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Earnings management and macroeconomic crises
Evidences from Brazil and USA capital markets

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Abstract

Purpose – The purpose of this paper is to investigate whether macroeconomic crises are a motivational factor for earnings management practices by the companies listed in the capital markets of Brazil and the USA.

Design/methodology/approach – The sample consisted of 7,932 firm-quarter observations from listed Brazilian companies and 99,931 from listed US companies, covering a 13-year period (1998-2010). The authors developed regression models for the panel data, taking into account discretionary accruals as an earnings management proxy (dependent variable), while crises were regarded as a macroeconomic factor (dummy variable of interest). Also considered were return on assets, market-to-book ratio, size, leverage, foreign direct investment, income taxes, quarters, and sectors, which were treated as control variables.

Findings – The results corroborate the conceptual issues involved in undertaking this study, and they demonstrate that in periods of macroeconomic crises, companies are more motivated to employ earnings management practices both in Brazil and in the USA.

Originality/value – Unlike previous studies, the model developed in our research includes multiple macroeconomic crises simultaneously. Furthermore, it was applied in two markets at different stages of development and operating in distinct institutional contexts, which indicates its viability for replication for a large number of countries.

Keywords Earnings management, USA, Brazil, Capital market, Macroeconomic crises, Motivational factor

Paper type Research paper

1. Introduction

The interaction between accounting, sociopolitical and economic factors has been the subject of a great deal of study and analysis. Weber (2006, p. 26) draws attention to the fact that: “The modern rational organization of capitalistic enterprise would not have been possible without two other important factors in its development: the separation of business from the household […] and, closely connected with it, rational bookkeeping.”

It is possible to witness the rise of accounting in the twentieth century, owing to its unique features that have rendered it useful to the capitalistic economic model. Horngren et al. (1995, p. 4) state that accounting can partly be understood as: “the system that...
measures business activities, processes that information and communicates the results to decision makers. For this reason it is called the language of business.”

According to International Accounting Standards Board (IASB, 2013), the aim and general purpose of financial statements is to supply information that can allow funds to be allocated by capital providers, as well as to support corporate managers in determining whether these funds will be used in an effective manner.

In this situation, accounting information serves as the basis for decision making by various groups, and it creates a setting where it is possible to deal with pressures that are exerted both within and outside organizations. According to Parker et al. (1989, p. 1): “accounting is an artifact, a product of human intervention designed for human purposes.” As a result, managers can be driven to distort accounting numbers, especially a company’s results, to the extent that the numbers are far from representing a reliable record of financial occurrences and events (Watts and Zimmerman, 1978; Schipper, 1989; Healy and Weahlen, 1999; Stolowy and Breton, 2004).

A large number of research studies that were carried out with respect to earnings management (e.g. Jones, 1991; Dechow et al., 1995; Kang and Sivaramakrishnan, 1995) have sought to determine the increase in discretionary power that managers have over financial statements as a result of particular events. Succinctly, accounting profits/losses are made up of two components: items that already affect cash (non-discretionary accruals), and items that have still not had an effect on it (discretionary accruals). This second category is due to the recognition of the accrual basis, which is an essential part of accounting theory (Riahi-Belkaoui, 2005).

An analysis of discretionary accruals has become one of the most common ways to identify earnings management practices (hereafter, EM) by companies, as shown by the models constructed by Jones (1991), Dechow et al. (1995), Kang and Sivaramakrishnan (1995), and McNichols (2000). In this context, it will be possible to assume that settlement results can be affected by the earnings management practices that arise from the existence – or even the imminent threat – of a macroeconomic crisis. This is due to the interrelationship between both core areas, combined with the perception that managers are in an ideal position to carry out this practice.

Studies that seek to establish the interaction between accounting and crises confirm that this issue has attracted interest in recent years. For example, Choi et al. (2011) evaluated the value relevance of accounting information in Asian crises; Barth and Landsman (2010) analyzed how financial statements contributed to the subprime crisis; Achim et al. (2010) discussed the need for corporate social responsibility in providing accounting information during an macroeconomic crisis; Buga et al. (2010) analyzed how macroeconomic crises may serve as a reason to enhance assurance for financial statements; and Scorte et al. (2009) highlighted the importance of providing accounting information during periods of macroeconomic crises.

Following the widespread increase in the means of communication, the globalization of economies, and other factors, an increasingly systematic relationship can be established in which economic effects that were previously viewed as isolated phenomena (or as the object of research in a specific sector) are now being assessed in terms of wide-ranging areas of knowledge. This forms a multifaceted prism that can assist in providing a broader understanding of these phenomena.

In the light of this, our main purpose was to investigate whether macroeconomic crises are a motivational factor for the adoption of earnings management practices by companies that are listed in the Brazilian stock exchange (BM&FBOVESPA) and in the US stock exchanges (NASDAQ and NYSE).
The subject of this investigation is still ongoing, owing to the magnitude of the effects of the 2008 macroeconomic crisis that began in the financial sector in the USA. Among other factors, this crisis was exacerbated by the fact that it was impossible to evaluate the exact extent of the losses that stemmed from the banks involved in the process. Barth and Landsman (2010) pointed out that the lack of transparency of the companies’ operations, which lay at the heart of this crisis, was of crucial importance in assessing the ineffectiveness of the investors when coping with the risks that these institutions experienced.

