Received 11 August 2024
Revised 5 January 2025
2 March 2025
Accepted 4 March 2025

Detecting misrepresentation of financial information: a literature review and a call for future studies

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Abstract

Purpose – This paper aims to present the instruments and methodologies available to help detect any form of misrepresentation of financial information in annual reports. The paper presents a theoretical framework and makes a call for future research in this field of study.

Design/methodology/approach – The literature review identifies impression and earnings management as two possible forms of misrepresentation. For the former, we present the specific reporting choices available to mislead the interpretation of the firm's performance; for the latter, we discuss different model specifications to detect window-dressing behaviors.

Findings – Insiders can opportunistically represent the firm's performance by using pictures, violating graph construction principles or exercising reporting discretion. Manipulations of the substance of annual reports are detectable using specifications that, using an evolutionary approach, this paper classifies into "first-generation" models, ratio analysis and "second-generation" models.

Originality/value – The paper provides novel classifications of the instruments and methodologies that help detect impressions and earnings management in annual reports. Using a matrix, our theoretical framework shows that existing protocols are not suitable for investigating possible relationships between these two forms of misrepresentation in terms of whether impression management and earnings management can be both interchangeable or complementary in annual reports. Thus, future studies investigating both forms of misrepresentation might position their offerings in one of the matrix squares or introduce protocols that can detect both forms of misrepresentation. For practice, the paper has particular implications for standard setters. Specifically, in addition to improving the existing accounting standards to obstruct earnings management, they should also issue a standard that prevents impression management, which is currently lacking.

Keywords Literature review, Impression management, Earnings management

Paper type Literature review

1. Introduction

It is possible to recognize that financial information is misrepresented when the fundamental qualitative characteristics of financial information are violated, so, according to the Conceptual Framework for Financial Reporting (2010), financial information is neither relevant nor faithful. While *relevance* here relates to financial information's capacity to make a difference in its users' decisions (Conceptual Framework for Financial Reporting, 2010; QC 6), financial information is *faithful* when financial reports represent economic phenomena in both form (i.e. words) and substance (i.e. numbers) (Conceptual Framework for Financial Reporting, 2010; QC 12). The latter definition suggests that both the wording used and the accounting numbers presented in annual reports can potentially be used to misrepresent financial information and mislead outsiders' perceptions of the company's performance. When the wording (form) of annual reports is manipulated, this is called impression management; in contrast, when the numerical information (substance) is manipulated, this is called earnings management.

Journal of Accounting Literature
Vol. 47 No. 5, 2025
pp. 300-322
Emerald Publishing Limited
e-ISSN: 2452-1469
p-ISSN: 0737-4607
DOI 10.1108/JAL-08-2024-0196

Conflict of interest declaration: We declare that we have no conflict of interest.

This paper aims to review the literature to clarify the techniques that help detect misrepresented financial information due to impression and earnings management. In the misrepresentation research, few—if any—studies have provided a comprehensive presentation of the instruments and methodologies used to misrepresent financial information in annual reports. To fill this gap, the purpose of this literature review is to develop a theoretical framework for the misrepresentation of financial information disclosed in annual reports by synthesizing the hundreds of papers that scholars have published in academic journals in recent decades (Bansal, 2023). The framework should also overcome the reservations about the relationships between the two forms of misrepresentation, which can be interchangeable or complementary in annual reports. Using this framework, specific avenues for future research on underexplored themes can be identified (Durisin and Puzone, 2009).

To contribute to the debate on misrepresentation, this paper reviews the literature and introduces a new theoretical framework posing the following major research questions:

RQ1. What are the main instruments used to detect impression management in annual reports (RQ_1)?

RQ2. How have methodologies evolved in detecting earnings management over time (RQ_2)?

RQ3. Are such instruments and methodologies suitable for detecting impression and earnings management by considering the possible relationships between these two forms of misrepresentation (RQ_3)?

To review the literature, the paper adopts a mixed-method approach. Specifically, it uses a systematic literature review to identify the articles and a narrative approach to analyze the techniques and key findings in this rapidly evolving field.

The paper examines the evolution of the standard body of knowledge of misrepresentation research. Specifically, it aims to contribute to the discipline by mapping the research papers that academics published in high-quality academic journals from 1985 to 2024. In contrast to Healy and Wahlen (1999) and Bansal (2023), who focused on earnings management, this paper uses an evolutionary approach to identify all the instruments available to outsiders to detect both impression management and earnings management.

Findings reveal that, according to academics, impression management might be present when insiders make opportunistic use of brightly colored pictures, glosses and novelty formats; violate graph construction principles; or exercise reporting discretion. Regarding earnings management, by analyzing three-time segments across 40 years, the paper maps the evolution of the instruments by identifying and classifying the use of first-generation models (e.g. Healy, 1985), ratio analysis (e.g. Leuz *et al*., 2003) and second-generation models (e.g. Dechow *et al*., 2012). While the techniques adopted focus on either impression management or earnings management, our theoretical framework reveals that these two forms of misrepresentation can also be complements rather than only substitutes.

By conducting this review, the present study does not contribute to a specific topic in the field of misrepresentation. While the paper does briefly discuss the "state of the art" of instruments and methodologies to detect impression management or earnings management in annual reports, the paper's primary contribution is in its call for future studies to introduce protocols to verify the thesis that these two forms of misrepresentation can be either complementary or interchangeable in annual reports. The theoretical framework presented illustrates that the existing instruments and methodologies used by scholars to detect impression and earnings management are not suitable for investigating possible relationships between these two forms of misrepresentation.

For practice, this paper highlights the need for standard setters to issue accounting standards to reduce the likelihood of managers carrying out impression management. This is necessary because, despite the fact that impression management is a form of

misrepresentation, there are currently no standards that obstruct opportunistic behaviors involving the reporting choices in annual reports.

The paper is composed of six sections. Following this introduction, Section 2 describes the methodology adopted to review the literature. Section 3 references the literature on impression management and Section 4 is dedicated to earnings management. Section 5 presents the theoretical framework. Finally, Section 6 concludes the paper and calls for future research on earnings management, impression management and the relationship between them.

2. Methodology

Unlike traditional literature reviews, a systematic review utilizes a replicable, rigorous, scientific and transparent process (Cook *et al*., 1997), thereby reducing the subjectivity typical of narrative reviews. This systematic literature review consists of three phases: data collection, data analysis and synthesis.

Regarding data collection, the EBSCO Host database was used to find articles that match certain inclusion criteria. Specifically, to be eligible for inclusion, articles were required to have the words "impression management" OR "earnings management" in the title or abstract. For earnings management, the term "accrual*" has been considered in the research strategy. Note that "*" is a wildcard symbol that is commonly used by search engines to identify all variations of a word and that can include any number of characters, including zero (Novykov *et al*., 2023).

The selection was limited to English-language peer-reviewed journals so as to identify the most relevant studies within the international academic community. Book chapters, editorials and opinion pieces were excluded. All "grey literature" was also excluded (Rothstein and Hopewell, 2009), as published studies are more likely to meet high-quality standards. Regarding the timeframe, the examined articles were published between 1985 and 2024.

A coding guide was used to facilitate the analysis of the articles included in the sample. This guide identified variables including the characteristics of the authors, the journals in which each publication appeared, the type of research product (i.e. empirical and theoretical), the methodology used and so on. These variables were entered into an Excel database. For the systematic literature review, data were operationalized by adhering to the "Preferred Reporting Items for Systematic Reviews and Meta-Analyses" (PRISMA) from Moher *et al*. (2009). This protocol is commonly used in systematic literature reviews (Tam *et al*., 2017). We used common Excel functions to elaborate the results, and we built graphs incorporating polynomial trend lines to understand the development of phenomena over time.

