Income Tax and Capital Structures: MNEs in Emerging Markets

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Abstract

Purpose: This study examines how income taxation influences the capital structure decisions of Brazilian multinational firms. We hypothesize that higher income tax rates increase the financial leverage of affiliates operating in different jurisdictions.

Design/methodology/approach: Using company-level data, we analyze foreign subsidiaries of the same parent company across markets with varying tax rates and capital market structures. Our econometric analysis employs panel data regression models with random effects to control for firm, industry, and country-specific factors.

Findings: A 10% increase in income tax rates leads to an 11.4% rise in affiliates' long-term debt relative to total assets. These findings highlight the complementary role of existing capital structure theories and the moderating effect of creditor rights.

Originality: Unlike typical MNEs in developed markets, Brazilian MNEs often serve as parent entities despite high domestic tax rates. This challenges conventional assumptions about intercompany debt positioning.

Keywords: Income taxation; Capital structure; Multinational; Emerging markets

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1. INTRODUCTION

According to Avdjiev *et al*. (2014), non-financial multinational companies from emerging economies have significantly increased their external funding over the last decade through the issuance of debt securities in offshore markets. They work with three types of structuring in which the offshore subsidiary sends resources to the parent country after raising resources abroad: Type 1: Subsidiary lends directly to the parent company (intercompany flow); Type 2: Subsidiary grants credit to unrelated companies (between companies' flow); Type 3: Subsidiary makes an international deposit at a bank (corporate deposit flows).

In most emerging countries, the Type1 is the most common. The interest tied to debt is deductible for corporate income tax purposes, while dividends must be paid out of after-tax corporate profits. This means that most tax systems tend to favor debt financing over equity financing. When determining their capital structure, companies that operate exclusively domestically only need to deal with the domestic tax system. However, multinational groups (Multinational Enterprises – MNEs) face a more complex decision-making process as they need to decide on their overall debt levels and how to distribute these debts among the group's affiliates in all countries in which the MNE operates. This means that the capital structure of an MNE reflects the income taxation systems of all the countries in which it operates (Huizinga *et al.*, 2008).

In Mintz and Smart (2004), for example, there is an excellent summary of possible tax planning involving the capital structure of MNEs operating in different countries. Generally, the process involves an affiliate, situated in a country with the most favorable income tax rate, extending loans to its counterparts in countries where the income tax rates are comparatively higher. This tax approach yields financial benefits, as the interest income accrued in the jurisdiction with lower tax rates incurs lesser income tax liabilities. Simultaneously, interest deductions in countries with higher tax rates lead to substantial income tax savings.

One possible implication for an emerging country is that the income tax rate may have a stronger impact on the debt-to-equity ratio of its affiliates than in developed countries. This is based on some evidence that suggests a greater sensitivity of capital structure decisions to tax incentives in developing countries (Fuest *et al.*, 2011). Mazouz *et al.* (2021) identified that direct international investments by Latin American MNEs do not follow the same pattern as international investments made by OECD member countries. In other words, there are general particularities in the way Latin American MNEs structure themselves and make investments.

As Brazil is one of the largest countries in the emerging economy, this study aims to explore the impact of income taxation on the capital structure decisions of Brazilian multinational firms. Therefore, the research hypothesis proposes: Elevated income tax rates contribute to the increase of the financial leverage of affiliates of Brazilian MNEs in the jurisdictions where these affiliates conduct their operations.

We review the existing literature on this topic and present our own empirical analysis based on a sample of Brazilian MNEs from various industries. We found that income tax rates have a significant effect on the debt-to-asset ratio of MNEs, such that higher tax rates induce more debt financing and lower tax rates encourage more equity financing. This result is consistent with the tax shield theory and suggests that MNEs adjust their capital structure to optimize their tax benefits across different jurisdictions. Our analysis focuses on the hypothesis that the income tax rate is positively associated with the debt-to-assets ratio in the capital structure of companies in emerging market MNEs (H1). Additionally, we propose a second hypothesis (H2), which suggests that creditor rights have a moderating effect on the relationship between income tax rate and debt-to-assets ratio, such that when creditor rights are lower, the influence of income tax rates on debt-to-assets ratio is higher, and when creditor rights are higher, the influence of income tax rates on debt-to-assets ratio is lower. The literature has mainly focused on the cases of US-based MNEs (e.g., Desai *et al.*, 2004) and German-based MNEs (e.g., most of the subsequent studies since 2004). However, there is a lack of research covering MNEs from Brazil or other Latin American countries.

The following section begins with a general overview of the literature on MNEs, followed by a more specific review of the studies that examine how income taxation affects the capital structure decisions of MNEs. Next we describe the model that we use to test our hypothesis and finally explain our findings.

2 LITERATURE REVIEW AND HYPOTHESES

2.1 The tax shield effect on the capital structure decisions of MNEs

The corporate finance literature has traditionally given full focus to the discussion of tax shield (Miller, 1977), from the texts mentioned above, to a unitary view of multinational groups in a consolidated manner and in a market perspective for investors in such groups. Arena and Roper (2010) explore how international taxation shapes multinational enterprises' decisions on external debt issuance, particularly when raising new capital or refinancing obligations.

Their analysis adopts a group-level perspective, focusing on the strategic choice of where to issue external debt, rather than examining the specific capital structures of individual affiliates. Although this approach is relevant, researchers have delved deeper into the subject and have been able to identify that, in the cases of MNEs, this discussion is more complex precisely because the taxation of MNEs is not unitary but fractional, to the extent that these economic groups operate in jurisdictions with the power to tax income independently and at different rates, creating challenges and opportunities.

In the case of an MNE, the assessment of agency costs and total bankruptcy costs, as opposed to the tax shield arising from market debt, must also be seen from the perspective of each group affiliate, in addition to the general vision of the MNE. This is because, for a given level of total bankruptcy cost, there is an incentive to allocate the majority of the MNE's external debt to the companies in the group that generate the largest absolute tax savings (Goldbach *et al.*, 2021). Egger *et al.* (2014) consider that the distribution of equity capital between different locations is generally established in advance and is of exogenous origin. To finance investments that exceed available internal resources, each MNE entity acquires debt in the local capital market. Furthermore, the authors consider that the MNEs have the possibility of operating an internal capital market and lending capital to affiliates with the greatest need for investment capital. In addition to investment needs, intercompany debt can also be used to minimize the global tax burden by shifting profits to locations with lower income taxation than the parent company. These aspects form the typical characteristics of the cases analyzed in the specific literature on the topic.

