4281	< 0.0000	†
N = 3,772		R <sup>2</sup> adjust. =	0.1095		
F-statistic	115.9850			< 0.0000	†

Levels of significance: \*\*\* 10% \*\* 5% † 1%.

The results exposed in Table 3 corroborate those found in literature, since the variables,  $\Delta REVC$  e  $PPE$  showed statistical significance. In addition, the  $ROA$  variable was highly significant (p-value  $<0.01$ ), like McNichols (2000) and Kothari, Leone, and Wasley (2005). Inclusion of the variable  $ROA$  strongly altered the coefficients of the variables  $INVAT$  (-345.6200 and 291.7400) and  $DREVC$  (-0.0340 and 0.0159) when compared with the coefficients of the model obtained from Dechow, Sloan, and Sweeney (1995) model –  $INVAT$  (-992.2000 and 326.0700) and  $\Delta REVC$  (-0.0146 and 0.0173). In addition, the adjusted  $R^2$  of the model was equal to 10.95%, compared to the adjusted  $R^2$  of 4.05% obtained from Dechow, Sloan, and Sweeney (1995) model, indicating the relevance of variable  $ROA$  to control the effect of the performance of companies in the discretionary accruals.

The effect of crisis in accruals was tested by adjusting the models (1) and (2), described in section 3.2. After adjusting the

model (1), Table 3, the discretionary accruals ( $DAC_{it}$ ) were obtained for each firm-year. Thus, the effect of crisis variables in discretionary accruals was estimated by the regression between discretionary accruals ( $DAC_{it}$ ) and the crisis variables ( $CRISESI$  and  $CRISESII$ ) previously defined in section 3.1.2, considering the existence of control variables.

Table 4 presents the results of the adjustment in the regression model with panel data (random effects) for the discretionary accruals, where  $MTB$ ,  $SIZE$ ,  $LEV$ ,  $FDI$  and  $SECTOR$  were considered as control variables. Table 5 presents the results of fitting the model (2), where besides the inclusion of  $ROA$  control variable, we added  $MTB$ ,  $SIZE$ ,  $LEV$ ,  $FDI$  and  $SECTOR$ . Thus, the hypothesis of difference in discretionary accruals due to the occurrence of crises has been tested by the inclusion of crisis variables ( $CRISESI$  and  $CRISESII$ ) directly in the regression of total accruals.

TABLE 4. Regressions of discretionary accruals  $DAC$ , estimated by two-step approach with crisis variables ( $CRISESI$  and  $CRISESII$ ).

Panel A:

$$DAC_{it} = \beta_0 + \beta_1 MTB_{it} + \beta_2 SIZE_{it} + \beta_3 LEV_{it} + \beta_4 FDI_{it} + \sum_{j=5}^{23} \beta_j SECTOR_{it} + \beta_{24} CRISESI_{it} + \varepsilon_{it}.$$

Variables	Coefficient	standard error	t value	p-value	
Constant	-0.0125	0.0108	-1.1645	0.2443	
$MTB$	0.0019	0.0008	2.4412	0.0147	*
$SIZE$	-0.0038	0.0019	-2.0617	0.0393	*
$LEV$	-0.0607	0.0090	-6.7473	$<0.0000$	†
$FDI$	-0.9544	0.3064	-3.1146	0.0019	†
† $SECTOR$	-	-	-	0.0003	†
$CRISESI$	-0.0102	0.0053	-1.9204	0.0549	**
N = 3,772		$R^2$ adjust. =	0.0778		
F-statistic	13.2654			0.0000	†

(continue)

TABLE 4. Regressions of discretionary accruals *DAC*, estimated by *two-step* approach with crisis variables (*CRISESI* and *CRISESII*).

(conclusion)

Panel B:

$$DAC_{it} = \beta_0 + \beta_1 MTB_{it} + \beta_2 SIZE_{it} + \beta_3 LEV_{it} + \beta_4 FDI_{it} + \sum_{j=5}^{23} \beta_j SECTOR_{it} + \beta_{24} CRISESII_{it} + \varepsilon_{it}.$$

Variables	Coefficient	standard error	t value	p-value	
Constant	-0.0131	0.0106	-1.2397	0.2152	
<i>MTB</i>	0.0018	0.0008	2.3297	0.0199	*
<i>SIZE</i>	-0.0039	0.0019	-2.1251	0.0336	*
<i>LEV</i>	-0.0608	0.0090	-6.7442	<0.0000	†
<i>FDI</i>	-0,8489	0,3128	-2,7138	0,0067	†
† <i>SECTOR</i>	-	-	-	0,0002	†
<i>CRISESII</i>	-0.0139	0.0054	-2.5767	0.0100	†
N = 3,772		<i>R</i> <sup>2</sup> adjust. =	0.0786		
F-statistic	13.4087			< 0.0000	†

Levels of significance: \*\*\* 10% \*\* 5% † 1%.