In order to achieve the proposed objective, we developed a model based on Dechow et al. (1995) EM model, also known as the modified Jones model (hereafter, MJM), which includes partitioning variables such as those outlined in previous studies (e.g. McNichols, 2000; Kothari et al., 2005; Choi et al., 2011), which were employed to make the study more robust. The model was estimated using the regression methodology for panel data, according to Wooldridge (2009) and Othman and Zeghal (2006). Our sample consisted in 7,392 firm-quarter observations for Brazil from 1998 to 2009 and 99,931 firm-quarter observations for the USA from 1998 to 2010. We found evidence of earnings management practices in companies listed in the Brazilian and US capital markets during the periods when the macroeconomic crisis was present, as compared to periods when a crisis did not occur. These findings will enable us to reconcile the gaps between the empirical findings and the underlying assumptions in the literature, whereby macroeconomic factors might act as the driving force that encourages organizations to adopt earnings management practices.

In view of this, undertaking this study can be justified by: first, the social importance of economic crises and the need for research in accounting; and second, the lack of previous studies investigating the relationship between macroeconomic factors and earnings management, using the approach outlined here (which includes a longitudinal data analysis that allows for the simultaneous observation of multiple crises). This research is different from the other studies because it was developed with the analysis of two different stock markets – a traditional stock market (USA) and an emerging stock market (Brazil); this overview may help the results gain more traction, once comparisons between the various circumstances are made. Moreover, it should be mentioned that this is the first paper to consider multiples crisis periods, thus allowing us to establish a new viewpoint surrounding earnings management practices that were adopted during crises.

Davis-Friday and Gordon (2005) observed that during periods of macroeconomic destabilization, financial statements can lose their informative value. Kim and Qi (2010) found evidences of association between low accruals quality and vulnerability to macroeconomic shocks. Accordingly, if EM practices are harmful to quality (relevant and reliable) financial information, it is expected that the evidences found in our research might be useful as a red flag to regulators, investors, analysts, and other participants in the capital market, i.e., our findings support previous studies concerns (e.g. Bhimani, 2008; Bezemer, 2010; Barth and Landsman, 2010) about the important role of accounting for market (un)stability and the need of researches on this topic (Arnold, 2009; Hopwood, 2009).

This paper is structured as follows: first, a review of previous studies and the formulation of hypotheses will be undertaken (Section 2.3); second, a description of the methodological procedures used, including the variables, models, and sample population will be detailed (Section 3); an analysis of the main results with their corresponding statistical tests will be presented (Section 4); and the summary, conclusions, and suggestions for future research will be outlined (Section 5).
2. Literature review and theoretical analysis

2.1 Earnings management and motivational factors

According to Barth and Landsman (2010), the purpose of financial statements is to provide financial information to people from various sectors, with the aim of enabling them to make reliable decisions with regard to the allocation of their financial resources. The financial statements can be used to supply information to a wide range of economic groups, including the following: current and potential future investors; employees; financial creditors; suppliers; clients; government departments; and, generally, the public itself (IASB, 2013).

Due to the misalignment between the interests of managers (agents) and shareholders (principals), there may be an incentive for managers to use accounting information opportunistically, as they may take advantage when choosing certain accounting practices (Watts and Zimmerman, 1986).

This draws attention to the area of research called earnings management – a term that was defined by Schipper (1989) – which refers to the deliberate alteration of financial statements by managers in an attempt to secure private benefits. It should be stressed that this kind of management occurs when managers use their judgment in financial reporting and in structuring transactions to alter financial reports, either to mislead the other stakeholders with regard to the underlying performance of the company, or to influence contractual outcomes that depend on reported accounting numbers (Healy and Weahlen, 1999).

In a similar way, authors like Scott (2003) and McKee (2005) characterize earnings management as a form of decision making that is based on accounting information, which seeks to obtain specific gains and even to keep financial results stable and in line with forecasts.

Although earnings management has an adverse effect on the information symmetry between internal and external agents who have a vested interest in a particular organization, this practice takes place within legal boundaries. It should be noted that not every judgment made based on financial statements leads solely and exclusively to artificial effects without firm economic and financial support.

Different accounting criteria are often adopted by employing management ability for analysis and forecasting, in order to determine whether or not future events will take place. In this regard, Dechow and Skinner (2000) state that earnings management is carried out on the basis of an intentional manipulation of accounting information, whereas fraud is the violation of accounting concepts and standards. Riahi-Belkaoui (1989) states that accounting fraud is practiced by means of falsifying and altering documents, by the deletion of records of particular operations, or via the omission of important information.

With regard to motivational factors for earnings management practices, Christaens et al. (2008) stress that this kind of decision is only made by companies when the benefits of manipulating the profit figures outweigh the risks and costs incurred. It should be underlined that the use of results as a benchmark for assessing the financial-economic performance of companies already constitutes a motivational factor in earnings management.

