

**EARNINGS MANAGEMENT DURING THE COVID-19 CRISIS: EVIDENCE FROM THE BRAZILIAN AND AMERICAN CAPITAL MARKETS**

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## 1. INTRODUCTION

The main purpose of this research is to evaluate the earnings management practices during the COVID-19 pandemic in the Brazilian and American capital markets. Although previous studies have demonstrated that earnings management occurs with greater frequency during economic crises (e.g., Choi et al., 2011; Filip & Raffournier, 2014; Flores et al., 2016), they do not indicate whether economic trends can affect this tendency during moments of crisis or whether this effect has a distinct magnitude in emerging economies as compared to developed ones.

In comparing earnings management practices in developed and developing countries, without adding the effects of economic crises, Lin and Wu (2014) point out that more developed markets, in general, have a larger number of regulatory mechanisms, greater disclosure, and greater creditor and shareholder rights. The results of Yu's study (2008) reveals that companies that are subjected to greater market monitoring experience a lower level of earnings management, highlighting another positive point for developed markets in relation to the quality of accounting information in these countries, given that there is greater coverage by analysts and shareholders.

Likewise, previous that which have sought to evaluate the effects of economic crises on accounting information have analyzed financial crises that have indirectly affected real economy firms (e.g., Achim et al., 2010; Barth & Landsman, 2010; Buga et al., 2010; Davis-Friday & Gordon, 2005; Hang & Wang, 1998; Herrmann et al., 2008; Johl et al., 2007; Masood et al., 2010; Scorte et al., 2009), but have not analyzed an event like the COVID-19 pandemic, which has directly affected companies through restrictions imposed on them to combat the spread of the pandemic.

An additional attribute that differentiates this study from others that have evaluated potential earnings management practices during periods of crisis stems from the fact that the COVID-19 pandemic has affected nations in a reasonably similar manner, causing the closing of commerce and restrictions on industrial production, culminating in a reduction in economic activities in terms of supply and demand. Given this scenario, there have been demands for governmental authorities to formulate stimulus plans so that their citizens can remain at home and companies can remain solvent during this period. These facts can be understood as the creation of a quasi-natural event, in the style of studies by Campbell et al. (2010) and Lennox and Pittman (2011), or even as an exogenous shock for accounting choices made by publicly traded firms, as noted by Bertomeu et al. (201).

However, if the effects of the COVID-19 crisis can be interpreted as an exogenous shock of similar proportions to the global economic system, the fact remains that different countries have not faced equal economic conditions and trajectories in combating this shock. According to *The Economist* (2020) "emerging economies will feel the impact of the pandemic for longer than advanced economies," especially due to their history of social inequality and poverty and the lower margins with which emerging governments must work in terms of making fiscal policy adjustments.

Topcu and Gulal (2020) emphasize that despite the COVID-19 pandemic having gained more accentuated contours since March 2020, the fact remains that we know little about how it has empirically affected companies in emerging markets.

The preceding context could be surmised for the two countries on which this study focuses, because while the American Congress approved more than 3 trillion dollars to battle the COVID-19 pandemic (Zurcher, 2021), Brazilian authorities approved an economic stimulus package of

roughly 150 billion dollars to deal with the adversity caused by COVID-19 in Brazil (KPMG, 2020). Naturally, the Brazilian economy is considerably smaller than the American economy. However, according to data from the World Health Organization (WHO) (2021), the United States and Brazil respectively lead the world in terms of the largest number of infections and deaths caused by this disease, even during this paper's development.

However, if Brazil and the United States are close in terms of the COVID-19 numbers based on WHO data (2021), they are markedly different if we compare their economic tracks during the past few years. According to information from the Organisation for Economic Co-operation and Development (OECD) (2021), the Brazilian economy shrank 1.07% in terms of gross domestic product (GDP) from 2015 to 2020, while the American economy grew 1.47%, indicating opposite economic paths.

To develop our analyses, we used two proxies to detect potential earnings management practices. The first proxy consists of the discretionary accruals (DAC) obtained from the Modified Jones Model in accordance with Dechow et al. (1995), with adjustments suggested by Kothari et al. (2005). The use of this proxy was realized in order to capture the synthesis of the accounting choices made by these companies based on the aggregate accrual model.