Huizinga *et al.* (2008) observe that the parent company provides explicit and implicit credit guarantees for the debts of its affiliates. Considering income tax rates in all countries where multinationals operate, they predicted that multinationals would balance their debt with the market and consider debt among MNE affiliates. They considered that, if the income tax rate in a country increases, it will be more profitable for the affiliate in that country to use more debt. However, this increased reliance on debt escalates the group’s risk of bankruptcy, thereby creating a tension. Nonetheless, MNEs are able to balance the debt levels of their affiliates via intercompany transactions to mitigate this effect, producing systemic balancing. In this way, MNEs can maximize the tax benefit of their debt to their affiliates and, at the same time, reduce the overall risk of bankruptcy through the intercompany transfer of debt to the market, which is not possible in a purely domestic group.

Expanding on this, Huizinga *et al.* (2008) delve into a common scenario where the interest expenses associated with intercompany debt can be deducted from the taxable income

of the foreign subsidiary (the debtor). The interest income from this transaction is then channeled to the parent company, effectively reducing the subsidiary's income tax obligations in its home country. However, it is important to note that this interest income is still subject to corporate income tax in the parent country. This typical case reflects the profile of MNEs that have their parent company in developed countries with developed capital markets, which is not necessarily the case for MNEs from developing countries. They therefore add that, in an international context, the tax costs of debt and equity financing depend on the combined tax systems of the countries of the subsidiaries and the country of the MNE's parent company. Furthermore, they emphasize that the tax costs of equity financing reflect not only income tax rates, but also specific provisions to avoid double taxation of income in the parent country.

The typical case is so strong that Goldbach *et al.* (2021) elaborate that understanding why MNEs use their parent company as a creditor in intercompany loans is important as it provides information on the functioning of the MNEs ' internal capital market and the other factors involved. In other words, emphasis is placed on the fact that the parent company functions as a provider of capital in the form of debt for the other companies in the group. Despite this, the study was innovative because it also addressed the situation in which the provider of capital in the form of debt is not necessarily the parent company in the figure called "internal bank". The authors consider that a loan from an internal bank is not affected by the overall MNE's tax shield but is sensitive to the maximum tax difference (highest tax rate minus lowest tax rate). Their model finds that the parent company's debt and the group's total market debt complement each other when it comes to tax incentives. Yet, they are substitutes for the non-tax costs of debt. Parent company debt is leveraged to offset the transaction costs associated with accessing the capital market. Its utilization escalates in comparison to external debt, correlating directly with the subsidiary's expenses incurred while tapping into the external capital market. Still, subsidiaries operating in a frictionless capital market do not resort to using the parent company's debt. This suggests that they have more efficient or cost-effective means of financing at their disposal.

Feld, Heckemeyer and Overesch (2013) quantitatively reviews empirical studies on how taxes influence corporate debt financing. Based on evidence from 48 studies, they find a significant tax impact, with the choice of tax rate proxy shaping key results. Furthermore, for multinational firms the tax effects on debt are higher.

The unique characteristics of Brazil play a crucial role in the context of this study. Unlike the typical scenarios often discussed, the parent companies of Brazilian MNEs are not situated in a developed country with a mature capital market. In addition, the logic of the

intercompany debt flow is that it produces deductible interest expenses in the country that has the highest income tax rate, thus enhancing the group's tax shield. Given that Brazil is known for having one of the world's highest income tax rates, one might logically assume that Brazilian companies would be the debtor of intercompany debt. However, in contrast to the typical scenario discussed in literature, these companies often serve as the parent entities, which sets them apart from the norm.

2.2. Differences in Tax Rates

In the realm of international finance, two predominant research streams have emerged to examine the impact of income taxation on the capital structure of multinational enterprises' (MNEs) affiliates. There are two major approaches. The first approach takes a direct route, concentrating on the uncomplicated structure of the parent company and its role in providing debt-based funding to its foreign subsidiaries. The second approach presents a more intricate perspective, acknowledging the complex corporate frameworks of MNEs. It considers the role of subsidiaries functioning as internal banks that facilitate debt financing to other foreign subsidiaries. This latter approach is a more contemporary development, recognizing the multifaceted and sophisticated nature of MNEs beyond the scope of the initial research stream.

The Direct Approach

In the first direct approach, there are three important papers that mark the inception of empirical analyses within literature. The paper "A multinational perspective on capital structure choice and internal capital markets" (Desai *et al.*, 2004) is the most relevant on the topic because it influenced many other papers. It was observed that the capital structure of US-based MNEs' group companies is influenced by income tax, in which an increase in the income tax rate of 10% in the group company's country leads to a 2.6% increase in the debt-to-assets ratio. Furthermore, the authors observed that the higher the income tax rate, the greater the incentive for intercompany debt.

Another paper uses the thin-cap rules[4] perspective to analyze the effective reduction of the incentives for excessive debt for German group companies in OECD countries (Buettner *et al.*, 2012). The authors analyzed data related to subsidiaries of German groups in 36 countries – all member countries of the OECD and the European Union. The authors observed that when

[4]Term that represents rules that limit the deductibility of interest when calculating income tax in the case of significantly leveraged companies.

the income tax rate increases by 10%, the leverage ratio also increases by 2.1%, which is consistent with the outcome found by Desai *et al.* (2004).

The other study also uses data from German MNEs but emphasizes subsidiaries operating in developing countries (Fuest *et al.*, 2011). The findings mirrored those of other studies that took into account all subsidiaries of the MNEs. However, a more nuanced picture emerged when these subsidiaries were divided into two categories: those situated in developed countries and those in developing countries. It was observed that the impact of income taxation on the degree of intercompany indebtedness was twice as pronounced for subsidiaries in developing countries compared to their counterparts in developed nations. This suggests a differential effect of tax policies based on the economic maturity of the host country.

This paper reinforces the view that developing countries are especially susceptible to multinational tax planning strategies. The authors reason that, from the perspective of the transfer pricing theory induced by income taxation in MNEs, it can be assumed that MNEs organize their internal financial structures in such a way that entities in low-tax countries have an inclination towards financing by equity, while entities in high income tax countries have an inclination towards intercompany debt financing. As financing structures are also influenced by non-tax factors, the idea that developing countries are more vulnerable to tax-induced profit shifting does not necessarily imply that the absolute level of debt financing is higher. However, we would expect the sensitivity of intercompany loans to differences in income tax rates to be greater the weaker the tax authorities' ability to prevent income transfer.

