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Does tax avoidance differ between economies and sectors? Determinants of tax avoidance in developed and emerging economies

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Abstract

Purpose: This study aims to examine whether tax avoidance determinants result in different levels of avoidance depending on the economy and sector. Prior literature finds that firms in developed countries avoid taxes. However, the level of tax avoidance differs across developed economies. In emerging economies, there are few studies that investigate tax planning and the results are not always in line with developed economies.

Design/methodology/approach: We use a sample of firms from major economies (IMF, 2019), the G7 countries, and firms from major emerging economies, called BRICS (Brazil, Russia, India, China, and South Africa). We use a panel data multilevel analysis considering these two groups per level, one for G7 countries and the other for BRICS countries; and we also use the sector level and country and sector level combined.

Findings: We find that there are no differences in tax avoidance levels between developed and emerging economies but rather between individual countries. But industrial sector and regulatory enforcement of a country play an important role to determine tax avoidance level. It is also possible to observe that some determinants of tax avoidance do not yield different tax avoidance levels across countries and sectors.

Originality: This study fills a gap in the tax avoidance literature, showing that tax avoidance determinants may not accurately predict tax avoidance behaviour, depending on the country, sector, and level of regulatory enforcement.

Keywords: Tax avoidance. Effective Tax Rate. Developed economies. Emerging country.

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Introduction

This research aims to examine whether tax avoidance determinants result in different levels of avoidance depending on the economy and sector. Prior literature finds that firms in developed countries avoid taxes (Dyreng et al. 2008, 2017). However, the level of tax avoidance differs across developed economies (Thomsen & Watrin, 2018). We expect that the extent of tax avoidance also differs between developed and emerging economies. Using a sample of BRICS and G7 countries, we investigate corporate tax planning. Our results show that the country of the parent company as well as the industry have an impact on tax avoidance level.

Determinants of tax avoidance can be classified in the following categories: (a) firm characteristics, (b) attributes of the environment where firms operate, (c) gatekeeper restrictions, and (d) firm-level incentives for tax aggressiveness (Wild & Wilson, 2018).

With regard to firm characteristics, prior literature examines the association of tax avoidance with size, cost planning, international operations (Desai & Dharmapala, 2006, 2009); quality of the informational environment (Gallemore & Labro, 2015); business strategy (Higgins et al., 2015); financial restriction (Law & Mills, 2015; Edwards et al., 2016; Richardson et al., 2015); use of tax havens (Lee, 2017; Dyreng & Lindsey, 2009; Dyreng et al., 2015; Taylor & Richardson, 2012); social responsibility and reputation (Davis *et al.*, 2016; Hoi et al., 2013); political connections (Brown et al., 2015; Mills et al., 2013) and corporate governance (Badertscher et al., 2013; Chan et al., 2016; Chen et al., 2010; Richardson et al., 2016; Salihu et al., 2015; Desai & Dharmapala, 2009).

Prior literature also finds an association of tax planning with environmental attributes, such as investment opportunities (McGuire et al., 2014), potential political costs (Mills *et al.*, 2013), successive fiscal amnesties (Shevlin et al., 2017) and capital markets (Lisowsky, 2010; McGuire et al., 2014; Wilson, 2009).

Furthermore, the literature investigates whether some gatekeepers, such as corporate networks (Brown & Drake, 2013) and institutional investors (Khurana & Moser, 2013; Cabello et al., 2019), facilitate or inhibit tax avoidance. And finally, there are several studies on firm-level incentives for tax aggressiveness, where the effects of several firm-level variables on tax aggressiveness are tested, such as: firm-specific stock price crash risk (Kim et al., 2011), personal tax evasion (Chyz, 2013), tournament incentives (Kubick & Masli, 2016), corporate legality (Ginesti & Macchioni, 2020), among others.

However, there are few studies that investigate tax planning in emerging economies and the results are not always in line with developed economies. Regarding Brazil, Cabello *et al.* (2019) show that institutional shareholders have an impact on tax avoidance. Other studies conducted with Brazilian companies find an association between corporate governance and tax avoidance (Martinez & Ramalho, 2014; Santana & Rezende, 2016).

Companies in emerging economies must deal with a weak institutional environment or the existence of "institutional deficits" (Khanna & Palepu, 1997), inefficient legal frameworks, weak intellectual property rights, and under-developed financial markets and human capital (Hitt & Worthington, 2005). The institutional conditions of emerging economies are more turbulent than those of developed economies (Hoskinsson *et al.* 2000). Thus, it is possible to assert that companies operating in the favourable environment offered by developed economies can focus on their core business opportunities and have more time to manage the company, not having to expend resources to deal with a difficult environment.

This scenario suggests that firms can operate at different levels of tax avoidance when located in developed and emerging economies with a higher use of tax avoidance practices in emerging economies.

Considering all the potential determinants that can influence tax avoidance and the different results considering the economy where firms are located, we can assert that companies located in developed or emerging countries are likely to present higher levels of tax avoidance. Previous studies (Derashid *et al.* 2003) suggest that firms' industry can also influence tax avoidance practices. We expect and find that the country and the sector are associated with corporate tax avoidance. However, we do not find a difference when we differentiate between companies from major advanced economies (International Monetary Fund - IMF, 2019), namely, the G7 countries of Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States of America, and from emerging economies, namely, the BRICS countries of Brazil, Russia, India, China, and South Africa. This result indicates that national regulatory enforcement is an important driver of tax avoidance practices.

We contribute to prior literature by showing that different tax avoidance determinants may not successfully predict tax avoidance practices, based on country, sector, and

level of regulatory enforcement. Finally, we contribute to the tax accounting research by using a linear mixed model, encouraging new research to use the hierarchical approach to explain tax avoidance since institutional aspects of country and sector can play an important role as a determinant.

2. Theoretical Background and Hypotheses Development

In this section we develop the theoretical background who support our hypotheses.

2.1 Developed and Emerging Economies and Business Environment

An emerging economy is generally defined as one that often has low per capita income but also has quick economic development, economic liberalization as government policies and a free market economy (Hoskisson et al., 2000).

The International Monetary Fund (IMF) classifies countries into advanced and emerging economies using the following criteria: (1) per capita income level, (2) export diversification, and (3) degree of integration into the global financial system. However, this classification observes only macroeconomic indicators and does not provide many details about the business environment.

Young *et al.* (2014) examine three commonly held theories of the firm—neoclassical economics, the resource-based view, and the nexus of contracts view— and demonstrate how strategic choices at the firm level are affected by institutional weakness in emerging economies. The study suggests that (a) institutional structure is less stable in emerging economies, making it more difficult to plan, analyse and implement corporate strategies; (b) the institutional environment of emerging economies offers fewer incentives for organizational stakeholders to invest in the firm-specific organizational capital required to develop core competencies, which makes it more difficult for indigenous firms to compete in higher value-added industries or activities; and (c) contracts are harder to specify and enforce in emerging economies, making transactions costs much higher (Young *et al.*, 2014).

Even if there are differences in the business environment between emerging and developed countries, globalization can be an driver forcing firms to compete at the national and global levels; in other words, globalization can dictate the way of business (Young *et al.* 2014). However, in the business environment, companies must also address local regulatory aspects, such as tax system characteristics and tax enforcement.

Derashid *et al.* (2003), using a sample of Malaysia companies with data from 1990-1999, conduct a study that links industrial sectors and the ETR (Effective Tax Rate). The results suggest that manufacturing firms and hotels pay significantly lower effective taxes in Malaysia.

Atwood *et al.* (2012) provide evidence that tax system characteristics impact tax avoidance across countries. The study shows that firms avoid taxes less when the required book-tax conformity is higher, a worldwide approach is used, and tax enforcement is perceived to be stronger.

Xu *et al.* (2020), using an enforcement change in Taiwan, observed that the relationship between fiscal aggressiveness and company value becomes more negative after the regulatory change, contributing to demonstrate that potential increases in regulatory costs can outweigh the benefit of the stricter tax enforcement in constraining insiders' income diversion, intensifying the conflict between aggressive tax positions and shareholder wealth.

2.2 Determinants of Tax Avoidance

The prior literature investigates numerous determinants of tax avoidance. Our study examines the association of tax avoidance with the country as well as the sector. Therefore, we selected tax avoidance determinants that can perform in different outcomes considering the country and the sector, considering previous studies.

