BRAZILIAN INFLATION RATE: IF I DO NOT SEE IT IN ACCOUNTING, DOES IT NOT EXIST?

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Abstract

The inflation control with the Brazilian economic plan called "*Plano Real*", removed the application of the models to recognize in financial statements the inflationary effects. To demonstrate the destructive effect even with "low" inflation, we used the official inflation adjusting model in order to recognize the inflationary effects in the financial statements of 53 Brazilian public-firms (2010 to 2016). The differences between the nominal and adjusted values are quite significant: 59% and 44% to return on assets and on equity, respectively, 88% in the cost of debt and 117% in the level of financial leverage. Moreover, 75% of firms are paying more dividends.

1. Introduction

The main purpose of this study was to analyze some consequences of the inflationary effects on the analyses and financial decisions of companies. Specifically, this research sought to study, in an original way, how failing to recognize inflation impacts financial statements. This was done through the analysis of four indicators: (i) profitability (of the assets and of the net equity), (ii) the degree of financial leverage, (iii) the cost of debt, and (iv) the dividend capability of companies in the Brazilian market. Additionally, this study produced a simulation that shows that the effects of inflation would have been relevant even if the inflation rates had been significantly lower than they have been.

In Accounting literature, discussions on the importance of recognizing inflationary effects in financial reports are not recent, and works dealing with the subject have been published in as far back as the 1960s (Souza, 2016). In Brazil, due to the hyperinflation, this literature is very broad, being worthy of special note the works of Iudícibus (1966), Martins (1979), Famá (1980), Santos (1980), Szuster (1980), Santos (1993, 2001), Gabriel (2004), Ambrozini (2006), Ayres, Mignoni, Silva and Szuster (2011), Melo, Martins, Nagai, Amaral and Salotti (2012), Santos and Ribeiro (2014), Souza (2016), and Malvessi (2017). However, were not found works handling the degree of financial leverage and the cost of debt, and have found only a few works that dealt with the distribution of profits / dividends payments.

Even if most of these studies are not recent, they provide evidence that even when dealing with inflation rates that might consider "low," the effects of inflation on financial reports still being relevant, especially since they affect the actual indebtedness of companies and their actual profitability.

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These effects may influence not only the management's investment decisions, performance measurement, and visualization of tax rates, but also the decision-making of stakeholders. Furthermore, they also foster comparability problems regarding accounting information (Gabriel, 2004; Ambrozini, 2006; Melo et al., 2012; Souza, 2016).

The development of the Plano Real in 1994 significantly reduced the Brazilian inflation rate. Seeking to clear the inflationary self-memory, the Federal Government issued the Law 9.249/95, which forbids the use of models for the recognition of inflationary effects in financial demonstrations as of January 1st, 1996 (Martins, Santos & Gelbcke, 2003; Santos & Ribeiro, 2014).

However, while Plano Real has indeed suppressed hyperinflation, inflation still exists (Ambrozini, 2006; Melo et al., 2012; Santos & Ribeiro, 2014) and provokes accounting distortions; even with reduced rates, its impact on the values reported by companies is still matter (Gabriel, 2004, Melo et al., 2012, Souza, 2016). Malvessi (2017, p. 34) mentions that failing to recognize these effects can result in "erroneous and misleading managerial decisions".

Likewise, what exactly is a "high" or "low" inflation rate is relative. Brazil's current inflation rate is considered low because of the contrast with the rates from the hyperinflation period. Of course, there will be no surprise if we compare Brazil's 2016 inflation rate of 6,29% with a negative one, like that of Switzerland, of -0,43% in the same year. But consider that the United States, Germany, Spain, Denmark, Portugal, and other countries had rates below 2%; France, Japan, Saudi Arabia, and others had less than 1%; and the average rate of the BRICS, excluding Brazil (Russia, India, China, and South Africa), is little more than 3%. It is worth noting that Brazil is indeed heading towards a level of inflation closer to the latter, but even that still distorts the results considerably. Additionally, the accrued effect of past inflation rates still distorts current depreciations, amortizations, the real gains and losses from the sales of "old" assets, etc.

In this context, the research question posed in this study is: "*Does failure to recognize the effects of inflation on accounting indicators result in consequences for the analyses and decisions of companies and third parties?"* To answer the proposed research question, this study sought to achieve four goals.

Primarily, this study sought to measure the impact that failure to recognize the effects of inflation has on the main indicators of profitability: Return on Asset (ROA) and Return on Equity (ROE). These indicators, so often used in financial reports, are doubly affected by inflation rates since monetary restatement affects not only the net income, but also the values of the net equity and asset (Gabriel, 2004; Martins, Gelbcke, Santos e Iudícibus, 2013; Melo et al., 2012). Therefore, the first theoretical conjecture proposed by this study is: *The nominal*

profitability indicators differ significantly from the indicators that would be calculated based on corrected financial statements.