Empirically, the authors identified that, when the income tax rate increases by 10%, leverage also increases by 1.77% overall. When companies operate in developed countries, they experience a leverage increase of 1.09%. However, in developing countries, this increase is significantly higher at 3.26%. This suggests that developing countries offer more incentives to enhance the tax shield for companies within economic groups. As a result, these incentives effectively reduce the income tax payable. It is important to reiterate, as previously mentioned, the relevance of the debt increase in relation to the rise in the income tax rate remains valid in this context.

Analyzing data from the Bureau of Economic Analysis annual survey, alongside firm income and country-specific tax rates, Faulkender and Smith (2016) observe that companies in higher-tax countries tend to have greater leverage and lower interest coverage ratios. This aligns with theoretical expectations and provides further empirical validation for the trade-off theory of capital structure.

Clearly, each of the studies from the initial stream that utilizes a direct approach conducts identical tests and uniformly illustrates the propositions of this study. The proposal here is to use the same approach for the same problem, so that it becomes easier to compare results and evaluate other possibilities.

The Indirect Approach

In the second approach, most of the papers discuss the complexities of the large MNEs and emphasize the role of some subsidiaries functioning as internal banks that facilitate debt financing to other foreign subsidiaries. In Huizinga *et al.* (2008), a more systemic view of MNEs is perceived, since the more dichotomous view between controlling company and subsidiaries, in which the controlling company raises funds from the market and transfers it to subsidiaries, is left aside and it is assumed that choices and structure can be more complex. Furthermore, they also moved towards incorporating financing issues directly with the market in the countries of each affiliate as a factor that influences their debt.

In the case of Møen *et al.* (2019), which is more recent, it also uses the data from German MNEs. They followed the same hypothesis as Huizinga *et al.* (2008), in which differences in national tax systems affect the way debt to the market is used in MNEs. They concluded three important points: 1 - The value of MNEs is maximized if both intercompany and market debt are used to reduce income tax payments; 2 - Intercompany debt between affiliates and market debt are independent of each other; 3 - As in Huizinga *et al.* (2008), they concluded that MNEs have a tax advantage over purely domestic companies because the latter cannot reallocate debt by transferring it to where it would be more tax efficient.

Although the perspective of Møen *et al.* (2019) is a comparison of purely domestic companies and multinational groups, the authors' analysis is too comprehensive for this study, since their model predicts that the value of the company is maximized if the lender in intercompany loans is an affiliate operating as a financial center located in the country with the lowest effective income tax rate. Therefore, the use of a company in a low income tax rate jurisdiction as a financial center ensures that interest income, obtained through the transfer of intercompany debt, is taxed at the lowest possible tax rate, while interest expenses are deducted from the taxable profit in affiliates that have a higher income tax rate. This planning reduces the amount of income tax that the MNE pays globally. The study by Møen *et al.* (2019) is relevant because it highlights the presence and use of affiliates utilized as financial centers in countries with low taxation.

Following the same reasoning as the previous ones, Goldbach *et al.* (2021) review the discussion of "The tax-efficient use of debt in multinational corporations" by splitting the issue into three different alternative sources for debt capital: 1 - Subsidiary's debt with the parent company; 2 - Subsidiary's debt with other group companies; 3- Debt with companies outside the group. In the first alternative, the authors point out that it cannot be seen as a tax planning maneuver because Germany is a country known for its high income tax rates. Conversely, the second alternative presents a potential strategy for reducing tax burdens. This strategy involves a company located in a low-tax country lending capital to a company in a high-tax country, thereby creating a tax advantage. The final alternative, however, is less relevant to tax planning. Therefore, its potential to create value within the context we are discussing herein is limited.

From Goldbach *et al.* (2021), it is possible to understand that, in the case of Brazil, the situation is similar to that of Germany, since Brazil imposes a substantial income tax rate of 34%. In other words, in the context of this study, a capital structure that could be theoretically defended based on specialized literature on the subject would be: Brazilian parent companies carrying higher debt, and their subsidiaries in countries with lower income tax rates maintaining lower debt levels. Essentially, Brazil's high income tax rate potentially incentivizes companies to accrue more debt, whereas MNEs based in countries with lower taxation are likely to adopt the opposite approach.

These two major research methodologies indicate a potential for mutual complementarity to explain emerging market MNE leverage strategy. Therefore, we combined both approaches to test our Hypothesis 1. To validate the hypothesis, we employed the econometric model established by Desai *et al.* (2004) and subsequently adopted by Fuest *et al.* (2011) and Buettner *et al.* (2012). This model is designed to examine the impact of income taxation on the debt-to-assets ratio within MNE's group companies. Recognizing that Brazilian MNEs utilize foreign affiliates as financial hubs, we incorporated insights from Huizinga *et al.* (2008), Goldbach *et al.* (2021), and Møen *et al.* (2019) into our discussion. This enriched our understanding of the unique characteristics of Brazilian MNEs. These sources offer valuable tools for examining more intricate organizational structures, where the parent company does not necessarily fund its subsidiaries. It is understood that this is the theoretical basis for testing the research hypothesis.

H1: Income tax rate is positively associated with the debt-to-assets ratio in the capital structure of companies in Emerging Market MNEs

2.3. Differences in Creditor Protection.

There are significant differences across countries in terms of investor rights and their legal enforcement (Grossman and Hart, 1988). Based on one of the most extensive empirical investigations of these differences among major investor protection and corporate governance systems around the world, La Porta *et al*. (1998) found out that the legal systems in emerging economies are weak and inefficient in protecting investor rights.

Due to the principal-agent problem agency cost, the absence of specific legal provisions that protect the rights of outside investors makes it more onerous for firms to raise external financing (La Porta *et al.*, 1997). This higher external financing cost is not only for equity financing, but also for debt financing.

As both managers and majority shareholders may expropriate the cash flow generated by the firm, creditors want to protect their rights to recover dues from a borrower who has defaulted. Creditor protection laws encompass a variety of rights to make harder for defaulting firms to seek protection in reorganization.

Some examples of creditor rights are protections for creditors that largely deal with bankruptcy and reorganization procedures, as well as measures that enable creditors to repossess collateral, the protection of their degree of seniority to repossess liquid assets, and votes in the decisions for how to reorganize the company and pay off the creditors. (La Porta *et al.*, 2000).

