Matching Quality and Business Cycle

Aluno Doutorado/Ph.D. Student João Paulo Machado Ribeiro ORCID iD[1], Aluno Doutorado/Ph.D. Student Elizangela Lourdes De Castro ORCID iD[1,2], Aluno Doutorado/Ph.D. Student Patrícia Pain ORCID iD[3], Doutor/Ph.D. Suliani Rover ORCID iD[1]

[1]UFSC, Florianópolis, SC, Brazil. [2]UFJF, Governador Valadares, MG, Brazil. [3]UFES, Vitória, ES, Brazil

Aluno Doutorado/Ph.D. Student João Paulo Machado Ribeiro
0000-0003-1383-8729 **Programa de Pós-Graduação/Course** Programa de Pós Graduação em Contabilidade
Aluno Doutorado/Ph.D. Student Elizangela Lourdes De Castro
0000-0002-1486-9925 **Programa de Pós-Graduação/Course** Programa de Pós Graduação em Contabilidade
Aluno Doutorado/Ph.D. Student Patrícia Pain
0000-0002-0660-226X **Programa de Pós-Graduação/Course** Programa de Pós Graduação em Ciências Contábeis
Doutor/Ph.D. Suliani Rover
0000-0001-8612-2938 **Programa de Pós-Graduação/Course** Programa de Pós Graduação em Contabilidade
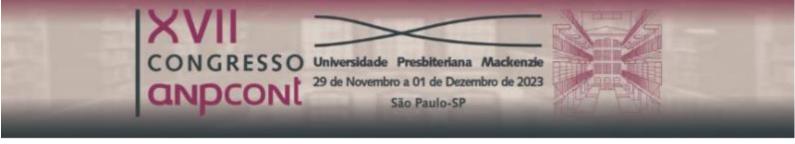
Resumo/Abstract

The alignment of expenses with generated revenues is crucial for accounting matching. Different forms of correspondence include direct matching, reflecting costs as expenses, historical cost allocation, and expense recognition due to future uncertainty. Matching helps reflect a company's economic performance and mitigate timing issues. Limited studies examine revenue value independently. The concept of matching originated during the Great Depression and remains relevant today. Its importance to high-quality earnings is often overlooked in the literature. Thus, this study aims to analyze the different reflexes of business cycle phases on matching quality from revenues and expenses. We examine data from companies listed on G20 group stock exchanges from 2001 to 2021 on statistical, correlation and regression analyses. By separating the sample between high and low enforcement, we identified that the matching quality is higher when it is low. Thus, our results demonstrate that the quality of matching is lower in the phases of the economic cycle of recession, contraction, and recovery, in relation to expansion, when analyzing separately countries with low and high enforcement. These results shed light on matching quality determinants influenced by the business cycle and institutional settings. They are relevant to regulators, investors, managers, and academics, indicating that revenue-expense combinations suffer during low economic growth, such as recessions. Moreover, the link between matching quality and the business cycle differs across legal structures, being weaker in countries with strict accounting standards enforcement.

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Abstract

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Keywords: matching quality, revenues and expenses, business cycle.

1 INTRODUCTION

The alignment of expenses with the revenues they generate is linked to the accounting practice of matching (Zimmerman & Bloom, 2016). This process of revenue-expense matching has great implications for the single most important output of the accounting system (Dichev & Tang, 2008; Graham et al., 2005). Thus, correspondence can assume, according to Zimmerman and Bloom (2016), the forms of direct correspondence, reflection of the cost as an expense in the income statement, allocation of historical cost, or expense of expenses incurred due to the uncertainty of its future benefit. In correspondence, there is a situation in which the accounts present related revenues and expenses simultaneously, generating a metric, which can be periodic performance to better reflect the economic performance of a company (Kim & Kim, 2021). Furthermore, the matching principle helps mitigate timing problems intrinsic in cash flows (Dechow, 1994).

Studies that consider the relevance of revenue value are limited and, for the most part, consider its relevance simultaneously with earnings (Bilinski & Eames, 2019). Although it is still rare in the accounting literature, the emergence and evolution of the concept of matching evolved from the Great Depression and has survived in accounting thought and practice (Zimmerman & Bloom, 2016). Consistent with this view Costa et al. (2020) document that this

a topic that has been largely ignored, despite being considered critical to producing high-quality earnings (Dichev et al., 2013).

As highlighted by Bilinski and Eames (2019), low-quality expenses increase investor demand for additional information. At the same time, matching is useful for investors and lenders as it can help predict earnings power (Zimmerman & Bloom, 2016). On the other hand, managers with more experience deliver better combinations of revenues and expenses contemporaneously, because more capable managers estimate provisions more accurately and can select projects with lower initial cash outflows (Cho & Choi, 2021). Aligned with this thinking, Oskouei and Sureshjani (2021) found that managers with better skills in their role also have a better understanding of the negative effect that management can have on the company's future performance and tend to use other methods instead of earnings management.

Managers with different skills can make various decisions in conditions of economic and financial crisis (Oskouei & Sureshjani, 2021). According to Oskouei and Sureshjani (2021), years of economic recession are considered years of economic crisis, whereas years of prosperity can be considered years of non-crisis. Stagflation, on the other hand, is considered simultaneously as the problem of high rate of growth inflation and low rate of economic growth, both of which have very undesirable results in society. These tangible changes in the business environment have reduced the profitability of companies, so it is likely that the correspondence between revenues and expenses is influenced by variations in economic activities.

Consistent with prior research that examined earnings quality vary across business cycles, and their fundamental impact on firms' reporting quality (Jenkins et al., 2009; Paulo & Mota, 2019; Wang et al., 2015). Studies have also documented that there are more accounting conservatism earnings during the recession phase than during the expansion phase (Jenkins et al., 2009). He and Shan (2016) focused on the matching of revenues and expenses and presented international evidence that supports the view that measures of economic activities are relevant determinants of matching.

