Book-tax Differences as an Indicator of Earnings Management and Tax Avoidance: An Analysis in the G-20 Countries

ABSTRACT

Objective: The aim of this study was to empirically examine whether book-tax differences (BTD) is an indicator of earnings management and tax avoidance in G-20 countries.

Method: This research analyzed 22 countries between 2006 and 2016 and applied Tang's (2014) model, which aims to evaluate the association between BTD, earnings management (EM), tax avoidance (TA) and its interaction term (EMxTA). This model was applied in each country individually and for the G-20 as one using panel data adjusted by fixed effects.

Originality/Relevance: BTD is considered a proxy capable of indicating EM and TA since the difference between book income and taxable income may arise due to these manipulations. Nevertheless, few studies evaluated this association empirically, especially in several countries simultaneously. Therefore, this research contributes to the theme by presenting empirical evidence on this relationship in an international context.

Results: It was observed a positive and significant association between BTD and TA in all countries, either individually or in the G-20. However, EM was significant and positive only in some countries individually, but not jointly in the G-20. Finally, most countries and the G-20 had a positive association between BTD and the interaction term (EMxTA).

Theoretical/Methodological contributions: Evidence implies that BTD can be often considered a proxy for detecting TA and EM. This contributes to the accounting literature as it presents empirical evidence corroborating the theory. Besides, this study is relevant to a scarcely studied area which is the way TA and EM are performed, i. e., whether there is a trade-off between these manipulations or if they are performed simultaneously.

Keywords: Book-tax Differences. Earnings Management. Tax Avoidance.

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Journal of Accouting, Management and Governance. Brasilia, V.22 N.3, p. 352-367, Sep-Dec. 2019

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1 INTRODUCTION

Firms' flexibility to disclose a taxable income that is distinct from book income changes across nations. This flexibility may be higher or lower between countries, depending on the level of book-tax conformity (BTC) required in each. In general, BTC can be understood as the proximity between financial and tax rules and is characterized by the link between book income and taxable income. In this sense, Atwood, Drake, and Myers (2010) define BTC as the flexibility that a firm has to report a taxable income that is different from book income. Consequently, the requirement for greater BTC implies lower differences between book income and taxable income, i. e., book-tax differences (BTD).

BTD can inform about earnings quality since the differences between book income and taxable income provide information about the transitional components of income (Marques, Costa, & Silva, 2016). This is the case of earnings management (EM) and tax avoidance (TA), in which the difference between book income and taxable income becomes a useful measure to indicate such manipulations (Hanlon, 2005; Tang, 2005; Tang & Firth, 2011). BTD can indicate EM and TA because differences between accounting standards and tax rules allow managers to exploit this gap opportunistically, since they have different incentives to report firm performance (Desai, 2005; Tang, 2005). Specifically, Frank, Lynch, and Rego (2009) explain that low BTC allows managers to manipulate book income and taxable income in opposite directions, which results in higher BTD.

BTD arises from the differences between financial and tax rules, as well as from EM and TA practices. In this sense, Tang and Firth (2011) point out that BTD reflects not only technical differences between the two sets of rules (financial and tax standards) but also the opportunistic differences resulting from managerial choices when reporting firm performance. Thus, BTD is an indicator that captures both EM and TA, as seen by Ferreira *et al.* (2012), Formigoni, Antunes and Paulo (2009) and Furtado, Souza and Neto (2016) in Brazil, Tang (2005) and Tang and Firth (2011) in China, and Phillips, Pincus and Rego (2003) and Seidman (2010) in USA. Most of these papers, however, focus on a particular country, except for Tang (2014), who presents this analysis in 32 countries - although this is not the author's main objective.

This study raises the following research question: Can earnings management and tax avoidance explain the book-tax differences in different G-20 countries? As a result, the purpose of this study is to empirically examine whether BTD is an indicator of earnings management and tax avoidance in the G-20 countries during the period 2006-2016.

This issue is important for investors and governments as it demonstrates whether BTD can be used as an indicator of EM and TA in different countries. Moreover, by empirically evaluating several countries, this research provides evidence on the theory that BTD is capable of indicating EM and TA in firms, being important for managers to evaluate manipulation practices in a managerial context. Finally, this paper expands previous research by encompassing several G-20 countries, which account for over 80% of global wealth and about 75% of world trade.

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2 THEORETICAL BACKGROUND

2. 1 Book-Tax differences

Book-tax differences (BTD), according to Tang and Firth (2011), refers to the gap between the book income disclosed in a firm's financial statements and the taxable income reported to tax authorities. These differences, in turn, arise for several reasons. First, financial and tax systems have different users and objectives, and therefore, divergent rules. While taxable income is determined by fiscal standards – in which policymakers formulate tax rules to collect revenue, encourage/discourage some activities, stimulate economy and avoid income underestimation – book income is calculated according to Generally Accepted Accounting Principles (GAAP) and seeks to capture economic transactions in order to provide useful information for decision-makers (Ferreira *et al*., 2012; Hanlon & Heitzman, 2010; Moore & Xu, 2018).