Although the most basic creditor right is the right to repossess -- and then liquidate or keep -- collateral when a loan is in default (Hart, 1995), this creditor right is not granted by law in all countries In some emerging countries, even for collateralized loans, the law makes it difficult for lenders to repossess collateral, in part because such repossession leads to liquidation of firms that are viewed as socially undesirable. (La Porta et al., 2013).

Cho et al. (2014) argue that strong creditor protection discourages firms from committing to long-term debt repayments, as managers and shareholders aim to avoid the risk of losing control during financial distress. However, the effect observed by Cho et al. (2014) does not directly apply to this paper, as our focus lies not on external debt or the potential loss of control by MNE managers and shareholders, but rather on the capital structure of individual group affiliates and how it relates to creditor rights in each jurisdiction where they operate. For instance, while Subsidiary A in Country Z may face financial difficulties, this does not necessarily put the managers and shareholders of Parent Company A at risk of losing control over the MNE. Our discussion thus shifts to a different layer—the affiliate level—rather than viewing the MNE as a unified entity.

Research suggests that when creditor rights are weak and the capital market is underdeveloped, loans outside the economic group tend to be more expensive. As a result, multinational groups may resort to replacing market loans with loans from companies within the same group to mitigate these higher costs (Desai et al., 2004).

Given that procuring bank credit in the countries of the region has become increasingly challenging, it is anticipated that the tax benefits associated with debt in the capital structure of these regional companies will be amplified due to the dearth of external capital in domestic markets.

The results of studies by Duran and Stephen (2020) suggest that, following the 2008 financial crisis, Latin American MNEs took advantage of their access to international capital markets with low global interest rates. In contrast, domestic companies lacked international diversification and, consequently, were unable to take advantage of these favorable low global interest rates.

Similar findings were also detected in Indian multinationals. In order to raise debt in emerging economies with poor protection for creditor rights, Indian multinationals have to consider other compensation factors to lower their financial costs. The alternative is to belong to a solvent business group, because creditors will be more willing to provide financing if they expect solvent business groups to provide supportive collateral to their member firms. This will reduce their bankruptcy cost and facilitate their access to the credit market (Gopalan *et al.*, 2007).

As creditor rights become more established within a country's legal framework, the size and volume of bond market issuances and bank loans tend to increase. This is largely due to the heightened confidence among average investors and banks, who perceive a reduced likelihood of encountering a 'bad lemon'. In such markets, adequate creditor legal safeguards make it less onerous for firms to raise debt. This may influence other such financial cost factors as the tax shield effect in the company capital structure decision we discussed in the previous section. Consequently, we hypothesize the following:

H2: Creditor right has a moderating effect on the relationship between income tax rate and debt-to-assets ratio, such that when the creditor cright is lower, the influence of income tax rate on debt-to-assets ratio is higher; and when the creditor right is higher, the influence of income tax rate on debt-to-assets ratio is lower.

3 METHODOLOGY

Database

Capital IQ (Standard & Poor's) and Orbis (BvD – Moody's Analytics) were used to capture the financial data of non-financial companies. We accessed data from the controlling parent company and from subsidiaries outside Brazil. Therefore, we were able to filter out those companies whose ultimate parent company is located in Brazil, along with their respective international subsidiaries. All companies with available financial data on Orbis in the period from 2015 to 2021 were considered.

The use of company-level data facilitates the distinction between foreign subsidiaries under the same parent company. These subsidiaries operate in diverse markets characterized by distinct income tax rates and capital market structures. This differentiation allows us to identify the factors driving debt within the same group and estimate the effects of taxation and local capital market conditions. Additionally, this approach inherently controls for factors shared among all affiliates of a given company (Desai *et al.*, 2004). It is also important to note that the collected financial data adheres to IFRS accounting standards. Consequently, U.S. companies, which follow US GAAP, were not included in the database.

We adhere to the OECD BEPS project, which focuses on large multinational enterprises (MNEs) with revenues exceeding €750 million (BEPS Action Plan, OECD, 2013). There are several reasons for this focus. First, these large MNEs possess significant economic power and influence. This allows them to structure their operations differently from smaller companies. Such a difference in organization raises concerns about the erosion of the tax base, underscoring the necessity for a coordinated international response. Secondly, concentrating efforts on a smaller population that represents a substantial portion of the economy is more efficient.

In 2014, Federal Law No. 12,973 significantly reformed the Brazilian tax legislation, introducing major changes to income taxation in the country. One of the key changes was the adoption of worldwide income taxation, meaning Brazil began to tax income earned by companies that are resident or domiciled abroad if their parent company is resident in Brazil. This shift had a substantial impact on Brazilian companies operating internationally, requiring them to adapt to the new tax rules. Additionally, Law No. 12,973/2014 changed the timing of taxation to the point of legal availability of income or capital gains.

Variables

Regarding the dependent variable, we considered the ratio of long-term debt to total assets (Desai *et al.*, 2004) for the MNEs. Short-term debt was excluded, as discussions on working capital and short-term debt usually pertain to a different set of studies. Additionally, none of the corporate bonds issued by Brazilian MNEs had a maturity shorter than five years.

We could not consider intercompany transaction information due to the lack of data from affiliates outside Brazil. This limitation was also present in the study by Desai *et al.* (2004), as they could not obtain information on intercompany transactions without the controlling companies as counterparties. In the case of Brazilian MNEs, the absence of this data is somewhat mitigated by Brazil's status as the country of residence for the controlling companies and one of the countries with the highest income tax rates globally. This evidence will be further clarified in the statistical summary.

The independent variable was the income tax rates of the countries where the affiliates of Brazilian MNEs are located. This approach aligns with the methodologies of Desai *et al.* (2004) and Goldbach et al. (2021). Similarly, Møen et al. (2019) argue that the nominal rate is the best alternative for evaluating the marginal effect of effective tax rates on an MNE's affiliates. In Brazil, for instance, the nominal tax rate applied is 34%. This rate is a combination of two distinct taxes: the Corporate Income Tax (IRPJ) and the Social Contribution on Net Income (CSLL).

We considered using the companies' effective tax rates but discarded this option due to the high level of uncertainty surrounding the real reasons for income tax expenses, which can be influenced by various company-specific circumstances not publicly disclosed. The data source was the Worldwide Corporate Tax Rate Guide from Ernst & Young (EY) for the year 2022, reflecting tax rates for 2021.