Desai and Dharmapala (2009) test whether tax avoidance tends to be associated with firm value variation. They investigate the degree to which corporate tax avoidance activity is valued by investors in a sample of 862 U.S. firms in the period of 1993-2001. The authors assert that corporate governance should be an important determinant of the valuation of purported corporate tax savings, and therefore, the net effect on firm value should be greater for firms with stronger governance institutions. The results indicate that the effect of tax avoidance appears to be more positive for well-governed firm-year than for poorly governed firm-year. Their basic results that higher-quality firm governance leads to a larger effect of tax avoidance on firm value are reinforced by the use of an exogenous source of variation due to changes in tax regulations to construct instrumental variables for tax avoidance activity. Thus, their evidence is an important

result for our research, as we will test companies exposed to different tax regulations, and this difference can be reflected in governance and consequently in firm value.

Santana and Rezende (2016) find that Brazilian (and foreign) investors are aware of the risks brought by high levels of tax avoidance activity and are willing to adjust their stock return expectations to incorporate those risks. The authors also indicate that under-developed capital markets can contribute to this result. These results are not fully aligned with those of Desai and Dharmapala (2009). This indicates that this variable can yield different behaviours between the economies we analyse.

Considering the results of Desai and Dharmapala (2009), Santana and Rezende (2016) and Derashid *et al.* (2003), we develop the following hypothesis:

H_1: Firm value is positively related to tax avoidance and results in different levels of avoidance depending on the country and sector.

The association between internal information quality (IIQ) and tax avoidance is investigated by Gallemore and Labro (2015). They observe that firms with better IIQ can achieve more favourable tax avoidance outcomes. They use five publicly available proxies of the quality of a firm's internal information environment: (1) the speed at which management is able to produce an earnings announcement after fiscal year closing, (2) management forecast accuracy, (3) the absence of material weaknesses in internal control, (4) analyst following, and (5) analyst forecast accuracy. These results indicate that firms with better quality information have lower *cash ETR* (Effective Tax Rate), consistent with these firms being better able to engage in effective tax avoidance. Another interesting result of Gallemore and Labro (2015) is that the negative effects of the geographic dispersion of companies' operations can be alleviated by IIQ.

Gallemore and Labro (2015) find that firms that operate in a very uncertain environment can offset some of the negative effect of uncertainty on their ETRs through the quality of their internal information system. Their study considers the presence of restructuring charges and sales volatility as proxies of uncertainty. However, we expect that the variable can have different effects, considering the G7 vs. BRICS groups, if emerging economies have macro and microeconomic uncertainty, such as a weak institutional environment or the existence of "institutional deficits" (Khanna & Palepu, 1997), inefficient legal framework, weak intellectual property rights and under-developed financial market and human capital (Hitt & Worthington, 2005). Thus, considering this evidence and the results of Derashid *et al.* (2003), we develop the following hypothesis:

H_2: IIQ is positively related to tax avoidance and results in different levels of avoidance depending on the country and sector.

Khurana and Moser (2013) examine whether institutional ownership affects firm tax aggressiveness using a sample of firms with institutional ownership data from 1995-2008. The results indicate that firms with higher levels of total institutional ownership are generally more tax aggressive, as are firms with relatively higher levels of short-term institutional ownership. This suggests that short-term institutional shareholders influence firm management to be more tax aggressive to maximize firm value in the short term, and institutional shareholders with a longer investment horizon discourage firm tax aggressiveness.

Khurana and Moser's (2013) research uses US companies, but the first considered the concentration of the shareholders, and the second considered the period of the shareholders' investment. Cabello *et al.*'s (2019) study uses Brazilian companies considering the concentration of shareholder investment. The results of these studies and the results of Derashid *et al.* (2003) suggest the following hypothesis:

H_3: Institutional ownership is positively related to tax avoidance and results in different levels of avoidance depending on the country and sector.

A study by McGuire *et al.* (2014) investigates whether three factors associated with traditional investment behaviour, firms' investment opportunity sets (IOS), operating uncertainty (OU), and capital market pressure (CMP), are also associated with investments in tax shelter activities. The sample consists of firm-year observations from 1981 to 2000. The proxies for IOS are book-to-market ratio and non-market components; for OU, the proxy is cash-flow volatility, and for CMP, the proxy is the number of consecutive positive changes in reported quarterly earnings. The tax shelters selected are corporate-owned life insurance, contingent payment instalment sales, contested liability accelerations, offshore intellectual property, and cross-border dividend capture. The results suggest that firms with large investment opportunity sets and higher operating uncertainty are less likely to invest in tax shelters and that firms with greater capital market pressure are more likely to invest in tax shelter activities.

Considering that the economic environment could influence cash flow volatility and capital market pressure and that companies in emerging countries must deal with uncertainty and an under-developed capital market, these companies may present different behaviours. Thus, we selected operating uncertainty as our fourth and capital market pressure as our fifth independent variables, and combined with Derashid *et al.*'s (2003) study, we develop the following hypotheses:

H_4: Operating uncertainty is negatively related to tax avoidance and results in different levels of avoidance depending on the country and sector.

H_5: Higher capital market pressure is positively related to tax avoidance and results in different levels of avoidance depending on the country and sector.

3. Research Design

Dependent variable

Following Dyreng et al. (2008), long-run cash ETRs became commonly used as dependent variables to capture tax avoidance (Chen *et al.*, 2010, McGuire *et al.*, 2014, Hasan et al., 2017, Austin & Wilson, 2017). Dyreng et al. (2017) assert that in cases of a permanent tax difference, the GAAP ETR as well as the cash and current ETR are reduced. If there is a temporary difference, the GAAP ETR is not affected (the current tax expense is lower, but the deferred tax expense is higher). Graham *et al.*'s (2014) survey observes that management places a higher value on the GAAP ETR than the cash ETR. Thus, considering the short period of analysis (5 years), the fact that some companies in the sample country are not required to report the current tax and Graham *et al.*'s (2014) evidence, we select two dependent variables to capture tax avoidance: GAAP_ETR and Cash_ETR.

Independent variables

As independent variables, we use (a) firm value (Desai & Dharmapala, 2009, Santana & Rezende, 2016), (b) internal informational quality (Gallemore & Labro, 2015), (c) institutional shareholders (Khurana & Moser, 2013; Cabello *et al.* 2019), (d) operating uncertainty (McGuire et al. 2014; Huang et al., 2017), and (e) capital market pressure (Myers *et al.* 2007; McGuire et al., 2014). The independent variables were selected considering that they can result in different tax avoidance level considering the environment

Firm value = Q

$$Q = \frac{(Total\ Assets - Equity) + Market\ Value\ of\ Equity}{Total\ Assets}$$

where:

- *Qit* - Corresponds to the Tobin's Q of firm *i* in year *t;*
- *MVEit* - Is the firm equity market value *i* in year *t;*
- *Eit* - Corresponds to firm equity *i* in year *t;*
- *Tait* - Corresponds to firm total assets *i* in year *t*.

Source: Desai and Dharmapala (2009)

Internal Informational Quality = IIQ

IIQ Variables	Descriptions
EA Speed	Number of days between the end of the fiscal year and the firm`s earnings announcement, multiplied by -1.
MF Acc	Absolute value of management`s estimate of earning per share (EPS) minus actual EPS, multiplied by -1, divided by price.
N° MW	Indicator variable equal to 0 if the firm reported a 404 MW in the current fiscal year, and 1 otherwise.
Analyst Following	Number of analyst estimates.
AF Acc	Absolute value of median analyst estimates of EPS minus actual EPS, multiplied by -1, divided by price.

Figure 1. Internal Information Quality Variables Descriptions.
Source: Gallemore and Labro (2015)

Using principal component analysis (PCA) for EA Speed, MF Acc, Analyst Following and AF Acc, we create the IIQ variable. We did not use the variable "N° MW", considering that not all companies in the sample must follow the Sarbanes-Oxley Act.

Institutional Shareholder Investment – InstShare

InstShare = We use the StarMine calculation available in Thomson Reuters Eikon. The institutional ownership of the primary share issue is determined in percent by taking the most recent ownership record for each fund reported in the last two years, summing them, and then dividing the sum by the total primary shares outstanding.

Operating Uncertainty = Abnormal CF Vol

Abnormal CF Vol = coefficient of variation in operating cash flows from the prior rolling five years less the median value of the coefficient of variation in operating cash flows for the firm's sector (Eikon Thomson Reuters - TRBC Economic Sector Name) over the same period.

Capital Market Pressure = EPS String

EPS String = count of the number of consecutive nonnegative changes in split-adjusted quarterly earnings per share relative to the same quarter from the prior year (Myers *et al.* 2007).