The second goal of this study was to pioneer an analysis on the impact of not applying monetary restatement to the calculation of the cost of debt of companies. The previous studies that dealt with inflationary effects on financial statements did not evaluate the impacts of this variable. Given that the cost of debt is a relevant factor for companies' financing decisions and for its financers' decisions, we consider that this is an important particularity of our research. We have observed that in environments that have inflation, the cost of the financial expense (or of the financial income) listed in the income statement includes a portion that corresponds to the simple correction of the initial balance of the interest-bearing liabilities (or of the financial asset) for the inflation; therefore, it does not represent the value of the costs (or income) in real terms. Thus, the second theoretical conjecture posed by this study is: *The real cost of debt is significantly inferior to its nominal cost.*

Subsequently, this research had as its third goal the analysis of the impact of inflationary effects on the Degree of Financial Leverage (DFL) of companies, a variable that seeks to measure the influence of indebtedness on the return on equity. Considering the expected effects on the mentioned indicators of profitability and cost of debt, the third theoretical conjecture we developed is: *The Degree of Financial Leverage calculated based on nominal book values is significantly different than it would be if it was calculated based on corrected financial statements.*

Finally, the fourth goal of this study was to analyze the effects of inflation on the profit distribution capacity of companies. This is a very relevant aspect in financial decisions even while it has not been researched very extensively until now; thus, this research seeks to fill that gap in the literature. In situations in which the dividends policy is to distribute a large part of the profits of that period, if that value is higher than the real income value calculated after taking inflation into account, the company may be decapitalizing itself, that is, not only distributing profits, but also returning part of the invested capital under the guise of dividends. Conversely, if the inflation-corrected income is larger than the nominal income, that constitutes evidence that the company is retaining part of the profit that could have been distributed. Therefore, the fourth theoretical conjecture posed in this work is: *The sum of the distributions of dividends and the Interest on Equity (IOE) based on the nominal income is significantly different from the value that would be distributed based on the real income of the company.*

Most of the previous studies focus on the effects of inflation observed on the values of statements and on rentability (Gabriel, 2004; Melo et al., 2012; Souza, 2016; Malvessi, 2017). Few were the works found that analyzed how inflation affects profit distribution capacity (Ambrozini, 2006) and no work was found dealing with the impact of inflation on the cost of

debt. Thus, the fact that our study deals with these two themes is considered our main differential.

This work also contributes to literature by analyzing the impacts of inflation on companies of different sectors, including financial firms, which are so often excluded from studies.

The discussion of this theme is relevant and timely, for it serves as a warning not only to the users of accounting information, but also to regulatory agents. Even in periods of low inflation, the possible consequences for the disclosed accounting information are expressive. An accrued inflation of 291% from December of 1995 to June of 2017 should not be ignored by accounting, especially when dealing with investments on long-term assets.

This research is share in five sections. After this introduction, the second section discusses the conceptual aspects of the monetary restatement models. The third and fourth sections present the methodology and the results, respectively. Finally, the fifth section contains our final considerations.

2. Contextualization of Inflation Accounting in Brazil

2.1 Monetary Restatement of Balance sheets (MRB)

The MRB inflation accounting model was introduced to the Brazilian framework specifically by article 185 of the Federal Law 6.404/76. The goal of this inclusion was the measuring of assets and their permutations based on a single currency with the same purchasing power, thus avoiding undervaluing the company's assets because of the hyperinflation that was being experienced in that time and the effects of that inflation on the result (Martins et al., 2013). This is clearly explained in the exposition of the motivations of the law, as transcribed and translated below:

> "Section I
> (...) Over the course of the inflationary process, fixing the social capital on nominal currency, without correction, leads to the gradual reduction of its value (in terms of currency with the same purchasing power) and to the distribution of capital to the shareholders in the form of dividends, even while the Criminal Code conceptualizes that distribution as a crime.
>
> (...) Article 185 prescribes the monetary restatement of permanent assets and of net equity <u>with the goal of eliminating from financial statements the distortions introduced by the modification of the purchasing power of the national currency</u>, which serves as a standard to evaluate the elements of the assets and liabilities.
>
> (...) The accounting offsets from the correction of permanent assets and of net equity will be compensated in special account, the balance of which shall be computed in the income statement; if resulting in debt, it shall remove from this result the portion corresponding to the fictitious profits, which only preserve the integrity of the net equity; if resulting in credit, it translates

inflationary gains earned on account of the capitalization structure of the company, which are a part of the accrued profits (article 186, § 3°)."

During the first period, which lasted from 1978 to 1985, only the MRB was used. This model was relatively simple: it (i) adjusted the permanent assets, with the result of that correction being recognized in the income statement as an "income"; and it (ii) restated the monetary value of the Net Equity, with the result of *that* correction also being recognized in the statement, but as an "expense". The net effect of (i) and (ii) was recognized in a specific calculation called "Monetary Restatement of Balance Sheets." The first ever inflation accounting model was developed in England and in that original model the correction of the permanent assets was an integral part of the nominal income. The latter consisted in the sum of all other incomes and expenses plus this value derived from the correction of the permanent assets; once the nominal income was determined, the correction of the net equity was subtracted from it in order to evidence the portion of the nominal income that could be considered the real income. This model is much clearer, and its non-use in Brazil greatly hindered a real comprehension of the MRB (Martins, 2004).

2.2 Integral Monetary Correction (1986 to 1995)

As the current legal model was way excessively simple for such a high inflation, the conclusion was that other calculations also had to be corrected, and some had to be adjusted to present value via the nominal addition of the inflationary effects (customers and suppliers especially – adjustment to present value wasn't common practice). More importantly, the fact that incomes and liabilities were still listed by their nominal values in the result, as well as the (supposedly) confusing MRB calculation, didn't help comprehension of the company's performance so much as they fostered additional confusion (Martins, 2004). The sum of the sale incomes of January and December, with inflation, for example, of "only" 100% in that period, was a capital example of the distortions caused by the inadequacy of the current model.

Thus, it became necessary to elaborate income statements with every calculation in the result being expressed via a currency with the purchasing power of a single date, with the same for the calculations of the balance sheet, even those relative to the previous balance (since in the legal model past numbers continued to be published under their original values). Via Instruction no. 64/87, the CVM – *Comissão de Valores Mobiliários,* or Brazil's Securities and Exchange Commission – introduced a new inflation accounting model, the Integral Monetary Restatement (IMR), for use in the financial statements of publicly held companies (Santos & Ribeiro, 2014).