Within the aims to analyze the different reflex of business cycles phases on matching quality from revenues and expenses, this study considers a sample of 31,429 companies (372,982 firm-year observations) analyzed through descriptive statistics, correlation, and regression analyses from 2001 to 2021. Our analyses focused on firms of countries member of the Group of Twenty (G20). This group's countries were originally founded in 1999 and represent around 85% of the global GDP, more than 75% of the global trade, and nearly two-thirds of the world population (G20, 2023).

Our findings contribute to accounting researchers, regulators, investors, and managers. First, by highlights how the contemporaneous correlation between revenues and expenses is affected by different phases of the business cycle, in special, the recession phase. Second, extend the understanding in prior literature about determinants of matching quality. Third, provides preliminary evidence of how the level of enforcement of accounting standards moderates the relationship between matching quality and business cycle.

2 PRIOR RESEARCH AND HYPOTHESES DEVELOPMENT

2.1 Revenues and Expenses Matching

The matching principle is considered a fundamental issue in financial reporting because of the central role of matching expenses with relevant revenue to determine reported earnings, which is considered the single most important output of financial reporting (Dichev et al. 2013; Graham et al., 2005). That's because the matching focuses on the operating performance of the

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firm; and it is expected that matched earnings are a better predictor of future operating performance (Zimmerman & Bloom, 2016). According to Zimmerman and Bloom (2016), matching can take four forms. First, direct matching where there is direct cause and effect exists between expenses and revenues. Second, when reflecting the cost as an expense in the income statement since has expired. Third, through historical cost allocation. Fourth, recognizing expensing incurred due to uncertainty of their future benefit.

The matching decision reflects the accountant's perception of the relative risks associated with cost outlays. In this sense accountants are concerned with economic and measurement risks. Economic risk is the probability that a disbursement will not result in a net benefit, so when the economic risk is considered high, the disbursement is treated as an expense in the same period that the disbursement commitment is incurred (Zimmerman & Bloom, 2016).

Previous studies have used the contemporaneous correlation between revenues and expenses as a proxy to measure the matching quality (Laitinen, 2020; Dichev & Tang, 2008; Krishnan et al., 2021). When all expenses can be traced directly and specifically to specific revenues occur the perfect matching. The poor matching, however, results in decreases in the contemporaneous correlation between revenues and expenses (Laitinen, 2020; Dichev & Tang, 2008). Thus, poor matching increases the volatility and decreases the persistence of the profits (Dichev & Tang, 2008).

As highlighted by Krishnan et al. (2021), the lack of resources to finance investments and uncertainty about future earnings can lead to earnings management to convince shareholders and creditors about future cash flows and growth prospects, reporting improvements in earnings.

There is a close connection between matching and the accrual basis. Regarding to matching, management can manipulate the measurement of earnings through the practice of earnings management, either through accruals or actual cash flow transactions. For these, earnings management can affect matching by changing existing item values or introducing new items or an income statement (Zimmerman & Bloom, 2016).

Prior studies address the quality of matching as a critical indicator of earnings quality (Dichev et al. 2013; Krishnan et al., 2021). Other research suggests that the matching of revenues and expenses is a crucial principle in the calculation of earnings, as it helps mitigate timing issues inherent in cash flows (Dechow,1994; Ball & Easton 2013; Costa et al., 2020). Some studies reported a significant decline in the matching quality over the past decades (Dornelson et al., 2011; Dichev & Tang, 2008; He & Shan, 2016), these results were attributed to changes in the real economy and accounting standards (Dichev & Tang, 2008; Hyun & Cho, 2018).

At stages in which companies demand a greater number of external resources, it is expected that they will have incentives for earnings management and, therefore, be more inclined to delay the recognition of expenses (Krishnan et al., 2021).

2.2 Business Cycle

The economic environment is an external factor that influences enterprises. If the economic cycle is growing the decisions of managers are more oriented to investments already with the decline of the economy, there is a tendency to cut spending and reduce investments. For Schumpeter (1939) business cycles are fluctuations in economic life which have been called business cycles and derive from external factors and innovations. Business cycles are "a type of fluctuation found in the aggregate economic activity of nations that organize their work mainly in business enterprises" (Burns & Mitchell, 1946, p.3).

There are in the literature at least two models for measuring business cycles. The NBER developed by Burns and Mitchell (1946), and the GDP movements based on Schumpeter (1939), the most used recently, that defined four phases of the business cycle: expansion, recession, contraction, and recovery phases. The expansion and recovery phases represent activity economic growth while decrease is contraction and recession phases. The phases of Schumpeter's cycle are defined according to the positive or negative variation of GDP in relation to the average of the period, considered as the moment of equilibrium (Jenkins et al., 2009)

According to Klein and Marquardt (2006) the business cycle impacts the quality of information including the matching, especially in moments of economic crisis. Expansion periods have "high" growth rate in economic productivity. In crisis period the firms can have bigger losses or profits, it depends on the sector and localization.

Industrial evolution shows a particular trajectory of industrial change that combines order and continuity factors (such as routines, learning effects, path dependence, irreversibility) and disorder and discontinuity effects (radical uncertainty, mutations, paradigm shifts, emergence of new institutions, instabilities, deviation enhancers, self-reinforcing processes) (Paulré, 2004).

Steady-state equilibria may be attractive aesthetic devices, but economic life and history show cycles and discontinuities as a normal feature. What matters most are the driving forces behind economic development in advanced countries. The emphasis, therefore, is on the growth and dissemination of knowledge, on pioneering entrepreneurs who create new markets and rejuvenate old firms, on the creation of credit for the provision of venture capital, and on Schumpeterian competition (Giersch, 1984).