Second, BTD can stem from the different treatments associated with profits timing and location (Desai, 2005). For the time being, tax authorities emphasize the receipt of revenues and payment of expenses or follow a hybrid regime, not allowing firms to recognize unpaid expenses or defer revenues that have already been received (Desai, 2005; Hanlon & Heitzman, 2010). On the other hand, book income is determined on an accrual basis over which revenue is recognized when realized and jointly associated with the expense (Desai, 2005). As for the location, Hanlon and Heitzman (2010) point out that while tax rules focus on the earnings location so that the appropriate jurisdiction can tax, consolidated financial statements include all gains and losses of subsidiaries, regardless of where they are realized.

In sum, the differences between financial and tax rules regarding the treatment of income and expenses, whether on timing or location, represent the normal portion of BTD. This normal BTD refers to mechanical differences between accounting and tax disclosure rules, signaling the gap between GAAP and tax rules (Tang & Firth, 2011).

2.2 Book-tax Differences, Earnings Management and Tax Avoidance

Besides emerging from the differences in financial and tax rules, BTD can also arise from manager decisions, for example, when applicating accounting rules, generating estimates and manipulating earnings, which corresponds to abnormal BTD (Moore & Xu, 2018). Abnormal BTD, according to Tang (2005), reflects the opportunistic differences from management choices in financial and tax disclosure, quantifying earnings management (EM) and tax avoidance (TA).

EM, according to Martinez (2013), can be defined as the practice of using discretionary accounting choices (recognition and measurement), operational decisions and/or selection of criteria for reporting financial statements (disclosure), within the limits of accounting standards, to modify the earnings disclosed and to influence perceptions about the underlying economic facts. On the other hand, tax management, evidenced by tax avoidance, involves the exploration of uncertainty in tax rules in order to choose an advantageous method and to structure activities with favored taxation to legally influence tax liabilities (Tang, 2005). Therefore, tax avoidance takes advantage of tax rules ambiguities with the purpose of reducing taxable income (Costa, 2012).

This trade-off between tax incentives to reduce taxable income and financial incentives to increase book income originate BTD (Chan, Lin, & Mo, 2010). Specifically, when managers have different incentives to disclose firm performance they can implement accounting standards and tax rules opportunistically, increasing BTD (Tang, 2005). Thus, BTD can be considered a proxy for detecting EM and TA, as analyzed in several studies.

In the USA, Phillips *et al*. (2003) have evaluated the use of deferred taxes (BTD proxy) as a metric to detect EM, observing US companies and evaluating three contexts: EM

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to avoid earnings decline, to avoid losses and to meet analysts' forecasts. Thus, the authors have concluded that deferred taxes can increment accrual measures in detecting EM in the first two cases. Also in the US, Seidman (2010) provides evidence on the quality of BTD as a proxy for EM and TA adjusting three factors: macroeconomic conditions, EM and changes in GAAP. In this sense, the author has found that BTD is a reasonable proxy for EM, but adjusting the effects of changes in GAAP generates a better proxy for EM.

In China, Tang (2005) has investigated BTD's potential in capturing EM and TA using an association test between abnormal BTD and the incentives for these manipulations. Results had shown that firms with higher incentives for EM and TA had higher abnormal BTD, suggesting that BTD is a useful proxy for such manipulations, after controlling for accounting-tax misalignment. Likewise, Tang and Firth (2011) also have found similar results.

In the Brazilian context, several studies in this area can be found. For example, Ferreira *et al.* (2012) and Júnior, Kronbauer, Martinez, and Alves (2018) have sought to explain discretionary accruals due to BTD and concluded that a higher BTD is associated with higher discretionary accruals. For the authors, this result indicates that BTD may serve as a supplement to diagnose discretionary practices used by managers, specifically earnings management. Inversely, Furtado *et al.* (2016) have found that higher BTD is associated with lower use of discretionary choices by managers. In turn, Formigoni *et al.* (2009) have aimed to know BTD composition in order to identify whether EM and TA could explain it. However, the authors could not reach a conclusion because the models were not significant. Finally, Fonseca and Costa (2017) have examined the institutional and non-institutional determinants of BTD and found that discretionary accruals were not significant to explain BTD.

Lastly, it should be noted that EM and TA depend on the book-tax conformity (BTC) required in each country. Where BTC is high, managers end up with a choice between tax and financial disclosure decisions because EM to increase book income is accompanied by higher taxes and TA to reduce taxable income produces lower profits to shareholders (Blaylock, Gaertner, & Shevlin, 2015; Shackelford & Shevlin, 2001). Therefore, managers must choose which profit to manage, i. e., there is a trade-off between EM and TA.

On the other hand, in countries where BTC is low, EM and TA could occur simultaneously, increasing BTD. This is because of the gap between financial and tax rules, which increases the differences between book income and taxable income and allow managers to manipulate one of these results without influencing the other or to manage both information in opposite directions (Frank *et al.*, 2009). Consequently, the exercise of discretion to manage income and taxes results in BTD and, therefore, BTD is useful for detecting such manipulations, as corroborated by previous research. Thus, this research raises the following hypotheses:

H_1: There is a positive and significant association between BTD and tax avoidance in G-20 countries during the period 2006-2016.

H_2: There is a positive and significant association between BTD and earnings management in G-20 countries during the period 2006-2016.