In the IMR model, all the calculations in the balance sheet were separated into monetary and non-monetary items, with the former, which represented money or assets which

could be paid off into money, fully exposed to inflationary effects, being adjusted to present value; and the actualizations of these values, when present (exchange variation, monetary variation, etc.), in the form of financial incomes or financial expenses, were adjusted to reflect only their actual increases or decreases (Martins et al., 2013). Thus, the IMR model recognizes the effects of inflation in each and every item of a financial statement. The model has spread to privately held companies, in some cases by force of regulatory agents, and in others through voluntary adoption.

The results of the two models only differ in the presence or lack of adjustments to present value and corrections to inventory and other non-monetary items outside the Permanent Assets at the time. In the absence of these factors, the two models produced equal results.

The IMR was mandatory until December 1995, when there was an attempt to "erase" inflationary memory (Martins et al., 2013). From 1986 to 1995 the values corrected by the MRB and by the IMR coexisted in parallel. To Martins et al. (2013, p.799), with the extinction of monetary restatement, "all the advancements fostered by Law 6.404/76 were discarded by Law 9.249.". That the effects of inflation, however, evidently *cannot* be extinguished by force of law.

3. Methodology

3.1 Determination of the Sample

The sample of this research comprised every publicly held company listed in Exame Magazine's Melhores & Maiores database which presented the traits necessary for the realization of this study. For non-financial firms, the sampling was only of those companies which published financial statements throughout the entirety of the studied period (2010 to 2016) and which presented individual and consolidated statements.

In 2010 the International Financial Reporting Standards (IFRS) were adopted in Brazil. Initially, companies could opt to recognize their fixed assets by their fair value using the concept of *deemed cost*. To avoid distortions that may arise from this remeasurement, we opted to only analyze the statements from 2010 onwards. Following that, an enormous simplification was introduced, which was the assumption of null inflation between the beginning of 1996 and the beginning of 2010 (the average annual inflation being 7,95%). This affects absolute values but doesn't truly hinder the conclusions.

In this study, we also opted to analyze the info of the consolidated income statements. In the individual statements, the interests in subsidiaries are not consolidated, being thus present in the calculations of investments; this would make it necessary to first correct the financial statements of the investees, which would be unfeasible. For that same reason, in the

consolidated statements we have not applied monetary restatement to the investments on affiliated and joint ventures.

Based on these boundaries, we arrived at a sample of 82 companies from 21 different sectors. The next criterion we used was to keep only the sectors represented by more than five companies so that sector research could be made. Thus, the sampling of this research settled at 53 companies from eight different sectors, one of them being financial firms. For this sector we chose the five largest banks according to the ranking of the 2016 Best & Biggest database. Table 1 presents the list of companies sampled.

Table 1: Companies sampled in the research

Sector	Name	Sector	Name
Automotive	Marcopolo	Steel and Metal	Ferbasa
Automotive	Mahle Metal Leve	Steel and Metal	Metisa
Automotive	Iochpe-Maxion	Steel and Metal	Tupy
Automotive	Fras-Le	Steel and Metal	Usiminas
Automotive	Randon	Steel and Metal	Magnesita
Automotive	Embraer	Textiles	Cedro têxtil
Consumer Goods	M. Dias Branco	Textiles	Grendene
Consumer Goods	Natura	Textiles	Cia Hering
Consumer Goods	Bombril	Textiles	Alpargatas
Consumer Goods	Nadir Figueiredo	Textiles	Guararapes Confecções
Consumer Goods	Cremer	Textiles	Döhler
Consumer Goods	JBS	Textiles	Cia Industrial Cataguases
Consumer Goods	BRF	Textiles	Karsten
Energy	Petrobrás	Retail	Marisa
Energy	Eletrobrás	Retail	Magazine Luiza
Energy	CTEEP	Retail	Via Varejo
Energy	Biosev	Retail	Americanas
Energy	São Martinho	Retail	CBD
Energy	TAESA	Retail	Renner
Services	Localiza	Retail	Arezzo
Services	Valid Soluções	Retail	B2W
Services	Cielo	Financial	Itaú Unibanco
Services	Multiplan	Financial	Bradesco
Services	BM&FBovespa	Financial	Banco do Brasil
Services	CVC	Financial	Santander
Steel and Metal	CSN	Financial	Caixa
Steel and Metal	Paranapanema		

For each company in the sample, we collected data from the Balance Sheet, from the Income Statement and the Variations in Net Equity, and from the Explanatory Notes (fixed assets, intangible assets, loans, fundings, and financial outcome). Some data, like the value

of the interest expenses, wasn't present in that database, so we also collected some data manually from the financial statements of each company in each period.

3.2 Determination of the Variables

The effects of inflation were analyzed using the Monetary Restatement of Balance sheets (MRB) model due to this method being more easily applicable. For that, we performed the restatement of both the Fixed and Intangible Assets (including Goodwill) and the Net Equity. The inflation rate adopted in this study was the Extended Consumer Price Index – IPCA, or *Índice de Preços ao Consumidor Amplo* – the Brazilian government's "official" rate.

The initial balances from 2010 of the gross fixed assets and gross intangible assets were corrected integrally in 2010 by that year's inflation rate. The variations that occurred during that period were adjusted for the average inflation of the period. The values of accrued depreciation and accrued amortization were calculated via the proportionality of the depreciated/amortized value of the nominal balances. This proportionality was applied on the gross corrected value in order to obtain the corrected accrued depreciation/amortization. The effect of this correction was recognized as "correction of permanent assets." The same process was applied to the following years, adding up the effects over the pertinent assets since the beginning of 2010.