Schumpeter (1939) and Burns and Mitchell (1946) observed the external scenario and the economic variations that can occur differently in each country - varying through proxies that use the Gross Domestic Product (GDP). These authors separated the economic cycle into four stages. Factors that influence the decision-making process of companies and the quality of reported information are times of economic change. Periods of growth or recession, for example, can lead to greater or lesser conservatism (Barrik & Brown, 2019; Jenkins et al., 2009).

Therefore, as Schumpeter (1939) points out, after a revolutionary innovation (due to technical or scientific progress, for example), other related innovations are brought by this discovery, called "cluster of innovations". According to the author, successful innovation is usually a temporary source of market power, providing new monopolistic benefits to the innovating firm. Therefore, interest and profit are, in essence, the remuneration of innovations.

Financial factors are not the only ones that influence entrepreneurial activity, social and cultural factors in the environment also significantly influence the behavior of managers. To begin with, in periods of expansion, business opportunities are more frequent and numerous. However, policies must be defined in the crisis phase and at the beginning of recovery periods to be effective (Martínez-Rodriguez et al., 2020).

In dynamic environments with accumulation, strategic complementarities between agents' actions can easily create limit cycles. And this can arise even when behavior at the individual level favors stability, as the system converges to the steady state in the absence of agent interactions. A common criticism of many early models of macroeconomic fluctuations featuring limit cycles is that they implied an excessively high degree of predictability and environment, hence this criticism is no longer so obvious (Beaudry et al., 2020).

For Carvalho and Grassi (2019), theories of business cycles have typically resorted to exogenous aggregate shocks to generate such characteristics of aggregate fluctuations. Instead,

recent literature has proposed that the origins of business cycles can be traced back to micro-level disturbances. Additionally, as highlighted by Beraja et al. (2019), observed aggregate and regional wage elasticities may differ, as regional and aggregate economies are affected by different types of shocks. For example, we have that: regional shocks that alter the demand for local labor and may be the main factor explaining the differences between regions in employment and wages, during the Great Recession. However, a combination of shocks that drive both demand and labor supply could become important in the aggregate for the period.

Due to the recent inflationary recession in recent years, the financial crisis in listed companies has become clear. In fact, when inflation is high, or there is recession in a country, or economic growth is low or negative, the process of business growth and production will not be the same as in years of economic prosperity (Oskouei & Sureshjani, 2021). Macroeconomic shocks are important determinants of choice in firms' capital structure (Begenau & Salomao, 2019).

2.3 Hypotheses Development

Regarding the matching quality, Dichev and Tang (2008) documented that the principal insight of the theory presented by them is that: poor matching proceeds as "noise" in the economic relation of advancing the recognition of expenses before the corresponding revenues, reflecting on decreases in the contemporaneous correlation between revenues and expenses.

From the perspective of the factors that can influence the management decision for matching, Krishnan et al. (2021) found that the quality match suggests a mismatch of expenses and revenues in the introduction, growth and decline phases of the companies' life cycle. The implications of these findings are that lifecycle stages vary in terms of business circumstances raising questions about the feasibility of properly matching expenditures to revenues, and the informativeness of earnings at certain stages. Managerial discretion in delaying expense recognition may be more likely at some lifecycle stages, providing incentives and opportunities for aggressive accounting.

Consistent with prior research that examined the determinants of matching quality (Dichev & Tang, 2008), He and Shan (2016) find that measures of economic activities as GDP growth rates are low are associated with lower matching quality. Providing empirical evidence that supports the view that economic activities are important determinants of matching (He & Shan, 2016).

These finds are consistent with literature suggestions, that properties of earnings accounting numbers, and specifically firms' reporting quality, convey divergent information during different stages of the business cycle (Jenkins et al., 2009; Paulo & Mota, 2019; Wang et al., 2015). This research found the effects of the business cycle on earnings management (Paulo & Mota, 2019; Wang et al., 2015), conservatism, and value relevance (Jenkins et al., 2009). In addition, Jiang et al. (2015) provide evidence of the relationship between business cycles and management earnings forecasts.

Changes in economic activities cause decline in matching. Whereas, the decline is mainly due to the increased incidence of large special items, which in turn is caused by changes in economic activities. Complementarily, the shift in the economy towards industries with higher period costs and more research and development (R&D) activities may have contributed to the decline in matching (He & Shan, 2016).

The literature documents a significant association effect between the changes in economic activities on outputs of the accounting system. Hence, it's probable that the matching between revenues and expenses is likely to be influenced by variations in economic activities

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(Donelson et al. 2011; He & Shan, 2016). The quality of the contemporaneous association between revenues and expenses, i.e., the matching, during economic contraction is lower as compared to that of expansion. Given the increase in demand for more conservatism in earnings reported during contractions (Jenkins et al., 2009). Considering the literature review, we draw our hypotheses. In the first hypothesis we expect to find higher matching quality in the expansion phase of the business cycle, our reference stage on regression models. Thus, our hypothesis 1 is that:

H1: Matching quality is lower in the contraction, recession, and recovery phases, compared to the expansion economic phase.

Prior research suggests that during periods of low rates of economic growth, like in the recession phase of the business cycle, there is a lower quality of revenue-expense matching (coefficient distant to 1) (He & Shan, 2016). Therefore, it is reasonable to assume that in the recession phase there is a lower matching quality, compared to the other phases. The hypothesis (H2) is that:

H2: Matching quality is lower in the recession phase than in contraction and recovery phases, compared to expansion.