3 METHODOLOGICAL PROCEEDINGS
3.1 Sample and Data Collection

This study analyses G-20 countries and collect accounting information, in local currency, of non-financial firms listed on each country's main stock exchange during 2006 and 2016. To compose the sample, it was required that each country-year had at least 35

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usable data following some exclusions: firms with zero total assets, zero or negative pre-tax book income, and negative current tax expense (Tang, 2014). Thus, the final sample comprises 22 countries, as shown in Table 1.

Table 1
Firms amount by country

Country	Stock Exchange	Total	Excluded	Sample
Argentina	Bolsa de Comercio de Buenos Aires	85	20	65
Australia	Australian Securities Exchange	2.256	599	1.657
Belgium	Euronext.liffe Brussels	294	194	100
Brazil	B3 – Brasil Bolsa Balcão	502	241	261
Canada	Toronto Stock Exchange	1.961	1.333	628
China	Shanghai Stock Exchange	1.462	236	1.226
Finland	Nasdaq Helsinki	160	39	121
France	Euronext.liffe Paris	1.214	566	648
Germany	Deutsche Boerse AG	1.166	644	522
Greece	Athens Stock Exchange	218	36	182
India	National Stock Exchange of India	1.955	418	1.537
Indonesia	Indonesia Stock Exchange	574	144	430
Italy	Bolsa de Valores da Itália	455	228	227
Japan	Japan Exchange Group	3.038	420	2.618
Netherlands	Euronext.liffe Amsterdam	144	57	87
Russia	MICEX – RTS	277	70	207
South Africa	Johannesburg Stock Exchange	455	227	228
South Korea	Korea Exchange	1.254	561	693
Spain	Bolsa de Madrid	243	86	157
Turkey	Borsa İstanbul	455	187	268
UK	London Stock Exchange	1.678	531	1.147
USA	NYSE	2.536	1.159	1.377
Total		22.382	7.996	14.386

According to Table 1, the population comprises 22,382 companies currently listed. However, after financial firms elimination and the previously exclusions, the sample totalized 14,386 firms listed in 22 countries. This amount, analyzed over a period of 11 years (2006 to 2016), sums approximately 158,246 observations. The number of listed firms in each country varies considerably because the sample comprises stocks exchanges of different sizes and levels of development (Leuz, Nanda, & Wysocki, 2003).

3.2 Econometric Models

As a period of 11 years is analyzed, this study uses panel data regressions. In order to identify BTD as a proxy for earnings management and tax avoidance in each G-20 country, Tang's model (2014) was chosen. This regression model uses BTD as the dependent variable and EM, TA and their interaction term as independent variables, as shown by Equation (1):

$$BTD_{i,t} = \theta_0 + \theta_1 TP_{i,t} + \theta_2 DACC_{i,t} + \theta_3 DACC*TP_{i,t} + \varepsilon_{i,t} \tag{1}$$

In which:

$BTD_{i,t}$ = total book-tax differences of firm i in year t, calculated as pre-tax book income (PTBI) multiplied by each country's statutory tax rate (STR) less current tax expenses (CTE). The result is scaled by total assets;

$TP_{i,t}$ = represents tax avoidance of firm i in year t. TP is calculated as the STR less current effective tax rate (ETR), which is the ration between CTE and PTBI. STR data were obtained through KPMG Corporate Tax Rates Table;

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$DACC_{i,t}$ = represents earnings management and is given by the discretionary accruals of firm i in year t, which corresponds to residuals from Kothari, Leone, and Wasley (2005) model;

$DACC*TP_{i,t}$ = interaction term between earnings management and tax avoidance of company i in year t;

$\varepsilon_{i,t}$ = random regression error with $\varepsilon_{i,t} \sim N(0, \sigma^2)$.

Model 1 uses abnormal BTD to explain book-tax differences and the portion that cannot be explained by the regression (i.e. the standard regression error) corresponds to standard-related differences (normal BTD), or as Tang (2014) calls it, mandatory BTC. Thus, TP and DACC variables are expected to present a positive sign, as earnings management and tax avoidance cause BTD (Hanlon, 2005; Tang, 2005; Tang & Firth, 2011). In addition, the DACCTP variable can be expected to present both a positive and a negative sign, as these manipulations may face a trade-off or occur simultaneously (Frank *et al.*, 2009).

Besides being applied in each country, Model 1 is also executed in G-20 as a whole. In this case, some control variables are added, such as investor protection, IFRS adoption and legal enforcement, which are countries' institutional characteristics. Thus, Model 1 employed in the G-20 is given by (1.1):

$$BTD_{i,t} = \theta_0 + \theta_1 TP_{i,t} + \theta_2 DACC_{i,t} + \theta_3 DACC*TP_{i,t} + \theta_4 IFRS_{p,t} \quad (1.1)$$
$$+ \theta_5 PDI_{p,t} + \theta_6 ILEG_{p,t} + \varepsilon_{i,t}$$

Where:

$IFRS_{p,t}$ = equals 1 if country p requires IFRS adoption in year t and 0 otherwise;

$PDI_{p,t}$ = investor protection of country p in year t, obtained from World Bank Protecting Minority Investors Index (range from 0 to 10);