Following that same logic, the initial balance of the net equity was corrected by the inflation of the period. The variations of the period, except for the result of the period, were restated according to the average inflation rate of the period. The sum of the effects of the corrections on the initial balance and on the variations was recognized as "correction of the net equity." The value of the final corrected Net Equity was obtained by the difference between the total corrected assets (corrected permanent assets plus the remaining assets that were not corrected) and the value of the liabilities (which, by virtue of being mostly monetary items, were not corrected).

To calculate the value of the corrected result of the period, we added the nominal value to the result of the MRB calculation, which corresponds to the difference between the values of the "correction of permanent assets" and of the "correction of net equity." Table 2 presents a synthesis of the calculations of the variables mentioned above.

Table 2: Verification of the effects of inflation on assets, net equity and statement of the period

Variable	Description	Equation

imob_gross_c	Corrected gross fixed assets	(fixed_init x year_inflation) + (variations_imob x average_inflation)
depreciation_c	Corrected accrued depreciation	(nominal_accrued_depreciation / nominal_gross_imob) x imob_gross_c
intang_gross_c	Corrected gross intangible assets	(intang_init x inflation_year) + (variations_intang x average_inflation)
amortization_c	Corrected accrued amortization	(accrued_nominal_amortization / nominal_gross_intang) x intang_gross_c
perm_assets_c	Corrected permanent assets	(imob_gross_c - depreciation_c) + (intang_gross_c - amortization_c)
MRB	Result of MRB	Correction of fixed assets– Correction of net equity
result_c	Corrected result of period	result_nominal + MRB
assets_c	Total corrected assets	perm_assets_c + other_assets
NE_c	Corrected net equity	assets_c – other_liabilities

(1) *fixed_init* is the initial balance of the fixed assets.
(2) *intang_init* is the initial balance of the intangible assets.

Based on the values calculated as per Table 2, we were able to obtain the corrected ROA and ROE indicators. *ROE_c* was obtained by dividing the corrected result of the period (*result_c*) by the initial corrected net equity (*NE_c*) actualized for the inflation of the period. *ROA_c* was calculated by dividing the corrected operational outcome of the period – which is the corrected result of the period (*result_c*) minus the real interest rates – by the initial total corrected assets (*assets_c*), also actualized by the inflation of the period. We adopted a rate of 34% for the income and social contribution taxes in order to ascertain the tax economy as a result of the interest expenses. Considering the nature of the operations of the financial firms, the *ROA_c* of the five banks in our sample was calculated using the corrected net result of the period (*result_c*) and not the operational result.

In order to ascertain the effects of inflation on the cost of debt, we adjusted the initial balance of loans according to the annual inflation rate. The variations on the balance of loans were actualized by the average inflation rate. The real value of the interest expenses was obtained by finding the difference between the value recognized in the income statement of the period and the value of the corrections of the initial balance and of the variations of the loan account. The real cost of debt was calculated by dividing the real net interest of the income tax and the corrected value of the loans and fundings. The cost of debt was calculated only for the non-financial companies.

Having calculated the real cost of debt and the inflation-corrected ROA and ROE, we also calculated the corrected DFL using the following formula: *[ROA + (ROA - Cost of debt) x Liabilities / Net equity] / ROA* (Martins, 1979). "Liabilities" corresponds to the total of loans and fundings (interest-bearing liabilities). For the DFL, the ROA was adjusted so that "assets" referred to only to those assets that were acquired via interest-bearing liabilities: loans and fundings plus net equity. In other words, the liabilities that did not bear interests were

subtracted from the assets; after all, what we seek to compare is what is earned (or lost) when the assets produce rates higher (or lower) than the cost of debt.

In order to analyze how inflation impacts profit distribution capacity, we evaluated whether the sampled companies were distributing larger or smaller profits than would be distributed based on the corrected income statement of the period. We calculated the proportion of the income statement that was distributed to the shareholders (dividends or Interest On Equity), with that same percentile then being applied to the corrected income statement of the period. The difference between the dividends and IOE distributed based on the nominal result and those distributed based on the adjusted result indicates whether that distribution was excessive or insufficient.

There's a caveat to be made about that analysis. The dividends are calculated based on the individual result of the company since it is not possible to use the consolidated information. However, the Melhores & Maiores database calculates the monetary restatement of the individual information of each company since 1995; Therefore, specifically for the analysis of the impact of inflation on the profit distribution capacity of the companies, we collected the following information from the Melhores & Maiores database: (i) nominal net result of the period, (ii) dividends and IOE distributed in the period, and (iii) net corrected result of the period.

4. Analysis of the Results

Before analyzing the effects of inflation on each of the previously mentioned variables (ROA, ROE, cost of debt, DFL, and profit distribution capacity), it is interesting to observe that 38% of the non-financial companies in our sample did not opt to use the deemed cost as of the initial adoption of the IFRS in Brazil. The sectors in which it saw most use were Automobile Industry and Textiles (respectively, 67% and 63%). For those companies, we expect the value of the permanent assets listed to have little to no distortion when compared to those of the rest of the sample.