To synthesize the research, we clustered the articles according to the topics discussed in each. Regarding impression management (RQ_1), we aimed to identify the instruments used in annual reports to misrepresent financial information; regarding earnings management (RQ_2), we sought to identify the methodologies used to detect such phenomena in annual reports.

3. Results

3.1 Misrepresentation through impression management

Tweedie and Whittington (1990, p. 97) described impression management as a means of attempting to represent company performance in the best possible light. Many studies have investigated this topic over time; specifically, in the EBSCO Host database, we identified 2,302 articles with the term "impression management" in the title of the abstract. Focusing on English-language products that passed the peer-review process, the number dropped to 1,753. The selection was then limited to papers published in academic journals from 1985 to the end of 2024, further decreasing the number to 1,723. Using the "Thesaurus Term" function, we retained 1,014 articles in the misrepresentation field. Next, we screened the abstracts to identify the most common techniques managers use to influence outsiders' perception of the reporting entity's performance by presenting it in the best possible light. Insiders perform

impression management by opportunistically using brightly colored pictures, glosses and novelty formats; by violating graph construction principles; or by exercising reporting discretion.

When brightly colored pictures, glosses and novelty formats are used, these instruments are intended to "adorn" the accounting numbers disclosed in annual reports. With reference to pictures, Squiecs (1989, p. 209) observed that photographs are essential in annual reports because they offer the most effective, real and believable way to tell a story. Since the publication of his work, several scholars have observed that the number of pictures in annual reports has increased over time. Graves *et al.* (1996) examined the consolidated financial statements of 14 US public companies, recording the number and the size of photographs in the first year of occurrence and the two subsequent years and found that the number and size of photographs had been increasing since the 1960s. They concluded that consolidated financial statements had become an "aesthetic moment" due to managers' increasing attention to improving the attractiveness of the layout of annual reports. To achieve this goal, they broadcast the colorfully "adorned" information on television, based on the assumption that "any discourse must be cast in a television format to be perceived as valid" (Postman, 1985). Bringing images to the real world through television broadcast makes financial information seem more reliable; that is, "the pictures are more real than the accounts" (Graves *et al.*, 1996, p. 60). Thus, inspired by the media, insiders use colorful pictures and other aesthetic enhancements to increase the probability that readers will consider the financial information truthful.

The above reasoning suggests that accounting and financial statements cannot, in and of themselves, persuade readers that they are trustworthy and reliable. The reason for this is well explained by Beattie *et al.* (2008), who argued that annual reports lost credibility following scandals in several US companies (e.g. Enron). These scandals led to a change in the function of the annual report, which evolved from a dull, regulated, black-and-white financial document into a lengthy, colorful, presentation-driven marketing and public relations document and impression management tool, in which the actual financial statements are relegated to a technical appendix (Beattie *et al.*, 2008, p. 181). As a result, investors must exercise caution when reading this document (p. 219). Cooper *et al.* (1992) offer another explanation for the growing presence of colors and pictures in accounting and financial statements, describing them as type of a simulacrum—that is, something without a relationship to economic reality, with aestheticism remaining the only "meaningful channel" between users and producers of annual reports (Graves *et al.*, 1996, p. 60). All of the above evidence indicates that photographs play an increasingly significant role in manipulating perceptions regarding the truth and reliability of financial numbers, especially in the USA.

The use of graphs is also common in financial statements, as graphs can summarize both textual and numerical information. Indeed, a document with colorful graphs is far more aesthetically interesting and pleasant to read than a dull document without them. Graphs can also be more useful than plain text and/or numbers because visual memory facilitates human learning (Paivio, 1974). Moreover, in financial reporting, graphs are the most helpful instruments to describe trends (Wright, 1989).

However, insiders do not always employ graphs to make the interpretation of annual reports easier. Instead, they sometimes use graphs to deliberately mislead outsiders regarding the company's performance (Cho *et al.*, 2012) by violating the principles of graph construction. One prior work on this topic is that of Beattie and Jones (1992), who conducted the first systematic empirical investigation of the use and abuse of graphs in UK annual reports (p. 292). According to Beattie and Jones, impression management through the use of graphs occurs in the following two circumstances: first, when managers decide to use or not to use graphs with the intention of influencing perceptions of the company's performance; second, when managers fail to comply with the principles of graph construction when creating these graphs. The first circumstance is the dichotomous primary decision that Beattie and Jones (1992) call "selectivity." Selectivity occurs when managers emphasize a positive trend in

performance indicators using colorful and eye-catching graphs or when they do not use graphs in the case of a reduction in performance indicators. Beattie and Jones call the second circumstance "measurement distortion," which occurs when managers use graphs but do not comply with the principles of graph construction. By analyzing the literature, the authors systematized the conditions under which this kind of distortion occurs and identified incorrectly scaled axes, the use of non-zero vertical axes and broken axes as the most common conditions. However, these are not the only conditions, as Frownfelter-Lohrke and Fulkerson (2001) observed in their examination of cases in which graph construction principles are violated. Moreover, by analyzing the 2005 annual reports issued by 52 Italian listed companies, Ianniello (2009) found that "about one-quarter of key performance indicator graphs are materially distorted, graphical alterations that are favorable to the firms are relatively more frequent than those that are unfavorable and financial graphs exhibit slope parameters that depart materially from the optimum" (p. 442).

Finally, we consider reporting discretion, which we define as the possibility offered by standard setters to disclose accounting numbers in different ways. Among these options, some may allow companies to conceal negative results while others may allow them to unduly emphasize positive results. Through either or both of these approaches, it is possible for insiders to exercise reporting discretion to mislead outsiders regarding the company's actual performance through impression management. Indeed, insiders can exercise such reporting discretion even while perfectly complying with the accounting standards, making it quite challenging to detect their fraudulent intent to mislead outsiders regarding company performance. In other words, it is difficult to identify the circumstances under which reporting discretion can lead to opportunism exercised by insiders toward outsiders because the insiders are still technically acting within the Generally Accepted Accounting Principles (GAAP) regulations.

The accounting literature helps to identify such circumstances and allows us to consider reporting discretion using the available instruments for impression management. An example of an opportunity for reporting discretion is the Financial Accounting Standards Board's (FASB's) decision to allow for the disclosure of comprehensive income in a performance-based statement (e.g. in a single or separate income statement) or in a less clear statement of changes in stockholders' equity. While investors prefer the former because it shows the entity's performance more clearly, insiders can choose to hide negative performance by disclosing the comprehensive income and its components in the latter.

The literature robustly supports our arguments, particularly in demonstrating the correlation between the format chosen to disclose comprehensive income and the nature of its components—specifically, whether the reflected performance is positive or negative. Numerous scholars indicate that this correlation is a key factor in understanding how different stakeholders interpret the entity's performance. The preference of outsiders to read information regarding an entity's comprehensive income and its components in a different type of statement than that chosen by managers in the large majority of US annual reports further confirms this correlation.

Scholars who have investigated the existence of a correlation between the format chosen to disclose an entity's other comprehensive income (OCI) and the nature of its components found that the higher and more positive the OCI is, the more companies choose a performance-based statement for their annual reports; conversely, when the components are negative, the companies prefer to use a statement of changes in stockholders' equity, which is less readable than a performance-based statement, to hide the negative information (Bamber *et al*., 2010; Campbell *et al*., 1999; Pandit and Phillips, 2004). More recently, Shan and Dong (2012) investigated comprehensive income reporting choices by analyzing the annual reports of 200 commercial banks that comply with SFAS 130. They found that entities that reported negative OCI components and significant losses on remeasuring AFS securities not only disclosed comprehensive income in a statement of change in stockholders' equity but also presented information in the footnotes of annual reports rather than in the primary statement, with the (fraudulent) intent to conceal the information from the attention of outsiders.