$ILEG_{p,t}$ = legal enforcement of country p in year t, represented by World Bank Rule of Law Index (range from -2.5 to 2.5);

To obtain discretionary accruals required in Models 1 and 1.1 it was applied the Kothary *et al.* (2005) model, from which the residuals are estimated for each country. The model is presented as follow (2):

$$TA_{i,t} = \alpha_0 + \alpha_1 \left(\frac{1}{A_{i,t-1}}\right) + \alpha_2(\Delta REC_{i,t} - \Delta CAR_{i,t}) + \alpha_3 IMOB_{i,t} + \alpha_4 ROA_{i,t-1} + \varepsilon_{i,t} \quad (2)$$

In which:

$TA_{i,t}$ = total accruals of firm i in time t, given by the change in non-financial current assets minus the change in current liabilities, excluding the current portion of long-term debt, less depreciation, and amortization, scaled by total assets at t-1;

$A_{i,t-1}$ = total assets at the end of t-1;

$\Delta REC_{i,t}$ = change in sales revenue from year t-1 to t, scaled by total assets of t-1;

$\Delta CAR_{i,t}$ = change in accounts receivable in year t-1 through t, scaled by total assets at t-1;

$IMOB_{i,t}$ = net fixed assets in year t divided by total assets in t-1;

$ROA_{i,t-1}$ = return on assets in period t-1;

$\varepsilon_{i,t}$ = random regression error, where $\varepsilon_{i,t} \sim N(0, \sigma^2)$.

Jones's model (1991) suggested by Kothari *et al.* (2005) was chosen because, among earnings management models, this stands out (Martinez, 2013) since it includes a performance measure (ROA). In addition, this model was executed with panel data adjusted by fixed effects.

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3.3 Analysis of Regression Assumptions

Before performing the regressions, some statistical care was taken in order to obtain more robust results. First, to mitigate possible outlier effects, data were winsorized by 1% and 99%. Also, testing the existence of unit roots, the Fisher-Type Test was applied in order to verify stationarity. Finally, the following problems arising from regression analysis were observed:

a) Heteroskedasticity and Autocorrelation: In order to obtain standard errors consistent with heteroskedasticity and autocorrelation problems, regressions were performed with robust standard errors clustered by industry. For the regression performed jointly in the G-20, the clustering took place by country.

b) Multicollinearity: the Variance of Inflation Factor (VIF) was calculated to verify whether independent variables of each model are strongly correlated. If VIF is greater than ten, it is possible to verify the existence of strong multicollinearity. However, it should be noted that the inclusion of interaction terms increases the chances of this problem. Thus, to reduce potential multicollinearity problems, Models 1 and 1.1 were performed with variables centered on the mean, which is a technique of subtracting each observed value of a continuous variable by their mean and then calculating the interaction product. (Shieh, 2011).

c) Normality of residuals: to test if residuals are normally distributed, the Shapiro-Wilk test was performed.

Regarding models choice, Equations 1 and 2 were performed with only one type of adjustment in order to maintain consistency. Thus, these models were adjusted for fixed effects as this is plausible when samples are made up of populations (which in this case are all non-financial firms listed on each country's main stock exchange). For Model 1.1, the Hausman, Breush-Pagan and Chow tests are performed with the objective of identifying the most appropriate model: fixed, random or pooled effects, which indicate the use of a fixed-effects model.

4 RESULTS PRESENTATION

4. 1 Descriptive statistics

Table 2 presents the descriptive statistics of Model 1 variables in each country, as well as the overall average.

As noted in Table 2, most countries (as well as the overall average) had positive BTD, i.e., taxes that would be paid based on the statutory tax rate (STR) was higher than current tax expenses, demonstrating that book income was higher than taxable income in most nations. Conversely, negative BTD in some countries indicates that current tax expenses were higher than taxes that would be due based on the statutory tax rate, suggesting that taxable income was higher than book income. Tax avoidance measure (TP) was mostly negative, suggesting that the effective tax rate (ETR) was higher than the tax rate determined in each country. Finally, represented by discretionary accruals (DACC), EM has shown a negative average across all countries, indicating that firms managed earnings to report a lower profit.

However, these averages may differ between countries with certain institutional features. In this sense, Table 3 presents a comparison of means between countries with different legal systems, IFRS convergence status, level of investor protection and legal enforcement, as these characteristics may be related to greater BTD, EM, and TA (Ball, Kothari, & Robin, 2000; Costa, 2012; Niyama, Rodrigues, & Rodrigues, 2015).