Table 3 demonstrates the impacts of inflation on the values of the permanent assets (fixed and intangible), of the net equity, and of the result of the period for the year of 2016. The reason why only that year's values are being presented is because logically the percentile differences for 2010 are low; after all, they only contemplate the inflation of that year, disregarding the previously accrued inflation that influences the permanent assets and the net equity. Subsequently, these percentiles accumulate due to the – also accumulated – effects of inflation on the permanent assets and the consequences of that on the net equity. Thus, the analysis of the values of 2016 allows for a clearer evaluation of the accumulated effects of inflation.

We highlight that the value of the percentile differences *(Dif(%) Abs)* represents the absolute value of the average of the differences. Since inflation can produce positive impacts as well as negative, the simple averaging of the differences would not adequately represent the effects of inflation once it would eliminate positive and negative values. For example: company A has a nominal income of $100 and real income of $70, with a difference (-) of $30, or (-)30%; Company B has the same nominal income but a real income of $120, with a difference (+) of (+)30%; In average, we have a nominal income of $200 and real income of $190, with the average difference of 5%. But in absolute values, the average difference is $30 + $20, totaling 25% over the value of $200.

Table 3 shows that the impacts of inflation were rather relevant, not only on the permanent assets and net equity, but mainly on the net result of the period. For the values of the year of 2016, the average difference between nominal and corrected results is, expressively, 58%, with an emphasis on the Retail sector, in which the average percentile is 121%.

The average effect of inflation on the permanent assets was of 44%, with not a lot of difference between the different sectors. In the financial sector, the average difference between nominal and corrected net equity was of only 7%, a rather inexpressive impact that is easily explained by considering that banks have a low percentile of permanent assets in relation to net worth, due to reasons that include regulatory constraints. On the other hand, the effects of inflation on the net equity of non-financial companies were very relevant, reaching absolute values as high as 183% for the Energy sector.

We highlight that these impacts stem only from the effects of inflation since 2010. Such effects would be much more significative if the analysis had been initiated in 1995.

In the year 2016, the companies that presented the highest and lowest difference between their nominal and corrected permanent assets were Multiplan (69%) and CVC(18%, a value that is by no means immaterial), respectively. For the results of the period for 2016, the largest impact was for Lojas Americanas (815%), followed by Biosev (199%), which had a nominal loss of $272,657 that inverted into a profit of $271,003 following correction.

Table 3: Results of the effects of inflation on Fixed Assets, Equity and Income Statement

Sector	Nominal Permanent Assets	Corrected Permanent Assets	Dif% (abs.)	Nominal Net Equity	Corrected Net Equity	Dif% (abs.)	Nom. Net Profit	Corr. Net Profit	Dif% (abs.)
Automobile	3.456.963	4.738.224	44%	3.434.916	4.716.177	41%	163.913	165.703	73%
Consumer Goods	9.000.154	13.152.894	49%	6.170.401	10.323.140	66%	323.829	498.811	49%
Energy	103.258.405	151.297.528	45%	52.378.990	100.418.114	183%	(633.108)	3.010.612	82%
Financial	16.147.683	22.439.328	40%	87.846.242	94.137.887	7%	11.137.105	7.220.207	42%
Services	5.891.622	8.317.814	40%	6.723.683	9.149.875	35%	1.106.047	1.120.562	23%
Steel and Metal	18.336.807	27.743.157	50%	38.711.981	48.118.332	84%	2.262.548	1.129.925	27%
Textiles	649.334	932.073	48%	1.292.267	1.575.007	53%	160.918	129.543	36%
Retail	3.456.516	4.999.613	38%	3.333.051	4.876.148	38%	(111.163)	(90.933)	121%
2016 Average	18.504.790	27.005.783	44%	21.671.615	30.172.609	63%	1.456.669	1.393.508	58%

Table 4 evidences the profitability indicators (ROA and ROE), both nominal and corrected, well as the absolute value difference percentiles. The tendency of the difference rates to grow as the years pass is due mainly to the growing undervaluation of the depreciations and amortizations.

Table 4: Results of the effects of inflation on ROA and ROE

Sector	Year	Nominal ROA	Corrected ROA	Dif% (abs.)	Nominal ROE	Corrected ROE	Dif% (abs.)
Automobiles	2010	11%	9%	18%	22%	20%	12%
	2016	6%	4%	40%	6%	4%	53%
	Average			32%			49%
Consumer Goods	2010	10%	9%	19%	21%	23%	38%
	2016	8%	5%	39%	13%	10%	26%
	Average			27%			28%
Energy	2010	9%	7%	28%	14%	12%	34%
	2016	15%	13%	30%	12%	20%	59%
	Average			229%			62%
Financial	2010	2%	1%	26%	24%	19%	26%
	2016	1%	0,6%	46%	13%	7%	49%
	Average			39%			41%
Services	2010	20%	19%	20%	57%	56%	24%
	2016	9%	6%	33%	19%	15%	32%
	Average			28%			26%
Steel and Metal	2010	8%	6%	28%	14%	14%	29%
	2016	4%	2%	48%	22%	10%	47%
	Average			41%			42%
Textiles	2010	14%	11%	25%	20%	18%	19%
	2016	4%	3%	36%	1%	2%	54%
	Average			30%			34%
Retail	2010	10%	8%	40%	-109%	-169%	33%
	2016	5%	3%	61%	3%	2,6%	78%
	Average			62%			65%
General Average	**Average**			**59%**			**44%**

[1] ROE was not calculated for companies with negative net equity.

It is worth to note that the Nominal ROA and ROE columns, well as the Corrected ROA and ROE columns, can be misleading, showing small differences; but that is because there are enormous compensations happening upon the summing of the companies' values, with

some of them showing a nominal profit but a loss in real terms, and others showing the inverse, for example. Therefore, the focus of the reading must be on the absolute difference columns, *Dif% (abs.)*.