Control variables

Considering that we select as independent variables determinants of tax avoidance consolidated in previous literature, we select some control variables used in these same previous studies, in other words, variables used in Desai and Dharmapala (2009), Gallemore and Labro (2015), Khurana and Moser (2013), and McGuire et al. (2014): Return on Assets (ROA), Sales Growth (Growth), Leverage (LEV), Market to Book (MTB) and Property Plant and Equipment (PPE).

Country-level Control variables

According to Rabe-Hesketh and Skrondal (2012), multilevel modelling allows us to disentangle the processes operating at different levels, both by including explanatory variables at the different levels and by attributing unexplained variability to the different levels. One important challenge in multilevel modelling is to distinguish the within- and between-cluster effects of lower level covariates.

Considering this observation, we selected the World Project Justice Rule of Law (2019) factor as the country-level control variable because it can explain the differences across countries in many aspects, such as constraints on government powers, absence of corruption, government openness, fundamental rights, regulatory enforcement (RegEnf), civil justice and criminal justice. However, during the statistical test, we observe that only regulatory enforcement (RegEnf) offers an explanation at the levels of the country and sector.

According to World Justice Project - WJP (2019), the factor regulatory enforcement:

Factor 6 of the WJP Rule of Law Index) measures the extent to which regulations are fairly and effectively implemented and enforced. Regulations, both legal and administrative, structure behaviours within and outside of the government. A strong rule of law requires that these regulations and administrative provisions be enforced effectively and be applied and enforced without improper influence by public officials or private interests. Additionally, a strong rule of law requires that administrative proceedings be conducted in a timely manner and without unreasonable delays, that the due process is respected in administrative proceedings and that there is no expropriation of private property without adequate compensation. This factor does not assess which activities a government chooses to regulate, nor does it consider how much regulation of a particular activity is appropriate. Rather, it examines how regulations are implemented and enforced. To facilitate comparisons, this factor considers areas that all countries regulate to one degree or another, such as public health, workplace safety, environmental protection, and commercial activity. (WJP, 2019).

The ETR value may represent a more aggressive tax avoidance depending on the tax rate legally established in each country, which may even vary over the years within the same country. Therefore, to control these effects, we inserted the variable "CountryTax" that represents the legal tax rate per country and per year.

Research equations

In this study, we use a balanced panel data multilevel analysis because we observe the relationships between variables characterizing individuals and variables characterizing groups. In multilevel research, the data structure in the population is hierarchical, and the sample data are taken from this hierarchical population (Hox, 2010).

Multilevel analysis can be carried out through linear mixed models (LLMs) or hierarchical linear models (HLMs). According to West *et al.*, 2015 these models are called LLMs because the explanatory variables are a mix of fixed effects and random effects; in other words, they can be divided into fixed effects components and random effects components. While the estimated fixed effects parameters indicate the relationship between the explanatory variables and the metric dependent variable, the random effects components can be represented by the combination of explanatory variables and unobserved random terms (West *et al.*, 2015).

Multilevel models allow the identification and analysis of individual and intergroup heterogeneities to which these individuals belong, making it possible to specify random components at each level of analysis (Fávero & Belfiore, 2017)

According to Fávero and Belfiore (2017), multilevel analysis can separate the fixed effects components, which estimate the parameters of interest, from the random effects, which are shown by the error terms, enabling us to observe more easily that the random effects component can also explain the behaviour of the dependent variable.

$$Y_{ij} = \underbrace{\gamma_{00} + \gamma_{10}.X_{ij} + \gamma_{01}.W_j + \gamma_{11}.W_j.X_{ij}}_{\text{Fixed Effects}} + \underbrace{u_{0j} + u_{1j}.X_{ij} + r_{ij}}_{\text{Random Effects}}$$

where Y = dependent variable; X = independent variable; i = individual; j = group; W = explaining group variable; u = error term

According to Fávero and Belfiore (2017), the following equations present the two-level regression model analysis, where the first level contains explaining variables X_1 ..., X_Q referring to individual *i*, and the second level observes explaining variables W_1 ..., W_Q referring to group *j*:

Level 1: $$Y_{ij} = b_{0j} + \sum_{q=1}^{Q} b_{qj}.X_{qij} + r_{ij}$$

Level 2: $$b_{qj} = \gamma_{q0} + \sum_{s=1}^{S_q} \gamma_{qs}.W_{sj} + u_{qj}$$

where q = 0, 1, ..., Q and s = 1, ..., S_q.

Considering the variables selected and the statics model explanation, we developed three models.

Model I – We use two levels. Level two (*j*) refers to countries (G7 and BRICS countries – 12 countries), fitting the model with a random intercept and random slope for the countries legal corporate tax to control the effect of difference between ETR and local tax.

$$GAAP\ ETR_{i\,j} = \gamma_{00} + \gamma_{10}.Q_{ij} + \gamma_{20}.EASpped_{ij} + \gamma_{30}.MFAcc_{ij} + \gamma_{40}.AnlystFoll_{ij} + \gamma_{50}.AFAcc_{ij} + \gamma_{60}.InstShare_{ij} + \gamma_{70}.Abnormal\ CF\ Vol_{ij} + \gamma_{80}.EPS\ String_{ij} + Controls\ Variables + u_{0j} + r_{ij}$$

$$Cash\_ETR_{i\,j} = \gamma_{00} + \gamma_{10}.Q_{ij} + \gamma_{20}.EASpped_{ij} + \gamma_{30}.MFAcc_{ij} + \gamma_{40}.AnlystFoll_{ij} + \gamma_{50}.AFAcc_{ij} + \gamma_{60}.InstShare_{ij} + \gamma_{70}.Abnormal\ CF\ Vol_{ij} + \gamma_{80}.EPS\ String_{ij} + Controls\ Variables + u_{0j} + r_{ij}$$

Model II – we use two levels. The level two (*j*) refers to the sector based upon the Thomson Reuters Business Classification System (TRBC): Financials, Basic Materials, Energy, Consumer Non-Cyclicals, Consumer Cyclicals, Telecommunications Services, Utilities, Healthcare, Industrials and Technology (10 sectors).

$$GAAP\ ETR_{i\,j} = \gamma_{00} + \gamma_{10}.Q_{ij} + \gamma_{20}.IIQ_{ij} + \gamma_{30}.InstShare_{ij} + \gamma_{40}.Abnormal\ CF\ Vol_{ij} + \gamma_{50}.EPS\ String_{ij} + Controls\ Variables + \gamma_{01}.RegEnf_j + \gamma_{11}.RegEnf_j.Q_{ij} + \gamma_{21}.RegEnf_j.IIQ_{ij} + \gamma_{31}.RegEnf_j.InstShare_{ij} + \gamma_{41}.RegEnf_j.Abnormal\ CF\ Vol_{ij} + \gamma_{51}.RegEnf_j.EPSString_{ij} + u_{0j} + r_{ij}$$

$$Cash\_ETR_{i\,j} = \gamma_{00} + \gamma_{10}.Q_{ij} + \gamma_{20}.IIQ_{ij} + \gamma_{30}.InstShare_{ij} + \gamma_{40}.Abnormal\ CF\ Vol_{ij} + \gamma_{50}.EPS\ String_{ij} + Controls\ Variables + \gamma_{01}.RegEnf_j + \gamma_{11}.RegEnf_j.Q_{ij} + \gamma_{21}.RegEnf_j.IIQ_{ij} + \gamma_{31}.RegEnf_j.InstShare_{ij} + \gamma_{41}.RegEnf_j.Abnormal\ CF\ Vol_{ij} + \gamma_{51}.RegEnf_j.EPSString_{ij} + u_{0j} + r_{ij}$$

Model III – We use three levels. We use the countries as the second level (*j*) and the sectors as the third level (*k*).

$$GAAP\_ETR_{i\,j\,k} = \gamma_{000} + \gamma_{100}.Q_{jk} + \gamma_{200}.IIQ_{jk} + \gamma_{300}.InstShare_{jk} + \gamma_{400}.Abnormal\ CF\ Vol_{jk} + \gamma_{500}.EPS\ String_{jk} + Controls\ Variables + u_{00j} + u_{00k} + r_{0ij} + r_{1jk} + e_{ijk}$$

$$Cash\_ETR_{i\,j\,k} = \gamma_{000} + \gamma_{100}.Q_{jk} + \gamma_{200}.IIQ_{jk} + \gamma_{300}.InstShare_{jk} + \gamma_{400}.Abnormal\ CF\ Vol_{jk} + \gamma_{500}.EPS\ String_{jk} + Controls\ Variables + u_{00j} + u_{00k} + r_{0ij} + r_{1jk} + e_{ijk}$$

The random intercept or level-2 or -3 residual u_j *or* u_k is a country-specific and sector-specific error component, which remains constant across companies, while the level-1 residual r_{ijk} is a company-specific error component, which varies between companies *i* as well as between country *j* and sector *k*. The u_j are uncorrelated over countries, the r_{ijk} are uncorrelated over countries and companies, and the two or three error components are uncorrelated with each other or between countries and companies.