The control variables were profitability, tangibility, the log of sales, creditor rights, political risk, GDP growth, inflation rate and private credit. Control variables were also considered in Goldbach *et al.* (2021) and Desai *et al.* (2004).

In Table 1 we present a summary of the variables and their specifications that support the application in the model.

Statistical Model

The analysis was based on panel data regression models with random effects (Desai *et al.*, 2004). The model is presented in equation (1).

$$Lev_{ijkt} = \alpha_0 + \beta_1 Tax\_Rate_{ijkt} + \beta_2 X_{ijkt} + \beta_3 Y_{kt} + c_{ijk} + d_t + \varepsilon_{ijkt}\ , \qquad (1)$$

Where

Lev_{ijkt}: Long-term debt divided by total assets of firm i, industry j, country k and time t

$Tax\_Rate_{\ i,t}$: Income tax rate by country

$X_{ij,t}$: Set of control variables at firm level (Profitability; Fixed asset; Size)

$Y_{j,t}$: Set of control variables at the country level (Political risk; GDP growth; Inflation; Creditor Rights; Private Credit)

c_i: Unobserved effect of firm/industry/country

d_t: Unobserved effect of time

The estimate with random effects makes it possible to use the database in panel format and to control the estimates by any characteristic of the firm, industry or country constant over time (Barros, 2020). Additionally, this approach allows for the control of events over the years (Wooldridge, 2018). The equations were estimated by using the method of generalized moments – GMM (De Genaro and Astorino, 2022).

The residual analysis indicated the presence of heteroscedasticity of the errors (White's test) and robust standard errors were used. For robustness tests, another leverage measure was used, defined as total debt divided by total assets. The results were similar.

4 RESULTS

MNEs that issue corporate bonds outside Brazil exhibit distinct characteristics and opportunities that are essential to our study. Companies from developing countries that expand into international markets can access a broader and more cost-effective pool of external resources. Despite higher growth opportunities that increase information asymmetry and debt-related agency costs (Gonenc and de Haan, 2014), these companies can secure funds at lower costs.

Generally, companies with corporate bonds are, on average, larger than companies without corporate bonds. Affiliates issuing corporate bonds often act as internal banks for Brazilian MNEs, facilitating significant capital flows, as highlighted by Avdjiev *et al.* (2014). These MNEs are more likely to engage in international tax planning and require funds in the global market. Furthermore, Goldbach *et al.* (2021) find that larger MNEs are more likely to have financial centers outside the parent company's country and exhibit higher percentages of intercompany debt compared to smaller MNEs.

Our study examines all Brazilian MNEs for which financial data are available, comparing our findings with previous research. We applied our model specifically to subsidiaries of MNEs that have issued corporate bonds overseas and their corresponding parent companies in Brazil.

Table 2 shows the descriptive statistics (Panel A), the variable averages per country (Panel B) and the correlation matrix (Panel C). In the sample, the average level of indebtedness of the companies is 20%, and the income tax ranges from 17% to 35%, a sufficient range to understand the relationship between these two variables. Looking at the sample by country (Table 2 – Panel B), Germany, Belgium, China, Spain, Luxembourg, and Thailand have subsidiaries with the lowest leverage (0.0), while the highest average leverages are in the Netherlands (55%) and Austria (41%). The lowest tax rates are in Luxembourg (17%) and the highest ones in Argentina (35%) and Brazil (34%). The correlation matrix (Table 2 – Panel C) indicates a positive and weak correlation between leverage and income tax rate (0.18), which descriptively confirms H1. We also observe the expected positive signs in the correlations between leverage and creditor rights, fixed assets ratio, size, and GDP growth, as well as the expected negative sign of leverage with private credit. The degree of multicollinearity is moderate, as there are some strong correlations between the explanatory variables (income tax rate versus political risk: -0.86; income tax rate versus private credit: -0.78; and private credit versus creditor rights: -0.76), but they should not cause any undesirable effects in the models.

Table 3 presents the results of the regression models with panel data. Three models were estimated: Model (1) includes only the income tax rate, Model (2) includes the income tax rate plus the control variables to test H1, and Model (3) includes the income tax rate, its interaction with creditor rights, and the control variables to test H2.

Models 1 and 2, as presented in Table 3, indicate that the leverage of affiliates is influenced by incentives associated with elevated income tax rates in their respective host countries. In both models, the estimated coefficient for the rate of income tax is positive and statistically significant (p-value < 0.01), indicating a positive association between leverage and the income tax rate, thus confirming hypothesis 1. The estimated coefficient of Model 2 on the country's income tax rate (b=1.826) implies that an increase of 10 percentage points (pp) in income tax rates is associated with an increase of 18 pp in the affiliate's leverage. This result is in line with the results of Desai, Foley and Hines Jr. (2004), Buettner *et al.* (2012) and Fuest *et al.* (2011). It can also be seen that the R-squared of 0.242 is in line with the result of the seminal work by Desai *et al.* (2004), when considering this same independent variable, the result was 0.229.

Model 3 in Table 3 is used to test H2. The interaction between the income tax rate and creditor rights was negative and statistically significant (p-value < 0.01), indicating that creditor rights have a moderating effect on the relationship between the income tax rate and the leverage. Specifically, when creditor rights are stronger, the influence of the income tax rate on the leverage is weaker (b = - 1.264), thus confirming H2. To better understand the moderation, Figure 1 – Panel A shows how the expected value of leverage varies with an increase in the income tax rate for countries with lower (value = 1) and higher creditor rights (value = 3). We can observe that in a country with lower creditor rights, the effect of the income tax rate on leverage is stronger; the slope is steeper for countries with lower creditor rights compared to those with higher creditor rights. Thus, in countries with lower creditor rights, it is only worthwhile to increase leverage if the income tax rate rises, whereas in countries with higher creditor rights, the income tax rate does not have as strong an effect on corporate leverage.

In Figure 1 – Panel B, we represent the relationship between leverage and the income tax rate for each country. Overall, the relationship is positive, as indicated by the theory and H1. However, there are instances that contradict the logic that a higher income tax rate corresponds to higher leverage. This is evident in countries like Mexico, Argentina, and Brazil, where despite high income taxes, the leverage levels do not reach their peak. A plausible explanation could be that when Brazilian MNEs venture into Latin American countries, their organizational structure is not strictly designed with the objective of achieving intricate tax efficiency. This concept aligns with the observations made by Huizinga *et al.* (2008) and Møen *et al.* (2019), in the sense that MNEs carry out a general and organized balance of the leverage of their affiliates in order to explore the best possible tax efficiency. Perhaps the indication of their studies is valid for MNEs with parent companies in developed countries, where efficient tax management has been practiced for longer and with a much wider level of multiplicity of jurisdictions than Brazilian MNEs. It can be deduced that in the international and operational expansion of MNEs the initial priority is focused on operational guarantee and efficiency, and only later on more complex tax management.