Lev and Patell (1989) claim that accounting profits/losses might be regarded as information that is of primary importance, and which is obtained through financial statements for the analysis of evolving patterns of business enterprises. Thus, there is a concern that results are reported in a way that meets the expectations of interested parties, which tend to allocate a greater proportion of their funds to financing corporations that disclose profits that are in line with their (interested parties) requirements.
Healy and Weahlen (1999) address the issues that are concerned with the way that these behaviors have an impact on the analyses obtained by means of accounting data, and they recognize that the main feature of these analyses will be the extent to which a particular statement is influenced by earnings management. In undertaking this, the authors analyze some intermediate factors such as the magnitude and frequency of the earnings management, the specific means that are employed to carry it out, the nature of the driving force behind this practice, and the impact of earnings management on the allocation of resources (investment) by the economic agents.

Although earnings management has evolved within a broad and complex context, and since there are several factors that can encourage companies to adopt this practice, Watts and Zimmerman (1978) have laid down three key areas where companies might be prone to manipulate their results: incentive plans; level of indebtedness; and political costs. Healy and Weahlen (1999) add an additional point when they establish that variables such as capital markets and contracts supported by accounting information can exert pressure on organizations and, in some way, encourage EM practices.

Finally, some studies (e.g. Han and Wang, 1998; Johl et al., 2007; Choi et al., 2011; Tilden and Janes, 2012) found evidence that, when facing changes in macroeconomic scenarios, the managers deliberately choose the accounting practices of recognition and measurement more favorable to them.

### 2.2 Accounting and crisis

The links between accounting and macroeconomic crises have been explored in a number of wide-ranging academic studies in recent years (e.g. Boyer, 2007; Bhimani, 2008; Arnold, 2009; Barth and Landsman, 2010; Achim et al., 2010; Buga et al., 2010; Musvoto, 2011; Choi et al., 2011). Concerning EM behavior, macroeconomic crisis can either motivate or inhibit it; motivates when, for example, it is used as an “excuse” to drop losses from bad past management practices (Ahmand-Zaluki et al., 2011) and, could inhibit due to an increase in legal requirements and governmental enforcement and other gate keepers (such as auditors, creditors, etc.) actions (Chia et al., 2007; Filip and Raffournier, 2012).

Accordingly, it is expected that EM practices are affected by macroeconomic crises, but EM literature provided arguments both to deliberate increase or decrease in firms’ results. The managers could manipulate the results upward, for example, to assure the firm status and/or their benefits even with poor performance (Charitou et al., 2007; Ahmand-Zaluki et al., 2011) or, to avoid debt covenants violations (e.g. DeFond and Jiambalvo, 1994; Dichev and Skinner, 2002). Otherwise, managers might perform manipulations to push down the results to avoid withdrawal of government incentives and other political costs such as higher taxes, stricter regulation, and supervision (e.g. Jones, 1991), to mitigate losses from past practices drop losses from bad past management practices (Ahmand-Zaluki et al., 2011) or, to obtain advantage in contract negotiations (e.g. De Angelo and De Angelo, 1991).

The impact of the macroeconomic crisis on financial statements, and its consequences in accounting, has been the subject of other studies (e.g. Table I). It is reasonable to think that these periods of crises may provide reasons for companies to manage our earnings in order to show better results (or increased stability) than other companies, and organizations could use this practice to recognize a greater volume of financial losses, which would be stemming from situations that have arisen in earlier periods, yet which were only recognized as opportunistic measures that were justified by the crisis.
The accruals in companies’ financial statements usually reveal changes arising from variations in economic patterns (Kaplan, 1985). While underlining the fact that accruals refer to what has been entered in the accounting records (and which still do not have a financial effect on companies), the accounting procedures seek to provide forecasting information (in visual terms) regarding any events that may have had a financial impact on society; this procedure usually occurs by means of technical provisions. However, it should be emphasized that on the assumption that the practice of earnings management exhibits signs of a company’s abnormal accruals during periods of crisis, this may not only be caused by the conservative approach of managers, but also by their discovery of the ways in which they can obtain benefits for themselves.

The Theory of Economic Cycles was originally put forward by Kondratiev (1984), and it was then supplemented, notably, with the additions of the economists Schumpeter (1936) and Minsky (1986). This theory postulates the existence of a circular flow affecting the law of supply and demand, and highlights the fact that when a particular product/service finds the right conditions to be marketed, the economy of a given country will be in a state of expansion. Periodically, there are incremental increases in output that leverage this growth that, hence, affect this flow in the short term; this brings about sluggishness in the economy, which leads to a crisis (Costa, 2006; Louçã, 1999).
In a general way, the authors agree in their rationale where crises are regarded as complementary stages of the cycles where economies tend to grow, stagnate, decay, and recover. Kindleberger and Aliber (2005) insist that each event is unique for historians. By contrast, economists support the view that there are patterns in the data, and that particular events can bring about similar responses.

Although there are trends that are repeated in periods of crisis, it is still difficult to define the expression in objective terms, as Roubini and Mihm (2010, p. 48) make clear:

If we ask economists why the economy undergoes cycles of expansion and contraction, there is a huge array of answers. Some will say that crises are the inevitable result of government intervention in the market. Others will support the view that they occur because governments do not interfere enough. Still others will argue that there does not exist anything that can be called a bubble: the markets are perfectly efficient and if the value of houses doubles or increases three times in the space of a few years, and afterwards collapse — well, this is only the market reacting to new information.