In addition to papers showing the correlation between the format in which comprehensive income is disclosed and the nature of its components, we identified papers demonstrating that managers' preference for the statement of changes in stockholders' equity contrasts with outsiders' reporting preferences. For instance, King *et al*. (1999) demonstrated through interviews that, while the large majority of chief financial officers (CFOs) prefer to disclose comprehensive income in a less readable format like a statement of changes in stockholders' equity, professional investors prefer to see comprehensive income in a performance-based statement, as the latter facilitates the assessment of traditional performance measures. Hirst and Hopkins (1998) reached the same conclusion, explaining that performance-based statements are preferred for readability. Maines and McDaniel (2000) likewise confirmed that this is true, especially for nonprofessional investors, who found a separate statement of comprehensive income far simpler to read.

As explained above, CFOs prefer the less clear statement of changes in stockholders' equity due to the possibility of manipulating the perceived volatility of the firm's performance (Maines and McDaniel, 2000; Hirshleifer and Teoh, 2003; Yen *et al*., 2007), but doing so also has the effect of minimizing the possibility that outsiders who perceive the firm's performance as more volatile will place a lower value on the stock and will assess the manager as less competent (Graham *et al*., 2005; Maines and McDaniel, 2000). This is because, in the literature, the statement of changes in stockholders' equity is considered less readable than performance-based statements. Assuming that previous research findings about outsiders' preferences are representative, in the presence of reporting discretion, impression management occurs when managers decide to opportunistically present comprehensive income and its components differently from these preferences. This may explain why, in June 2011, the FASB substantially contributed to harmonizing accounting standards, issuing "Accounting Standard Update No. 2011–05 Comprehensive Income (Topic 220): Presentation of Comprehensive Income." This update aimed to eliminate the possibility of disclosing comprehensive income in a statement of changes in stockholders' equity, thereby limiting its presentation to either a combined statement of net income and comprehensive income or a separate statement of comprehensive income, as in IAS/IFRS-compliant countries. This was another small step towards convergence (Henry, 2011) that became effective for fiscal years beginning after 15 December 2011 for public entities and 15 December 2012 for non-public entities.

Regarding the preferences for disclosing comprehensive income shown by the managers of the IAS/IFRS-compliant entities, Cimini (2013, p. 14) argues that impression management due to reporting discretion is not expressed, as in the USA, until the issuance of the above-mentioned accounting standard update. Actually, despite the relevant weight of OCI components, impression management cannot occur in annual reports issued according to the IFRS thanks to the choice of European standard setters to prevent the presentation of comprehensive income and its components in the less clear statement of changes in stockholders' equity. Based on this decision, we can infer that the International Accounting Standards Board (IASB) has limited opportunism and avoids impression management due to the exercise of reporting discretion, at least concerning the presentation of comprehensive income and its components.

4. Misrepresentation due to earnings management

In recent years, earnings management has been the topic of thousands of research papers by scholars interested in the detection of either so-called accrual accounting earnings management or real activities earnings management. In the first case, they detect the manipulation of those components of earnings that the literature generally refers to as called accruals. In the second case, scholars focus on real activities—including reductions in expenditures on research and development (IAS 38), price discounts to increase sales or overproduction to disclose the lower cost of goods sold—all of which, unlike the manipulation of accruals—have a direct impact on cash flow (Roychowdhury, 2006). In addition, scholars investigating accrual-accounting

earnings management have either focused on specific accruals or assessed abnormal accruals as a whole, with the latter being the primary interest of the present paper.

Like impression management, accrual-based earnings management has been widely investigated by academics. The criteria used in the EBSCO Host database identified 917 articles with the terms "earnings management" AND "accrual*" in the title of the abstract. Focusing on English-language products that passed the peer-review process, the number of products dropped to 826. The selection was then limited to the papers published in academic journals from 1985 to the end of 2024, further decreasing the number to 822. Using the function "Thesaurus Term," the number of articles in the misrepresentation field is 624. A screening of the abstracts illustrated that scholars have used several models over time to detect accrual-accounting earnings management. Using an evolutionary approach, the next section distinguishes three types of such models: those that might be called "first-generation" models, those employing ratio analysis and "second-generation" models.

4.1 First-generation models

Although Healy (1985) never used the term "earnings management" or "window dressing" to describe the attitude of insiders regarding the manipulation of accounting numbers, his paper is nonetheless considered a seminal work in the earnings management literature. Healy found that bonus schemes incentivize managers to select accounting procedures and accruals that maximize the value of their bonus awards (p. 106). As such, bonus schemes become a function of the reported earnings, which managers can manipulate to maximize the expected utility of their bonus awards. In detail, Healy decomposed earnings (E) into cash flows (CF) from operations and total accruals (TA) as follows:

$$E_{it} = CF_{it} + TA_{it}. \quad (1)$$

Healy (1985) assumed that the components of total accruals (TA_{it}) are non-discretionary accruals (NDA_{it}) and discretionary accruals (DA_{it}). Due to difficulties in observing and measuring them, he surmised that, by manipulating discretionary accruals, managers could affect the timing of reported earnings, causing discretionary accruals to sum to zero over the manager's employment period with the firm (p. 89).

The idea behind Healy's (1985) research is that insiders—after observing the reported cash flow from operations plus non-discretionary accruals—manipulate discretionary accruals to achieve their earnings targets (i.e. the payment of awards) if the (real) reported earnings do not exceed the required boundary. The main concern regarding Healy's framework is that he could not measure discretionary or non-discretionary accruals. Discretionary accruals are very difficult to measure; thus, over the period analyzed, they are assumed to amount to zero. However, Healy also considered non-discretionary accruals unobservable, leading him to assume total accruals to be a proxy of earnings management. Therefore, analyzing a sample of 94 entities listed in the 1980 Fortune Directory of the 250 largest US industrial corporations, Healy used a *t*-test for difference in means to compare the mean total accruals with several bonus plan parameters. By doing so, Healy found that managers are more likely to choose income-decreasing accruals when their bonus plans' upper or lower boundaries are binding and income-increasing accruals when these boundaries are not binding (p. 106). This result is quite interesting, but the limitations of his methodology have led to criticism from several scholars. The main concerns regarding Healy's methodology are the use of the mean total accruals as a proxy of earnings management, for the reasons explained above and the use of cash flow from operations as a proxy of cash flow plus non-discretionary accruals. To overcome these limitations, DeAngelo (1986) provided better qualification of total accruals than in the past by analyzing the management buyout operations and then introduced the abnormal accruals concept as a proxy to detect earnings management.

DeAngelo (1986) calculated total accruals similarly to Healy (1985) [1] and explained that total accruals are negative because of the non-monetary depreciation expenses that are the most important components of total accruals. In her research design, DeAngelo used a methodology that she considered roughly similar to the event study methodology to assess abnormal accruals. In this regard, she calculated abnormal accruals as the difference between the total accruals reported over the period in which earnings management is expected and the ones reported during the prior year, as follows:

$$(AC_1 - AC_0) = (DA_1 - DA_0) + (NDA_1 - NDA_0) \quad (2)$$

where $(AC_1 - AC_0)$ are abnormal accruals calculated as the difference between the current total accruals and the normal total accruals of the prior period; $(DA_1 - DA_0)$ are abnormal discretionary accruals; and $(NDA_1 - NDA_0)$ are abnormal non-discretionary accruals.

For DeAngelo (1986), in contrast to Healy (1985), the proxy used to detect earnings management is abnormal accruals, which are not simply total accruals but, rather, the first difference $(AC_1 - AC_0)$ of the reported total accruals at the end of different periods. Despite the improvement of this methodology over Healy's, however, the difficulties in assessing non-discretionary accruals remain. Thus, DeAngelo continued to assume that the average change in non-discretionary accruals ($NDA_1 - NDA_0$) is approximately zero, such that a significant average decrease in total accruals primarily reflects a significant average reduction in discretionary accruals ($DA_1 - DA_0$) (p. 409). After calculating abnormal accruals, DeAngelo tested whether the quarterly and annual change measures of abnormal accruals, earnings and cash flow were statistically different from zero. Using a parametric test, *t*-test and non-parametric Wilcoxon's (1945) signed-rank test, her findings did not validate the research hypothesis that managers carry out earnings management before management buyouts. DeAngelo (1986) was aware of the weakness in the adopted methodology and argued that "one possible explanation for both sets of insignificant results is that the accrual methodology is simply not powerful enough to detect systematic income manipulation" (p. 418).