The country-specific and sector-specific error components u_j *and* u_k, respectively, represent the combined effects of omitted country and sector characteristics or unobserved heterogeneity at the country level or sector level, also considering the legal corporate tax for each country. If u_j is positive, the total residuals for country *j*, r_{ij}, will tend to be positive, leading to a heavier effective tax rate than predicted by the covariates. If u_j is negative, the total residuals will tend to be negative. Because u_j is shared by all companies for the same country, it induces within-country dependence among the total residuals, r_{ij}. The same applies to sector analysis.

For the robustness test, we use a panel data regression analysis without considering the country or sector level. The Hausman test indicates fixed effects for both dependent variables (GAAP_ETR and Cash_ETR).

4. Empirical Results

According to the International Monetary Fund (2019), the seven largest economies in terms of gross domestic product (GDP) based on market exchange rates are the United States, Japan, Germany, France, Italy, the United Kingdom, and Canada, often referred to as the Group of Seven (G7). We use companies from these countries as a sample from developed economies.

The countries selected as emerging economies are the BRICS countries: Brazil, Russia, India, China and South Africa. The BRICS refers to the grouping of five major emerging economies that has attracted global interest. (Bacik, 2013). We use companies from these countries as a sample from emerging economies. The final sample

consists of 125,340 observations with the following composition:

Table I. Countries and observation frequency

Country	Freq.	Percent.	Cum.
Brazil	1,955	1.56	1.56
Canada	16,135	12.87	14.43
China	6,380	5.09	19.52
France	3,330	2.66	22.18
Germany	3,470	2.77	24.95
India	22,730	18.13	43.08
Italy	1,900	1.52	44.60
Japan	16,750	13.36	57.96
Russia	1,420	1.13	59.10
South Africa	1,095	0.87	59.97
United Kingdom	6,170	4.92	64.89
United States of America	44,005	35.11	100.00
Total	125.340	100.00	

The period selected is 2014 to 2018 because the control variables selected have been available for comparison since 2014 and considering that the multilevel analysis represents an important approach of this study, we make the period shorter.

For data collection, we use the Compustat and Eikon databases, and for the statistical test, we use Stata. We winsorize the data at 1% to control outliers, following Kennedy *et al.*'s (1992) recommendation.
The Table II presents the descriptive statistics:

Table II. Descriptive Statistics

Variable	Obs.	Median	Mean	Std. Dev.	Min	Max
GAAP_ETR	54,165	0.2908	0.2733	0.2653	-0.9491	1.6039
Cash_ETR	28,835	0.1254	0.1790	0.3725	-1.3785	2.1078
FirmvalueQ	95,540	3.99e+07	2.10e+09	8.77e+09	6580	6.93e+10
IIQ	18,828	0 .0989	2.60e-09	1.0000	-5.4629	4.6548
InstShare	18,035	0.6745	0.6029	0.3409	0.0043	1.1830
AbCFVol	27,076	-0.0393	-0.1293	1.3041	-5.9340	5.1790
EPSString	125,340	0	1.3033	1.7033	0	4
EASpeed	82,976	130	201.2242	190.3485	18	928
MFAcc	26,801	-0.0008	-0.0071	0.0786	-0.3608	0.4416
AnalystFoll	30,024	5	7.187	7.2603	1	34
AFAcc	29,108	-0.0003	-0.0043	0.0654	-0.3588	0.2925
PPE	84,514	0.1665	0.2561	0.2662	0.0003	0.9753
LEV	54,952	0.1434	0.2393	0.3647	0.0002	2.8067
ROA	85,542	0.0178	-0.7829	3.9535	-33.0050	0.4120
MTB	88,021	1.8808	9.8625	24.4667	-8.0421	196.5507
Growth	33,240	0.0451	0.0255	0.4423	-1	2.1765
Regulatory Enforcement	125,340	0.7208	0.6723	0.1341	0.4016	0.8485

Notes: GAAP_ETR = the ratio of tax expanse to pretax financial accounting income ; Cash_ETR = the ratio of cash taxes paid to pretax financial accounting income; FirmvalueQ = Tobin's Q for measure the firm value; IIQ = factor from principal component analysis using EASpeed, MFAcc, AnalystFoll and AFAcc; InstShare = Institutional Ownership from StarMine calculation available in Thomson Reuters Eikon; AbCFVol = coefficient of variation in operating cash flows from the prior rolling five years less the median value of the coefficient of variation in operating cash flows for the firm's sector; EPSString = count of the number of consecutive nonnegative changes in split-adjusted quarterly earnings per share relative to the same quarter from the prior year; EASpeed = number of days between the end of the fiscal year and the firm`s earnings announcement, multiplied by -1; MFAcc = absolute value of management`s estimate of earning per share (EPS) minus actual EPS, multiplied by -1, divided by price; AnalystFoll = number of analyst following and providing estimates; AFAcc = Absolute value of median analyst estimates of earnings per share (EPS) minus actual EPS, multiplied by -1, divided by price; PPE = property plant and equipment; LEV = leverage; ROA = return on assets; MTB = market-to-book ratio; Growth = sales Growth; Regulatory Enforcement = measures the extent to which regulations are fairly and effectively implemented and enforced.

We can observe the main differences between the GAAP_ETR and Cash_ETR observations. This result reinforces the previous finding that some companies of some sample countries are not required to report current tax expenditures, resulting in fewer data observations.

Table III reveals the mean GAAP ETR,Cash ETR and Legal Corporate Tax (mean in the sample) by country. We can observe that GAAP_ETR has a higher mean than Cash_ETR, in line with Dyreng et al. (2017) observed. Japan, India, and South Africa present the highest income tax burdens, and Canada, Brazil, the UK and the USA present the lowest income tax burdens.

Table III. Mean Cash,GAAP ETR and Legal Tax

Countries	GAAP_ETR	Cash_ETR	Legal Tax
Brazil	0.2238031	0.1069177	0.34
Canada	0.249555	0.0652063	0.2662
China	0.2542542	0.1603308	0.25
France	0.2411067	0.1273904	0.3585648
Germany	0.2618317	0.1733697	0.30105
India	0.2794476	0.2920971	0.34564
Italy	0.3293533	0.1475638	0.2989824
Japan	0.3317075	0.3140414	0.31756
Russia	0.2482097	0.1245736	0.20
South Africa	0.2714163	0.2869001	0.28
UK	0.1947627	0.1556077	0.198
USA	0.233648	0.1256169	0.363484
Total	0.2590109	0.179262	0.3218802

Table IV reveals the mean GAAP and Cash ETR by sector. It is also possible to observe that GAAP ETR has the highest mean, and consumer cyclicals, industrials and consumer non-cyclicals present the highest income tax burden. Energy, healthcare and telecommunications services have the lowest ETR.

Table IV. Sector mean

Sector	GAAP_ETR	Cash_ETR
Basic Materials	0.260735	0.1630763
Consumer Cyclicals	0.2688673	0.2121988
Consumer Non-Cyclicals	0.2679155	0.2072598
Energy	0.2429165	0.1293725
Financials	0.2501571	0.1678947
Healthcare	0.2482702	0.15093
Industrials	0.2700954	0.2061233
Technology	0.260416	0.1786428
Telecommunications Services	0.2500697	0.1529956
Utilities	0.2538957	0.1625578
Total	0.2590109	0.179262

Table V (appendix I) shows the correlation between variables. It is suggested that there is no multicollinearity effect between the variables considering the low correlation values. One of the premises for the good adjustment of variables in a multiple linear regression is the absence of multicollinearity, therefore, we do not use additional tests to prove its presence, such as the test of Farrar and Glauber (1967).

As we can observe in Table VI, not all independent variables are capable of explaining the country level; variables management forecast accuracy (MFAcc) and abnormal cash flow volatility reveal no differences between sample countries in either of the tax avoidance measures. However, Analyst Following and EPS String can be explained by both measures.

The variables Firm Value Q and analyst forecast accuracy (AFAcc) can explain the tax avoidance behaviour only for the GAAP ETR measure, and the variable EASpeed can explain it only for the Cash ETR measure.