According to Palgrave (1924), there are marketing inconsistencies that are aggravated by various pressures, which tend to lead to economic crises. For this reason, the existence of a crisis is closely linked to supply and demand, and this directly affects companies by allowing them to experience a contraction in the demand for their respective products. With regard to this, Marx (1924) states that a crisis can occur as a result of a mismatch between the acts of purchasing and selling produced goods, and this directly affects the supply and demand relationship; hence, the negotiating value of the merchandise in question.

Although there is a strong tendency for a crisis to seriously affect patterns of production and consumption, it should be stressed that these events can occur for different reasons, and this allows them to have their own taxonomies. Crises can originate from particular failings in the financial market (such as defects in the infrastructure of a country), and they can also give rise to an expansion in the means of production, or even a readjustment of the main world economies to new circumstances, as has been shown in the growth of the emerging economies in the last two decades.

Even though this study does not seek to provide an exhaustive discussion of the ways in which an economic crisis can be defined, it is designed to confirm the importance of providing a broad understanding of this concept, since the focal point of the analysis is on the economic periods that can be characterized in this way. Thus, the dates given by previous studies in establishing these periods were adopted in the present analysis.

Our intention was to investigate whether macroeconomic crises are a motivational factor for earnings management practices by the companies listed in the capital markets of Brazil and the USA. Several studies have shown that earnings management is an active practice given that the one adopting it views opportunity and seeks the pursuit of profits, even by skewing the financial statements. Thus, according to this approach, it is reasonable to expect that this behavior can be verified in several capital markets, even though they operate in different contexts, such as in economic, legal, and political systems, as well as within a firm’s structure and financing system, among others.

For this reason, we have selected two capital markets formed by distinct intrinsic characteristics: one that is highly developed and mature (USA), and the other, which is emerging (Brazil).

2.3 The general characteristics of macroeconomic crises in Brazil (1998-2009)
Although the Brazilian government made strenuous efforts to protect the value of the Real against other currencies in the 1990s, in 1999, particularly in February and March,
the Brazilian currency underwent a sharp devaluation (Batista et al., 2006). Gremaud et al. (2007) state that the rate of exchange fluctuated in an abrupt manner, and they forced the government to take measures to adjust the value; these included a reduction in expenditures and an increase in the tax burden, with the ultimate aim of making a suitable adjustment to seasonal factors.

Menezes and Moreira (2001) make clear that the Brazilian exchange crisis that occurred in 1999 was a process that arose from fault lines in macroeconomic fundamentals, aggravated by mechanisms of financial contagion.

With regard to 2002, Costa et al. (2012, p. 147) stated:

The year 2002 was characterized by the external instability of the country and financial fragility of the public sector. The devaluation in the rate of exchange and increased flight of dollars overseas, led the Government, on more than one occasion, to take restrictive measures such as a reduction of public expenditure and an increase of taxes, while in the monetary area, the Banco Central increased interest rates.

More specifically, in the first two quarters of 2002, the evasion of foreign capital aggravated the circumstances outlined here and forced the government to take urgent measures. It should be stressed that in that year, there was a great sense of instability in the country among overseas investors as a result of the presidential elections. This particularly applied to the question of guaranteeing property rights, and it forced the recently elected Luiz Inácio Lula da Silva to issue a statement (known as a “letter” to Brazilians), which sought in all circumstances to calm international investors down regarding their concerns over the security of tenure for private property in the country, as well as the maintenance of guiding principles in the areas of politics and economics.

The second quarter of 2008 was selected as a period of crisis, owing to the global contagion of the crisis that began in the USA, and which basically stemmed from structural problems in the American financial system. The panic in the financial markets that echoed throughout the world in October 2008 occurred exactly when the decision was made to allow one of the largest financial institutions in North America, Lehman Brothers, to fail (e.g. Bresser-Pereira, 2010; Diawara, 2009; Krugman, 2009). Figure 1 shows the dates of the macroeconomic crises that Brazil experienced in the period from 1999 to 2009 on the basis of the description outlined in this study.

### 2.4 Characteristics of macroeconomic crises in the USA (1998-2010)

With respect to the USA, Achim et al. (2010) state that 2001, 2002, 2008, and 2009 were difficult years for the economy. According to these authors, 2001 was characterized by two events that undermined the economy of the country: the terrorist attack of September 11 and the fall of Enron – one of the largest American companies in the energy sector. It can be argued that the American capital markets crisis of 2002 was an extension of the trend that began in 2001, since the decline of the economy in that year occurred precisely at the time when the failure of WorldCom, a giant in the telecommunications sector, occurred. Farhi and Cintra (2003) suggest that the 2002
crisis was heightened by highly speculative activities in the capital markets, which led to sharp falls in the value of shares listed in the North American stock exchanges.

Moore and Baker (2008) outline some of the circumstances that triggered the crisis in 2008, such as flexibility in granting mortgages for the purchase of property and the easing of regulations to control the banking sector. These factors brought about a climate that was conducive to carrying out speculative practices and the leveraging of institutions without the necessary financial backing. Krugman (2009) refers to the beginning of the crisis in 2007 (to be specific, in February), when shareholders’ equity funds suffered serious losses following the falls in the stock market indices, and this lasted until 2009 as a result of the serious contractions in the real economy that were reflected in the financial indices (Diawara, 2009).