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Table 2
Descriptive Statistics

Countries	BTD			TP			DACC		
	Obs.	Mean	SE	Obs.	Mean	SE	Obs.	Mean	SE
Argentina	520	0,0023	0,0232	520	-0,0690	0,9382	660	-0,0255	0,0294
Australia	4.090	0,5712	20,0315	4.142	-0,0559	2,7316	12.843	-0,0329	0,0659
Belgium	618	0,0093	0,0434	620	0,0026	0,7845	896	-0,0501	0,0319
Brazil	1.783	0,0101	0,0984	1.783	-0,1470	3,1674	2.504	-0,0243	0,0345
Canada	2.814	0,0064	0,0926	2.825	-0,5711	18,8055	5.770	-0,0503	0,0164
China	9.523	0,0064	0,0458	9.536	0,0309	0,5261	10.114	-0,0011	0,0308
Finland	832	-0,0002	0,0103	832	-0,0909	0,8539	1.093	-0,0483	0,0263
France	3.911	0,0037	0,0325	3.917	-0,0451	1,1463	5.467	-0,0405	0,0195
Germany	3.422	0,0122	0,3132	3.424	-0,1176	3,6894	4.787	-0,0412	0,0211
Greece	988	0,0033	0,1664	989	-0,6223	6,1863	1.895	-0,0397	0,0249
India	11.715	0,0076	0,0198	11.725	-0,0855	8,3040	12.810	0,0014	0,0593
Indonesia	3.124	0,0021	0,0792	3.127	-0,1917	3,5249	3.759	-0,0190	0,0282
Italy	1.434	-0,0016	0,0348	1.438	-0,3837	2,8330	1.976	-0,0430	0,0188
Japan	22.244	-0,0012	0,0749	22.263	-0,1670	4,1708	25.181	-0,0297	0,0076
Netherlands	563	0,0038	0,0461	563	-0,1647	1,8819	791	-0,0514	0,0375
Russia	1.537	-0,0051	0,0420	1.539	-0,1992	2,7905	1.784	-0,0349	0,0210
South Africa	1.767	0,0076	0,0718	1.768	-0,0265	0,7556	1.991	-0,0247	0,0196
South Korea	5.221	0,0001	0,0109	5.222	-0,0912	0,9943	6.648	-0,0227	0,0224
Spain	849	0,0152	0,2847	849	-0,0411	0,9836	1.261	-0,0432	0,0490
Turkey	1.644	0,0026	0,0152	1.649	-0,2095	3,6691	2.425	-0,0095	0,0352
UK	5.695	0,0021	0,0258	5.697	-0,0789	0,9708	9.609	-0,0445	0,0204
USA	9.497	0,0693	1,8673	9.619	-0,0072	2,6048	11.302	-0,0430	0,0174
Overall	93.791	0,0348	4,2270	94.047	-0,1149	5,1583	125.565	-0,0285	0,0378

Table 3
Mean comparison of Model 1 variables

Characteristics	BTD		TP		DACC	
	Mean	Z	Mean	Z	Mean	Z
Common Law	0,0879	71,11***	-0,0954	63,50***	-0,0305	-55,22***
Code Law	0,0023		-0,1269		-0,0269	
IFRS	0,0600	-3,29***	-0,1166	-3,23***	-0,0316	42,77***
Non-IFRS	0,0143		-0,1136		-0,0250	
Strong protection[1]	0,0145	18,47***	-0,1364	17,35***	-0,0354	75,35***
Weak protection[1]	0,0568		-0,0915		-0,0214	
Strong enforcement[1]	0,0811	-19,90***	-0,1014	-20,42***	-0,0401	142,72***
Weak enforcement[1]	0,0032		-0,1242		-0,0180	

Note. Mann-Whitney nonparametric mean test because data did not have a normal distribution.
[1] Classification between countries with strong/weak protection and legal enforcement was made from values above (strong) or below (weak) the median.
***1% of significance

According to Table 3, almost all means were statistically different. First, BTD was higher in common law countries and in IFRS adopters than in code law countries and non-adopters. Also, BTD was greater in countries with weak investor protection and strong legal enforcement. Tax avoidance measure (TP) was more negative in code law countries, IFRS adopters, and in nations that have strong investor protection and weak legal enforcement. Thus, this evidence suggests that in countries with these characteristics, firms tend to perform less TA. In turn, earnings management was more negative in common law countries (which are principle-based), IFRS adopters, and in countries with strong investor protection and high legal enforcement, indicating that in countries with these features, earnings management was performed to reduce earnings.

4.2 Regressions Results

Preliminary to Model 1 regressions with panel data, the statistical precautions described in Section 3.3 were adopted. Thus, Table 4 presents the results of Model 1 with mean-centered variables and robust standard errors clustered by industry.

According to Table 4, the VIF in every country was less than ten, indicating the absence of strong multicollinearity between independent variables. In addition, the Shapiro-Wilk test had a p-value lower than 5% in all countries, suggesting errors did not follow a normal distribution. However, based on the Central Limit Theorem, this assumption can be relaxed because in sufficiently large samples, the test statistics will follow the appropriate distributions, even in the absence of error normality (Brooks, 2014).