† Variable SECTOR (19 sectors) significance was evaluated by a sequential F-test.

TABLE 5. Regressions of total accruals (*TA*) with crisis variables (*CRISESI* and *CRISESII*) and control variables using the *one-step* approach.

$$\text{Panel A: } \frac{TA_{it}}{A_{it-1}} = \beta_0 + \beta_1 INVAT_{it} + \beta_2 \frac{\Delta REVC_{it}}{A_{it-1}} + \beta_3 \frac{PPE_{it}}{A_{it-1}} + \beta_4 ROA_{it} + \beta_5 MTB_{it} + \beta_6 SIZE_{it} + \beta_7 LEV_{it} + \beta_8 FDI_{it} + \sum_{j=9}^{27} \beta_j SECTOR_{it} + \beta_{28} CRISESI_{it} + \varepsilon_{it}.$$

Variables	Coefficient	standard error	t value	p-value	
Constant	-0.0183	0.0125	-1.4636	0.1434	
<i>INVAT</i>	-334.9900	330.2100	-1.0145	0.3104	
$\Delta REVC$	-0.0187	0.0154	-1.2114	0.2258	
<i>PPE</i>	-0.1325	0.0191	-6.9510	< 0.0000	†
<i>ROA</i>	0.0016	0.0005	3.2361	0.0012	†
<i>MTB</i>	0.0020	0.0007	2.6633	0.0078	†
<i>SIZE</i>	-0.0021	0.0026	-0.8090	0.4186	
<i>LEV</i>	-0.0842	0.0118	-7.1668	< 0.0000	†
<i>FDI</i>	-0.9886	0.3018	-3.2758	0.0011	†
† <i>SECTOR</i>	-	-	-	0.0129	*
<i>CRISESI</i>	-0.0120	0.0053	-2.2527	0.0243	*
N = 3,772		<i>R</i> <sup>2</sup> adjust. =	0.1970		
F-statistic	33.1131			< 0.0000	†

(continue)

TABLE 5. Regressions of total accruals (TA) with crisis variables (CRISESI and CRISESII) and control variables using the one-step approach. (conclusion)

$$\text{Panel B: } \frac{TA_{it}}{A_{it-1}} = \beta_0 + \beta_1 INVAT_{it} + \beta_2 \frac{\Delta REVC_{it}}{A_{it-1}} + \beta_3 \frac{PPE_{it}}{A_{it-1}} + \beta_4 ROA_{it} + \beta_5 MTB_{it} + \beta_6 SIZE_{it} + \beta_7 LEV_{it} + \beta_8 FDI_{it} + \sum_{j=9}^{27} \beta_j SECTOR_{it} + \beta_{28} CRISESII_{it} + \varepsilon_{it}.$$

Variables	Coefficient	standard error	t value	p-value	
Constant	-0.0189	0.0124	-1.5301	0.1261	
INVAT	-342.4300	329.2900	-1.0399	0.2985	
ΔREVC	-0.0191	0.0153	-1.2426	0.2141	
PPE	-0.1311	0.0189	-6.9135	< 0.0000	†
ROA	0.0015	0.0005	3.2112	0.0013	†
MTB	0.0019	0.0007	2.5346	0.0113	*
SIZE	-0.0023	0.0026	-0.8971	0.3697	
LEV	-0.0844	0.0118	-7.1842	< 0.0000	†
FDI	-0.8570	0.3109	-2.7565	0.0059	†
†SECTOR	-	-	-	0.0091	†
CRISESII	-0.0169	0.0056	-3.0317	0.0024	†
N = 3,772		R <sup>2</sup> adjust. =	0.1979		
F-statistic	34.3054			< 0.0000	**

Levels of significance: \*\*\* 10% \*\* 5% \* 1%.

† Variable SECTOR (19 sectors) significance was evaluated by a sequential F-test.

The results presented in Tables 4 and 5 indicate the difference in discretionary accruals in periods of crisis and non-crisis. Some previous studies (e.g., Othman & Zeghal, 2006) revealed that variables ROA, MTB, SIZE, LEV and SECTOR were statistically significant. In our study, the control variables ROA, MTB, LEV, FDI and SECTOR were also statistically significant, which did not occur with the SIZE in the model using the one-step approach. The statistical significance of the SECTOR variable was tested using a sequential F-test, where the interest was to evaluate changes in accruals behaviour across different sectors (Economatica’s sectors classification was used).