Finally, given that the differences in financial reporting models affecting revenue-expense matching degree (Moscariello et al., 2020), and the effectiveness of applicable financial reporting standards could vary across countries and their institutional settings (Brown et al., 2014), we would expect that the relationship between the business cycle and matching is likely to vary across level of accounting enforcement. Using a proxy based on Brown et al. (2014), results from Dichev and Tang (2008) and Hyun and Cho (2018) makes clear that we can await a poor matching quality on current as the more standards are create and the most rigorous are the inspection committees. Thus, our third hypothesis is that:

H3: Matching quality varies between legal structures, being lower in countries with high enforcement.

3 RESEARCH DESIGN

(i)   Definition of Business Cycle

For this study, we classified the business cycle based on Schumpeter's model. The cycles were defined in four phases – Expansion, Recession, Contraction, and Recovery. The economic equilibrium is the quarterly real GDP, available in percentage change from the same quarter of the previous year from the Organization for Economic Co-Operation and Development (OECD) database. The data were collected for all-time series available for each country (Paulo & Mota, 2019)

(ii)   Measurement of Matching Quality

We analyzed the relationship between revenues and expenses using the matching model by Dichev and Tang (2008). This model has been used in several studies (e.g., Krishnan et al., 2021; Costa et al., 2020; He & Shan, 2016; Kim, 2018; Kim & Kim, 2021). According to the

model by Dichev and Tang (2008), when we regress the current revenues with past, current, and future expenses, the coefficient of current expenses (β_2) captures the cotemporaneous association between revenue and expense. Thus, the quality of matching is good, and no mismatching, if the coefficient β_2 should be close to 1 and the coefficients on past (β_1) and future (β_3) expenses should be smaller than the coefficient on current expenses (Krishnan et al., 2021).

$$Revenues_{it} = \beta_0 + \beta_1 Expenses_{it-1} + \beta_2 Expenses_{it} + \beta_3 Expenses_{it+1} + \varepsilon_{it} \tag{1}$$

Where $Revenues_{it}$ is net revenues, and $Expenses$ is total expenses, computed as the difference between net revenues and earnings before extraordinary items. The subscript i identifies the firm and t represents the fiscal year. All variables are scaled by the average value of total assets in years t-1 and t.

To test the hypothesis, we adapted the equation (1) to include indicators for the business cycles and their interaction terms with past, current, and future expenses using the following regression model presented in the Equation (2).

$$Revenues_{it} = \beta_0 + \beta_1 Expenses_{it-1} + \beta_2 Expenses_{it} + \beta_3 Expenses_{it+1} + \beta_{4-6} BusinessCycle_t + \beta_{7-9} BusinessCycle_t * Expenses_{it-1} + \beta_{10-12} BusinessCycle_t * Expenses_{it} + \beta_{13-15} BusinessCycle_t * Expenses_{it+1} + \gamma D\_Covid_t + \delta Fixed\text{-}Effects + \varepsilon_{it} \tag{2}$$

Where *BusinessCycle* represents the following variables: *Contraction*, *Recession*, and *Recovery* and the *Expansion* phase was using as our reference (baseline) group for the other phases. We added fixed effects for year, country, accounting standard, industry, and/or firm, to mitigate potential omitted variable problem. Also, it was included indicator for COVID-19 pandemic crisis and their interaction terms with past, current, and future expenses.

The COVID-19 pandemic caused serious economic damage, in addition to its wider human and social impact (Kökény et al., 2022). The initial outbreak of was in late 2019 when the global economy and global stock markets took severe upheavals. To limit the spread of the disease, governments have adopted strict and preventive measures that have restricted public life. These measures differ according to country circumstances, and may include wage subsidies, tax deferrals, extension of social assistance, unemployment insurance, and temporary adjustment of loan terms (Yassin et al., 2022). Thus, as we are working with a comprehensive sample, we controlled for the presence of the COVID-19 pandemic, as per Vidya et al. (2023), for the years 2020 and 2021.

The coefficients on the interaction terms between current expenses and the contraction, recession, and recovery phases of the business cycle (β_{10}, β_{11}, and β_{12}) present the association between this phase of the business cycle and revenue-expense matching, compared to expansion phase. If during a certain phase of the business cycle the firms exhibit weaker revenue-expense matching, the coefficient will be significantly negative. If the firm exhibit better revenue-expense matching in some phase of the business cycle, the coefficient will be positive and significant.

To examine how level the of enforcement of accounting standards affects the matching quality we estimated the model presented in Equation (2) for the subsample of countries with high and low enforcement of accounting standards following the proxy by Brown et al. (2014).

(iii)   Sample Selection and Data

We obtain firm-level data required for this study was collected from Refinitiv Eikon. Our sample consists of companies listed on stock exchanges in 19 of the G-20 countries and member countries of the European Union from 2001 to 2021. We exclude financial companies because of their different operating and financial structures. After removing the observations with missing values on variables used in the analyses, the final samples consist of 372,982 (31,429) firm-year observations (firms).

To control the effects of differences between a country's accounting standards adopted during the period in the analyses, we sort each year into six clusters (Convergence, IFRS - European Union, IFRS, Modified, Permitted and Local GAAP) from the dataset developed by Song and Trimble (2022), which can be accessed online at https://about.illinoisstate.edu/mktrimb/song-trimble-2022-dataset/. Song and Trimble (2022) suggest that prior literature generally has ignored the varied types and the complex timing of IFRS adoption.

We used the proxy of enforcement of accounting standards proposed by Brown et al. (2014) relate to 2008, therefore, after the widespread adoption of IFRS in 2005, a period in which it occurred many changes in financial reporting requirements and their enforcement (Preiato et al., 2014). Table 1 presents the sample composition by G-20 members, the classification enforcement of accounting standards according to Brown et al. (2014), and the status of the adoption of IFRS based on Song and Trimble (2022).