It is worth noting that, although there had been signs of a crisis in the USA since 2007, its strong impact on the economy was only noticed at the beginning of 2008 with the fall of the Lehman Brothers bank; in view of this, the year 2007 was not regarded as a year of macroeconomic crisis for the purpose of this study. Figure 2 shows the dates of the macroeconomic crises that USA experienced in the period from 1998 to 2010.

2.5 Hypothesis
Considering the analysis of previous studies in Section 2.2, the effect of macroeconomic crises on earnings management practices is unclear and, sometimes, indicated mixed results. So, the following research hypothesis was proposed for test: there is a statistically significant difference in discretionary accruals (used as proxies for earnings management behavior) of listed companies in periods of macroeconomic crisis when compared with those of non-crisis periods.

It should be noted that the proposed hypothesis was tested for two samples of listed companies: those in Brazilian and American capital markets. For Brazil, four macroeconomic crisis periods were selected: 1999, 2001, 2002, and 2008; the non-crisis periods were 1998, 2000, 2004-2007, and 2009. For the USA, 2001, 2002, and 2008 were selected as crisis periods, and non-crisis periods were 1998, 1999, 2000, 2003-2007, 2009, and 2010.

3. Research design
In this section, we outline the methodological procedures that were employed in conducting this research study. First of all, we will examine the procedures used for sample selection; following that, we will outline the models of earnings management used and the operational definition of the variables.

3.1 Sample selection
The data were collected from two different information databases to assess and validate the research theories: first, the Economatica System for collecting data from the accounts and financial statements of Brazilian companies; and second, Thomson Reuters to collect data from the accounts and financial statements of US companies.

Figure 2.
Periods of crisis in the USA economy (1998-2010)
It should be stressed that the data did not overlap; in other words, all of the information that applied to the Brazilian companies was obtained from the Economatica database, and the data that applied to the US companies were acquired from Thomson Reuters. The headings used to categorize the collected data can be found in Table II.

Following the criteria outlined above, we examined a sample of companies listed in the Brazilian Stock Exchange (BM&FBOVESPA) during the period from 1998-2009, which initially consisted of a panel with 9,873 firm-quarter observations in the study period (44 quarters). With regard to the USA, we examined a sample of companies listed in the US Stock Exchange (NYSE and NASDAQ) during the period from 1998 to 2010, which initially consisted of a panel with 122,977 firm-quarter observations in the study period (13 years). The use of data from quarterly financial statements made it possible to assess the effects that could not be detected with the use of annual data (Giroux, 2011).

Companies were rejected from the initial sample if: first, data on depreciation and amortization, or assets and liabilities were missing, since this can have an impact on aggregate accrual measures; second, data were missing for fixed assets (property, plant, and equipment – PPE). In order to mitigate the effects of the outliers in the sample, we winsorized all variables using percentiles 0.5 and 99.5 percent. The final sample consisted of an unbalanced panel, which was comprised of 8,600 firm-quarter observations for Brazil and 99,931 firm-quarter observations for the USA.

3.2 Model and variables
The models most commonly used in previous studies on earnings management are based on measures of aggregate total accruals, where discretionary accruals are used as a proxy for EM (Jones, 1991; Dechow et al., 1995; McNichols, 2000). In this study, we adjusted the Dechow et al. (1995) EM model, also known as the MJM, and included more partitioning variables, such as those proposed in previous studies (e.g. McNichols, 2000; Kothari et al., 2005; Choi et al., 2011), so that it would be more robust for testing the research hypothesis.

The model has two steps. The first is used to consider the decomposition of total accruals \( TA_{it} \) in non-discretionary accruals \( NDAC \) and discretionary accruals \( DAC \), as follows:

\[
\frac{TA_{it}}{A_{it-1}} = \beta_0 + \beta_1 INVAT_{it} + \beta_2 \frac{\Delta REV_{it}}{A_{it-1}} + \beta_3 \frac{PPE_{it}}{A_{it-1}} + \beta_4 ROA_{it} + \epsilon_{it}
\]

where \( TA_{it} \) represents the total accruals of firm \( i \) in quarter \( t \), deflated by total assets in quarter \( t-1 \); \( A_{it-1} \) represents the total assets of firm \( i \) in quarter \( t-1 \), and \( INVAT_{it} \),

<table>
<thead>
<tr>
<th>Companies</th>
<th>Period</th>
<th>Database</th>
<th>Types of data</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brazilian companies</td>
<td>All the publicly-traded companies listed in the BM&amp;F Bovespa</td>
<td>1998 to 2009</td>
<td>Quarterly: 44 quarters</td>
<td>The year 2010 was not included in the Brazilian sample as a result of the need to harmonize with the IFRSs</td>
</tr>
<tr>
<td>US companies</td>
<td>All the publicly-traded companies listed in NYSE or NASDAQ</td>
<td>1998 to 2010</td>
<td>Quarterly: 48 quarters</td>
<td>Although there are other stock exchanges in the USA, the bulk of the publicly-traded companies can be found in NYSE and NASDAQ</td>
</tr>
</tbody>
</table>

Table II.

Headings for the data collection
ΔREVCᵢᵗ, PPEᵢᵗ, and ROAᵢᵗ, represent, respectively (for firm 𝑖 in quarter 𝑡), the inverse of total assets, the difference between the change in gross revenue, and the changes in accounts receivable (ΔREVᵢᵗ−ΔRECᵢᵗ), the fixed assets, and the return on assets (ROA, as a proxy for the control variable for the firm’s performance).