Table 4
Model 1 results by country

$$BTD_{i,t} = \theta_0 + \theta_1 TP_{i,t} + \theta_2 DACC_{i,t} + \theta_3 DACC*TP_{i,t} + \varepsilon_{i,t}$$

Countries	TP	DACC	DACC*TP	Constant	Obs.	R^2-within	F-Statistic	Mean VIF	Shapiro-Wilk
Argentina	0,0349***	0,0302	0,2180	-0,0011**	495	0,2895	7,49***	1,17	0,0000***
Australia	0,0480***	0,1169***	0,3411	0,0129***	3.683	0,0896	13,53***	1,59	0,0000***
Belgium	0,0215***	-0,0140	0,0696	0,0066***	596	0,2131	33,66***	1,06	0,0000***
Brazil	0,0097***	0,0089	0,1948***	0,0052***	1.655	0,1772	14,59***	1,12	0,0000***
Canada	0,0120***	-0,0177	0,1343	-0,0029***	2.642	0,1665	68,34***	1,80	0,0000***
China	0,0300***	0,0238***	0,3194***	0,0037***	8.674	0,3958	328,15***	1,06	0,0000***
Finland	0,0197***	-0,0359	0,0836	-0,0012***	776	0,3086	25,64***	1,16	0,0000***
France	0,0185***	-0,0374	0,1078	0,0020***	3.668	0,2635	35,61***	1,09	0,0000***
Germany	0,0281***	-0,0442	0,3391**	0,0002	3.251	0,3173	55,30***	1,56	0,0000***
Greece	0,0018***	0,0457**	-0,0274***	-0,0035***	954	0,1227	15,98***	1,09	0,0000***
India	0,0363***	-0,0067	0,2424***	0,0017***	9.830	0,3285	51,73***	1,37	0,0000***
Indonesia	0,0192***	-0,0168	0,1933***	-0,0025***	2.815	0,2894	75,86***	1,37	0,0000***
Italy	0,0042***	-0,0519*	0,0895*	-0,0034***	1.314	0,1703	17,66***	1,09	0,0000***
Japan	0,0147***	-0,1411***	0,3929***	-0,0025***	21.351	0,3537	211,66***	1,35	0,0000***
Netherlands	0,0097***	0,0520*	-0,0761	0,0003	537	0,2193	11,93***	1,14	0,0000***
Russia	0,0245***	0,1028***	-0,3282***	-0,0061***	1.340	0,2891	33,11***	1,14	0,0000***
South Africa	0,0378***	0,0793**	0,3801	0,0033***	1.629	0,3308	61,76***	1,16	0,0000***
South Korea	0,0151***	0,0032	0,1471***	-0,0008***	4.931	0,3254	63,08***	1,16	0,0000***
Spain	0,0228***	-0,0037	0,0345	0,0027***	784	0,3405	236,11***	1,44	0,0000***
Turkey	0,0212***	-0,0087	0,2416*	-0,0012***	1.497	0,2218	30,20***	1,43	0,0000***
UK	0,0157***	-0,0219	-0,1020*	0,0006***	5.301	0,2039	75,34***	1,02	0,0000***
USA	0,0221***	0,0606	0,1865***	0,0084***	8.733	0,1822	124,76***	1,19	0,0000***

Note: ***1% of significance, **5% and *10%

As for model explanatory power, Table 4 demonstrates that F-statistic was significant at 1% in all countries. Yet, this model explanatory power differs across countries, such as China (where 39.58% of BTD variation could be explained by the proposed model) and Australia (where R^2 was the lowest, explaining only 8.96 % of the change in BTD).

Regarding the variables, tax avoidance (TP) was positive and statistically significant at 1% in all sampled nations, corroborating the hypothesis H_1. This suggests that greater TA is associated with larger differences between book income and taxable income. In turn, earnings management measure (DACC) was significant in only eight countries: South Africa, Australia, China, Greece, the Netherlands, Italy, Japan, and Russia. Most of these countries showed a positive association between BTD and EM, except for Italy and Japan. Therefore, in the remaining countries, it can be stated that the higher the discretionary accruals, the higher is BTD, consistent with the hypothesis H_2.

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Finally, it was found that earnings management and tax avoidance interaction term (DACC*TP) was statistically significant in more than half of the analyzed countries. In Greece, UK, and Russia, there was a negative association between DACC*TP and BTD, indicating that the greater the effect of earnings management on BTD, the lower the impact of TA on BTD, and vice versa. On the other hand, the interaction term had a positive association with BTD in the remaining countries: Germany, Brazil, China, South Korea, USA, India, Indonesia, Italy, Japan, and Turkey. This means that for each unit of change in EM (TA), TA (EM) increases BTD.

In sum, the results corroborate the hypothesis H_1 that there is a positive and significant relationship between TA and BTD in all G-20 countries. However, the hypothesis H_2 that the relationship between EM and BTD is positive and significant is only confirmed in some countries, notably South Africa, Australia, China, Greece, the Netherlands, and Russia.

In addition to Model 1 results individually, this study also presents a regression with all G-20 countries together, adding some institutional control variables, which results are presented in Table 5.

Table 5

Model 1.1 results in the G-20

Variables	Coefficient	P-value	Statistics	
TP	0,0198***	0,000	Obs.	86455
DACC	0,0019	0,832	R^2	0,2682***
DACC*TP	0,2705***	0,000	VIF	1,12
IFRS	-0,0014	0,370	Shapiro-Wilk(p-value)	0,0000
PDI	0,0005**	0,025	Hausman test (p-value)	0,0000
ILEG	0,0002	0,922	Breush-Pagan test (p-value)	0,0000
Constant	-0,0023	0,213	Chow test (p-value)	0,0000

Note: ***1% of significance and **5%

As observed in Table 5, Model 1.1 was statistically significant at 1%, explaining 26.82% of BTD variation in G-20 countries. As in the previous results, there is also the absence of multicollinearity problems and the lack of error normality.