Regarding the significance of the control variables, the variable ROA showed positive signal indicating that firms with extreme performance tend to manage more their results (in line with McNichols, 2000; Kothari, Leone, & Wasley, 2005). The positive sign of the variable MTB indicates that companies with higher growth expectations tend to manage more results (in accordance with Othman & Zeghal, 2006; Arnedo, Lizarraga, & Sánchez, 2007). The negative sign of LEV observed in the models indicates that companies with higher leverage tend to manage less their results, as noticed before by Dechow and Skin-

ner (2000), Jelinek (2007) and Han, Kang, Salter, & Yoo (2010). As noted in Nobes (1998) and Zarzeski (1996), the sources of financing can affect the accounting practices. In our study, this relationship indicated that companies with greater reliance on foreign investment are less likely to manage their results.

Finally, the results showed in Table 4 indicated that large firms (variable SIZE) tend to exercise less discretion in accounting results as observed in Othman and Zeghal (2006), Stubben (2010) and Han, Kang, Salter, & Yoo (2010). However, this result was not observed in Table 5 (one-step approach). This is due to the fact that in the first approach (two-step), the statistical significance of crisis variables and control variables were assessed by the regression of discretionary accruals  $DAC_{it}$  (unobservable), which might have introduced a bias to the results of the models in Table 4.

Table 4 show the statistical significance of the variables of crisis (CRISESI significant at 10% and CRISESII significant at 1%). The crisis scenario defined by the variable CRISESII reported higher discretionary accruals than CRISESI. Still considering the results of the models presented in Table 4, we observe an adjustment of the models (Panel A and B) with adjusted R<sup>2</sup> equal to 7.78% and 7.86% respectively.

In Table 5, the statistical significance of crisis variables was assessed directly in the models of total accruals (*one-step approach*) using a panel data regression of total accruals as a function of crisis variables, considering the control variables *ROA*, *MTB*, *SIZE*, *LEV*, *FDI* and *SECTOR*. The models presented, respectively, adjusted  $R^2$  equal to 19.70% and 19.76%. Results obtained by the models (Panel A and B) when using this approach are identical to the models presented in Table 4 (*two-step approach*), when we analyze the statistical significance of crisis variables.

In summary, the significance of the crisis variable in the models indicates that, as expected on the basis of the literature review conducted, this is a motivating factor for EM practices could aim either to reduce or increase the earnings. In the first case, such a practice might be used, for example, to “dump” poor results from prior periods or even to avoid government sanctions (e.g. withdrawal of subsidies), covering a higher than expected performance. In the second, such a practice could be adopted especially to bring “good news”, retaining or attracting fearful investors.

The estimated models (*two-step* and *one-step approach*) did not fulfil the basic assumptions imposed by a statistical technique of regression (homogeneity and normality of errors), which requires precaution in the results analyzed. However, the results obtained in all models showed stable coefficients and statistical significance for all control variables (with the exception of the *SIZE* variable in the model using *one-step approach*), which is consistent with previous studies.

In fact, this effect occurs, but without compromising the statistical significance of crisis variables. Again, we observed a greater significance when using the crisis scenario *CRISESII*.

## Inference on discretionary accruals

To complete the studies on the behaviour of accruals in relation to crisis variables, inferences were made about the discretionary accruals  $DAC_{it}$  (unobservable) estimated by: (i) the Dechow, Sloan, and Sweeney (1995) model with extension (McNichols, 2000; Kothari, Leone, & Wasley, 2005; Han, Kang, Salter & Yoo, 2010), using the two-step approach and; (ii) the model (2) – one-step approach (both described in section 3.2).

In each of these models, as shown in Table 6, discretionary accruals  $DAC_{it}$  were estimated without the presence of crisis variables. Then a t test was conducted to evaluate the difference in discretionary accruals for periods of crisis and non-crisis.

The results in Table 6 indicate that, regardless of the approach (and model) used, there is a change in discretionary accrual behaviour when we consider the periods of crisis and non-crisis, i.e., the average discretionary accruals in periods of crisis is statistically different from the average in non-crisis periods. We also observed that the significance is greater in the model corresponding to Panel A, when discretionary accruals were estimated with no regard to firm performance (control variable *ROA*). When the effect of control variables *ROA* and *ROA*, *MTB*, *SIZE*, *LEV*, *FDI* and *SECTOR* was considered, respectively, in models of Panels B and C, we assume that we are getting “more pure” discretionary accruals, which could alter the statistical significance of crisis variables of crisis, i.e., the discretionary accrual behaviour when we analyze according to the periods of crisis.

TABLE 6. Inference in discretionary accruals according to the variables of crises.