Table 1. Sample Composition

G20 Member	Obs.	% of Obs.	Firms	% of Firm	Enforcement[1]	IFRS adoption[2]
Argentina	1,355	0.36	78	0.25	Low	Modified
Australia	18,494	4.96	1,543	4.91	High	Modified
Brazil	4,586	1.23	332	1.06	Low	Modified
Canada	13,091	3.51	1,456	4.63	High	IFRS
China	61,960	16.61	6,175	19.65	High	Convergence
European Union	34,946	9.37	2,912	9.27	-	European Union
France	8,547	2.29	588	1.87	High	European Union
Germany	8,425	2.26	582	1.85	High	European Union
India	36,581	9.81	3,335	10.61	Low	Convergence
Indonesia	7,704	2.07	721	2.29	Low	Convergence
Italy	3,340	0.9	328	1.04	High	European Union
Japan	62,120	16.65	3,820	12.15	High	Permitted
South Korea	31,789	8.52	2,337	7.44	Low	IFRS
Mexico	1,917	0.51	127	0.40	Low	IFRS
Russia	6,415	1.72	513	1.63	Low	IFRS
Saudi Arabia	1,616	0.43	225	0.72	-	Modified
South Africa	2,017	0.54	167	0.53	High	IFRS
Turkey	5,178	1.39	391	1.24	Low	IFRS
United Kingdom	11,208	3	959	3.05	High	European Union
United States of America	51,693	13.86	4,840	15.40	High	Permitted
Total	**372,982**	**100**	**31,429**	**100**		

Notes: [1] classification according to Brown et al. (2014), from firms of the European Union we used the classification specific to each member country, this proxy is not available for Saudi Arabia. [2] Table 1 presented the status of the adoption of IFRS based on Song and Trimble (2022) in the year 2021.

4 RESULTS

4.1 Descriptive statistic

The descriptive statistic of interest variables is presented in Table 2. It is observed that the general average for revenues and expenses is 0.978 and 1.044, respectively. The variables also have a high standard deviation. These higher values indicate that the sample has an apparently unusual variability. For some possible reasons first, we use observations in more recent periods (from 2001 to 2021) and all possible observations for the proposed analysis, which includes large and small firms from different economic sectors (Cho & Cho, 2020; Dichev & Tang, 2008).

Second, our sample is made up of many countries that have different economic characteristics and contexts. Our results are consistent with previous studies (Hyun & Cho, 2018). We analyze the descriptive business cycle by phases of economic development – expansion and recession, which have the highest mean of revenues and expenses and greater variability if compared to the phases of contraction and recovery. We also observed that in the contraction the ratio between revenues and average total assets is lower than in the other phases of the business cycle.

Table 2. Descriptive Statistics

Statistics	Mean	Std. dev.	Minimum	p25	Median	p75	Maximum
Panel A. Full sample (372,982 observations)							
Revenues$_{it}$	0,978	12,487	0,000	0,406	0,774	1,225	7464,951
Expenses$_{it}$	1,044	12,404	-88,560	0,436	0,776	1,231	7336,935
Panel B. Contraction (117,167 observations)							
Revenues$_{it}$	0,869	1,464	0,000	0,384	0,703	1,121	232,582
Expenses$_{it}$	0,863	1,506	-51,781	0,384	0,680	1,094	232,468
Panel C. Expansion (140,346 observations)							
Revenues$_{it}$	1,077	20,242	0,000	0,455	0,836	1,293	7464,951
Expenses$_{it}$	1,181	20,035	-88,560	0,498	0,846	1,315	7336,935
Panel D. Recession (82,072 observations)							
Revenues$_{it}$	0,976	2,054	0,000	0,383	0,761	1,242	355,032
Expenses$_{it}$	1,094	2,952	-39,193	0,427	0,784	1,271	471,957
Panel E. Recovery (33,397 observations)							
Revenues$_{it}$	0,946	1,312	0,000	0,373	0,800	1,262	96,206
Expenses$_{it}$	0,976	1,405	-28,610	0,435	0,803	1,251	96,264

Table 3 exhibits Pearson's correlation matrix of key variables. We can note that the variables have a positive and strongly significant correlation with the business cycle in all phases (*p-values* < 0.01), signaling that changes in the business cycle generate variations in the matching of revenues and expenses. However, the correlation between *Expenses$_{it}$* and *Revenues$_{it}$* has different coefficients in each phase of the business cycle being stronger in the expansion, contraction, and recovery than in the recession phases.

Table 3. Pearson's correlation matrix of key variables

Variables		(1)	(2)	(3)	(4)		(1)	(2)	(3)	(4)
		Recovery					Contraction			
(1) *Revenues$_{it}$*	*Expansion*	1	0,319***	0,911***	0,589***	*Recession*	1	0,732***	0,960***	0,450***
(2) *Expenses$_{it-1}$*		0,980***	1	0,343***	0,189***		0,188***	1	0,736***	0,342***
(3) *Expenses$_{it}$*		0,993***	0,977***	1	0,592***		0,377***	0,474***	1	0,455***
(4) *Expenses$_{it+1}$*		0,961***	0,947***	0,961***	1		0,147***	0,133***	0,204***	1

Notes: *, **, and *** indicate 10%, 5%, and 1% significance levels. Pearson coefficients are presented below the diagonal for phase of expansion and recession of the business cycle and Pearson coefficients for phase of recovery and contraction of the business cycle are presented above.

4.2 Regressions results

Our empirical analyses of the baseline results are in Table 4. We used five estimates for the regression model (Equation 2). The main difference is in the insertion of different controls in each one and/or the form of estimation of the model.