Brazilian MNEs primarily have their main source of value creation in Brazil. When they need to raise funds in the capital market, they seek the most economical alternative, which is often the global debt capital market. It is in this context that tax planning comes into play. These companies have the flexibility to select the most beneficial locations for setting up their export hubs. A significant number of these companies prefer countries that have established treaties to prevent double taxation. Notable examples of such countries include Austria, the Netherlands, and Luxembourg.

This choice is often enabled by the significant volume of sales in strong currencies – USD and EUR – that they have through subsidiaries outside Brazil functioning as trading hubs. With these characteristics, it becomes easier to use these group entities to raise funds in the global debt market.

At this point, the two topics converge because these trading hubs, in addition to providing tax advantages, offer better creditor rights than those in Brazil. Excluding the tax aspect and considering only the capital market, it would make more sense to establish financing hubs in the USA or the UK, where creditor rights and capital market development are even more advanced. However, these two jurisdictions do not offer the tax benefits of the previously mentioned countries. Therefore, we can infer that although rationally Brazilian groups could raise funds in the USA or the UK, Austria, the Netherlands, and Luxembourg are favored by these companies due to the tax incentives they provide, which are considered to be the most significant benefits.

We see fundraising decisions on three levels: (1) where to raise funds for the group as a whole (local or offshore); (2) where there is an actual need for capital (often it is for the parent company in Brazil); (3) what is the most efficient structure from a tax perspective (if offshore, issuance of corporate bonds with a pass-through to Brazil, for example).

As noted by Avdjiev *et al.* (2014), companies from emerging countries such as Brazil use an international fundraising mechanism through the issuance of corporate bonds outside their country of origin and transfer the resources in debt transactions with the parent companies. This pattern can be observed in the case of Brazilian MNEs. Furthermore, Goldbach et al. (2021) highlight that MNEs, particularly those with controlling companies in high-tax countries, are significantly incentivized to establish "internal banks" or financial subsidiaries (financial centers). These entities are often located in their affiliates based in countries with lower income tax rates. In other words, the largest groups have economies of scale that justify the creation of these offshore financial structures. Mintz and Smart (2004) point out that this type of structure was observed in jurisdictions considered to have low income tax rates.

Møen et al. (2019) observe that the maximum tax difference, which corresponds to the difference between the income tax rate of the affiliate analyzed and the lowest income tax rate, is a variable that plays a fundamental role in the transfer of debts motivated by tax incentives associated with intercompany debt. They conclude that the greater the maximum tax difference, the greater the likelihood that an affiliate will seek loans from the lowest-taxed affiliate within the group. When examining this scenario, Brazil presents itself as an almost ideal blend for Brazilian MNEs, as it uniquely combines a high income tax rate with the

presence of group headquarters. In this sense, it is clear that there are reasons for large groups of Brazilian MNEs to set up affiliates in countries with low income taxation, using financial centers to raise funds outside the country and send resources to their controlling companies.

In the same study, Møen et al. (2019) point out that there is a particular consideration related to the fact that some countries offer broad tax benefits to financial centers. They reference several examples of these preferential tax regimes. These include the unique financial institution regimes in Belgium, the specialized financial institution systems in the Netherlands, the distinctive financial institution frameworks in Luxembourg, and the management company regime prevalent in Switzerland. They give details of the case of the Belgian system which, for example, until 2010, considered operational expenses and financial costs as the starting point of the tax base of financial centers, instead of income. The authors point out that a quick consultation of company registers available in the Netherlands, Belgium and Luxembourg revealed that many large German MNEs had financial centers in these countries.

In the case of the Brazilian MNEs under analysis, it is possible to observe a concentration of corporate bonds issuances in just a few jurisdictions: The United Kingdom, The Netherlands, Luxembourg and Austria. Of these jurisdictions, only the United Kingdom does not have a treaty with Brazil to avoid double taxation on the income. In the case of countries with which Brazil has the aforementioned treaty, there is still a debate in which it is argued that the income earned in such countries should be taxed in Brazil only when dividends are effectively paid (economically made available). Therefore, in these cases there would be a postponement of the taxation of profits in affiliates resident in countries with which Brazil has a treaty, thus creating an incentive for financial centers to be established in these countries. It should be noted that both the Netherlands and Luxembourg already appear in Møen's study *et al.* (2019), but due to the incentives for financial centers. In the specific case of Austria and Brazil, the treaty to avoid double taxation on income considers that dividends paid by a company resident in Austria to one in Brazil, which holds at least 25% of the shares in the capital of the Austrian company those dividends will be exempt from income tax in Brazil.

Another relevant factor is related to the guarantors of the corporate bonds. We used the Capital IQ of Standard & Poor's in our search for bonds issuances abroad from Brazilian MNEs with maturity after the year 2015. We found 571 issues, totaling USD 407 billion. Of these issuances, using the S&P RatingsDirect ® proprietary data, it was possible to identify the guarantors of 137 issues. In all cases, the controlling companies appeared as guarantors of the operations. In other words, there is a direct connection between the affiliates that issued the

corporate bonds and their controlling companies, making it less likely that the allocation of resources raised will be transferred from financial centers to other countries in which the MNEs operate.

5 CONCLUSION

The analysis of the results presented in this study demonstrates the significant influence of income tax rates on the capital structure of Brazilian MNEs. From the regression presented in our study, we observed that a 10% increase in the income tax rate is associated with an 11.4% increase in affiliates' long-term debt in relation to total assets.

These results suggest that the two major approaches may complement each other to explain the emerging market MNE leverage strategy. As we mentioned in the literature review, there are two major approaches. The first approach adopts a direct method, focusing on the straightforward structure of the parent company and its provision of funding through debt to overseas subsidiaries. The second approach presents a more intricate perspective, acknowledging the complex corporate frameworks of MNEs. It considers the role of subsidiaries functioning as internal banks that facilitate debt financing to other foreign subsidiaries.