The second proxy employed was the size of variation in the property, plant, and equipment (PPE) accounts. The main reason for the use of this second metric is associated with the search for earnings management practices through real activities—real earnings management (e.g., Brown et al., 2015; Huang & Sung, 2017; Kim et al., 2012; McGuire et al., 2012; Roychowdhury, 2006)—as well as the fact that some associations, such as the International Federation of Accountants (Gould & Arnold, 2020), for example, warn of the need to evaluate the risk of misalignments with the operational and financial conditions of these companies that may be using the COVID-19 crisis to lower their share prices that, even before this event, indicated that the values invested in them may not be recovered.

The findings suggest that publicly traded Brazilian firms may engage in more earnings management than do American firms. These results remained consistent when both mentioned proxies were used as well as when more robust approaches, such as sample matching through Propensity Score Matching (PSM) as part of a Difference in Differences approach (DiD), were applied.

We can consider these findings as an indication that companies in emerging markets, buffeted by the sinking paths of economic development indicators (e.g., GDP), are more likely to practice earnings management during the COVID-19 crisis than are organizations based in more established economies.

Within the context of the principal conclusions of this study, we can deduce that accounting information is used as micro-data of public interest in the formulation of economic and social policies, above all, during periods of crisis (e.g., Deninson & Williams, 2015; Grave & Radcliffe, 2004; Trombetta, 2019). However, governmental authorities need to understand that data from financial statements during periods of economic anomalies may be biased so that organizations achieve goals of particular interest to them such as securing financing with lower interest rates based on governmental subsidies (Crouzet & Tourre, 2020), by posting losses from underperforming investments that should have been recorded in previous years (Laskaridou & Athanasios, 2013).

In addition, it has been reported that accounting information is used as a base for decision making involving the allocation of resources (e.g., Arkelof, 1970; Bruns, 1968; Burchell et al., 1980; Christensen, 1976; Drăgulescu et al., 2014; Jensen & Meckling, 1976; Wilson, 1953).

However, during moments of economic restrictions, users of this accounting information must be careful with these numbers, given that they may contain procedural choices that are not strictly aligned with the interests of the quality of accounting information. Similarly, auditors, analysts, and standard setters, among other business gatekeepers (Coffee, 2006), should pay increased attention so that accounting procedures are not used to provide a veneer of misleading information under cover of the COVID-19 crisis.

## **2. LITERATURE REVIEW AND DEVELOPMENT OF THE HYPOTHESES**

### **2.1. Accounting Information and Economic Crises**

During economic crises, it is usual for capital markets researchers, standard setters, and regulators to rely on financial statements to evaluate whether it is possible to forecast business cycles (Davis-Friday & Gordon, 2005).

Within this context, the development of studies that seek to evaluate the qualitative statistics of accounting information during periods of crisis reveal an important academic concern related to the utility of financial statements during economic recessions. In the following paragraphs, we will review a few examples of studies on accounting during crises.

Musvoto (2011) evaluated the impact of the financial crisis of 2008 on accounting evaluations and the development of financial theory. Massod et al. (2010) discussed the importance of accounting regulations in terms of the financial industry, seeking to prevent problems such as those observed during the Subprime crisis. Buga et al. (2010) analyzed the importance of external auditing to provide economic stability during the American mortgage crisis.

Barth and Landsman (2010), meanwhile, discussed how financial statements could have helped in the identification of the beginning of the financial crisis in the United States in 2008, especially how accounting through the concept of fair value could have improved the informational value of financial reports. Scorte et al. (2009) discussed the importance of financial statements during economic crises highlighting the relevance of accounting regulation to increase informational evidence. Herrmann et al. (2008) studied the impact of the Asian crisis in 1997 on the conservative approach of corporate financial statements. Davis-Friday and Gordon (2005) investigated the informational power of accounting statements during the Mexican crisis of 1994.

### **2.2. Earnings Management and Economic Crises**

If, on the one hand, it is possible to perceive a proliferation of accounting research that seeks to analyze how the information provided by financial reports affects and is affected by times of economic crisis, on the other hand, there is no widespread literature mapping how financial crises can create opportunities for earnings management practices, despite moments of this nature being able to accentuate the incentives for this type of management (Watts & Zimmerman, 1978). Some scarce examples of such literature are listed below.

Eng et al. (2019) highlighted results that indicate how earnings management differs between American and Chinese family businesses. In the United States, earnings management through real activities occurs to a greater extent post-crisis while in China the results are the opposite.