Table 4. The Association between Business Cycle and Revenue-Expense Matching

Dep. Var = $Revenues_{it}$	(1)	(2)	(3)	(4)	(5)
$Expenses_{it-1}$	0.229***	0.229***	0.229***	0.193***	0.158***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
$Expenses_{it}$	**0.726*****	**0.725*****	**0.726*****	**0.766*****	**0.811*****
	(0.001)	**(0.001)**	**(0.001)**	**(0.001)**	**(0.001)**
$Expenses_{it+1}$	0.054***	0.054***	0.054***	0.051***	0.042***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
$Contraction_{it}$	0.161***	0.134***	0.115***	0.131***	0.070***
	(0.007)	(0.009)	(0.009)	(0.008)	(0.009)
$Recession_{it}$	0.785***	0.822***	0.711***	0.549***	0.226***
	(0.008)	(0.008)	(0.009)	(0.008)	(0.009)
$Recovery_{it}$	0.226***	0.240***	0.197***	0.182***	0.084***
	(0.012)	(0.013)	(0.013)	(0.011)	(0.013)
$Expenses_{it-1} * Contraction_{it}$	-0.175***	-0.175***	-0.171***	-0.133***	-0.115***
	(0.005)	(0.005)	(0.005)	(0.004)	(0.004)
$Expenses_{it-1} * Recession_{it}$	-0.222***	-0.221***	-0.141***	0.015***	0.124***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
$Expenses_{it-1} * Recovery_{it}$	-0.226***	-0.225***	-0.210***	-0.151***	-0.120***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
$Expenses_{it} * Contraction_{it}$	**0.160*****	**0.156*****	**0.160*****	**0.081*****	**-0.043*****
	(0.005)	**(0.005)**	**(0.005)**	**(0.005)**	**(0.005)**
$Expenses_{it} * Recession_{it}$	**-0.477*****	**-0.476*****	**-0.444*****	**-0.468*****	**-0.504*****
	(0.003)	**(0.003)**	**(0.003)**	**(0.002)**	**(0.002)**
$Expenses_{it} * Recovery_{it}$	**0.080*****	**0.072*****	**0.092*****	**0.023*****	**-0.035*****
	(0.008)	**(0.008)**	**(0.008)**	**(0.007)**	**(0.007)**
$Expenses_{it+1} * Contraction_{it}$	-0.046***	-0.046***	-0.045***	-0.046***	-0.041***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
$Expenses_{it+1} * Recession_{it}$	-0.039***	-0.039***	-0.037***	-0.031***	-0.009***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
$Expenses_{it+1} * Recovery_{it}$	-0.019***	-0.018***	-0.022***	-0.018***	-0.012***
	(0.004)	(0.004)	(0.004)	(0.003)	(0.003)
D_Covid_t			0.243***		0.062***
			(0.013)		(0.014)
$D\_Covid_t * Expenses_{it-1}$			-0.055***	-0.093***	-0.119***
			(0.004)	(0.004)	(0.004)
$D\_Covid_t * Expenses_{it}$			-0.234***	-0.167***	-0.133***
			(0.005)	(0.005)	(0.006)
$D\_Covid_t * Expenses_{it+1}$			-0.014***	-0.015***	-0.020***
			(0.001)	(0.001)	(0.001)
$Intercept$	-0.108***	-0.181***	-0.199***	-0.062***	-0.044**
	(0.004)	(0.017)	(0.016)	(0.004)	(0.018)
$Accounting\ Standard\ FE$	No	Yes	Yes	Yes	Yes

	(1)	(2)	(3)	(4)	(5)
Industry FE	No	Yes	Yes	Yes	Yes
Year FE	No	Yes	Yes	Yes	Yes
G20 Member FE	No	Yes	Yes	Yes	Yes
Firm FE	No	No	No	Yes	No
Observations	372,982	372,982	372,982	372,982	339,493
R-squared	0.983	0.983	0.983	0.987	0.986
p-value of Test F	0.000	0.000	0.000	0.000	0.000

Notes: Column (1) shows the results of the OLS estimation of Equation (2) without control for covid-19 that analyzes the association between the business cycle and revenue-expense matching. Column (2) present the result of OLS regression without control for covid-19, and with accounting standard- year- G20 Member- and industry-fixed effects. Column (3) present the result of OLS regression with control for covid-19, accounting standard-year- G20 Member- and industry-fixed effects. Column (4) presents the results of least squares regression with a firm fixed-effects estimator. Column (5) presents results that utilize a changed format of Dichev and Tang's model following Costa et al. (2020) with the annual first difference in OLS estimation. To mitigate the influence of outliers, we winsorized all continuous variables at the 2nd and 98th percentiles. Standard errors are reported in parenthesis. *, **, and *** indicate 10%, 5%, and 1% significance levels for two-tailed t-tests.

The results indicate that the coefficients on current expense (*Expenses$_{it}$*) which represent the matching quality in the expansion phase, are significantly positive in all columns (*p-value* < 0,01). These results are comparable with prior studies in revenue-expense matching (Cho & Choi, 2020; Costa et al, 2020; Dichev & Tang, 2008; Hyun & Cho, 2018). Highlight that coefficient with the annual first difference OLS estimation is uppermost than others.

We find that the business cycle phases influence positively and significant revenues and expenses matching. The coefficients on the interaction term between current expense and contraction and recovery phases are significantly positive in columns (1), (2), (3), and (4) (all p-value < 0,01). Although, in the First Diff test (column (5)) the coefficient is negative. For the recession phase the negative coefficients in all columns. These results show that the contraction and recovery phases have better revenue and expense matching than recession phase. One possible justification is the influence of accounting conservatism, especially in periods economic growth. One possible justification is the influence of accounting conservatism, especially in periods of economic growth due to it is greater in these moments than in economic crisis. Klein and Marquardt (2006) explain recessive business cycles there is an intensification of record losses which can without being linked to some revenue affect the matching quality.