At the end of the 1980s, the methodology used to detect earnings management radically changed, thanks to a more rigorous use of event studies. This method allowed scholars to measure the magnitude of discretionary accruals that, assumed to be a measure of abnormal accruals, have become a measure of earnings management.

McNichols and Wilson (1988) introduced this new methodology. Unlike Healy (1985) and DeAngelo (1986), they detected earnings management due to the manipulation of a specific accrual, which is a provision for bad debts, instead of total accruals. Adopting an event study statistical model similar to that introduced by Izan (1978) and then used by Binder (1998), McNichols and Wilson (1988) used the following equation to detect earnings management:

$$DA_t = \alpha + \beta PART_t + \sum_{K=1}^{K} X_{kt} + \varepsilon_{it} \quad (3)$$

where DA_t are discretionary accruals, deflated by lagged total assets; $PART_t$ is a dummy variable that is equal to 1 if the entity is observed over the event period, when scholars test the presence of earnings management and 0 over the estimation period when scholars assume that insiders did not carry out earnings management (or, more realistically, manipulated earnings without producing a break in the discretionary accruals' random walk); X_{kt} is a vector of several variables that influence discretionary accruals, deflated by lagged total assets; and ε_{it} is the error term.

They used an accrual estimation model that includes, between the explicative variables, a dummy that is equal to 1 if the vector of accounting amounts that are assumed to be associated with non-discretionary accruals are observed over the event period and 0 if accounting amounts are observed over the estimation period, with the assumption that insiders,

over the estimation period, have not carried out any manipulation that significantly affected the magnitude of the abnormal accruals' random walk. In the McNichols and Wilson (1988) model, the statistical significance of the coefficient of the PART variable (β) is fundamental to determining whether insiders have manipulated accounting amounts. That is, the regression coefficient β is used to test the presence of earnings management.

In this regard, two possibilities exist from a statistical point of view: the regression coefficient β is either statistically significant or not statistically significant. In the first case (i.e. β significant), two regression lines have different intercepts and the same slope. One interpolates the observations over the estimation period, whose intercept is α (PART = 0), and one interpolates the observations over the event period, whose intercept is α + β (PART = 1). The economic meaning of this first case is that, after the event, there is a structural break in the magnitude of discretionary accruals in comparison to the period before the event; that is, because of the event, insiders manipulated earnings enough to produce a structural break in the discretionary accruals' random walk. In the second case (i.e. β not significant), there is a single regression line whose intercept is α, interpolating observations over the estimation and event periods. In this case, the economic meaning is that discretionary accruals are statistically the same before and after the event.

This innovative approach adopted to detect earnings management suffers from several limitations that may bias the inference on the β regression coefficient. Dechow *et al.* (1995, 2012), describing the model of McNichols and Wilson (1988), argue that both measurement errors in discretionary accruals and the problem of omitted variables bias the regression coefficient, its standard errors and ultimately the statistical inference in tests for earnings management.

Due to the limitations of the dummy variable approach of Izan (1978), and following after the research of McNichols and Wilson (1988), scholars used the original market model to detect earnings management with regression models estimated both over the estimation period and the event period. One of these scholars is Jones (1991). Like McNichols and Wilson, she used the term earnings management to identify the attitude of insiders toward manipulating earnings. However, while the former used the discretionary components of a specific accrual (e.g. bad debts), the latter avoided distinctions by studying the aggregate accruals as a whole, similar to Healy (1985) and DeAngelo (1986).

Jones (1991) tested whether insiders of domestic producers who would like to benefit from import protection carried out earnings management by manipulating total accruals one year before and one year after the completion of the investigation by the US International Trade Commission (ITC). Using a sample of 23 firms, she used two methodologies to detect earnings management. The first is a replication of the one used by DeAngelo (1986), which led to the conclusion that accruals decreased, but this result does not allow for a firm conclusion that earnings management decreased because earnings and cash flow decreased. The second methodology required four steps and relied on a classic event study adopted by using a market model.

In the first step, Jones (1991) defined the event as the year when the ITC completed its import relief investigation. Next, she identified an event period (p) and an estimation period (t). Jones assumed that the event period was three years—that is, the years before, during and after the event. According to data availability, the estimation period ranges from 14 to 32 years before the event period. In the second step, Jones moved beyond Kaplan's (1985) statement that changes in working capital accounts and thus accruals, depend on the economic circumstances of the firm. Instead, Jones built a model to assess normal accruals during the estimation period, with total accruals as the dependent variable and the determinants of non-discretionary accruals as regressors.

$$\frac{\mathrm{TA}_{\mathrm{it}}}{\mathrm{A}_{\mathrm{it}-1}} = \alpha_{\mathrm{i}}\frac{1}{\mathrm{A}_{\mathrm{it}-1}} + \beta_{1\mathrm{i}}\frac{\Delta\mathrm{REV}_{\mathrm{it}}}{\mathrm{A}_{\mathrm{it}-1}} + \beta_{2\mathrm{i}}\frac{\mathrm{PPE}_{\mathrm{it}}}{\mathrm{A}_{\mathrm{it}-1}} + \varepsilon_{\mathrm{it}} \tag{4}$$

where $\mathrm{TA}_{\mathrm{it}}$ is the total accruals over the estimation period; $\Delta\mathrm{REV}_{\mathrm{it}}$ is the change in revenues from t–1 and t of the firm i that Jones (1991) considers non-discretionary; $\mathrm{PPE}_{\mathrm{it}}$ is the gross

property, plant and equipment in year t of the firm i that control the portion of total accruals related to non-discretionary depreciation expense; A_{it-1} is the lagged total asset of the firm i; and ε_{it} is the error term.

Jones (1991, pp. 211–212) justified the presence of the abovementioned variables as regressors of her accrual estimation model, stating that:

Revenues are used to control for the economic environment of the firm because they are an objective measure of the firms' operations before managers' manipulation, but they are not completely exogenous. Gross property, plant and equipment are included to control for the portion of total accruals related to non-discretionary depreciation expense. Gross property, plant and equipment are included in the expectations model rather than changes in this account because total depreciation expense (versus the change in depreciation expense) is included in the total accruals measure.

In the third step, Jones (1991) calculated abnormal accruals as the difference between the reported total accruals and the non-discretionary accruals predicted by using the regression coefficients estimated over the estimation period under the strong hypothesis of stationarity of non-discretionary accruals (Jones, 1991, p. 210). Jones assumed abnormal accruals to be discretionary accruals because, once she controlled for the effect of the economic circumstances on non-discretionary accruals, she could assume that the difference between current and prior-year accruals was due solely to changes in discretionary accruals.

Algebraically, this difference is calculated as follows:

$$\frac{DA_{ip}}{A_{ip-1}} = \frac{TA_{ip}}{A_{ip-1}} - \frac{NDA_{ip}}{A_{ip-1}} = \frac{TA_{ip}}{A_{ip-1}} - \left(a_i \frac{1}{A_{ip-1}} + b_{1i} \frac{\Delta REV_{ip}}{A_{ip-1}} + b_{2i} \frac{PPE_{ip}}{A_{ip-1}} \right) \tag{5}$$

where NDA_{ip} are the predicted values of a regression model; the accounting variables are those observed over the event period; and the regression parameters ($a_i\, b_{1i}\, b_{2i}$) are those estimated over the estimation period and are assumed to be constant over time due to the hypothesis of stationarity (i.e. non-discretionary accruals are assumed to be constant over time).