Flores et al. (2016) point out that, during periods of financial crisis in Brazil and the United States, companies are motivated to practice earnings management. However, they do not indicate in which country this occurs to a greater extent, or whether earnings management practices follow the same direction or head in opposing ones (e.g., Big Bath Accounting, Taking a Bath Accounting, Income Smoothing).

Although Filipe and Raffournier (2014) expected that earnings management would be greater during periods of economic stress, they found contrary results based on a database for

European countries, which signaled a decrease in earnings management during years of financial crisis.

Han and Wang (1998) verified the use of earnings management in the American petroleum industry in an attempt to reduce taxes during the Gulf War. To a certain extent, this result is similar to the findings of Jones (1991), which revealed that American firms managed their numbers during the oil crisis in the beginning of the 1990s in order to avoid becoming the object of tax sanctions.

Even though there is some signaling that less earnings management is expected of publicly traded companies in more developed capital markets, above all, due to the robustness of corporate governance mechanisms (Biddle et al., 2009; Lin & Wu, 2014; Yu, 2008), there are no studies that evaluate the propensity for earnings management during periods of economic crisis, focusing on countries with distinct economic paths such as Brazil and the United States.

### **2.3. COVID-19 Crisis and Emerging Economies**

Since the 1990s, Brazil and the United States have traversed different economic paths. The distinctness of their paths has become more accentuated over the past decade. From 2009 to 2019 while American GDP per capita grew at an average 2% annually, Brazil's GDP decreased and only returned to a value close to zero in 2018 and 2019, according to *World Economic Outlook* (2021).

There were a few significant events that occurred between 2011 and 2020 as Brazil's economic results diverged markedly from that of the United States. This period witnessed the end of the commodities boom, the impeachment of President Dilma, a severe domestic crisis in 2015 and 2016, and the COVID-19 pandemic in 2020. As a result, Brazil slipped eight positions in the world ranking of GDP per capita, with its lead over other emerging countries diminishing significantly, according to *World Economic Outlook* (2021).

The inconsistency demonstrated by the Brazilian economy suggests greater exposure to the effects of the COVID-19 pandemic. A large portion of the measures adopted to face this crisis, such as social distancing, impose restrictions on the full functioning of business relationships (Altig et al., 2020), which have further complicated issues facing the emerging Brazilian economy.

Djankov and Panizza (2020) point out that emerging countries have been more exposed to economic losses from the COVID-19 crisis because they have: (i) a history of high levels of poverty and inequality; (ii) many informal workers and employees in small companies; (iii) a smaller range of work that can be performed at home; (iv) limited capacity for tax policy adjustments; and (v) precarious access to international financial markets.

Cakmaklı et al. (2020) emphasized that companies based in emerging economies usually require a larger scale of resources from international creditors and investors, as one of the common traits of such economies is the low rate of domestic savings, which forces organizations to finance their projects using resources from foreign investors. Therefore, with greater limits on access to foreign capital, firms based in emerging countries tend to be more affected than their counterparts in developed economies.

Haroon and Rizvi (2020) found that emerging capital markets suffered severe reductions in liquidity as the number of COVID-19 cases increased, indicating that the liquidity crisis may be worse in emerging countries due to the historical high risk of making such investments.

### **2.4. Earnings Management during the COVID-19 Crisis in Emerging Economies**

As mentioned earlier, the accounting choices made by companies based in emerging economies may be more susceptible to earnings management during the COVID-19 period due to the economies' structural fragilities. These fragilities can be analyzed based on the motivations for earnings management established by Watts and Zimmerman (1978).

Since governments have less margin for tax adjustments in emerging economies (Djankov

& Panizza, 2020), companies tend to manage their earnings to avoid higher taxes during the COVID-19 pandemic (e.g., Amidu et al., 2019; Desai & Dharmapala, 2009; Iskandar, 2005; Jones, 1991; Kałdońsk & Jewartowski, 2021). This behavior has to do with earnings management linked to political costs based on Watts and Zimmerman's (1978) hypothesis.

Because companies based in underdeveloped countries are more dependent on resources from foreign investors (Cakmaklı et al., 2020), there will be a greater incentive for earnings management in order to avoid breaking contractual covenants during the COVID-19 crisis (e.g., Chan & Gao, 2014; Duh et al., 2015; Liang, 2004; Pappas et al., 2019). This may be explained by contractual reasons for earnings management, which correspond with Watts and Zimmerman's formulation (1978).