Both profitability indicators were heavily affected by the effects of inflation. In relation to the ROA, the average absolute difference was 59%. The sectors that showed the smallest and largest impacts were Consumer Goods (27%) and Energy (229%), respectively. Considering only 2016, the company with the largest difference percentile for the ROA was B2W (133%), and the one with the smallest percentile was Petrobrás (9%). Please note that due to the aforementioned compensations, analyses by sector will not evidence, upon comparing their ROA and ROE, such large disparities. In other words, what goes for the group doesn't go for the individuals that form that group.

For the ROE, the average absolute difference was 44%, with the Services sector showing the smallest impact (26%) and the Retail companies being the most affected (65%). Considering only 2016, Cremer was the company that suffered the least impact on its ROE (1.79%), with Lojas Americanas showing the most impact (453%). The latter was also the company that had the largest difference percentile for the period of 2016, which explains such an impact on the ROE.

The second and third goals of this study are related to the impacts of inflation on the cost of debt and on the Degree of Financial Leverage, respectively. Table 5 presents these analyses.

Table 5: Results of the impacts of inflation on the Cost of Debt and on the DFL

Sector	Year	Nom. Cost of Debt	Real Cost of Debt	Dif% (abs.)	Nominal DFL	Corrected DFL	Dif% (abs.)
Automobiles	2010	6%	2%	73%	1.48	1.66	12%
	2011	6%	2%	152%	1.42	0.08	115%
	2012	6%	2%	80%	1.41	1.62	17%
	2013	8%	3%	158%	1.45	1.65	13%
	2014	6%	2%	176%	1.35	1.68	24%
	2015	11%	4%	106%	0.79	0.08	691%
	2016	11%	7%	49%	0.58	0.79	152%
	Average	**8%**	**3%**	**113%**	**1.21**	**1.08**	**146%**
Consumer Goods	2010	6%	2%	67%	1.13	1.35	48%
	2011	6%	2%	90%	1.48	1.64	36%
	2012	5%	1%	77%	1.91	1.72	67%
	2013	7%	3%	59%	1.46	1.58	27%
	2014	9%	4%	56%	1.64	1.64	16%
	2015	15%	7%	66%	1.48	1.63	21%
	2016	9%	5%	82%	1.73	2.68	97%
	Average	**8%**	**3%**	**71%**	**1.55**	**1.75**	**45%**

|						
	2010	6%	2%	74%	1.23	1.36	11%
	2011	5%	1%	95%	1.45	1.64	13%
	2012	6%	2%	69%	457.41	3.79	34%
Energy	2013	4%	0%	107%	2.10	1.92	53%
	2014	5%	1%	97%	2.64	1.66	35%
	2015	7%	1%	96%	9.48	1.64	50%
	2016	6%	1%	79%	-11.40	1.89	62%
	Average	**6%**	**1%**	**89%**	**70.06**	**2.02**	**38%**
	2010	6%	2%	68%	1.35	1.45	6%
	2011	6%	2%	79%	1.30	1.38	5%
	2012	4%	1%	100%	1.50	1.58	6%
Services	2013	5%	1%	90%	1.49	1.52	5%
	2014	5%	1%	120%	1.64	1.65	4%
	2015	7%	0%	102%	1.42	1.07	47%
	2016	6%	2%	76%	1.34	1.37	8%
	Average	**6%**	**1%**	**92%**	**1.43**	**1.42**	**13%**
	2010	5%	1%	100%	1.37	1.60	21%
	2011	5%	0%	122%	1.49	1.86	35%
	2012	5%	1%	91%	1.29	1.61	56%
Steel and Metal	2013	6%	2%	79%	0.74	1.22	171%
	2014	6%	1%	99%	0.67	1.41	235%
	2015	7%	0%	134%	2.44	-0.60	239%
	2016	5%	0%	119%	2.75	1.59	34%
	Average	**6%**	**1%**	**107%**	**1.52**	**1.22**	**118%**
	2010	8%	4%	56%	1.13	1.25	11%
	2011	12%	7%	53%	2.26	1.79	13%
	2012	11%	7%	50%	0.70	1.17	55%
Textiles	2013	11%	7%	48%	0.98	1.03	6%
	2014	12%	7%	49%	0.64	0.58	6%
	2015	21%	13%	57%	1.10	0.67	54%
	2016	20%	15%	30%	1.63	1.05	22%
	Average	**14%**	**9%**	**49%**	**1.21**	**1.10**	**24%**
	2010	5%	1%	203%	3.24	3.44	18%
	2011	7%	2%	85%	1.12	8.55	508%
	2012	5%	1%	85%	3.45	2.17	1.275%
Retail	2013	5%	1%	81%	-4.73	2.66	24%
	2014	6%	2%	77%	0.43	1.69	26%
	2015	8%	1%	128%	0.74	1.59	456%
	2016	8%	4%	73%	2.67	-1.18	179%
	Average	**6%**	**2%**	**105%**	**0.99**	**2.70**	**355%**
General Average		**8%**	**3%**	**88%**	**8.53**	**1.63**	**117%**

(1) For the financial sector neither the cost of debt nor the DFL were calculated;
(2) The DFL was not calculated for companies with negative net equity.

The cost of debt is one of the most important variables in the financing decisions of companies, and the differences between the nominal and the corrected cost are brutal in every sector. In general, the average difference is an expressive 88%. This difference is even more relevant for some companies; for example, the nominal cost of debt for Usiminas in 2016 was 1.4%, while the actual cost was negative, -2,6%, a difference of 285%. The company that had the least impact was Grendene, with a difference of 17%, which is still by no means negligible.