Variables	Crisis Indicator	Company-year	Mean	Standard Deviation	t test and (p-value)
Panel A – Dechow, Sloan and Sweeney model (1995):					
$\frac{TA_{it}}{A_{it-1}} = \beta_0 + \beta_1 INVT_{it} + \beta_2 \frac{\Delta REVC_{it}}{A_{it-1}} + \beta_3 \frac{PPE_{it}}{A_{it-1}} + \varepsilon_{it}$					
<i>CRISESI</i>	0 (No)	2,104	0.0076	0.1684	3.060
	1 (Yes)	1,668	-0.0089	0.1623	0.002†
<i>CRISESII</i>	0 (No)	2,095	0.0108	0.1692	4.380
	1 (Yes)	1,677	-0.0128	0.1609	0.000†

(continue)

TABLE 6. Inference in discretionary accruals according to the variables of crises.

(conclusion)

Variables	Crisis Indicator	Company-year	Mean	Standard Deviation	t test and (p-value)
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Panel B – Dechow, Sloan and Sweeney (1995) extended model:

$$\frac{TA_{it}}{A_{it-1}} = \beta_0 + \beta_1 INVAT_{it} + \beta_2 \frac{\Delta REVC_{it}}{A_{it-1}} + \beta_3 \frac{PPE_{it}}{A_{it-1}} + \beta_4 ROA_{it} + \varepsilon_{it}.$$

CRISESI	0 (No)	2,104	0.0052	0.1665	2.170
	1 (Yes)	1,668	-0.0064	0.1592	0.030*
CRISESII	0 (No)	2,095	0.0074	0.1681	3.110
	1 (Yes)	1,677	-0.0091	0.1568	0.002†

Panel C: 
$$\frac{TA_{it}}{A_{it-1}} = \beta_0 + \beta_1 INVAT_{it} + \beta_2 \frac{\Delta REVC_{it}}{A_{it-1}} + \beta_3 \frac{PPE_{it}}{A_{it-1}} + \beta_4 ROA_{it} + \beta_5 MTB_{it} + \beta_6 SIZE_{it} + \beta_7 LEV_{it} + \beta_8 FDI_{it} + \sum_{j=9}^{27} \beta_j SECTOR_{it} + \varepsilon_{it}.$$

CRISESI	0 (No)	2,104	0.0051	0.1610	2.240
	1 (Yes)	1,668	-0.0062	0.1483	0.025*
CRISESII	0 (No)	2,095	0.0070	0.1623	3.070
	1 (Yes)	1,677	-0.0085	0.1464	0.002†

Levels of significance: \*\*\* 10% \*\* 5% † 1%.

## SUMMARY AND CONCLUSIONS

Our purpose was to verify if during economic crises listed, companies in Brazilian stock exchange tended to adopt earnings management practices. To achieve our goal, a 3,772 firm-years observation sample was selected from 1997 to 2009 and tested with regression models, different approaches (one and two-step statistical tests) and two diverse scenarios for crises (considering the theory of business cycles).

After a descriptive analysis to observe variable behaviour, we ran the regression analysis using both the *two-step approach* – estimating discretionary accruals (EM proxy) controlled by performance (ROA) before testing its relation with crisis variable and the remaining control variables and the *one-step approach* – an unique model including discretionary accruals, both the crisis variable and the control variables – for the two crises scenarios (CRISESI and CRISESII) in order to test the proposed hypotheses – i.e. *there is a statistically significant*

*difference in discretionary accruals (used as proxies for earnings management behaviour) of companies listed in the Brazilian stock exchange in periods of economic crisis in relation to non-crisis periods.*

The results obtained revealed that crisis variables were significant in accruals models developed. Furthermore statistical tests on discretionary accruals identified statistically significant differences between the means comparing crisis and non-crisis periods, despite the models tested (*two-step* and *one-step approaches*) for estimating these accruals. These differences were observed in both planned scenarios. For the first scenario, crisis definition was based strictly on economic concepts of business cycles theory. On the second scenario, an economic environment of instability in Brazil was also considered due to the 2002 political process. Thus, it is appropriate to infer that managers' behaviour changed during economic crises periods. Explanations for such changes were not covered by our models.

Although, as mentioned before, the inherent subjectivity implied in earnings management concept and the limitations of using discretionary accruals as proxy (e.g. they cannot be observed directly) alert us to be cautious about the implications of our results and it can be said, at least, that regulators should be more alert to managers' manipulations on accounting numbers during crises. In this sense, our study can be useful for investors and creditors. This is particularly relevant for capital markets that presented rapidly growth in the past ten years and are trying to gain domestic and foreigner investors' confidence. This is the case of Brazil, our focus, but it can also be applied in other markets, either emerging or developed.

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