Thus, it is possible to establish that economic crises heighten the potential for earnings management motives as established by Watts and Zimmerman (1978). In addition, the COVID-19 crisis may particularly accentuate the incentives for earnings management in emerging economies. Following the prior literature, we propose the first hypothesis:

**Hypothesis 1** – Earnings management practices through discretionary accruals have been more accentuated in Brazil than in the United States during the COVID-19 crisis.

It is noteworthy that the COVID-19 pandemic has represented a deviation from the expectations for the Brazilian economy. According to Reuters (2019), at the end of 2019, a return of growth was expected because there had been few occasions that had united such favorable conditions for the implementation of the administrative, policy and tax reforms necessary to attract foreign investment in Brazil.

This frustrating scenario caused by COVID-19 may have generated at least unexpected accounting implications for some Brazilian firms, more specifically in terms of the impairment test foreseen by IAS 36, to which Brazilian companies have been subjected since 2010 due to the convergence towards International Financial Reporting Standards (IFRS).

Flores et al. (2016) stated that the Brazilian economy has a markedly cyclical feature, a statement corroborated by the recent trend in GDP per capita. Thus, it is possible that some companies during the recent Brazilian crisis have in not posted losses from impairment because of their expectations of economic growth beginning in 2020. These expectations, however, have been postponed due to the COVID-19 pandemic.

Laskaridou and Athanasios (2013) analyzed the use of subjectivity inherent in performing the impairment test in terms of earnings management in Greece's emerging economy. They concluded that losses due to impairment signaled a lack of a temporal link in terms of their concretization, which suggests that these losses should have been registered before they in fact were.

Thus, it is possible to conjecture that Brazilian companies that seek to post losses due to underperforming shares, considering the impairment test features, may feel compelled to make these entries because they cannot foresee conditions to postpone these losses from 2020. In addition, they may seek to take advantage of the justification of the COVID-19 economic crisis to derecognize bad assets, which should have been registered as expenses in the years leading up to the pandemic. Given this, we present our second hypothesis:

**Hypothesis 2** – Decreases in PPE have been greater in publicly traded Brazilian companies than in American companies during the COVID-19 crisis.

This second hypothesis can be better understood from the perspective of the "taking a bath" accounting concept. According to Scott (2015), it is an earnings management practice that occurs

more frequently during periods of stress or a reorganization of society. Because companies have to report losses under specific conditions, managers opt to present the greatest loss possible so that future quarters do not give back part of the accruals that led to these current losses, thereby increasing their chances of further realizing profits.

Considering this concept (Scott, 2015), interpreted in light of Roychowdhury's definition (2006) of real earnings management, it is possible to suppose that organizations have greater incentives to post underperforming losses during the COVID-19 crisis so that the reversion of these impairments in the future will give them a greater chance of reporting profits.

### 3. METHODOLOGY

#### 3.1. Sample

The databases used in this study consist of information from Thomson Reuters. Initially we collected information on publicly traded Brazilian and American companies from 1998 to 2020. We then eliminated companies that did not present consistent data for at least three years. In addition, in order to mitigate biases due to outliers, all the variables were winsorized using percentages of 0.5 and 99.5.

According to Topcu and Gulal (2020), the main economic effects of the COVID-19 pandemic were first witnessed in March 2020. Therefore, we used quarterly information to capture the implications of the COVID-19 crisis in terms of earnings management by our sample companies.

Giroux (2011) notes that quarterly information in archival research should be used when a given event cannot be captured through the use of annual data. That being said, the final sample considers information based on 22,244 and 139,856 firm observations in Brazil and the United States, respectively.

#### 3.2. Measurement of Accrual-Based Earnings Management

The proxy used to detect earnings management based on DAC was obtained by using the Modified Jones Model (MJM) (Dechow et al, 1995), with adjustments suggested by Kothari et al. (2005), as represented in Equation 1.

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

where:  $TA_{i,t}$  represents the total accruals of firm  $i$  in quarter  $t$ , deflated by total assets in quarter  $t-1$ ;  $A_{i,t-1}$  represents the total assets of firm  $i$  in quarter  $t-1$ , and  $INVAT_{i,t}$ ,  $\Delta REVC_{i,t}$ ,  $PPE_{i,t}$ , and  $ROA_{i,t}$ , represent, respectively (for firm  $i$  in quarter  $t$ ), the inverse of total assets, the difference between the changes in gross revenue and the changes in accounts receivable ( $\Delta REV_{i,t} - \Delta REC_{i,t}$ ), fixed assets, and the return on assets ( $ROA$  as a proxy for the firm performance control variable).