Regarding the variables, tax avoidance (TP) remained positive and statistically significant at 1%, confirming the hypothesis H_1 and the results obtained individually in each country. In turn, earnings management (DACC) did not have statistical significance, not corroborating hypothesis H_2 that there is a positive and significant relationship between EM and BTD in G-20 countries. The interaction term DACC*TP was positively associated with BTD, consistent with the results obtained in most individual countries. Thus, it can be stated that, in G-20, earnings management and tax avoidance occur simultaneously, increasing the difference between book income and taxable income.

Finally, it is possible to verify that investor protection (PDI) presented a significant and positive association with BTD. This means that the higher the level of investor protection in a country, the more book income moves away from taxable income.

5 RESULTS DISCUSSION

Table 2 shows that most countries had higher book income than taxable income. For Machado and Nakao (2012) this indicates that even with EM and TA practices, the disclosure of accounting information in these countries has served the interests of tax authorities (which aims to collect taxes) and investors (whose interest is to obtain reliable information without managers' opportunism). Also, Table 2 demonstrates that only Belgium and China showed evidence of TA, as the effective tax rate was lower than the statutory tax rate. About China,

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Tang and Firth (2011) explained that the tax system provides several tax incentives, which can make effective tax rates become significantly lower than the nominal rate. In addition, variation in tax burdens and inefficient tax administration within a country also provide incentives for firms to get involved in TA practices.

Table 3 shows higher BTD in common law countries and in IFRS adopters than in code law countries and in those who have not yet converged. Regarding the legal system, this result may be due to the greater gap between the financial and the tax rules of common law countries. In this sense, Ball *et al*. (2000) explained that in common law countries there is less government interference in the definition of accounting practices, resulting in low BTC and high differences between book income and taxable income. On the other hand, in code law countries, whose BTC is higher, BTD is lower due to the greater influence of regulation and tax accounting on financial statements (Ball *et al.*, 2000).

In turn, the highest BTD in IFRS adopters is also corroborated by Costa (2012), who found that international accounting standards increased BTD in Brazil. This occurs, according to Chan *et al.* (2010), because the IFRS signals a greater distance between accounting and tax disclosure, besides leading to greater EM and TA. Indeed, Table 3 also supports this idea, as IFRS adopters showed more downward earnings management. This result, as well as the evidence of higher downward EM in common law nations, can be explained by the adoption of principle-based accounting standards, which characterizes international accounting standards and the common law system. Specifically, principle-based standards facilitate EM practices, as they do not reach all possible situations and provide greater discretion to managers (Matsumoto & Parreira, 2009; Niyama *et al*., 2015).

Table 3 also shows greater downwards earnings management in countries with strong investor protection and strong legal enforcement. However, this evidence contradicts the literature that strong investor protection and legal enforcement limit incentives for EM (Leuz *et al*., 2003). Finally, Table 3 further demonstrates that TA was higher in countries with weak investor protection and strong legal enforcement. This evidence differs from Atwood, Drake, Myers and Myers (2012) and Tang (2014), who found that strong legal enforcement discourages TA as it increases the chances of detection and penalties application.

Regarding the research question, Tables 4 and 5 show that TA was one of the main causes of differences between book income and taxable income in all countries individually and jointly (G-20). Therefore, this suggests that BTD can be used as a proxy for TA in G-20 countries, consistent with studies conducted in China (Tang, 2005; Tang & Firth, 2011), USA (Seidman, 2010) and Japan (Onuma, 2013), where BTD was able to indicate TA practices. However, it is different from Tang (2014), who found that TA is significant only in some countries and has a negative association with BTD.

On the other hand, BTD can be considered a proxy to identify EM only in some countries. This is consistent with Tang (2005) and Tang and Firth (2011) in China and Tang (2014), who also observed a positive association between BTD and EM in South Africa, Australia, Greece, and the Netherlands. In Brazil, the lack of EM significance to explain BTD is consistent with Fonseca and Costa (2017) but differs from Ferreira et. al (2012), who confirmed EM and BTD association. In the USA, the results contradict evidence found by Hanlon (2005) and Phillips *et al.* (2003), whose studies observed BTD can help detect EM. Finally, together in the G-20 countries, BTD was not a proxy capable of detecting EM.

Finally, Tables 4 and 5 still provide evidence whether EM and TA are performed simultaneously or not. As EM (TA) associated with TA (EM) increases BTD, it is possible to state, based on Frank *et al.* (2009), that earnings management and tax avoidance occur simultaneously, increasing the difference between book income and taxable income. This is seen in Germany, Brazil, China, South Korea, the USA, India, Indonesia, Italy, Japan, and

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Turkey, as well as in the G-20. Similarly, Tang (2014) obtained evidence that in these countries there is a positive and significant association between BTD and TA and EM interaction term. Moreover, this simultaneity may also be a sign that these countries have low BTC, as the gap between financial and tax standards enables managers to manipulate book income and taxable income in opposite ways (Frank *et al.,* 2009).