Additionally, for analysis of the third hypothesis, in Table 5 we presented the results of the model proposed in Equation (2) with the view to explore how the level of accounting enforcement is associated with the matching quality. Also in Table 5, we documented the robustness of our results estimates based on Multilevel Regression. In general, the analyze multilevel, shown in Column 3, presents results that confirm the results found in Table 4.

Table 5. The Association between Business Cycle and Revenue-Expense Matching by Level Enforcement and estimates based on Multilevel Regression

Dep. Var = *Revenues$_{it}$*	(1)	(2)	(3)
	Enforcement Level		Multilevel Regression
	High	Low	
Expenses$_{it-1}$	0.228***	-0.011***	0.207***
	(0.001)	(0.002)	(0.001)
Expenses$_{it}$	**0.716*****	**1.037*****	**0.750*****
	(0.001)	**(0.002)**	**(0.001)**
Expenses$_{it+1}$	0.063***	-0.001***	0.052***
	(0.001)	(0.000)	(0.001)

	(1)	(2)	(3)
$Contraction_{it}$	0.316***	0.014***	0.136***
	(0.016)	(0.002)	(0.008)
$Recession_{it}$	0.785***	0.033***	0.597***
	(0.012)	(0.003)	(0.007)
$Recovery_{it}$	0.409***	0.065***	0.180***
	(0.022)	(0.003)	(0.011)
$Expenses_{it-1} * Contraction_{it}$	-0.188***	0.073***	-0.149***
	(0.007)	(0.002)	(0.004)
$Expenses_{it-1} * Recession_{it}$	-0.153***	0.028***	-0.035***
	(0.004)	(0.004)	(0.003)
$Expenses_{it-1} * Recovery_{it}$	-0.243***	0.018***	-0.174***
	(0.005)	(0.002)	(0.003)
$Expenses_{it} * Contraction_{it}$	**-0.022****	**-0.100****	**0.103****
	(0.010)	**(0.002)**	**(0.005)**
$Expenses_{it} * Recession_{it}$	**-0.467****	**-0.053****	**-0.456****
	(0.003)	**(0.004)**	**(0.002)**
$Expenses_{it} * Recovery_{it}$	**-0.090****	**-0.097****	**0.041****
	(0.017)	**(0.003)**	**(0.007)**
$Expenses_{it+1} * Contraction_{it}$	-0.047***	0.008***	-0.046***
	(0.003)	(0.000)	(0.002)
$Expenses_{it+1} * Recession_{it}$	-0.035***	0.001***	-0.032***
	(0.001)	(0.000)	(0.001)
$Expenses_{it+1} * Recovery_{it}$	-0.009	0.015***	-0.020***
	(0.011)	(0.001)	(0.003)
$Intercept$	0.215***	0.192***	-0.041
	(0.019)	(0.004)	(0.096)
Control Covid	Yes	Yes	Yes
Accounting Standard FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
G20 Member FE	Yes	Yes	Yes
Firm FE	No	No	Yes
Observations	258,843	108,133	372,982
R-squared	0.984	0.981	-
p-value of Test F/Wald	0.000	0.000	0.000

Notes: Column (1) shows the results of OLS regression without control for covid-19, and with accounting standard- year- G20 Member- and industry-fixed effects for the subsample of countries with high enforcement of accounting standards following the proxy by Brown et al. (2014). Column (2) presents these results for the subsample of countries with low enforcement of accounting standards. And the Column (3) present the result of Multilevel regression with control for covid-19, accounting standard- year- G20 Member- and industry-fixed effects, this model was estimates in three level: firm, industry, and country.

To mitigate the influence of outliers, we winsorized all continuous variables at the 2nd and 98th percentiles. Standard errors are reported in parenthesis. *, **, and *** indicate 10%, 5%, and 1% significance levels for two-tailed t-tests.

In columns (1) and (2) we have presented the results of a sample of high and low enforcement of accounting standards. For countries with high enforcement, following Brown et al. (2014), we observed that the quality of matching was in line with the results found in Table 4. However, in the low enforcement sample, the coefficient of current expenses ($\beta2$) that captures the cotemporaneous association between revenue and expense is close to 1, which indicates a great matching in the expansion phase of the business cycle. These findings are in

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line with our expectation in H3 of a lower expense and revenue matching in countries with high enforcement. These expectations were based on the review of the literature that suggests a poor matching quality on current as the more standards are created and the most rigorous the inspection committees (e.g. Dichev & Tang, 2008; Hyun & Cho, 2018). Additionally, prior studies emphasized that the differences in financial reporting models affect revenue-expense matching degree (Moscariello et al., 2020), and could vary across institutional settings (Brown et al., 2014).

When considering the coefficient of past expenses ($\beta1$), like a proxy of conservatism accounting (Dichev & Tang, 2008), we observe more conservatism in the expansion phase in institutional settings with high enforcement, but not when the level of enforcement is low.

For the high enforcement sample, the findings suggest a lower revenue-expense matching degree in the contraction, recession, and recovery phases of the business cycle than compared to the expansion phase. And that matching quality is lower in the recession phase than in the other phases. Consistent with the hypothesis that the quality of matching quality varies between legal structures (institutional settings), we observed that in the other phases of the business cycle, the mismatching is lower in countries with low enforcement of accounting standards. However, in this context, the recession phase presented better revenue-expense matching than the contraction and recovery phases.