For the Brazilian sample we inserted an additional control variable  $IFRS_{i,t}$  due to Brazil's partial adoption of the IFRS in 2008 and its full adoption in 2010. This variable is a time dummy variable that is equal to zero for the quarters before 2008 and equal to one for the quarters beginning in 2008 to mitigate the effects caused by the Brazilian market's adoption of international financial reporting norms.

Beginning with the base assumption that the MJM explanatory variables are less susceptible to earnings management, we concluded that the appropriate error term for Equation 1 represents DAC as measures of earnings management.

$$DAC_{i,t} \equiv \varepsilon_{i,t}. \quad (2)$$

The MJM has been used as a reference for a wide array of studies on earnings management practices (e.g., Ali et al., 2011; Bartov et al., 2001; Chen et al., 2020; Choi et al., 2011; Dechow et

al., 2003; Dechow et al., 1995; Espahbodi et al., 2021; Flores et al., 2016; Garel et al., 2020; Jones et al., 2008; Jones, 1991; Li et al., 2020; McNichols, 2000; Othman & Zegal, 2006).

### 3.3. Measurement of Real Earnings Management

In accordance with previous studies (e.g., Brown et al., 2015; Enomoto, 2015; Galdi et al., 2020; Huan & Sun, 2017; Roychowdhury, 2006), we employed a second proxy to detect earnings management through real activities associated with unusual losses for fixed assets (PPE).

According to Roychowdhury (2006), real earnings management is typically characterized by atypical movements within the context of individual accounting positions, such as, impairments of fixed assets. Thus, the metric for real earnings management in this study was established by variations in PPE, as illustrated below.

$$\Delta PPE_{i,t} = \frac{PPE_{i,t}}{A_{i,t-1}} - \frac{PPE_{i,t-1}}{A_{i,t-1}} \quad (3)$$

where  $\Delta PPE_{i,t}$  refers to the variation in balances for PPE accounts between each quarter for each company, weighted by total outdated assets per quarter.

### 3.4. Models

Because the COVID-19 pandemic has been an exogenous shock that has affected these countries in a reasonably similar manner, we opted to tests based on the DiD approach, in accordance with the recommendations of Goodman-Bacon (2018).

Bertomeu et al. (2016) claimed that the application of DiD modeling is considered a quasi-natural experimental method—particularly appropriate for situations characterized by an event that is exogenous to the company shares that have been affected. Various studies have concluded that the COVID-19 pandemic represents an external shock to companies (e.g. Azarova & Mier, 2021; Song et al., 2020; Venetoklis, 2021).

Following an approach similar to the DiD models employed by Campbell et al. (2010) and Lennox and Pittman (2011), which are specifically oriented toward accounting aspects, we developed Equations (4) and (5) wherein the variable  $Treatment_{i,t}$  is a dummy that receives a value of zero for American firms and one for Brazilian firms, as displayed below.

$$DAC_{i,t} = \beta_0 + \beta_1 Treatment_{i,t} + \beta_2 Covid19_{i,t} + \beta_3 Treatment_{i,t} * Covid19_{i,t} + \beta_4 IFRS_{i,t} + \beta_5 ROA_{i,t} + \beta_6 BTM_{i,t} + \beta_7 Crises_{i,t} + \beta_8 \sum_{j=1}^n Industry_j + \beta_9 \sum_{k=1}^n Quarters_k + \omega_{i,t}. \quad (4)$$

$$\Delta PPE_{i,t} = \beta_0 + \beta_1 Treatment_{i,t} + \beta_2 Covid19_{i,t} + \beta_3 Treatment_{i,t} * Covid19_{i,t} + \beta_4 IFRS_{i,t} + \beta_5 ROA_{i,t} + \beta_6 BTM_{i,t} + \beta_7 Crises_{i,t} + \beta_8 \sum_{j=1}^n Industry_j + \beta_9 \sum_{k=1}^n Quarters_k + \omega_{i,t}. \quad (5)$$

The term  $Treatment_{i,t} * Covid19_{i,t}$  denotes the interaction between two different dummies for the DiD model.  $Treatment_{i,t}$  is equal to zero for American firms and one for Brazilian firms, while  $Covid19_{i,t}$  is equal to zero before March 2020 and one after.