After the decomposition of the accruals and the estimates of discretionary accruals (a proxy for earnings management), the ratio of the crisis variables was tested, this took into account the control variables shown in Table III.

By means of the first step (1), the discretionary accruals (DACᵢᵗ) are estimated by residuals 𝜀ᵢᵗ, where they represent the difference between total accruals and the estimated mean of the non-discretionary accruals (NADCᵢᵗ). In this case, the crisis type variable in discretionary accruals is estimated by the regression between the discretionary accruals DACᵢᵗ and the variable CRISIS, previously defined in Section 2.2, and which took into account the assumptions made about the control variables (defined in Table III), i.e.:

\[
\text{DAC}_i^t = \text{intercept} + \alpha_j \text{QUARTERS}_i + \gamma_k \text{SECTOR}_i + \beta_1 \text{MTB}_i^t + \beta_2 \text{SIZE}_i^t + \beta_3 \text{LEV}_i^t + \beta_4 \text{FDI}_i^t + \beta_5 \text{TAX}_i^t + \beta_6 \text{CRISIS}_i^t + \omega_i^t.
\]

where \(j = 1, \ldots, 3\) and \(i = 1, \ldots, 20\), are the coefficient indexes \(\alpha, \gamma\), and which represent the number of categories of the dummy variables, QUARTERSᵢ and SECTORᵢ.

The model, which includes both steps (1) and (2), were estimated using the methodology for panel data regression, in accordance with Wooldridge (2009) and Othman and Zeghal (2006).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
<th>Reason for inclusion in the statistical model</th>
<th>Reference in the literature</th>
</tr>
</thead>
<tbody>
<tr>
<td>MTB</td>
<td>Market to book (market value of shares divided by net income value)</td>
<td>To control the effects of the market expectations about the values of the companies that form the sample</td>
<td>Jones et al. (2008), Othman and Zeghal (2006)</td>
</tr>
<tr>
<td>SECTOR</td>
<td>21 sectors for Brazilian companies (Econômica). 31 sectors for USA companies (Thomson-Reuters)</td>
<td>To control relevant accounting differences among the sectors</td>
<td>Othman and Zeghal (2006)</td>
</tr>
<tr>
<td>TAX</td>
<td>Taxes in profits accrued in the period (Income taxes divided by total assets)</td>
<td>To control the effect of earnings management that arises from incentives within the tax environment</td>
<td>No previous</td>
</tr>
<tr>
<td>QUARTERS</td>
<td>Dummy variables for the four quarters</td>
<td>To control the seasonal effects observed in DAC</td>
<td>Han and Wang (1998)</td>
</tr>
<tr>
<td>LEV</td>
<td>Natural logarithm of leverage of the companies by obtaining capital from third parties</td>
<td>To control effects originating from earnings management as a result of a greater need for the capital of third parties</td>
<td>Dechow and Skinner (2000); Iatridis and Kadorinis (2009).</td>
</tr>
<tr>
<td>FDI</td>
<td>Foreign direct investment</td>
<td>Sources of finance of companies can affect accounting practices</td>
<td>No previous</td>
</tr>
<tr>
<td>SIZE</td>
<td>Natural logarithm of total assets</td>
<td>To control the effects of companies different sizes</td>
<td>Othman and Zeghal (2006)</td>
</tr>
</tbody>
</table>

Table III. Control variables
4. Results

In this section we will outline the results of the data analysis. Initially, we conducted a descriptive analysis to show the behavior of the variables used in the models. Following this, we examined the results of the regression models with panel data (unbalanced data), which were used to evaluate the theories of discretionary accruals in periods of crises in Brazil and the USA.

4.1 Descriptive statistics

Table IV shows the descriptive statistics of the total accruals (TA) for the entire sample in Brazil and the USA. The results indicate an average value of −0.0406 for total accruals, together with a high variability (0.0849) in Brazilian companies. In the USA, the average value and standard deviation for total accruals was −0.0132 and 0.0704, respectively. It should be noted that in both cases (Brazil and USA), the total accrual average by crisis type variable is lower during periods of crisis than during non-crisis periods. The t-test also indicates that, statistically, the TA average during periods of crisis is lower than the TA average during non-crisis periods ($p < 0.01$).

It should also be noted that the average income tax rates (TAX) were very different from those found in the data supplied by Brazilian companies. This fact might be explained by the clear differences between the tax model employed for profits in Brazil,
compared with that in the USA, and these differences provide evidence of the variations that explain why the data must be segregated in both countries.

Tables AI and AII display the correlation matrix between the variables – which will be used in models (1) and (2) – based on the Spearman correlation coefficient (note that a non-parametric measure of correlation does not imply the existence of a linear relationship between the variables under study). Correlations indicate that the total accruals (TA) are positively correlated with ROA, MTB, FDI, LEV, income taxes, SIZE, and PPE.

4.2 Discretionary accruals from Brazil and US data

The effect of a crisis on accruals was tested by statistical estimation of the model (both steps 1 and 2), as described in Section 3.2. The results from Brazil shown in Table AIII corroborate those found in the literature, since the variables INVAT and PPE showed a statistical significance. In addition, the ROA variable was highly significant (p-value < 0.01), as was described by McNichols (2000) and Kothari et al. (2005). In addition, the adjusted $R^2$ of the model was equal to 2.93 percent; this coefficient is similar to that of other studies in earnings management literature, such as noted in Jones (1991).