In addition, we also have found that creditor rights moderate the relationship between the income tax rate and leverage, weakening the impact of income tax rates on leverage when creditor rights are stronger (b = -1.264), thus supporting hypothesis H2. In countries with weaker creditor rights, the income tax rate has a more significant effect on leverage, with a steeper slope compared to countries with stronger creditor rights.

Therefore, in nations with lower creditor rights, increasing leverage is only beneficial if the income tax rate rises, whereas in countries with higher creditor rights, the income tax rate has a less pronounced effect on corporate leverage.

In this study, however, it was not possible to obtain information from all companies belonging to Brazilian MNEs, as this type of data is not created or required by Brazilian authorities. If they were, they would not be publicly accessible, especially in the case of information held by the Tax Authorities of Brazil , which is protected by tax secrecy. However, data from all parent companies and main subsidiaries have been considered, as the most complete private databases available on the market have been used.

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The Authors declare that there is no conflict of interest.

The data that support the findings of this study are available from the corresponding author upon request.

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Table 1. Summary of variables and their specifications

Variables	Description	Signal Expected	Literature
Dependent			
LEV	Leverage Long-term debt to total assets		Desai *et al.* (2004) Goldbach *et al.* (2021)
Independent			
ITR	Income Tax Rate Tax rate by country	+	Desai *et al.* (2004) Goldbach *et al.* (2021)
RC	Rights to the Creditor Creditors' rights strength index, with higher levels indicating stronger legal protections (scale: 0-3)	+	La Porta and Lopez-de- Silanes (1998) Desai *et al.* (2004) Goldbach *et al.* (2021)
Controls			
PC	Private Credit The ratio of private credit granted by banks to GDP	-	Beck *et al.* (1999) Desai *et al.* (2004) Goldbach *et al.* (2021)
PROF	Profitability The ratio between EBIT and total assets	+	Desai *et al.* (2004) Goldbach *et al.* (2021)
FA	Fixed Asset The ratio between fixed assets and total assets	+	Desai *et al.* (2004) Goldbach *et al.* (2021)
SIZE	Size Natural logarithm of total assets	+	Desai *et al.* (2004) Goldbach *et al.* (2021)
PR	Political Risk Annual average of monthly assessments from the International Country Risk Guide with higher values indicating greater risk (scale -2.5-2.5)	-	Desai *et al.* (2004) Goldbach *et al.* (2021)
GDP	Gross Domestic Product (GDP) Growth of the country's GDP (%)	+	Goldbach *et al.* (2021)
INF	Inflation Contemporary percentage change in the country's GDP deflator (%)	+	Desai *et al.* (2004) Goldbach *et al.* (2021)

Source: table by authors

Table 2. Descriptive statistics, averages per country and correlation matrix

Panel A – Descriptive statistics

	N	Average	Median	S.D.	Min	P25	P75	Max
Leverage	392	0.20	0.07	0.26	0	0	0.32	1
Tax Rate	387	0.26	0.25	0.07	0.17	0.19	0.34	0.35
Profitability	345	0.06	0.03	0.12	-0.42	0	0.10	1.21
Fixed Assets	390	0.63	0.69	0.32	0	0.47	0.88	1
Size	392	14,137	14,152	2,278	3,689	12,892	15,656	19,450
Creditor Rights	330	2.21	2	0.79	0	2	3	3
Private Credit	370	176,886	154,785	108,034	20,753	81,831	229,235	416,794

Source: table by authors

Panel B – Averages per country

	Leverage	Tax Rate	Profitability	Fixed Assets	Size	Creditor 's Rights	Private Credit
Germany	0	0.21	0.082	0.001	100,620	3	120,905
Argentina	0.24	0.35	0.075	0.577	12,958	1	24,018
Australia	0.32	0.3	0.115	0.706	13,663	3	195,521
Brazil	0.22	0.34	0.067	0.757	15,587	3	790
Belgium	0	0.25	0.108	0.008	10,593	2	2,160
China	0	0.25	-0.006	0.001	8,557	1	0
Spain	0	0.25	-0.048	0.108	12,741	1	173,554
France	0.01	0.25	0.003	0.371	12,213	1	209,068
Netherlands	0.55	0.26	0.003	0.783	15,641	2	269,426
India	0.03	0.30	0.075	0.478	10,886	0	0
Luxembourg	0	0.17	-0.012	0.791	13,991	1	3,890
Mexico	0.12	0.30	0.041	0.716	12,551	2	42,603
Portugal	0.18	0.21	0.024	0.336	12,166	3	177,053
UK	0.19	0.19	0.095	0.572	14,482	2	159,904
Singapore	0.03	0.17	0.051	0.226	11,168	0	0
Thailand	0	0.20	0.154	0.277	11,483	0	162,039
Uruguay	0.22	0.25	0.002	0.687	10,937	0	29,604
Austria	0.41	0.25	0.057	0.559	130,831	2	1,431

Source: table by authors

Panel C – Correlation Matrix

		1	2	3	4	5	6	7	8	9
1	Leverage	1								
2	Income Tax Rate	0.18	1							
3	Creditor rights	0.17	0.70	1						
4	Private Credit	-0.10	-0.78	-0.76	1					
5	Profitability	-0.01	0.15	0.23	-0.26	1				
6	Fixed Assets	0.25	0.23	0.06	0.03	-0.01	1			
7	Size	0.27	0.35	0.25	-0.18	-0.01	0.48	1		
8	Political Risk	0.02	-0.86	-0.71	0.81	-0.11	-0.17	-0.29	1	
9	GDP Growth	0.05	-0.25	-0.24	0.30	-0.15	-0.13	-0.13	0.33	1
10	Inflation	0.01	0.44	0.12	-0.43	0.11	0.12	0.10	-0.48	-0.36