In order to give the DiD models greater reliability, we used the PSM technique following Rosenbaum and Rubin's instructions (1983). The utilization of PSM in studies that involve accounting subjects has been gaining ground in recent years (e.g. Fleischer et al., 2017; Franzen & Weißenberger, 2018; Hong et al., 2018), especially in terms of creating subsamples with common characteristics between the treatment and control groups.

The parameters for deciding which companies were treated with PSM and which were not included industry (the two-digit Standard Industrial Classification code), size, whose proxy was

the natural logarithm of total assets with a caliper of 0.001 for the neighbor approach, and quarter, taking into consideration the quarter ending in March 2020—the period when the economic crisis caused by COVID-19 came to the fore (Topcu & Gulal, 2020).

## **4. RESULTS**

### **4.1. Descriptive Statistics**

Analyzing the greatest variations of aggregated DAC in a combined fashion, it is possible to conjecture that the Subprime crisis between 2007 and 2009 can explain the greatest variations in these two series. While GDP decreased sharply during this period, earnings management as measured by DAC increased substantially.

In the Brazilian capital markets, the proxies of earnings management occur simultaneously with a drop in GDP. The increase in DAC occurred from 2005 to 2010 during the American mortgage crisis. However, in the case of the American capital markets, the discretionary accumulations suffered a notable variation during this five-year window after the advent of the Subprime crisis. In other words, this drop of roughly 4% occurred between 2005 and 2010, and the variation of 0.10 in terms of DAC occurred between 2010 and 2015.

The analysis of the term DAC and the variation in GDP for Brazil and the United States highlights the economic differences between the two countries as noted by previous authors (e.g. Cakmaklı et al., 2020; Djankov & Panizza, 2020; Haroon & Rizvi, 2020). The Brazilian economy is substantially smaller and more concentrated than the US economy. Due to less concentrated industries, there may be incentives to anticipate potential earnings management practices in periods of crises to further specific company interests, such as, posting losses due to underperforming shares and access to more favorable financing, among other possibilities proposed in the earnings management literature (e.g. Scott, 2015; Watts & Zimmerman, 1978).

Otherwise, considering the fact that the United States possesses one of the largest capital markets in the world, the coverage of analysts and other gatekeepers, which is particularly accentuated during periods of economic crises, may reduce opportunities to use heterodox accounting procedures because companies are under greater scrutiny and subject to greater criticism by users of financial statements. Yu (2008) presented revealed that companies covered by a larger number of capital market analysts are less likely to employ management earnings practices.

In relation to the proxy for real earnings management  $\Delta PPE_{i,t}$ , it may be concluded that its positive variation is more accentuated during periods in which GDP is growing. This result is predictable to a certain extent because improvements in the economic scenario cause companies to invest more in PPE assets (Rensburg et al., 2020).

Our Pearson/Spearman correlation analysis signals that the earnings management proxies indicate statistically significant associations with the explanatory variable *Covid19*, which represents the period after March 2020. This result can be considered a statistically significant association rather than a variation, given that the DAC as well as the PPE variations display distinctly different behavior during the year 2020 as compared to previous quarters. These results are in keeping with our initial conjectures.

Other variables reveal statistical significance in a wide variety of associated results, corroborating the relevance of their use in terms of controlling for sample differences in the same way as previous studies involving the analysis of earnings management practices in specific situations of economic crises have done (e.g. Eng et al., 2019; Flores et al., 2016; Othman & Zegal, 2006). Descriptive statistics and correlation matrix were suppressed because of paper size restrictions.

## 4.2. Models results

Table 1 presents the results obtained by regressions using Equations 4 and 5, which are based on DiD models, comparing Brazilian and American firms simultaneously but considering all of the sample observations (unmatched sample).

The results obtained through the *Treatment\*COVID-19* interaction variable unmistakably indicate that earnings management practices in terms of the aggregate accrual proxy (DAC) as well as the earnings management construct based on real activities ( $\Delta PPE$ ), occur in a statistically more accentuated manner in the Brazilian than in the American capital markets. This result also held true when we used all of the applicable control variables (IFRS, ROA, BTM, Crises, Fixed effects).

Seeking to ensure greater robustness for the findings of the DiD models, we matched the data samples based on PSM according to the criteria employed by Hong et al. (2018), Weißenberger (2018), and Fleischer et al. (2017). The objective we sought was to maintain the variation between the dependent terms *DAC* and  $\Delta PPE$  while reducing the statistical significance between the covariates considering the treatment group made up of Brazilian firms vis-à-vis the control group made up of American firms.