With regard to US companies, the results of the Dechow et al. (1995) model, added to the ROA variable, can be found in Table AIV. The results displayed in Table AV also corroborate those found in the literature, since all the variables (INVAT, ΔREVC, PPE, and ROA) showed statistical significance. In addition, the adjusted $R^2$ of the model was equal to 2.57 percent.

It should be pointed out that this first step was expected to obtain the residues (which were used as a dependent variable and proxy in the discretionary accruals (DAC)).

4.3 Results of regression

In this section, we present the results of the data analysis of the regression models using panel data (unbalanced data) in order to evaluate the hypothesis of discretionary accruals during periods of crisis. The models were estimated using the R® software (version 2.15). In order to estimate the models, we used the models with random effects methodology for two reasons: first, the test results of the Breusch-Pagan Lagrange multiplier (Wooldridge, 2009) indicated the presence of unobserved heterogeneity (therefore, the use of a panel regression technique is appropriate); and second, the existence and inclusion of control variables did not vary over time (SECTOR).

Initially, we showed the results using data from Brazil in Table AV. The results for the US data are given in Table AVI.

4.4 Results from the Brazilian data

The discretionary accruals (DAC$_{it}$) were obtained for each firm-year. Thus, the effect of crisis variables in discretionary accruals was held by the regression between discretionary accruals (DAC$_{it}$) and the crisis variable previously defined in Section 3.2, which took into account the existence of control variables.

Table AV shows the results of the regression model with panel data (random effects) for the discretionary accruals, where QUARTERS, SECTOR, MTB, SIZE, LEV, FDI, and TAX were considered as control variables. Thus, the hypothesis of the differences in discretionary accruals caused by the occurrence of crises was tested by the inclusion of the crisis variable (CRISIS) directly in the regression of discretionary accruals. The $R^2$ of the model was equal to 4.44 percent; this finding is close to the results
discovered by Han and Wang (1998) and Johl et al. (2007), who investigated earnings management during some of the crises explored in this study.

When the results in Table AV were analyzed, it could be noted that the Quarters, Income tax (TAX), and FDI variables were statistically significant, and they helped to explain the variation in the discretionary accruals. More specifically, it is possible note that the Brazilian companies decreased their earnings management in fourth quarter; this behavior may be explained by the fact that firms seek to report better numbers at the end of the year, likely in order to overcome market expectations. Foreign direct investment (FDI) did not appear to be a relevant coefficient to analyze, although this variable has demonstrated statistical significance. However, the TAX variable revealed that companies with larger values of income taxes tended to improve their discretionary accruals and their EM. The statistical significance of the SECTOR variable was tested by means of a sequential F-test, where the objective was to evaluate changes in the behavior of accruals across different sectors (the Economatica® sectors classification was used).

With regard to the dummy variable (CRISIS), it can be stated that was statistically significant, which indicates a difference in the discretionary accruals during periods of crisis and non-crisis. It is worth highlighting that the estimated coefficient of CRISIS proved to be negative (−0.0103), which would suggest that the companies were seeking management practices with the aim of reducing discretionary accruals.

4.5 Results from the US data
Table AVI shows the results of the regression model with the panel data (random effects) for the discretionary accruals, where QUARTERS, SECTOR, MTB, SIZE, LEV, FDI, and TAX were considered as control variables. The adjusted $R^2$ of the model was equal to 1.28 percent; the definitions of these values are the same as those described for the Brazilian findings.

When the results in Table AVI are analyzed, it can be seen that with the exception of the MTB, variable, all of the control variables were statistically significant. This suggests that the introduction of items that are aimed at mitigating the effects of the size of companies, sectors, market relations, and investment flows, among other factors, are important when constructing more robust models for earnings management by means of aggregate accruals.

With regard to the dummy variable (CRISIS), this also proved to be statistically significant, which suggests a difference in the discretionary accruals between periods of crisis and non-crisis. As was the case for the data from Brazil, the estimated coefficient of the CRISIS variable was negative (−0.0045), which would suggest that the companies were more inclined to reverse their accruals motivated, for example, by the need to show positive results, proving above-average performance, or at least a performance that was close to that determined by the market standards during these periods.

These results support the projected expectations forecast that were established during the conceptual development of this study, and they show that in a time of macroeconomic distortions, companies become more inclined to adopt EM practices.

5. Summary and conclusions
The results obtained from this study support the proposed hypothesis, indicating that macroeconomic crises are motivational factors for adopting earnings management practices. By creating this time lag from a monetary standpoint, it is expected that
accounting can provide some indications of what companies’ situations might be like with regard to solvency and liquidity in future undertakings. However, as outlined in this research (as well as in others on the issue of earnings management), it can be argued that it is on the occasions when managers might spot a chance to derive particular benefits from distortions in financial statements that they take advantage of this way of presenting accounting numbers.

With regard to the question of identifying the control variables that can supplement the aggregate accruals models and improve the clear capacity of these tools to carry out a search for discretionary accruals as a proxy for earnings management, they can be itemized as follows: sectors, taxation, market values compared with book values, quarters, leverage, ROA, and foreign direct investment. These variables were shown to be important for benchmarking estimates, and they can thus reduce the risk of bias in the regression model.