These results (Model I – Table VI) indicate that the national environment can influence corporate governance, partial IIQ and capital market pressure reflected in different tax avoidance behaviours.

Table VI. Model I result

	GAAP_ETR		Cash_ETR	
	Coef.	p-value	Coef.	p-value
FirmvalueQ	-5.52e-13 ***	0.004	-3.20e-13	0.209
EASpeed	-3.09e-06	0.804	0.0000227	0.160
MFAcc	-0.140261	0.374	-0.0049667	0.972
AnalystFoll	0.0011773 ***	0.001	0.001119 **	0.012
AFAcc	0.2847196 *	0.062	0.0039638	0.978
AbCFVol	0.0025341	0.296	0.0028987	0.269
EPSString	-0.0025565 *	0.063	0.0057877 ***	0.001
PPE	-0.0408848 ***	0.000	-0.122356 ***	0.000
LEV	-0.0903782***	0.000	-0.105917 ***	0.000
ROA	-1.129687 ***	0.000	0.2634657 ***	0.000
MTB	-0.0008881 ***	0.000	0.0000209	0.895
Growth	-0.0517528 ***	0.000	-0.0215512 **	0.043
Constant	0.3623277 ***	0.000	0.2041468 ***	0.000
Prob. (Chi2)	0.00		0.00	

	GAAP_ETR			Cash_ETR		
Random-effects Parameters	Estimate	Std. Err.	p-value	Estimate	Std. Err.	p-value
Country: Independent						
sd(CountryTax)	0.1319448	0.0516955	0.000	0.1140368	0.0579487	0.000
sd(Constant)	0.0315109	0.0124096	0.000	0.0408251	0.0156917	0.000
sd(Residual)	0.236936	0.0016508		0.3325945	0.0021497	

Notes: GAAP_ETR = the ratio of tax expanse to pretax financial accounting income ; Cash_ETR = the ratio of cash taxes paid to pretax financial accounting income; FirmvalueQ = Tobin's Q for measure the firm value; IIQ = factor from principal component analysis using EASpeed, MFAcc, AnalystFoll and AFAcc; AbCFVol = coefficient of variation in operating cash flows from the prior rolling five years less the median value of the coefficient of variation in operating cash flows for the firm's sector; EPSString = count of the number of consecutive nonnegative changes in split-adjusted quarterly earnings per share relative to the same quarter from the prior year; EASpeed = number of days between the end of the fiscal year and the firm`s earnings announcement, multiplied by -1; MFAcc = absolute value of management`s estimate of earning per share (EPS) minus actual EPS, multiplied by -1, divided by price; AnalystFoll = number of analyst following and providing estimates; AFAcc = Absolute value of median analyst estimates of earnings per share (EPS) minus actual EPS, multiplied by -1, divided by price; PPE = property plant and equipment; LEV = leverage; ROA = return on assets; MTB = market-to-book ratio; Growth = sales Growth; CountryTax = country legal tax percentage. *, **, *** indicate the significance levels at 10%, 5% and 1% respectively.

Figure 2 shows the random intercept by country in Model I, revealing that companies in Brazil, Canada, China, France, Italy and Russia tend to avoid more taxes compared to their legal taxes than companies in Germany, India, Japan, South Afrika, UK and USA.

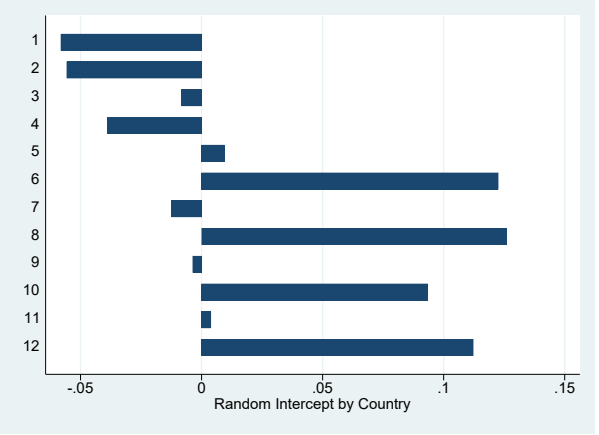

Figure 2. Random Intercept by Country

Notes: 1 – Brazil; 2 – Canada; 3 – China; 4 – France; 5 – Germany; 6 – India; 7 – Italy; 8 – Japan; 9 – Russia; 10 – South Africa; 11 – United Kingdom; 12 – United States of America.

Model II presents the influence of the sector on tax avoidance levels, independent of the country, but considering the Regulatory Enforcement of the country as a control variable at the sector level, in other words, the Regulatory Enforcement reflected in the sector.

The measure Cash ETR (Table VII) is not able to explain any independent variable; nevertheless, the GAAP ETR variable can be explained by Firm Value and AbCFVol in their fixed effect, and the Regulatory Enforcement of the country reflected in the sector reveals a difference in tax avoidance level between the sample countries. This result means that there are differences in tax avoidance level among the sample companies due to the regulatory enforcement of the country and sector characteristics.

Table VII. Model II result

	GAAP_ETR		Cash_ETR	
	Coef.	p-value	Coef.	p-value
FirmvalueQ	4.12e-12 ***	0.000	6.16e-13	0.678
Q_RegEnf	-5.87e-12 ***	0.000	-4.97e-13	0.808
IIQ	-0.0066322	0.778	0.0006815	0.981
IIQ_RegEnf	0.0270784	0.413	0.0025105	0.949
AbCFVol	-0.0291833 **	0.018	-0.0152886	0.342
AbCFVol_RegEnf	0.0426979 **	0.017	0.0236038	0.300
EPSString	-0.0023777	0.706	0.0088739	0.270
EPSString_RegEnf	0.0028568	0.744	-0.0027156	0.808
PPE	-0.0467597 ***	0.000	-0.1081692 ***	0.000
LEV	-0.1050185 ***	0.000	-0.1429932 ***	0.000
MTB	-1.180006 ***	0.000	0.2854058 ***	0.000
ROA	-0.0006783 ***	0.000	-9.50e-06	0.951
Growth	-0.0453701 ***	0.000	-0.0193629 *	0.069
Constant	0.3230117 ***	0.000	0.2183503 ***	0.000
Prob. (Chi2)	0.00		0.00	

	GAAP_ETR			Cash_ETR		
Random-effects Parameters	Estimate	Std. Err.	p-value	Estimate	Std. Err.	p-value
Sector: Independent						
var(Regulatory Enforc.)	0.0023114	0.0030328	0.000	0.0007856	0.0017219	0.000
var(CountryTax)	0.0878336	0.0511838	0.000	0.0003057	0.0055521	0.000
var(Constant)	0.0038856	0.003564	0.000	0.001034	0.0007875	0.000
var(Residual)	0.0553557	0.0007735		0.1117749	0.001446	

Notes: GAAP_ETR = the ratio of tax expanse to pretax financial accounting income ; Cash_ETR = the ratio of cash taxes paid to pretax financial accounting income; FirmvalueQ = Tobin's Q for measure the firm value; Q_RegEnf = Tobin's Q interaction with Regulatory Enforcement; IIQ = factor from principal component analysis using EASpeed, MFAcc, AnalystFoll and AFAcc; IIQ_RegEnf = IIQ factor interaction with Regulatory Enforcement; AbCFVol = coefficient of variation in operating cash flows from the prior rolling five years less the median value of the coefficient of variation in operating cash flows for the firm's sector; AbCFVol_RegEnf = AbCFVol interaction with Regulatory Enforcement; EPSString = count of the number of consecutive nonnegative changes in split-adjusted quarterly earnings per share relative to the same quarter from the prior year; EPSString_RegEnf = EPSString interaction with Regulatory Enforcement; PPE = property plant and equipment; LEV = leverage; ROA = return on assets; MTB = market-to-book ratio; Growth = sales Growth; Regulatory Enforcement = measures the extent to which regulations are fairly and effectively implemented and enforced; CountryTax = country legal tax percentage. *, **, *** indicate the significance levels at 10%, 5% and 1% respectively.

Figure 3 shows the random intercept by sector in Model II, revealing that companies in the energy, financials, healthcare, technology, and utilities sectors tend to avoid more taxes than companies in other sectors.