Source: table by authors

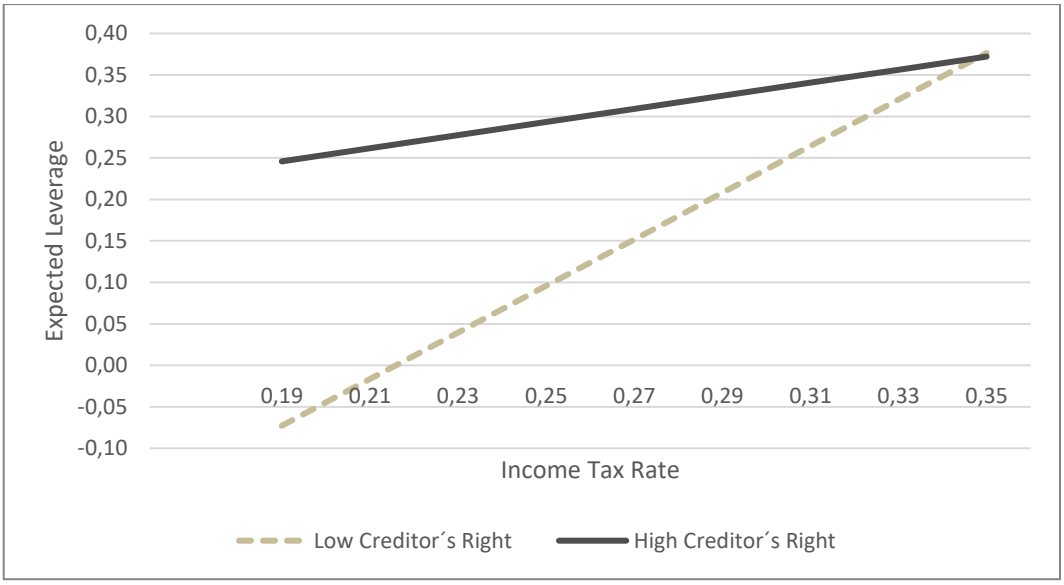
Table 3. Panel data regression results

Variables	Leverage		
	(1)	(2)	(3)
Rate Income tax	1.144***	1.826 ***	4.072***
	(0.239)	(0.667)	1.038
Creditor Rights		0.102***	0.436**
		(0.023)	0.140
Rate Income tax*Creditor Rights			-1.264***
			(0.492)
Private Credit		-0.002*	-0.002*
		(0.001)	(0.001)
Profitability		-0.086	-0.076
		(0.121)	(0.119)
Fixed Assets		0.224**	0.244***
		(0.092)	(0.095)
Size		0.003	0.001
		(0.010)	0.009
Political risk		0.160***	0.119***
		(0.041)	(0.032)
GDP Growth		0.009***	0.009**
		(0.003)	(0.003)
Inflation		0.009***	0.009**
		(0.003)	(0.004)
Constant	-0.094*	-0.765***	-1.340***
	(0.055)	(0.178)	(0.300)
Observations	387	297	298
Groups	74	65	66
R- square	0.101	0.242	0.289
Wald test	22.90***	267.75***	122.82***
Random Effect Controller/Industry/Country	Yes	Yes	Yes
Random Effect Year	Yes	Yes	Yes

Note: Robust standard errors in parentheses. * p<0.1; ** p<0.05; ***p<0.01
Source: table by authors

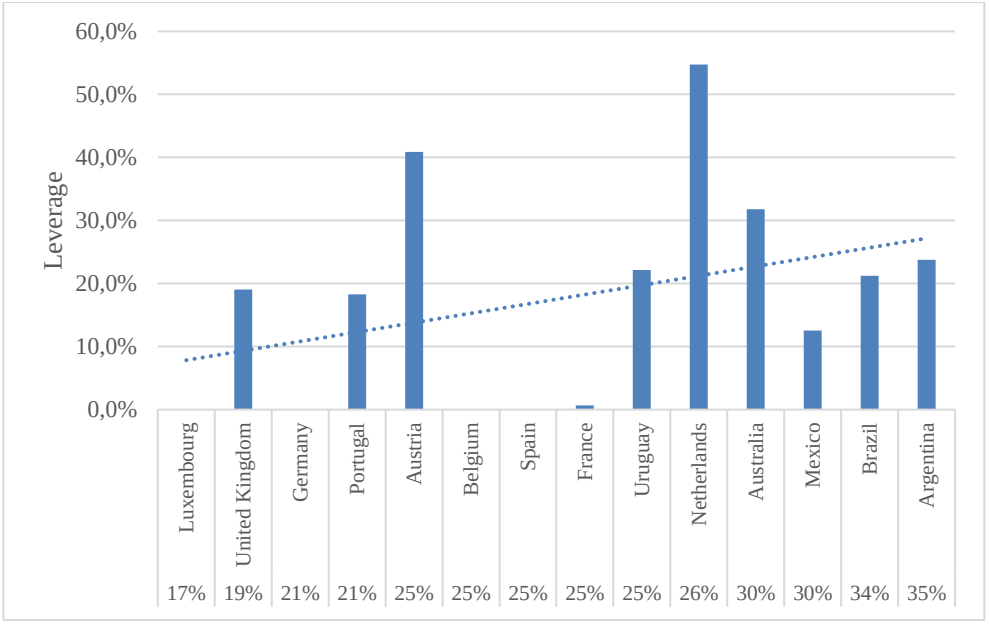
Figure 1. Expected leverage levels in relation to the income tax rate and average leverage per country by income tax rate.

Panel A – This graph illustrates expected leverage levels in relation to the income tax rate. It differentiates between countries with fewer creditor rights and those with more creditor rights.



Source: figure by authors

Panel B – Average Leverage per country by Income Tax Rate



Source: figure by authors

Supplementary File 1. Panel data regression results – Robustness check

Variables	Leverage - Robustness check		
	(1)	(2)	(3)
Rate Income tax	1.201***	1.654**	3.550***
	(0.265)	(0.811)	(1.291)
Creditor Rights		0.0761***	0.591***
		(0.026)	(0.172)
Rate Income tax*Creditor Rights			-1.820***
			(0.609)
Private Credit		-0.002***	
		(0.001)	
Profitability		-0.024	-0.014
		(0.103)	(0.104)
Fixed Assets		0.172*	0.191**
		(0.083)	(0.082)
Size		0.014	0.160
		(0.015)	(0.135)
Political risk		0.054*	0.068**
		(0.024)	(0.028)
GDP Growth		0.003	0.005
		(0.004)	(0.004)
Inflation		0.007*	0.007*
		(0.004)	(0.004)
Constant	-0.086	0.118	-1.173**
	(0.054)	(0.484)	(0.478)
Observations	326	258	259
Groups	64	56	57
R- square	0.122	0.2528	0.3034
Wald test	20.49***	151.54***	183.77***
Random Effect Controller/Industry/Country	Yes	Yes	Yes
Random Effect Year	Yes	Yes	Yes

Note: Robust standard errors in parentheses. * p<0.1; ** p<0.05; ***p<0.01
Source: table by authors