On the basis of the results obtained for the samples (listed companies in Brazil and USA), it can be concluded that the proposed hypothesis was confirmed: there is a statistically significant difference in the discretionary accruals (used as proxies for earnings management behavior) of listed companies during periods of macroeconomic crisis when compared with those of non-crisis periods. These observations are important because they can be reconciled with the empirical findings regarding the prevailing assumptions on this issue, which can be found in the literature, where macroeconomic factors can act as a driving force (motivational factor) to provide companies with incentives to adopt earnings management. This conclusion can be drawn from the abnormal behavior noted in discretionary accruals during the course of the sample-based research undertaken here. It is worth noting that the results do not refer to a single crisis; rather, the findings enable one to infer that earnings management practices were employed by companies during multiple crisis in very different environments (Brazil and the USA).

The results obtained with the regression models for both the companies listed in Brazil and those listed in the USA also revealed a negative coefficient for the dummy variable (CRISIS), which suggests that companies tend to revert to discretionary accruals during periods of crisis, as an attempt to improve a company’s earnings. This might indicate an attempt to improve a company’s results by means of a reversal of accruals. This finding might be better understood whether observed the underlying scenario of crisis period. Generally, during these periods, firms find themselves in the midst of restrictions where they cannot access the financial resources of the creditors and shareholders. As was established from this coefficient, it is possible that earnings management can be used to decrease the incomes that are reported, to demonstrate that the private sectors need government subsidies, whether this is completed through reductions in taxes or by the transfer of funds. Another view is that this finding may signify that abnormal times or crises periods can be regarded by managers as a good opportunity to reverse excessive discretionary accruals made in previous years (Jones, 1991).

The focal point of this discussion leads directly to the question of how far the users of accounting information are able to distinguish between the effects of earnings management in accounts statements during periods of crisis. As has been determined throughout the course of this study, discretionary practices are not in themselves harmful features within the framework of accounting; rather, they are valuable resources that enable the experiences of an organization that arise from a particular incident to be reflected in a quantitative way. However, it is essential to distinguish between the use of judgment that is based on rational thought and serious debate from the decisions that are made automatically, which simply seek to meet the needs and requirements of a particular group.
References


McKee, T.E. (2005), *Earnings Management: An Executive Perspective*, Thomson, Columbus, OH.


Wooldridge, J.M. (2009), Introductory Econometrics: A Modern Approach, South-Western, Cengage Learning, Mason, OH.

Further reading


(The Appendix follows overleaf.)
### Table AI

Spearman correlation matrix of variables in models

<table>
<thead>
<tr>
<th>Variables</th>
<th>BTM</th>
<th>CRISIS</th>
<th>FDI</th>
<th>LEV</th>
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<th>SIZE</th>
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<th>ΔREVC</th>
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**Note:** *****Significant at 10 percent (0.10), 5 percent (0.05) and 1 percent (0.01), respectively**

**Source:** Data from Brazilian companies
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<th>Variables</th>
<th>BTM</th>
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<th>LEV</th>
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**Note:** *****Significant at 10 percent (0.10), 5 percent (0.05) and 1 percent (0.01), respectively.**

**Source:** Data from USA companies
Table AIII.
Panel data regression with random effects for TA

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Note: **,**,*Significant at 10 percent (0.10), 5 percent (0.05) and 1 percent (0.01), respectively

Source: Data from Brazilian companies

Table AIV.
Panel data regression with random effects for TA

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Note: **,**,*Significant at 10 percent (0.10), 5 percent (0.05) and 1 percent (0.01), respectively

Source: Data from USA companies

Table AV.
Panel data regression of discretionary accruals DAC

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Note: **,**,*Significant at 10 percent (0.10), 5 percent (0.05) and 1 percent (0.01), respectively

Source: Data from Brazilian companies


### About the authors

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### Management and macroeconomic crises

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<th>p-value</th>
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\[ \text{n} = 99,931 \quad R^2 \text{ adjust} = 0.0128 \]

\[ \text{F-statistic } = 32.419 \]

Model: \[ DA_{it} = \beta_0 + \gamma_j \text{QUARTERS}_{it} + \chi_k \text{SECTOR}_{it} + \beta_1 \text{MTB}_{it} + \beta_2 \text{SIZE}_{it} + \beta_3 \text{LEV}_{it} + \beta_4 \text{FDI}_{it} + \beta_5 \text{TAX}_{it} + \beta_6 \text{CRISIS}_{it} + \epsilon_{it} \]

\( * \), **, ***Significant at 10 percent (0.10), 5 percent (0.05) and 1 percent (0.01), respectively

**Source:** Data from USA companies

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**Table AVI.** Panel data regression of discretionary accruals DAC

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EEG – Emerging Economies Group, set forth by the International Accounting Standards Board (IASB). A Member of the International Integrated Reporting Committee – IIRC, initiative which is part of the “Accounting for Sustainability – A4S” initiative led by the Prince of Wales. A Member of the Editorial Board of *The Accounting and Finance Journal* (edited by the Research Foundation in Accounting and Finance, linked to the Accounting Department of Universidade de São Paulo).


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