In the fourth step, Jones (1991) used the Wilcoxon (1945) signed-rank test to verify her research hypothesis that, during the import relief investigations by the ITC, accounting accruals were underestimated by insiders to maximize the benefit from increased import protection and/or the amount of protection granted. This non-parametric test found that discretionary accruals for year 0 are significantly less than zero (p-value <0.001), validating her research hypothesis.

Dechow *et al*. (1995) improved on the Jones (1991) model by proposing a model specification. After referencing all of the previous models used by scholars to detect earnings management, they proposed a model that they called a "modified Jones" model. In this model, with the continued assumption that the components of total accruals are non-discretionary accruals and discretionary accruals, non-discretionary accruals become a linear combination of a set of variables as shown in the following expression:

$$\frac{NDA_{ip}}{A_{ip-1}} = a_i \frac{1}{A_{ip-1}} + b_{1i} \frac{\Delta REV_{ip} - \Delta REC_{ip}}{A_{ip-1}} + b_{2i} \frac{PPE_{ip}}{A_{ip-1}} \tag{6}$$

where ΔREV_{ip} is the change in firm i revenues during the event period; ΔREC_{ip} is the change in firm i receivables during the event period; PPE_{ip} are the gross property, plant and equipment of firm i during the event period; and a_i, b_{1i}, b_{2i} are the OLS coefficients of the following regression that is estimated over the estimation period as follows:

$$\frac{TA_{it}}{A_{it-1}} = \alpha_i \frac{1}{A_{it-1}} + \beta_{1i} \frac{\Delta REV_{it}}{A_{it-1}} + \beta_{2i} \frac{PPE_{it}}{A_{it-1}} + \varepsilon \tag{7}$$

Like in the Jones (1991) model, there is a strong assumption that non-discretionary accruals are constant over time. The most significant difference regards the prediction of normal accruals over

the event period. In the modified Jones model, Dechow *et al.* (1995) used $\Delta REV_{it} - \Delta REC_{it}$ instead of ΔREV_{it}, explaining that the original model implicitly assumes that discretion is not exercised over revenue in either the estimation period or the event period. The modified version of the Jones model implicitly assumes that all changes in credit sales in the event period result from earnings management. This is based on the reasoning that it is easier to manage earnings by exercising discretion over the recognition of revenue on credit sales than it is to manage earnings by exercising discretion over the recognition of revenue on cash sales (Dechow *et al.*, 1995, p. 199).

Several scholars subsequently demonstrated that the modified version of the Jones (1991) model improved the original Jones model despite still being affected by several limitations. Dechow *et al.* (2012, p. 282) described the limitations of what we call "first-generation" models as follows:

(1) All of the models generate well-specified test statistics when applied to random samples;

(2) All models generate tests of low power for earnings management of economically plausible magnitudes (e.g. 1%–5% of total assets); and

(3) All models are misspecified when applied to samples of firms with extreme financial performance.

McNichols (2000) integrated the concerns listed above as follows:

(1) All the models require the event study approach, which assumes no earnings management during the estimation period and the need to test the hypothesis that earnings management has occurred over the event period, with non-discretionary accruals assumed to be constant over time; further, the event study approach is limited by the difficulty of identifying the two periods and the linearity assumption;

(2) All the models assess total accruals following the balance sheet approach, which, unlike, the cash flow statement approach, is neither really sensitive to the hypothesized manipulation nor readily controlled; and

(3) All the research protocols of the first-generation models are firm-specific and, unlike the industry-specific approach, require panel data of at least 10 years with the potential bias of losing observations due to missing data.

4.2 Ratio analysis

All the limitations above discussed led to a decline in the strand of literature seeking to detect earnings management using event studies, regression models and test statistics (i.e. the "first-generation" models). Due to their limitations, a new strand of literature began to assess earnings management using "second-generation" models. Before introducing and diffusing these models, however, scholars detected earnings management using ratios (Leuz *et al.*, 2003), with four indexes being commonly used.

The first index is calculated as follows:

$$R_1 = \frac{\sigma(E_{it})}{\sigma(CF_{it})} \tag{8}$$

where:

$\sigma(E_{it})$ is the standard deviation of earnings of entity i at the end of fiscal year t;

$\sigma(CF_{it})$ is the standard deviation of the cash flow of entity i at the end of fiscal year t.

This measure of earnings management provides evidence of how insiders have smoothed earnings over time. Income smoothing is a very popular strategy in earnings management

(Scott, 2006). The index decrease (increase) suggests that insiders increased (decreased) the earnings smoothing over time. The standard deviation of a variable is a measure of its variability with respect to the mean. The more the variable assumes values higher (lower) than the mean, the higher its variance is. Being equal to the standard deviation of the cash flow from operations, a decrease in the standard deviation of the operating earnings suggests that, over time, insiders could have reduced the variability of earnings. In other words, they could have smoothed the reported earnings to gain private benefits. On the other hand, an increase in the earnings' standard deviation suggests that earnings increased in volatility over time.

The second index is calculated as follows:

$$R_2 = \rho(TA_{it};\ CF_{it}) \tag{9}$$

where:

TA_{it} is the change of total accruals of entity i from period t and t–1;

CF_{it} is the cash flow from the operations of entity i from period t and t–1.

The insight of this index is that if the firm's cash flow is lower at the end of the period than at the beginning of the same period, insiders could compensate for this reduction by reporting inflated earnings to mislead the investors' perception of the real (negative) performance. As suggested by Dechow (1994), who calculated similar metrics using Pearson's correlation coefficient, accrual accounting leads to a low negative correlation; however, she also explained that if the absolute value of the correlation coefficient became too high (i.e. if the correlation became too negative), this could mean that insiders manipulated accruals in order to compensate for a reported variation in operating cash flow.

The third index is calculated as follows:

$$R_3 = \frac{abs(TA_{it})}{abs(CF_{it})} \tag{10}$$

where:

$abs(TA_{it})$ is the absolute value of total accruals of entity i at the end of fiscal year t;

$abs(CF_{it})$ is the absolute value of the cash flow of entity i at the end of fiscal year t.

The higher the index, the more EM exists, since total accruals are assumed to be a measure of EM. Therefore, the increase (decrease) of the median value of total accruals highlights the EM increase (decrease).

The fourth index is calculated as follows:

$$R_4 = \frac{SP_{it}}{SL_{it}} \tag{11}$$

where:

SP_{it} is the number of entities that disclose small profits at the end of the period t;

SL_{it} is the number of entities that disclose small losses at the end of the period t;

This measure of earnings management has been extensively used in the literature (Burgstahler and Dichev, 1997; Burgstahler and Eames, 2003; Degeorge *et al*., 1999; Hayn, 1995) and provides evidence regarding whether insiders conceal small losses and earnings declines in order to disclose a small positive net income. Considering that hiding small losses is simpler than hiding large ones, Burgstahler and Dichev (1997) and Leuz *et al*. (2003) evaluate whether small profits/small losses are present by assuming that if net earnings after taxes, scaled by

lagged total assets, are in the range (0, 0.01], the company discloses small profits. Conversely, if net earnings after taxes, scaled by lagged total assets, are in the range [– 0.01, 0), the company discloses small losses. If the index shows a statistically significant increase (decrease) over time, this indicates that the sample contains a number of firms that disclose small profits compared to the ones that disclose small losses, providing evidence of an increase (decrease) in earnings management.