Graph 1 shows the behavior of the cost of debt in relation to the variation of the inflation rates. In 2010 and 2011, the nominal cost of debt was very close to the inflation rate. From 2012 onwards, as the inflation rose or fell, the nominal cost of debt followed a similar behavior. Graph 1, however, shows that this doesn't necessarily mean the behavior of the actual cost of debt will be similar.

Graph 1 – comparison between the cost of debt (both nominal and actual) and the inflation
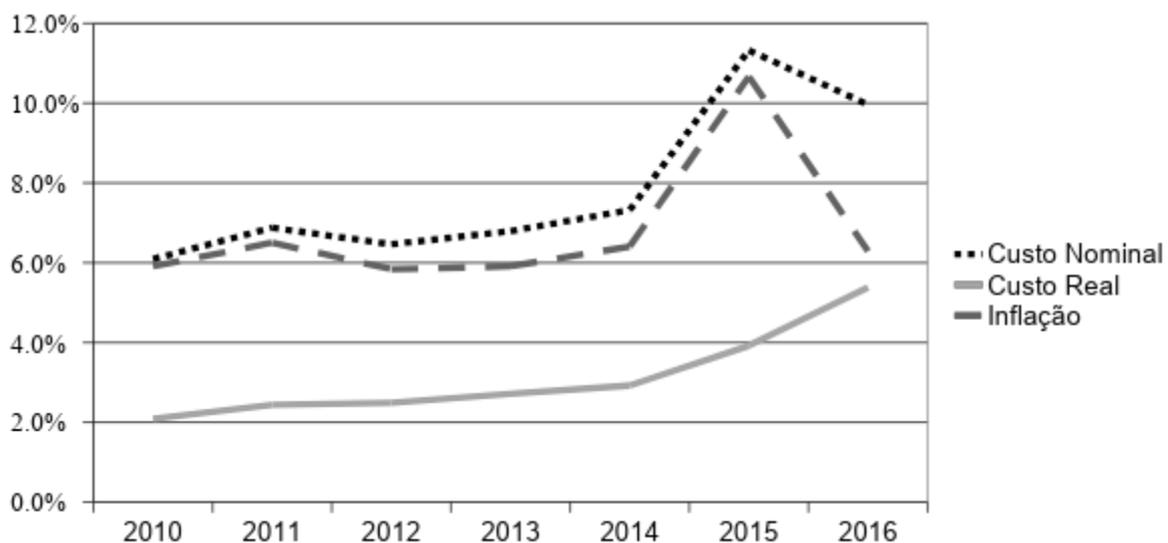
In relation to the DFL, our understanding is as such: values superior to 1 indicate that the ROE was superior to the ROA, demonstrating the presence of gains and that the actual financial expenses were inferior to the ROA. Values inferior to 1 indicate the opposite. Negative values indicate negative ROE or ROA, a ROE inferior to the ROA, or other negative factors.

In general, the average absolute difference between the nominal DFL and the corrected value was an expressive 117%. This difference has the potential to influence the analyses and decisions that relate to the capitalization structure of companies. This percentage is even higher in the Retail sector, which has an average absolute difference of 355%.

In order to reach our fourth research goal, Table 6 presents the analysis of the effects of inflation on the profit distribution capacity. These values represent the average, per

company, of the seven years that have been analyzed (2010-2016). The third column indicates the average value of the dividends and IOE distributed by the companies. The fifth column shows the average value that would have been distributed if the proportion of the distribution had been kept, but the value was ascertained based on the corrected result.

Table 6: Partial results of the effects of inflation on profit distribution

Company	Nominal profit	Total distrib.	Corrected profit	Corrected distrib.	Difference	Conclusion
Itaú Unibanco	17.772.802	7.542.453	13.308.091	5.647.711	1.894.742	Greater
Santander	5.772.942	3.177.825	4.117.536	2.266.575	911.250	Greater
Banco do Brasil	12.265.793	4.782.585	10.424.389	4.064.599	717.986	Greater
Caixa	5.315.130	2.904.587	4.364.572	2.385.131	519.456	Greater
BRF	1.281.110	617.111	929.709	447.841	169.270	Greater
TAESA	775.628	555.694	580.252	415.718	139.976	Greater
CSN	1.303.983	597.218	1.001.942	458.885	138.333	Greater
CTEEP	1.202.542	354.035	950.641	279.874	74.161	Greater
Multiplan	318.598	134.378	163.007	68.753	65.625	Greater
Grendene	450.977	240.820	338.384	180.696	60.124	Greater
BM&FBovespa	1.281.989	893.683	1.200.769	837.064	56.619	Greater
Embraer	546.927	178.151	384.578	125.269	52.882	Greater
Via Varejo	340.484	134.624	218.203	86.275	48.349	Greater
CBD	632.843	180.401	468.569	133.572	46.829	Greater
Guararapes Confecções	376.523	100.226	243.849	64.910	35.316	Greater
Alpargatas	302.541	107.987	219.668	78.407	29.580	Greater
JBS	1.189.905	270.721	1.073.038	244.132	26.589	Greater
Marcopolo	250.219	96.043	181.862	69.805	26.238	Greater
Cielo	2.768.023	1.073.747	2.703.499	1.048.717	25.030	Greater
Natura	690.709	509.636	660.598	487.419	22.217	Greater
Randon	129.484	48.494	80.978	30.328	18.166	Greater
M. Dias Branco	527.078	117.661	447.802	99.964	17.697	Greater
Cia Hering	276.846	128.599	244.606	113.623	14.976	Greater
Marisa	89.841	27.382	43.993	13.408	13.974	Greater
Tupy	91.197	47.907	64.685	33.980	13.927	Greater
Valid Soluções	104.539	49.540	76.243	36.131	13.409	Greater
Arezzo	101.734	55.200	81.739	44.351	10.849	Greater
Ferbasa	102.493	27.623	71.495	19.269	8.354	Greater
Renner	440.437	182.256	422.027	174.638	7.618	Greater
Iochpe-Maxion	109.065	45.071	93.501	38.639	6.432	Greater
Mahle Metal Leve	155.135	107.156	146.314	101.063	6.093	Greater
São Martinho	151.560	36.300	129.169	30.937	5.363	Greater
Cremer	21.741	11.816	16.356	8.889	2.927	Greater
Döhler	26.207	7.495	16.383	4.685	2.810	Greater
CVC	122.724	45.086	116.724	42.882	2.204	Greater
Fras-Le	45.510	14.608	39.136	12.562	2.046	Greater
Metisa	18.921	5.399	13.953	3.981	1.418	Greater
Comp Ind Cataguases	7.114	3.039	4.568	1.951	1.088	Greater
Nadir Figueiredo	15.581	6.458	14.147	5.864	594	Greater
Karsten	(49.592)	876	(45.068)	796	80	Greater
Bombril	(77.366)		(69.539)			
Biosev	(629.441)		(609.577)			
Magnesita	(57.582)		(96.290)			
B2W	(213.377)	769	(237.292)	855	(86)	Lesser
Cedro têxtil	(27.121)	2.846	(33.679)	3.534	(688)	Lesser