After applying PSM in the statistical manner described by Rosenbaum and Rubin (1983), we verified that the averages of the dependent variables remained statistically different between the samples, as expressed in the means test presented in Table 2. By analyzing the means of the passive covariates (ROA, BTM and Crises), we could deduce that the means in Brazil and the United States became statistically equal after performing the PSM procedure (Table 3).

Considering that the results after the application of PSM were satisfactory in the terms expected by Rosenbaum and Rubin (1983), we repeated regressions of the models denoted by Equations 6 and 7. However, this time, we considered the matched samples between the Brazilian and American firm-observations, resulting in a matched sample with a total of 36,902 firm-observations (Table 3).

Once again, through these two proxies, the results indicate that earnings management practices occur in a more pronounced form in the Brazilian than in the American capital markets (the main result of Column 3 is 0.053\*\* for DAC, and for Column 6 it is -0.152\*\*\* for  $\Delta PPE$ ). These results corroborate the previous explanations, indicating that Hypotheses 1 and 2 have not been rejected.

**Table 1.** Difference in Differences (DiD) – Unmatched Sample

Variables	(1) DAC	(2) DAC	(3) DAC	(4) $\Delta$ PPE	(5) $\Delta$ PPE	(6) $\Delta$ PPE
Treatment	0.053*** (0.004)	0.059*** (0.004)	0.046*** (0.005)	0.110*** (0.010)	0.117*** (0.010)	0.101*** (0.006)
COVID-19	0.005 (0.005)	0.005 (0.005)	0.020*** (0.006)	0.103*** (0.005)	0.103*** (0.005)	0.128*** (0.003)
Treatment*COVID-19	<b>0.056***</b> <b>(0.016)</b>	<b>0.051***</b> <b>(0.016)</b>	<b>0.041**</b> <b>(0.018)</b>	<b>-0.059***</b> <b>(0.014)</b>	<b>-0.065***</b> <b>(0.014)</b>	<b>-0.075***</b> <b>(0.009)</b>
IFRS		-0.032*** (0.005)	-0.039*** (0.006)		-0.040*** (0.005)	-0.039*** (0.003)
ROA			0.001** (0.005)			0.001*** (0.00002)
BTM			0.000 (0.000)			-0.000 (0.000)
Crises			-0.002 (0.002)			<b>-0.011***</b> <b>(0.001)</b>
Observations	162,100	162,100	162,100	162,100	162,100	162,100
R-squared	0.004	0.004	0.003	0.019	0.019	0.051
Constant	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes

Note: All of the regressions were estimated by OLS using a panel data perspective for the complete sample presented in Table 1. The standard errors appear in parentheses: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 2** – Means Test after the PSM Procedure

Countries	Average of DAC	Average of $\Delta$ PPE	Average of ROA	Average of BTM
USA	-0.018	-0.053	5.2	72.4
Brazil	-0.139	-0.405	7.8	2.29
P-values	0.00***	0.00***	0.133	0.892

Note: \*\*\* Means significant at a level of 1%.

The visual inspections of the dependent and covariate variables resulting from the implementation of PSM are depicted in Figure 1.

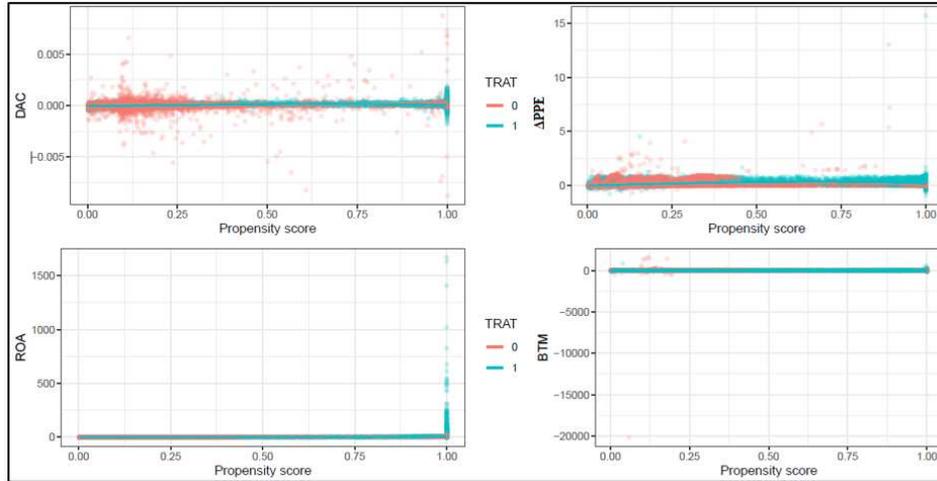


Figure 1: Visual inspections of the dependent and covariate variables after PSM implementation.