In this sense, Atwood *et al.* (2010) ranked 33 countries according to their BTC level and confirm that Germany, the USA, and India are among the five last and countries such as Brazil and Indonesia are below the BTC median. However, findings related to China, South Korea, and Japan are not supported by the authors, as these countries were ranked among the highest BTC, while this research puts them between those with the lowest BTC.

Conversely, countries such as Greece, UK, and Russia – where for each unit of change in EM (TA), TA (EM) reduces BTD – face a trade-off on which profit to manage (Shackelford & Shevlin, 2001). This trade-off suggests a high BTC level in these countries, as the proximity between book income and taxable income reduces earnings manipulation incentives. However, Atwood *et al.* (2010) demonstrated only the UK was above the BTC median, while Greece was ranked between those countries with the lowest BTC.

6 CONCLUSIONS

Earnings management (EM) and tax avoidance (TA) are considered as BTD sources since managers have different incentives in accounting and tax reporting: they seek to report higher book income to shareholders while disclosing a lower taxable income in order to pay lower taxes. Thus, EM and TA result in greater differences between book income and taxable income, making BTD to be considered as a proxy capable of detecting such manipulations. Taking this into account, this study aimed to empirically examine whether BTD is an indicator of earnings management and tax avoidance in G-20 countries.

Results have shown a positive association between BTD and TA in all countries individually and jointly (G-20), suggesting that the higher tax avoidance, the greater the difference between book income and taxable income. Therefore, BTD can capture information on tax avoidance in G-20 countries, being relevant to investors and governments. On the other hand, EM only was positive and significant in some countries, indicating that BTD can be used by investors to detect earnings management only in some individual nations, but not jointly in the G-20. Finally, it was also found that some countries face a trade-off between tax avoidance and earnings management, suggesting a high level of BTC. However, in most of them and in the G-20, these manipulations occurred simultaneously, pointing out to a low level of conformity between accounting and tax rules.

This study is relevant to international investors and shareholders once it demonstrates that BTD can be useful to indicate earnings management in some countries. It is also useful for tax authorities and audit firms as it shows that they can focus on firms with higher BTD to identify those more prone to manage earnings and taxes. Finally, this research contributes to the literature that links BTD, EM, and TA, presenting broader empirical evidence that corroborates the theory that BTD can be used to identify such practices.

However, this study has shown some limitations as it does not control for the misalignment between financial and fiscal rules on each country, due to the use of several nations with different rules and particularities. In addition, this research has been limited by the lack of monetary update of accounting variables and control over tax incentives. Finally, it is suggested that future researches use variables related to differences between financial and tax rules to explain BTD, controlling for the misalignment of these standards. Furthermore, it would be important to consider the simultaneity of BTD and EM and TA variables, since the

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gap between accounting and tax rules (high BTD due to low BTC) allows earnings management and tax avoidance, leading to higher BTD. Finally, the application of other models to estimate discretionary accruals and the use of other BTD measures are suggested, considering, for example, permanent and temporary book-tax differences.

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Book-tax Differences Como Indicador de Gerenciamento de Resultados e de Gerenciamento Tributário: Uma Análise nos Países do G-20

RESUMO

Objetivo: *O objetivo desta pesquisa foi examinar empiricamente se a book-tax differences (BTD) é um indicador de gerenciamento de resultados e de tributos nos países do G-20.*

Método: *A pesquisa analisou 22 países durante 2006 e 2016, onde se aplicou o modelo de Tang (2014) que busca avaliar a relação entre BTD, gerenciamento de resultados (GR), gerenciamento tributário (GT) e seu termo de interação (GRxGT). O modelo foi aplicado em cada país do G-20 e para o G-20 em geral, executando-se as regressões com dados em painel ajustados por efeitos fixos.*

Originalidade/Relevância: *A BTD é considerada uma proxy capaz de indicar o GR e GT, visto que a diferença entre o lucro contábil e tributável pode surgir devido tais manipulações. Apesar disso, poucos estudos avaliam essa relação empiricamente, especialmente em vários países concomitantemente. Logo, esta pesquisa contribui para o tema ao apresentar evidências empíricas sobre essa relação em uma conjuntura internacional.*

Resultados: *Observou-se uma associação positiva e significante entre BTD e GT em todos os países, seja individualmente ou no G-20. Por outro lado, o GR só foi significante em algumas nações de maneira individual, mas não conjuntamente no G-20. Finalmente, verificou-se que a maioria dos países e o G-20 detiveram uma associação positiva entre o termo de interação (GRxGT) e a BTD.*

Contribuições teóricas/metodológicas: *As evidências implicam que a BTD pode ser considerada, muitas vezes, uma proxy para detectar o GT e o GR. Isso contribui para a literatura, pois demonstra evidências empíricas mais abrangentes que são condizentes com a teoria. Além disso, a pesquisa é relevante para uma área ainda pouco estudada, que se refere à discussão sobre a forma com que o GR e o GT são realizados, isto é, se existe um trade-off entre essas manipulações ou se essas são realizadas concomitantemente.*

Palavras-chave: *Book-tax Differences. Gerenciamento de Resultados. Gerenciamento Tributário.*

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