Magazine Luiza	48.154	9.124	55.181	10.455	(1.331)	Lesser
Paranapanema	(45.034)	5.068	(71.569)	8.054	(2.986)	Lesser
Americanas	334.227	102.516	365.325	112.055	(9.539)	Lesser
Localiza	342.164	97.295	389.107	110.643	(13.348)	Lesser
Usiminas	(402.832)	61.238	(679.529)	103.301	(42.063)	Lesser
Eletrobrás	(3.018.878)	336.116	(6.473.570)	720.755	(384.639)	Lesser
Bradesco	13.444.217	4.735.330	16.334.294	5.753.275	(1.017.945)	Lesser
Petrobrás	5.869.714	4.657.857	7.671.590	6.087.719	(1.429.862)	Lesser

Among the 53 analyzed companies, 40 distributed a higher sum of dividends and IOE than would have been distributed based on the corrected profit. Moreover, 10 companies distributed less than the corrected amount, which suggests that they are withholding a part of the profits that could be distributed to the shareholders. The 3 remaining companies didn't turn a profit, and therefore they did not distribute any dividends or IOE during the period.

Considering the presented discussions, we believe the goals of this study have been achieved, with the results of the analyses supporting the four presented theoretical conjectures. We hope these results will alert readers, managers, creditors, investors, teachers, students and others about the damaging effects of failing to recognize the effects of inflation on financial statements for financial analyses and decisions, even in contexts of "low" inflation. The fact that we "don't see" inflation doesn't mean it doesn't exist.

As a sensitivity analysis, we chose, finally, to redo all the calculations using an inflation rate of only 3% per year (close to current inflation and what is to be expected in the near future), which represents less than 40% of the average effective inflation of 2010 to 2016, which was of 7.95% per year. Even with an inflation of only 3%, the results evidenced extremely significant results. The average difference between nominal and corrected values was of 30% for the ROA, 21% for the ROE, 41% for the Cost of Debt and 37% for the DFL. Such findings support our conclusion that failure to recognize the effects of inflation on financial statements provokes extremely relevant distortions and can be significantly damaging for financial analyses and decisions.

5. Final Considerations

The goal of this work has been to contribute to the discussion on the risk of ignoring the effects of inflation on some financial analyses and decisions, specifically: (i) the profitability indicators, ROA and ROE; (ii) the cost of debt; (iii) the Degree of Financial Leverage; and (iv) the profit distribution capacity. We believe that this goal has been reached, seeing as the various analyses led during the course of the work support the four proposed theoretical conjectures.

Using a sample of 53 companies both financial and non-financial, the results evidenced that the average difference, in absolute values, between the corrected and nominal ROA and ROE indicators was of an expressive 59% and 44% respectively. In relation to the cost of debt,

the focus on which is one of the main differentials of this work, the difference was 88%. These effects also impact the calculation of the DFL, for which the average difference was 117%. This study also evidenced that the majority of the companies (40 out of a total of 53) is distributing profits in a sum greater than they would be distributing based on corrected financial statements, but a small number of companies are also distributing lesser than the corrected amount. Additionally, we have verified that these impacts are extremely significant, even when calculated based on an annual inflation rate of only 3%.

The effects of inflation vary considerably depending on the branch of activity of the company as a result of its ownership structure. The impacts on the ROA, for example, varied from 27%, in the consumer goods sector, to 229% for the energy companies.

This study contributes to the research field on the effects of inflation – and the consequences that ignoring them has on financial statements published since 1995 – by evidencing in a clear manner the methods and procedures used to correct the calculations. In addition, it opens a more specific discussion on the effects of inflation on the cost of debt, the DFL and the profit distribution capacity of companies, issues that have not been explored much by previous research.

We believe that the main contribution of this research is evidencing to the reader the relevance of the damaging effect that failing to recognize the effects of inflation in financial statements can produce on the analyses and decisions of managers and external agents, even in contexts that may be considered of low inflation.

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