**Table 3.** Difference in Differences (DiD) – Matched Sample

Variables	(1) DAC	(2) DAC	(3) DAC	(4) $\Delta$ PPPE	(5) $\Delta$ PPPE	(6) $\Delta$ PPPE
Treatment	0.022*** (0.003)	0.103*** (0.014)	0.101*** (0.012)	0.066*** (0.003)	0.074*** (0.003)	0.065*** (0.004)
COVID-19	0.098*** (0.014)	0.097*** (0.012)	0.064*** (0.013)	0.091*** (0.003)	0.117*** (0.013)	0.047*** (0.010)
Treatment*COVID-19	<b>0.031***</b> <b>(0.012)</b>	<b>0.049***</b> <b>(0.012)</b>	<b>0.053**</b> <b>(0.014)</b>	<b>-0.124***</b> <b>(0.013)</b>	<b>-0.148***</b> <b>(0.011)</b>	<b>-0.152***</b> <b>(0.016)</b>
IFRS		-0.027*** (0.005)	-0.038*** (0.005)		-0.045*** (0.005)	-0.035*** (0.004)
ROA			-0.001 (0.001)			0.003*** (0.005)
BTM			0.005 (0.001)			0.001 (0.005)
Crise			<b>-0.041***</b> <b>(0.006)</b>			<b>-0.033***</b> <b>(0.005)</b>
Observations	36,902	36,902	36,902	36,902	36,902	36,902
R-squared	0.007	0.007	0.008	0.143	0.145	0.086
Constant	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes

Note: All of the regressions were estimated by OLS using a panel data perspective for the complete sample presented in Table 1. Standard errors in parentheses:  
 \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

## 5. FINAL THOUGHTS

COVID-19 is not only a public health crisis, but also an economic crisis without precedent. It has profoundly affected social relationships, consequently also affecting the way in which companies produce and generate employment and income all over the world (Pak et al., 2020).

In this sense, it is possible to identify relevant economic differences during this crisis compared to other times of economic instability, given that the pandemic has little in common with other crises of the 20th and 21st centuries (Foroni et al., 2021). Given this scenario, this study sought to analyze whether the COVID-19 pandemic has stimulated earnings management by publicly traded firms in Brazil and the United States.

A comparative analysis of these two countries is opportune to the extent that this crisis constitutes an exogenous shock for both these economies, making it possible to compare the incentives for earnings management at times of crisis in economic environments with differing growth trajectories and capital market configurations.

The results suggest that earnings management practices that employ accruals have varied in a statistically different manner during the COVID-19 economic crisis compared to other quarters and crises. Similar results support the hypothesis that earnings management occurs in an abnormal manner as does the proxy that examines this type of manipulation through real activities.

In terms of the analysis comparing these practices in Brazil and the United States, the following findings are interesting: (i) Brazil tends to manage earnings through accruals more during crises compared to the United States; (ii) during the COVID-19 crisis, earnings management has been greater than during other crises in Brazil and the United States; (iii) earnings management through real activities seems to be a more common practice in crises in Brazil than in the United States, even though specifically during the COVID-19 crisis, American companies have also reported abnormal levels of PPE losses in relation to other quarters.

These findings are robust and have proved to be consistent when examined using various statistical tests, including those that use the DiD approach and PSM, considering the matched samples. In this sense, the economic implications of this study are important, given that the findings indicate that companies based in emerging economies, such as Brazil, buffeted by decreasing economic development indicators (e.g. GDP), have a greater propensity to practice earnings management during crises, such as the COVID-19 pandemic, than do organizations based in developed economies.

Therefore, it is salutary to emphasize that governmental authorities need to understand that the information in financial statements during periods of economic anomalies may be biased due to companies deciding to take care of their own interests by seeking lower cost financing through government subsidies (Crouzet & Tourre, 2020), as well as posting losses in underperforming investments that should have been reported in previous quarters (Laskaridou & Athanasios, 2013).

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