4.3 Second-generation models

Moving to the "second-generation" models, McNichols (2002, p. 61), discussing Dechow and Dichev (2002), proposed a measure of the quality of (working capital) accruals and earnings based on the extent to which (working capital) accruals map into cash flow realizations in contemporaneous and adjacent periods. McNichols corrected Jones's (1991) model and introduced a new accruals estimation model to avoid one of the main concerns among scholars regarding the first-generation models—that is, their misspecification due to the presence of omitted (independent) variables (e.g. the so-called economic fundamentals) that are correlated with non-discretionary accruals' determinants. Assuming that discretionary accruals estimates correlate with earnings performance, McNichols (2002) proposed adding cash flow to the Jones (1991) model to reduce the extent to which the model omitted variables correlated with sample firms' economic performance fundamentals. In addition, overcoming another limitation of the first-generation models, McNichols (2002) used the cash flow statement approach [2] rather than the balance sheet approach to calculate total accruals. In estimating them, she only considered working capital accruals, arguing that doing so was consistent with Dechow and Dichev (2002) and recognizing that depreciations (excluded from the accrual computation) are related to long-term capital expenditure rather than working capital accruals (Allen *et al.*, 2010). Methodologically, McNichols (2002) compared the following three specifications: the Dechow and Dichev (2002) model, the Jones (1991) model and her model, which combines the former with the latter.

The specifications that she used are as follows:

$$\frac{\Delta WC_{it}}{A_{it-1}} = \alpha_1 + \alpha_2 \frac{CFO_{it-1}}{A_{it-1}} + \alpha_3 \frac{CFO_{it}}{A_{ict-1}} + \alpha_4 \frac{CFO_{it+1}}{A_{ict-1}} + e_{it} \quad (12)$$

$$\frac{\Delta WC_{it}}{A_{it-1}} = \alpha_1 + \alpha_2 \frac{\Delta SALES_{it}}{A_{it-1}} + \alpha_3 \frac{PPE_{it}}{A_{ict-1}} + e_{it} \quad (13)$$

$$\frac{\Delta WC_{it}}{A_{it-1}} = \alpha_1 + \alpha_2 \frac{CFO_{it-1}}{A_{it-1}} + \alpha_3 \frac{CFO_{it}}{A_{ict-1}} + \alpha_4 \frac{CFO_{it+1}}{A_{ict-1}} + \alpha_5 \frac{\Delta SALES_{it}}{A_{it-1}} + \alpha_6 \frac{PPE_{it}}{A_{ict-1}} + e_{it} \quad (14)$$

where ΔWC_{it} is the changes in working capital accounts as disclosed on the statement of cash from operations, measured as the increase in accounts receivable plus the increase in inventory plus the decrease in accounts payable and accrued liabilities plus the reduction of taxes accrued plus the increase (decrease) in other assets (liabilities); CFO_{it} is the cash from operations; $\Delta SALES_{it}$ is the change in sales; and PPE_{it} is property, plant and equipment.

By using a sample of non-financial firms over the period of 1988–1998, McNichols (2002) found that her model (equation (14) above) was the most correctly specified. Both the Jones (1991) model (equation (13)) and the Dechow and Dichev (2002) model (equation (12)) are not correctly specified, since their residuals—assumed by Dechow and Dichev (2002) to be a measure of earnings quality—are associated with lagged, current and future cash flow and also with the change in sales. By comparing the adjusted R^2 and the F-statistic of the three accrual estimation models presented above, McNichols (2002) found that equation (14), being less misspecified, provided the best discretionary accruals estimates. Moreover, she found not only that equation (14), compared to equations (12) and (13), has the highest explanatory power

(adjusted R^2) and *F*-statistic but also that the current operating cash flow has a regression coefficient and t-statistic higher than both the lagged and the future cash flow. For this reason, the current operating cash flow is considered among the explicative variables of her accrual estimation model, to reduce problems due to omitted variables.

Despite her new specification's contribution to the literature, McNichols (2002) knew that several other improvements still needed to be made to the various models. In the conclusion of her paper, she argued that a possible direction for future research would be to focus on specific accruals rather than aggregate accruals or total accruals as a whole. Notwithstanding this suggestion, scholars like Larcker and Richardson (2004) and Callao and Jarne (2010) continued to extensively investigate aggregate accruals with advanced multivariate analysis instead of studying particular accruals. Unlike McNichols (2002), they added cash flow to the modified Jones (1991) model rather than the prior Jones (1991) model. These scholars added, between regressors, the current operating cash flow from operations that controls for the current operating performance. They also included the book-to-market ratio as a proxy for the expected growth in the firm's operations. They did not also add the lagged and future cash flow due to McNichols's (2002) finding that the current operating cash flow has the highest regression coefficients and t-statistics.

The specification that they used is as follows:

$$\frac{TA_{it}}{A_{it-1}} = \alpha_1 \frac{1}{A_{it-1}} + \alpha_2 \frac{\Delta REV_{it} - \Delta REC_{it}}{A_{it-1}} + \alpha_3 \frac{PPE_{it}}{A_{it-1}} + \alpha_4 \frac{BM_{it}}{A_{it-1}} + \alpha_5 \frac{CFO_{it}}{A_{it-1}} + e_{it} \qquad (15)$$

where BM_{it} is the book-to-market ratio calculated by scaling the book value of common equity to the market value of common equity. The other variables have well-known meanings.

In their study, Callao and Jarne (2010) explained that the model was estimated for the period of 1997–2002, assuming that non-discretionary accruals are a function of year-to-year change in sales; property, plant and equipment; book-to-market ratio; and current operating cash flows. Having estimated the parameters for 1997–2002, they predicted discretionary accruals in the event period (2003–2006) after subtracting non-discretionary accruals from total accruals (p. 168). They used the prediction error to interpret the discretionary part of accruals. In their model, discretionary accruals are assumed to measure abnormal accruals, their proxy of earnings management. From a statistical point of view, they are the residuals of a regression model. Once discretionary accruals are calculated, analysis of the increase or decrease of misrepresentation due to earnings management requires the use of a test statistic (such as the parametric *t*-test or the non-parametric Wilcoxon's (1945) signed-rank test) that compares discretionary accruals estimated at each reporting date and checks whether the difference is statistically significant.

Other scholars have also introduced new models in an effort to overcome concerns about the first-generation models. Kothari *et al*. (2005) are among those who adopted a methodology to detect earnings management that overcomes most of the first-generation models' limitations. In their paper, they examined the specification and power of tests based on performance-matched discretionary accruals and compared them with tests using traditional discretionary accruals measures (e.g. Jones (1991) and modified Jones (1991) models) (Kothari *et al*., 2005, p. 163).

Kothari *et al*. (2005) used ROA to control for the entities' performance. In addition, they abandoned the firm-specific approach to assessing discretionary accruals and adopted the industry-specific procedure by using the so-called performance-matched methodology in line with Barber and Lyon (1997). Assuming ROA to be a performance measure (Prencipe, 2006), Kothari *et al*. (2005) explained that its inclusion between the explicative variables avoids misspecification due to the correlation between accruals and past and contemporaneous firms' performance. In this regard, Kothari *et al*. (p. 167) argued that the correlation between accruals and the performance of the entity is suggested by economic intuition and by extant models of accruals, earnings and cash flow, with empirical evidence provided by several scholars,

including Guay *et al*. (1996), Healy (1996), Dechow *et al*. (1998) and Barth *et al*. (2001). The inclusion of ROA among regressors allowed scholars to control for firms with extreme financial performance. Dechow *et al*. (1998) recognized that this variable is very useful for controlling the effect of performance on measured discretionary accruals, despite a large variety of variables that can be used for the same purpose.

The use of the performance-matched methodology avoids the shortcomings of using the event study protocol, which is not always accurate in detecting earnings management. Avoiding the use of an event study, Kothari *et al*. (2005) calculated discretionary accruals by estimating the residuals directly from their annual cross-sectional industry regression model. In doing so, they opened a new strand of literature examining this topic without using event studies that distinguish between an estimation and an event period. In this strand, the concept of discretionary accruals perfectly overlaps with that of residuals of the accrual estimation models, which continue to include, between regressors, variables that are assumed to be associated with non-discretionary accruals. Kothari *et al*. (p. 174) did not have a "pre-event" period, which helped them to overcome concerns regarding event studies' assumption that non-discretionary accruals are constant over time.