4.3 Additional analyses

As additional analyses we estimated the quality of revenue-expense matching by phases of the business cycle, considering in this estimation the difference in matching quality associated with the level of enforcement of the country. Additionally, we estimated the models by adjusting the standard errors to G20 Member and firm-clustering effects, to correct for possible cross-sectional and serial correlations (Petersen, 2009).

Table 6. Revenue-Expense Matching for Business Cycle and Level Enforcement

Dep. Var = $Revenues_{it}$	Contraction	Expansion	Recession	Recovery
$Expenses_{it-1}$	0.064	-0.011	0.035	0.012
	(0.069)	(0.017)	(0.033)	(0.013)
$Expenses_{it}$	**0.933*****	**1.011*****	**0.964*****	**0.933*****
	(0.066)	**(0.017)**	**(0.034)**	**(0.072)**
$Expenses_{it+1}$	0.007***	0.000	0.000	0.012
	(0.001)	(0.001)	(0.000)	(0.013)
$High\_Enforc_i$	0.160*	-0.153**	0.528***	0.161
	(0.087)	(0.063)	(0.185)	(0.133)
$Expenses_{it-1} * High\_Enforc_i$	-0.023	0.239***	0.043	-0.028
	(0.097)	(0.025)	(0.096)	(0.017)
$Expenses_{it} * High\_Enforc_i$	**-0.246****	**-0.295*****	**-0.713*****	**-0.314***
	(0.124)	**(0.024)**	**(0.217)**	**(0.185)**
$Expenses_{it+1} * High\_Enforc_i$	0.006	0.063***	0.028	0.031
	(0.013)	(0.003)	(0.020)	(0.041)
Intercept	0.018	0.129***	0.219*	0.242***
	(0.045)	(0.044)	(0.113)	(0.086)
Control Covid	Yes	Yes	Yes	Yes
Accounting Standard FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

G20 Member FE	No	No	No	No
Firm FE	No	No	No	No
Observations	116,006	138,424	79,816	32,730
R-squared	0.939	0.989	0.219	0.875
p-value of Test F	0.000	0.000	0.000	0.000

Notes: Column shows the results of OLS regression without control for covid-19, and with accounting standard-year and industry-fixed effects for phases of the business cycle with correct standard errors for G20 Member and firm-clustering effects. To mitigate the influence of outliers, we winsorized all continuous variables at the 2nd and 98th percentiles. Standard errors are reported in parenthesis. *, **, and *** indicate 10%, 5%, and 1% significance levels for two-tailed t-tests.

The results presented in Table 6 are consistent with our main finds. First, we can observe that in the context of low levels of enforcement, following Brown et al. (2014), there is a great matching in the expansion phase of the business cycle, following the recession, recovery, and contraction phases. These results imply the contemporaneous relation between revenues and expenses varies between the phases of the business cycle with large a quality of matching during periods of economic expansion.

Second, in countries with a high level of enforcement, we observed a reduction in the quality of revenue-expense matching in all phases of the business cycle. This result is consistent with our expectation that is poor matching quality in this context, as the more standards are created and the most rigorous the inspection committees (Brown et al., 2014; Dichev & Tang, 2008; Hyun & Cho, 2018; Moscariello et al., 2020). Moreover, the results suggest that in the recession phase of the business cycle, there is more reduction in contemporaneous relation between revenues and expenses to the countries with a high level of enforcement, which is consistent with the finds presented in Table 5.

Finally, we investigate whether our results hold excluding in the sample the years after the COVID-19 pandemic. Untabulated findings indicate that our results continue robust when we estimate this sample. Therefore, corroborate the confirmation of our hypotheses, and contribution to prior accounting literature demonstrating that economic activities are important determinants of earnings quality (Jenkins et al., 2009; Paulo & Mota, 2019; Wang et al., 2015) and especially in revenue-expense matching (He & Shan, 2016).

5 CONCLUDING REMARKS

This study analyzed whether the business cycle phase has different reflexes on matching quality from revenues and expenses. Furthermore, we were tests whether this relationship varies across the level of the enforcement of accounting standards. The properties of earnings accounting and the quality of financial reporting directly affect different stages of the business cycle as suggested by the previous literature (Jenkins et al., 2009; Wang et al., 2015). However, it is unclear how the matching quality varies across business cycles.

In our research design, we were using the model measure of revenue-expense matching by Dichev and Tang (2008), and we classified the business cycle based on Schumpeter's model analyzing firms of countries member of the G20 due to their representativeness in global GDP, global trade, and world population (G20, 2023).

Our hypothesis 1, that the quality of matching is lower in the stages of the economic cycle of recession, contraction, and recovery, in relation to expansion, was only confirmed when the sample was divided into low and high enforcement countries. For the whole sample, this could not be confirmed. Thus, the legal-cultural environment can also be seen as having a

moderating effect on the moderation of the economic cycle on the quality of matching. The results confirmed H2 that the matching quality is lower in the recession stage compared to the others. And regarding hypothesis 3, this was confirmed by the same results that confirmed H1. By separating the sample between high and low enforcement, we also identified that the matching quality is higher in low enforcement. In this case, the coefficient approached to 1 (1.037) considering the reference in the expansion stage, since perfect matching denotes a coefficient equal to 1.

Our results advance the understanding of the determinants of matching quality, which are affected by different stages of the business cycle and institutional settings. Our findings are potentially important to regulators, investors, managers, and academics by indicating that the capable combinations of revenues and expenses contemporaneously are negatively affected in periods of low rates of economic growth, like in the recession phase of the business cycle. Our findings also suggest that the relationship between matching quality and business cycle varies between legal structures, being lower in countries with high enforcement of accounting standards.

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