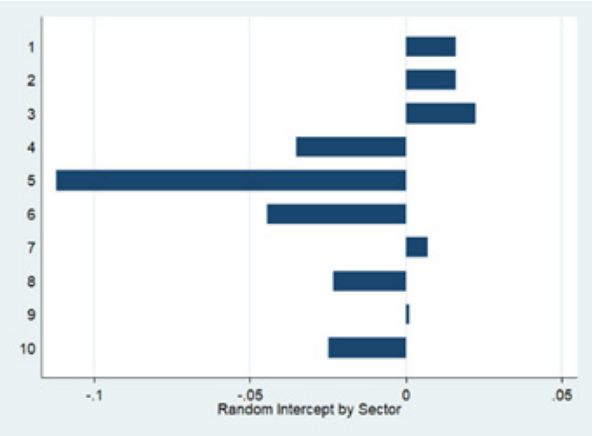

Figure 3. Random Intercept by Sector

Notes: 1 – Basic Materials; 2 – Consumer Cyclicals; 3 – Consumer Non-Cyclicals; 4 – Energy; 5 – Financials; 6 – Healthcare; 7 – Industrials; 8 – Technology; 9 – Telecommunications Services; 10 – Utilities.

Finally, Model III (Table VIII) reveals that there is a difference in tax avoidance behaviour in the sample companies considering Firm Value, IIQ and EPS String reflected in the GAAP ETR measure due to the countries and sector characteristics combined. For the Cash ETR measure, only the EPS String has statistical significance.

Table VIII. Model III result

	GAAP_ETR		Cash_ETR	
	Coef.	p-value	Coef.	p-value
FirmvalueQ	-3.06e-13 *	0.067	2.09e-13	0.358
IIQ	0.0089427 **	0.016	-0.0003587	0.916
AbCFVol	0.0010217	0.676	0.0016911	0.525
EPSString	-0.0026051 *	0.055	0.0058438 ***	0.001
PPE	-0.046793 ***	0.000	-0.14416 ***	0.000
LEV	-0.0670878 ***	0.000	-0.0913029 ***	0.000
ROA	-1.130186***	0.000	0.2539371 ***	0.000
Growth	-0.0480542 ***	0.000	-0.0155903	0.143
Constant	0.3476677 ***	0.000	0.2096368 ***	0.000
Prob. (Chi2)	0.00		0.00	

	GAAP_ETR			Cash_ETR		
Random-effects Parameters	Estimate	Std. Err.	p-value	Estimate	Std. Err.	p-value
Country: Identify						
var(CountryTax)	0.0220652	0.0179591	0.000	0.0145483	0.0136231	0.000
var(Constant)	0.00012655	0.0010945	0.000	0.0015133	0.0013039	
Sector: Identify						
var(Constant)	0.002833	0.00062	0.000	0.0026122	0.0006984	0.000
var(Residual)	0.0542155	0.0007596		0.1091438	0.0014169	

Notes: GAAP_ETR = the ratio of tax expanse to pretax financial accounting income; Cash_ETR = the ratio of cash taxes paid to pretax financial accounting income; FirmvalueQ = Tobin's Q for measure the firm value; IIQ = factor from principal component analysis using EASpeed, MFAcc, AnalystFoll and AFAcc; InstShare = Institutional Ownership from StarMine calculation available in Thomson Reuters Eikon; AbCFVol = coefficient of variation in operating cash flows from the prior rolling five years less the median value of the coefficient of variation in operating cash flows for the firm's sector; EPSString = count of the number of consecutive nonnegative changes in split-adjusted quarterly earnings per share relative to the same quarter from the prior year; PPE = property plant and equipment; LEV = leverage; ROA = return on assets; MTB = market-to-book ratio; Growth = sales Growth; CountryTax = country legal tax percentage. *, **, *** indicate the significance levels at 10%, 5% and 1% respectively.

We present table IX below where we summarize the expected hypotheses and the results found.

Table IX - Predicted hypotheses and Models results

Hypotheses	Variables	Expected hypotheses	Results Model I		Results Model II		Results Model III	
			GAAPETR	CashETR	GAAPETR	CashETR	GAAPETR	CashETR
H_1	FirmvalueQ	+	-***	n.s.	+***	n.s.	-*	n.s.
	IIQ	+	n.u.	n.u.	n.s.	n.s.	+**	n.s.
H_2	IIQ (AnalistFoll)	+	+***	+**	n.u.	n.u.	n.u.	n.u.
	IIQ (AFAcc)	+	+*	n.s.	n.u.	n.u.	n.u.	n.u.
H_3	InsShare	+	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
H_4	AbCFVol	-	n.s.	n.s.	-**	n.s.	n.s.	n.s.
H_5	EPSString	+	-*	+***	n.s.	n.s.	-*	+***

Notes: GAAP_ETR = the ratio of tax expanse to pretax financial accounting income; Cash_ETR = the ratio of cash taxes paid to pretax financial accounting income; FirmvalueQ = Tobin's Q for measure the firm value; IIQ = factor from principal component analysis using EASpeed, MFAcc, AnalystFoll and AFAcc; InstShare = Institutional Ownership from StarMine calculation available in Thomson Reuters Eikon; AbCFVol = coefficient of variation in operating cash flows from the prior rolling five years less the median value of the coefficient of variation in operating cash flows for the firm's sector; EPSString = count of the number of consecutive nonnegative changes in split-adjusted quarterly earnings per share relative to the same quarter from the prior year; n.u. = unused; n.s. = no statistical significance. *, **, *** indicate the significance levels at 10%, 5% and 1% respectively.

Taking the results of model II, we can confirm H_1 (firm value – FirmValueQ variable) considering the sector level and GAAP_ETR estimation. The results of corporate governance predicted by Desai and Dharmapala (2009) are positive related to tax avoidance, and the sector can explain this behaviour.

The negative coefficient in FirmValueQ observed in model I and III can be explained by Santana and Rezende (2016) research, where the authors claim that investors are aware of the risks brought by high levels of tax avoidance activity and are willing to adjust their stock return expectations to incorporate those risks. The authors also indicate that under-developed capital markets can contribute to this result. Thus, we can assert that Firm value is negatively related to tax avoidance considering the country itself and the country combined with the sector.

We find that the country and sector (Model III) are associated with GAAP ETR. Thus, H2 is confirmed. As predicted by Gallemore and Labro (2015), internal information quality has a positive effect on tax avoidance, and country and sector characteristics can influence differences in tax avoidance levels.

When the InstShare variable was used for multilevel analysis, the results indicated that this variable could not contribute to a multilevel analysis. Therefore, it was observed that the country or sector level does not explain the effects of InstShare on tax avoidance variables. Thus, H_3 is not confirmed, showing that institutional ownership, predicted by Khurana and Moser (2013), does not yield differences in tax avoidance level between countries and sectors; in other words, the country and sector environment are not able to interfere with companies' institutional shareholders.

H_4 is confirmed only when we use the sector (Model II) showing that operating uncertainty, predicted by McGuire *et al.* (2014), is negatively related to tax avoidance and the regulatory enforcement of the country reflected in the different level between sectors.

Finally, H_5 (capital market pressure – EPSString variable) is confirmed using Cash_ETR measure. This results show that the higher capital market pressure, predicted by McGuire *et al.* (2014), results in a positive tax avoidance considering the country itself and the country combined with the sector. Considering the GAAP_ETR tax avoidance measure, the results of EPSString indicate a negative coefficient revealing that the capital market pressure negatively reflects on tax avoidance. As mentioned earlier, the Cash_ETR variable has less observation than GAAP_ETR and the tax accruals can result in different tax avoidance measures as per Dyreng *et al.* (2017) observed.

Even though, in Model II, when interacting the firm value (FirmValueQ) with Regulatory Enforcement we can observe that regulatory enforcement overturns the impact of firm value on tax avoidance and when interacting operating uncertainty (AbCFVol) with Regulatory Enforcement the operating uncertainty become statistically significant, partially confirming H_4, but overwhelmed by the interaction positive effect itself. These results show us that Regulatory Enforcement plays an economically relevant role in determining tax avoidance by firms, with a direct impact on the effect of firm value and operational uncertainty.

Analysing the results of the three models in general, it is possible to state that the country and the sector should be considered in the analysis of tax avoidance levels, even if the effects are not as high as we predicted; ignoring these aspects may limit the effectiveness of the decision-making process regarding new investments for companies located in different countries.

The reflection of the regulatory enforcement of the country was only observed combined with the sector (Model II); this control variable was not reflected at the country level (Model I) or the country and sector level combined (Model III).

The use of two groups per level, one for G7 countries and the other for BRICS countries, did not have statistical significance in the random-effects parameters. This result means that the economic classification of developed and emerging, was not able to explain differences in tax avoidance. A possible explanation is that countries can be classified as developed and emerging, but companies cannot be. Another possible explanation is that tax avoidance behaviour responds to tax system characteristics and enforcement, as Atwood *et al.* (2012) and Xu *et al.* (2020) observes, and the business environment reflects many aspects (Young *et al.*, 2014) but not tax avoidance. Thus, we test all 12 countries separately.