Other minor aspects of the Kothari *et al*. (2005) model have also other concerns regarding the first-generation models. For instance, the Kothari *et al*. methodology avoids the concern that all models generate well-specified test statistics when applied to random samples. In this regard, to randomize their sample, the scholars used a simulation analysis to identify 250 different simulated samples of 100 firms each. They drew samples without replacement from the entire sample or stratified subsets. These subsets included the lowest and highest quartiles of firms ranked on book-to-market, past sales growth, earnings-to-price, size and operating cash flow. To construct the subsets, they ranked all firm-year observations each year based on each partitioning characteristic (e.g. book-to-market or size, measured at the beginning of the year). Each year, they only retained the upper and lower quartiles of the sample. For each partitioning variable, they then pooled observations across all years to form two sub-samples: one based on pooling all data from the annual upper quartiles and another based on pooling all data from the annual lower quartiles (Kothari *et al*., 2005, p. 172).

In their empirical analysis, they collected data using COMPUSTAT for a sample of 123,000 firm-year observations over the period of 1962–1999. Kothari *et al*. (2005) required a large amount of data not only to guarantee the robustness of their findings but also because they used randomized samples to detect earnings management with both the Jones (1991) and the modified Jones (1991) models as well as with the performance matching approach, discovering that all of these are misspecified without any controls for performance.[3] With these models as a reference, Kothari *et al*. (2005) used and compared the following specifications to assess discretionary accruals:

$$\frac{TA_{it}}{A_{it-1}} = \alpha_0 + \alpha_1 \frac{1}{A_{it-1}} + \alpha_2 \frac{\Delta REV_{it}}{A_{it-1}} + \alpha_3 \frac{PPE_{it}}{A_{it-1}} + \alpha_4 ROA_{it} + e_{it} \quad (16)$$

$$\frac{TA_{it}}{A_{it-1}} = \alpha_0 + \alpha_1 \frac{1}{A_{it-1}} + \alpha_2 \frac{\Delta REV_{it} - \Delta REC_{it}}{A_{it-1}} + \alpha_3 \frac{PPE_{it}}{A_{it-1}} + \alpha_4 ROA_{it} + e_{it} \quad (17)$$

where ROA_{it} is the return on assets of firm i at the end of period t, calculating scaling earnings and total assets. The other variables have well-known meanings.

Since Kothari *et al*. (2005) did not use the event study approach, in comparison to previous studies, abnormal (discretionary) accruals are the residuals calculated after the estimation of equations (16) and (17). Another distinctive feature of the second-generation models is a constant term between the regression parameters. The authors justified this methodological choice by arguing that the constant term and deflating variables with the lagged total assets reduce heteroskedasticity. Moreover, they explained that the constant term allows controlling

for omitted size variables (Brown *et al*., 1999). In contrast, a model without the constant term produces biases in the test statistics used to compare the different models.

Ultimately, Kothari *et al*. (2005, p. 165) conceded that their methodology did not and could not solve all the problems arising from bad discretionary accruals models or from a researcher's failure to recognize the accrual management incentives that are unique to the research question being addressed. Some years later, Cheng *et al*. (2012) demonstrated that both the McNichols (2002) specification and the Kothari *et al*. (2005) model are useful for detecting earnings management. In detail, the best-performing model is the one in which operating cash flows are used as the controlling variable in firm-specific regressions (McNichols, 2002), followed by the one in which ROA is used as the control variable in industry-specific regressions (Kothari *et al*., 2005). However, despite the effectiveness of both specifications of the second-generation models, neither of the specifications controlled for reversals of accruals from one period to another. This is the purpose of Dechow *et al*. (2012) that criticized the performance-matching procedure adopted by Kothari *et al*. (2005) to mitigate misspecification [4]. To overcome this limitation, Dechow *et al*. (2012) introduced a new approach to detect earnings management, using a methodology similar to that of McNichols and Wilson (1988). Through the analysis of a sample of 209,530 firm-year observations between 1950 and 2009, Dechow *et al*. (2012) compared three different specifications corresponding to three different scenarios that involve the presence of reversals.

In the first scenario, Dechow *et al*. (2012) hypothesized that no reversals were present in their model; thus, the model specification that they adopted is the same as McNichols and Wilson (1988):

$$\mathrm{WC}_{it} = \alpha_1 + \alpha_2 \mathrm{PART}_{it} + \sum_k \mathrm{f}_k \mathrm{X}_{k,i,t} + \mathrm{e}_{it} \tag{18}$$

where WC_{it} are the non-cash working capital accruals, estimated similarly to Dechow and Dichev (2002), PART_{it} is a dummy variable that is equal to 1 when the researcher hypothesizes the presence of earnings management and 0 otherwise; and $\mathrm{X}_{k,i,t}$ are the economic fundamentals included in the accruals estimation model that can control for non-discretionary working capital accruals.

This specification does not consider the dummy variable PART_{it} and is representative of the different specifications of all the first-generation models (e.g. sales and property, plant and equipment for the Jones (1991) model) and second-generation models that do not control for reversals, with $X_{k,i,t}$ being the variables that scholars used to control for non-discretionary accruals.

In the second scenario, the scholars hypothesized that all the accrual-accounting earnings management reversed in the following period. Thus, they adopted the following model specification:

$$\mathrm{WC}_{it} = \alpha_1 + \alpha_2 \mathrm{PART}_{it} + \alpha_3 \mathrm{PARTR}_{it} + \sum_k \mathrm{f}_k \mathrm{X}_{k,i,t} + \mathrm{e}_{it} \tag{19}$$

where PARTR_{it} is a dummy variable that is equal to 1 when the researcher hypothesizes that earnings management reverses and 0 otherwise.

In this model, if the difference between the coefficients of PART_{it} and $\mathrm{PARTR}_{it,}$ is positive, this suggests an upward earnings management; in contrast, if the difference is negative, this indicates a downward earnings management. More concretely, in the first case ($a_2 - a_3 > 0$), manipulations of accruals during the period investigated will reverse in future periods not investigated by the researcher. In the second case ($a_2 - a_3 < 0$), reversals that refer to manipulations during previous periods not investigated by the researcher reversed during the period analyzed. If researchers could detect earnings management by analyzing the entire firm's life cycle, they would find the equivalence between a_2 and a_3, because all earnings management carried out in prior periods has to reverse in subsequent periods.

In the third scenario, Dechow *et al.* (2012) hypothesized that the accrual-accounting earnings management reverses in both the first and second years following the period during which the researcher assumes the presence of manipulations. This is the model specification adopted for the third scenario:

$$WC_{it} = \alpha_1 + \alpha_2 PART_{it} + \alpha_3 PARTP1_{it} + \alpha_4 PARTP2_{it} + \sum_k f_k X_{k,i,t} + e_{it} \quad (20)$$

where $PARTPn_{it}$ are the n sub-periods (e.g. in equation (16) $n = 1$ and 2) that comprise the hypothesized period during which earnings management reverses.

Aside from controlling for the reversal of earnings management, Dechow *et al.* (2012) concluded that all models generate well-specified test statistics when applied to random samples. In this regard, they used an iterative methodology based on simulations to evaluate the specifications of Healy (1985), Jones (1991), modified Jones (1991), Dechow and Dichew (2002) and McNichols (2002) models. The methodology used by Dechow *et al.* (2012, p. 275) reduced misspecification due to omitted variables and increased the power of the test statistics by around 40%.

5. Theoretical framework for future research

This literature analysis has shown that academics have adopted very different methodologies to detect impression management and earnings management. While the detection of impression management is primarily based on the use of descriptive statistics (e.g. univariate analysis), that of earnings management, with the limited exception of ratio analysis, is based on regression models (e.g. multivariate analysis). Whichever methodology is used, none of the analyzed papers have engaged with the hypothesis that these two forms of misrepresentation might be interchangeable or complementary in annual reports. To help fill this gap regarding the potential relationship between impression and earnings management, Figure 1 offers a matrix, which puts the degree of earnings management on the *x*-axis and the degree of impression management on the *y*-axis. This approach makes it possible to address RQ_3, by showing that earnings management and impression management can be substitutes for one another or complementary in annual reports.

The matrix has four quadrants (Q_i; i = 1–4). Q_1 refers to financial statements with no conflict of interest but rather an equilibrium between insiders' and outsiders' interests. In these

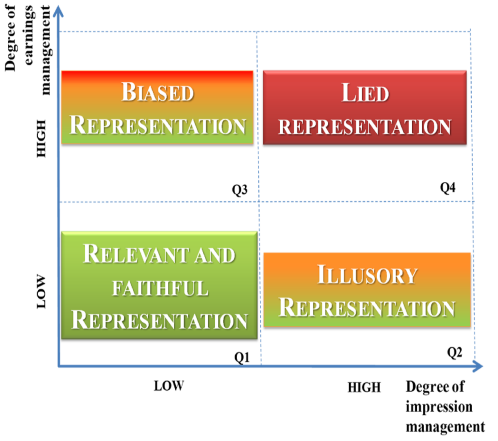

Figure 1. Impression and earnings management matrix. Source: Authors' own work

cases, insiders have not opportunistically manipulated the form (words) nor the substance (numbers) of their reports and outsiders can correctly perceive the entity's performance. This illustrates the case of "relevant and faithful representation."

Q_2 refers to circumstances in which the interests of insiders contrast with those of outsiders and insiders misrepresent financial information through reporting choices. In the case of "illusory representation," if the fundamental economic indicators (e.g. earnings, cash flow) worsen over time, insiders, instead of manipulating the substance of annual reports, opportunistically use their reporting choices to mask the decline. Illusory representation might also be used by managers to legitimate their conduct (Dowling and Pfeffer, 1975) through the use of reporting choices that reduce pressure from stakeholders (Deegan, 2002). Indeed, not even an auditor's report guarantees that financial information is not misrepresented, because the auditor's report may not be "impression management sensitive." The results of this paper might enable outsiders to recognize the possible instruments that insiders could use to carry out impression management. The same results might be helpful for standard setters in issuing new accounting standards to obstruct such forms of misrepresentation.

Q_3 addresses the case of "biased representation" in which only the substance (numbers) of the report has been manipulated by insiders, while the form (words) has not been managed at all. As in Q_2, outsiders in this case—especially nonprofessional investors—cannot correctly perceive the company's performance; even though the accounting numbers presented in the annual report are "wrong," outsiders accept them as "real." Nevertheless, this case differs from that of Q_2, as an auditor's report can suggest to outsiders that financial information is misrepresented and biased by opportunistic behaviors of insiders.

In Q_4, the degree of opportunism is far higher than in other clusters because, in addition to manipulating the substance of the report, reporting choices are also used to prevent a correct interpretation of the accounting numbers disclosed in the annual report. In this quadrant, unlike Q_2 and Q_3, earnings management and impression management are complementary; that is, they coexist. These are the annual reports in which several areas are affected by manipulations involving both accounting numbers (substance) and their disclosure (form). For these reports, an auditor's opinion should indicate to outsiders that the financial information is misrepresented in the numbers, but, as in Q_2, the auditor will not recognize the misrepresentation in words. Therefore, in the case of "lied representation," both the substance (numbers) and the form (words) have been manipulated, creating the greatest conflict of interest between insiders and outsiders. In the presence of such serious conflict between insiders and outsiders, financial statements either say nothing or lie.

In sum, taking into account the review of studies in which the two forms of misrepresentation have been investigated separately, we can conclude that the instruments and methodologies thus far used by scholars to detect impression and earnings management are not suitable for investigating possible relationships between these two forms of misrepresentation. Univariate analysis will likely remain the dominant methodology to investigate impression management, while multivariate analysis will continue to be adopted for earnings management. However, these methodologies would need to be integrated in order to control for the presence of both forms of misrepresentation in annual reports.

6. Concluding remarks and a call for future studies

This paper has presented a literature review identifying the instruments that have been used by scholars to help detect any form of misrepresentation of financial information in annual reports. The review of the literature has suggested that impression management might be detected when insiders opportunistically use brightly colored pictures, glosses and novelty formats; violate graph construction principles; or exercise reporting discretion (e.g. RQ_1). Meanwhile, for earnings management, the review results have identified three types of methodologies: "first-generation" models, ratio analysis and "second-generation" models (e.g. RQ_2). The studies cited in Section 2 focused on impression management, thus implicitly

assuming an absence of earnings management behavior; meanwhile, those cited in Section 3 did the opposite, focusing on earnings management and thus implicitly assuming that reporting choices were not used to misrepresent financial information opportunistically.

This paper's presentation of a new theoretical framework contributes to the literature in at least two ways. First, the new framework makes it possible to synthesize the hundreds of papers on misrepresentation that scholars have published in academic journals in recent decades (Bansal, 2023). Second, the framework makes a call for future research by bringing attention to the possibility that impression and earnings management might be interchangeable or complementary in annual reports. Only when these phenomena are investigated together, rather than only separately, will it be possible to position future studies on misrepresentation in one of the four quadrants of the matrix presented in this paper. Moreover, because the literature review has shown that the two forms of misrepresentation have only been investigated separately thus far, it appears that the instruments and methodologies that have been used by scholars to detect impression and earnings management are not suitable to investigate possible relationships between these two forms of misrepresentation (RQ_3).

By introducing new methodologies that can control for the relationship between the two forms of misrepresentation, academics and practitioners can help to fill this gap while investigating emerging themes, such as the relationship between environmental, social and governance (ESG) disclosures and managers' likelihood of misrepresenting financial information. In addition to those cases in which both the ESG disclosure and the accounting numbers are either both correct or both biased (Q_1 vs. Q_4), scholars might detect if a disclosure is opportunistically misrepresented to legitimate the manager's conduct (Dowling and Pfeffer, 1975; Deegan, 2002) through illusory representation (e.g. Q_2), or if the form (text) of the disclosure is accurate but the substance (numerical data) has been altered to mislead the investors' perception of the company's performance by hiding earnings management practices (e.g. Q_3).

Future studies might also investigate cross-country variations—focusing, for instance, on the ability of country-level investor protection or firm-level corporate governance quality to affect the relationship between the two forms of misrepresentation.

Finally, future studies could also focus on underexplored contexts. For example, the reviewed literature did not provide solid evidence on misrepresentation in public administration or in the banking industries, both of which are characterized by peculiarities and business models that might require significant adaptation of the instruments and methodologies used by scholars to detect misrepresentation in the more deeply investigated non-financial entities.

Notes

1. Because his research design is directed to the investigation of management buyouts of public stockholders, with respect to Healy (1985), DeAngelo (1986) calculated total accruals also considering the earnings impact of the equity method of accounting for intercorporate investments.
2. Hribar and Collins (2002) observed that the balance sheet approach relies on the presumed distinction between changes in balance sheet working capital accounts and the accrual component of revenues and expenses on the income statement. However, there are also so-called non-articulation events (e.g. reclassifications, acquisitions, divestitures, accounting changes and foreign currency translations) that appear in the balance sheet but do not flow through the income statement. Consequently, the cash flow statement approach reduces the possibility that a portion of the changes in balance sheet working capital accounts, due to non-operating events, would erroneously be shown as accruals under the balance sheet approach.
3. To test the different model specifications, Kothari *et al*. (2005, p. 172) used the rejection rate of a *t*-test whose null hypothesis is zero discretionary accruals.
4. The scepticism of Dechow *et al*. (2012) is due to the substantial reduction in test power; moreover, the effectiveness of the matching procedure requires the use of the relevant omitted variable.

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