For the robustness test, we test the variables that compose the IIQ variable separately in Models II and III (EASpeed, MF Acc, Analyst Following and AF Acc), and the results do not reveal different analysis associated with any variable.

The results using Cash_ETR as the dependent variable reveal a Prob (chi2) equal to 1.00 when the Institutional Share composes the equation. This result means that a common panel data regression is sufficient, and the

country level is not able to explain differences in the independent variable effects on the dependent variable. On the other hand, by excluding institutional share from the equation, a multilevel analysis is possible.

5. Conclusion

This study aims to examine whether tax avoidance determinants result in different levels of avoidance depending on the country and sector. We find that the country and sector can influence tax avoidance levels to some extent and must be considered in the decision-making process regarding new international investments. It is also possible to observe that some determinants of tax avoidance, such as institutional ownership, do not yield different tax avoidance by country and sector.

We found that there are no differences in tax avoidance levels between developed and emerging economies but rather between individual countries. But industrial sector and regulatory enforcement of a country play an important role to determine tax avoidance level.

This study fills a gap in the tax avoidance literature, showing that tax avoidance determinants may not predict tax avoidance levels equally well depending on the country, sector, and level of regulatory enforcement.

The results are aligned with those of Derashid *et al.* (2003), who find that the sector can influence differences in tax avoidance, and Atwood *et al.* (2012), who show that countries and regulatory enforcement (tax characteristics) can influence the differences.

The limitation of this study can be observed in the limited number and form of tax avoidance measures, of determinants of tax avoidance and the short period of study. We suggest extending this research using more determinants of tax avoidance, countries and levels that can impact tax avoidance levels, especially on regulatory enforcement.

References

Atwood, T. J., Drake, M. S., Myers, J. N., & Myers, L. A. (2012). Home country tax system characteristics and corporate tax avoidance: International evidence. *The Accounting Review*, 87(6), 1831-1860. https://doi.org/10.2308/accr-50222

Austin, C. R., & Wilson, R. J. (2017). An examination of reputational costs and tax avoidance: Evidence from firms with valuable consumer brands. *The Journal of the American Taxation Association*, *39*(1), 67-93. https://doi.org/10.2308/atax-51634

Bacik, G. (2013). Turkey and the BRICS: Can Turkey join the BRICS?. *Turkish Studies*, 14(4), 758-773. https://doi.org/10.1080/14683849.2013.861109

Badertscher, B. A., Katz, S. P., & Rego, S. O. (2013). The separation of ownership and control and corporate tax avoidance. *Journal of Accounting and Economics*, 56(2), 228–250. https://doi.org/10.1016/j.jacceco.2013.08.005

Brown, J. L., & Drake, K. D. (2013). Network Ties Among Low-Tax Firms. *The Accounting Review*, 89(2), 483–510. https://doi.org/10.2308/accr-50648

Brown, J. L., Drake, K., & Wellman, L. (2015). The benefits of a relational approach to corporate political activity: evidence from political contributions to tax policymakers. *Journal of the American Taxation Association*, 37(1), 69–102. https://doi.org/10.2308/atax-50908

Cabello, O., Gaio, L., & Watrin, C. (2019), "Tax avoidance in management-owned firms: evidence from Brazil", *International Journal of Managerial Finance*, 15(4), 580-592. https://doi.org/10.1108/IJMF-04-2018-0117

Chan, K. H., Phyllis Lai Lan Mo, & Tanya Tang. (2016). Tax Avoidance and Tunneling: Empirical Analysis from an Agency Perspective. *Journal of International Accounting Research*, 15(3), 49–66. https://doi.org/10.2308/jiar-51345

Chen, S., Chen, X., Cheng, Q., & Shevlin, T. (2010). Are family firms more tax aggressive than non-family firms? *Journal of Financial Economics*, *95*(1), 41–61. https://doi.org/10.1016/j.jfineco.2009.02.003

Chyz, J. A. (2013). Personally tax aggressive executives and corporate tax sheltering. *Journal of Accounting and Economics*, *56*(2-3), 311-328. https://doi.org/10.1016/j.jacceco.2013.09.003

Davis, A. K., Guenther, D. A., Krull, L. K., & Williams, B. M. (2016). Do socially responsible firms pay more taxes? *The Accounting Review*, 91(1), 47–68. https://doi.org/10.2308/accr-51224

Derashid, C., & Zhang, H. (2003). Effective tax rates and the "industrial policy" hypothesis: evidence from

Malaysia. *Journal of international accounting, auditing and taxation*, 12 (1), 45-62. https://doi.org/10.1016/S1061-9518(03)00003-X

Desai, M. A., & Dharmapala, D. (2006). Corporate tax avoidance and high-powered incentives. *Journal of Financial Economics*, 79(1), 145–179. https://doi.org/10.1016/j.jfineco.2005.02.002

Desai, M. A., & Dharmapala, D. (2009). Corporate Tax Avoidance and Firm Value. *Review of Economics and Statistics*, 91(3), 537–546. https://doi.org/10.1162/rest.91.3.537

Dyreng, S. D., Hanlon, M., & Maydew, E. L. (2008). Long-run corporate tax avoidance. *The Accounting Review*, 83(1), 61-82. https://doi.org/10.2308/accr.2008.83.1.61

Dyreng, S. D., & Lindsey, B. P. (2009). Using Financial Accounting Data to Examine the Effect of Foreign Operations Located in Tax Havens and Other Countries on U.S. Multinational Firms' Tax Rates. *Journal of Accounting Research*, 47(5), 1283–1316. https://doi.org/10.1111/j.1475-679X.2009.00346.x

Dyreng, S. D., Lindsey, B. P., Markle, K. S., & Shackelford, D. A. (2015). The effect of tax and nontax country characteristics on the global equity supply chains of U.S. multinationals. *Journal of Accounting and Economics*, 59(2), 182–202. https://doi.org/10.1016/j.jacceco.2015.01.003

Dyreng, S. D., Hanlon, M., Maydew, E. L., & Thornock, J. R. (2017). Changes in corporate effective tax rates over the past 25 years. Journal of Financial Economics, 124(3), 441-463.

Edwards, A., Schwab, C., & Shevlin, T. (2016). Financial constraints and cash tax savings. *The Accounting Review*, 91(3), 859–881. https://doi.org/10.2308/accr-51282

Farrar, D. E., & Glauber, R. R. (1967). Multicollinearity in Regression Analysis: The Problem Revisited. *Review of Economics and Statistics*, 49(1), 92–107. https://doi.org/10.2307/1937887

Fávero, L. P., & Belfiore, P. (2017). *Manual de análise de dados: estatística e modelagem multivariada com Excel®, SPSS® e Stata®*. Elsevier Brasil.

Gallemore, J., & Labro, E. (2015). The importance of the internal information environment for tax avoidance. *Journal of Accounting and Economics*, 60(1), 149–167. https://doi.org/10.1016/j.jacceco.2014.09.005

Ginesti, G., Ballestra, L. V., & Macchioni, R. (2020). Exploring the Impact of Firm-level Legality on Tax Avoidance. *European Management Review*, *17(2)*, 499-514. https://doi.org/10.1111/emre.12382

Graham, J. R., Hanlon, M., Shevlin, T., & Shroff, N. (2014). Incentives for tax planning and avoidance: Evidence from the field. *The Accounting Review*, 89(3), 991-1023. https://doi.org/10.2308/accr-50678

Hasan, M. M., Al-Hadi, A., Taylor, G., & Richardson, G. (2017). Does a firm's life cycle explain its propensity to engage in corporate tax avoidance?. *European Accounting Review*, *26(3)*, 469-501. https://doi.org/10.1080/09638180.2016.1194220

Higgins, D., Omer, T. C., & Phillips, J. D. (2015). The Influence of a Firm's Business Strategy on its Tax Aggressiveness. *Contemporary Accounting Research*, 32(2), 674–702. https://doi.org/10.1111/1911-3846.12087

Hitt, M. A., Li, H., & Worthington IV, W. J. (2005). Emerging Markets as Learning Laboratories: Learning Behaviors of Local Firms and Foreign Entrants in Different Institutional Contexts. *Management and Organization Review*, 1(3), 353-380. https://doi.org/10.1111/j.1740-8784.2005.0019a.x

Hoi, C. K., Wu, Q., & Zhang, H. (2013). Is Corporate Social Responsibility (CSR) Associated with Tax Avoidance? Evidence from Irresponsible CSR Activities. *The Accounting Review*, 88(6), 2025–2059. https://doi.org/10.2308/accr-50544

Hoskisson, R. E., Eden, L., Lau, C. M., & Wright, M. (2000). Strategy in emerging economies. *Academy of management journal*, 43(3), 249-267. https://doi.org/10.5465/1556394

Hox, J. J. 2010. Multilevel analysis: techniques and applications / Joop J. Hox. – 2nd ed.

Huang, H., Sun, L., & Zhang, J. (2017), Environmental Uncertainty and Tax Avoidance, *Advances in Taxation*, *24*, 83-124. https://doi.org/10.1108/S1058-749720170000024002

International Monetary Fund. 2019. World

Economic Outlook: Growth Slowdown, Precarious Recovery. Washington, DC, April. https://doi.org/10.5089/9781484397480.081

Kennedy, D., Lakonishok, J., & Shaw, W. H. (1992). Accommodating outliers and nonlinearity in decision models. *Journal of Accounting, Auditing and Finance*, 7(2), 161-190. https://doi.org/10.1177/0148558X9200700205

Khanna, T., & Palepu, K. (1997). Why Focused Strategies. *Harvard business review*, 75(4), 41-51.

Khurana, I. K., & Moser, W. J. (2013). Institutional Shareholders' Investment Horizons and Tax Avoidance. *Journal of the American Taxation Association*, 35(1), 111–134. https://doi.org/10.2308/atax-50315

Kim, J. B., Li, Y., & Zhang, L. (2011). Corporate tax avoidance and stock price crash risk: Firm-level analysis. *Journal of financial Economics*, *100*(3), 639-662. https://doi.org/10.1016/j.jfineco.2010.07.007

Kubick, T. R., & Masli, A. N. (2016). Firm-level tournament incentives and corporate tax aggressiveness. *Journal of Accounting and Public Policy*, *35*(1), 66-83. https://doi.org/10.1016/j.jaccpubpol.2015.08.002

Law, K. K. F., & Mills, L. F. (2015). Taxes and Financial Constraints: Evidence from Linguistic Cues. *Journal of Accounting Research*, 53(4), 777–819. https://doi.org/10.1111/1475-679X.12081

Lee, N. (2017). Can Territorial Tax Compliance Systems Reduce the Tax Avoidance of Firms with Operations in Tax Havens? *Emerging Markets Finance and Trade*, 53(4), 968–985. https://doi.org/10.1080/1540496X.2016.1247690

Lisowsky, P. (2010). Seeking Shelter: Empirically Modeling Tax Shelters Using Financial Statement Information. *The Accounting Review*, 85(5), 1693–1720. https://doi.org/10.2308/accr.2010.85.5.1693

Martinez, A. L., & Ramalho, G. C. (2014). Family Firms and Tax Aggressiveness in Brazil. *International Business Research*, 7(3), 129–136. https://doi.org/10.5539/ibr.v7n3p129

McGuire, S. T., Omer, T. C., & Wilde, J. H. (2014). Investment Opportunity Sets, Operating Uncertainty, and Capital Market Pressure: Determinants of Investments in Tax Shelter Activities? *Journal of the American Taxation Association*, 36(1), 1–26. https://doi.org/10.2308/atax-5059

Mills, L. F., Nutter, S. E., & Schwab, C. M. (2013). The Effect of Political Sensitivity and Bargaining Power on Taxes: Evidence from Federal Contractors. *The Accounting Review*, 88(3), 977–1005. https://doi.org/10.2308/accr-50368

Myers, J. N., Myers, L. A., & Skinner, D. J. (2007). Earnings momentum and earnings management. *Journal of Accounting, Auditing and Finance*, 22(2), 249-284. https://doi.org/10.1177/0148558X0702200211

Rabe-Hesketh, S., & Skrondal, A. (2012). *Continuous responses*. StataCorp LP.

Richardson, G., Taylor, G., & Lanis, R. (2015). The impact of financial distress on corporate tax avoidance spanning the global financial crisis: Evidence from Australia. *Economic Modelling*, 44(C), 44–53. https://doi.org/10.1016/j.econmod.2014.09.015

Richardson, G., Wang, B., & Zhang, X. (2016). Ownership structure and corporate tax avoidance: Evidence from publicly listed private firms in China. *Journal of Contemporary Accounting and Economics*, 12(2), 141–158. https://doi.org/10.1016/j.jcae.2016.06.003

Salihu, I. A., Annuar, H. A., & Sheikh Obid, S. N. (2015). Foreign investors' interests and corporate tax avoidance: Evidence from an emerging economy. *Journal of Contemporary Accounting and Economics*, 11(2), 138–147. https://doi.org/10.1016/j.jcae.2015.03.001

Santana, S. L. L., & Rezende, A. J. (2016). Corporate tax avoidance and firm value: from Brazil. Revista Contemporânea de Contabilidade, 13(30), 114-133. https://doi.org/10.5007/2175-8069.2016v13n30p114

Shevlin, T., Thornock, J., & Williams, B. (2017). An examination of firms' responses to tax forgiveness. *Review of Accounting Studies*, 22(2), 577–607. https://doi.org/10.1007/s11142-017-9390-6

Taylor, G., & Richardson, G. (2012). International Corporate Tax Avoidance Practices: Evidence from Australian Firms. *The International Journal of Accounting*, 47(4), 469–496. https://doi.org/10.1016/j.intacc.2012.10.004

Thomsen, M., & Watrin, C. (2018). Tax avoidance over time: A comparison of European and US firms. *Journal of*

International Accounting, Auditing and Taxation, 33, 40-63. https://doi.org/10.1016/j.intaccaudtax.2018.11.002

West, B. T., Welch, K. B., & Galecki, A. T. (2015). Models for repeated-measures data: The rat brain example. *Linear-Mixed Models-A Practical Guide Using Statistical Software. West BT, Welch KB, and, Galecki AT, eds*, 232.

Wilde, J. H., & Wilson, R. J. (2018). Perspectives on corporate tax planning: observations from the past decade. *The Journal of the American Taxation Association*, 40(2), 63-81. https://doi.org/10.2308/atax-51993

Wilson, R. J. (2009). An Examination of Corporate Tax Shelter Participants. *The Accounting Review*, 84(3), 969–999. https://doi.org/10.2308/accr.2009.84.3.969

World Justice Project (2019). WJP Rule of Law Index 2019. https://worldjusticeproject.org/our-work/wjp-rule-law-index

Xu, S., Mo, W. S., & Peng, J. (2020). How Does Tax Aggressiveness Affect Shareholder Wealth? An Examination Using a Regulatory Transition. *The International Journal of Accounting*, 55(04), 2050015. https://doi.org/10.1142/S1094406020500158

Young, M. N., Tsai, T., Wang, X., Liu, S., & Ahlstrom, D. (2014). Strategy in emerging economies and the theory of the firm. *Asia Pacific Journal of Management*, 31(2), 331-354. https://doi.org/10.1007/s10490-014-9373-0

APPENDIX I

Table V. Correlation between variables

	Cash_ETR	GAAP_ETR	FirmvalueQ	AbCFVol	IIQ	InstShare	EPSString	PPE	LEV	ROA	MTB	Growth	CountryTax
Cash_ETR	1.0000												
GAAP_ETR	0.1066	1.0000											
FirmvalueQ	0.0187	-0.0097	1.0000										
AbCFVol	0.0112	0.0574	-0.0460	1.0000									
IIQ	-0.0010	0.0151	0.0392	-0.0137	1.0000								
InstShare	0.0315	0.0313	-0.1976	-0.0154	-0.0408	1.0000							
EPSString	0.0220	-0.0300	-0.0115	-0.0035	0.0619	0.0127	1.0000						
PPE	-0.1969	-0.0970	-0.0388	-0.0079	0.0514	-0.0795	0.0166	1.0000					
LEV	-0.0917	-0.0625	-0.0093	0.0091	-0.0048	0.0223	0.0108	0.1743	1.0000				
ROA	0.1135	-0.1778	-0.0658	-0.0067	0.1052	-0.0822	0.1505	-0.0727	0.0266	1.0000			
MTB	0.0214	-0.0191	0.2311	-0.0324	0.0045	0.0516	0.0338	0.0143	-0.2410	-0.1314	1.0000		
Growth	-0.0281	-0.0363	-0.0520	-0.0076	0.0506	-0.0199	0.0345	-0.0344	0.0357	0.0276	0.0206	1.0000	