

Assets of foreignness in a regulated industry

Assets of
foreignness

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Abstract

Purpose – Foreign subsidiaries incur substantial institutional conformity costs because they have to respond to host-country institutional pressures (Slangen & Hennart, 2008). The purpose of this paper is to study this type of cost from institutional and regulatory perspectives. The authors argue that these costs decrease when the host country adopts concepts of international regulations that multinationals may be familiar with due to their own home country regulation experience. This prior regulatory experience gives foreign subsidiaries an advantage of foreignness (AoF), which can offset their liability of foreignness (LoF).

Design/methodology/approach – This study compared the returns on assets of 35 domestic firms with those of foreign subsidiaries in the Brazilian energy industry between 2002 and 2021, using regression dynamic panel data.

Findings – The existence of a relationship between the international regulatory norm and the Brazilian regulator has transformed the LoF into an advantage of foreignness to compete with local energy firms. The results also suggest that the better the regulatory quality of the subsidiary's country of origin, the better its performance in Brazil, as it can reduce compliance costs. Finally, the greater the psychic distance between Brazil and the foreign subsidiary's home country, the worse its performance.

Research limitations/implications – The research suggests that one of the keys to competitiveness in host countries is local regulatory ties. Prior international regulatory experience gives foreign subsidiaries an asset of foreignness (AoF). This result complements the current institutional and regulatory foreignness

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studies on emerging economies (Cuervo-Cazurra & Genc, 2008; Mallon et al., 2022) and the institutional asymmetry between home and host country (Mallon & Fainshmidt, 2017).

Practical implications – This research suggests that one of the keys to competitiveness in host countries is local regulatory ties. Prior international regulatory experience gives foreign subsidiaries an asset of foreignness (AoF). This result complements the current institutional and regulatory foreignness studies on emerging economies (Cuervo-Cazurra & Genc, 2008; Mallon et al., 2022) and the institutional asymmetry between home and host country (Mallon & Fainshmidt, 2017). The practical implication is that the relationship between conformity costs, capital budget calculation and strategic planning for internationalization will be related to the governance quality of the home country of multinationals. The social implication is that a country interested in attracting more direct foreign investment to areas that need foreign technology transfer and resources may consider adopting international regulatory standards.

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Originality/value – This research discuss firm and local regulator tie is one of core competitiveness in host countries (Yang and Meyer, 2020). This study also complements the current institutional and regulatory foreignness studies in emerging economy (Cuervo-Cazurra & Genc, 2008; Mallon et al., 2022). Second, prior regulatory experience of multinational enterprise in similar environment can affect its foreign affiliate performance (Perkins, 2014). Third, this study confirms current literature that argues that knowledge and ability to operate in an institutionalized country can be transferred from parent to affiliate. In the end, this study investigates whether AoF persists when host governments improve the governance of their industries.

Keywords Asset of foreignness (AoF), Liability of foreignness (LoF), Transaction cost, Governance, Firm performance, Government regulation

Paper type Research paper

Introduction

When a foreign subsidiary performs better than a local firm, does that mean the subsidiary is not suffering from liability of foreignness (LoF)? Not really. Foreign subsidiaries can simultaneously have disadvantages due to their LoF and asset of foreignness (AoF). The advantages enjoyed by foreign subsidiaries unavailable to domestic firms within the host country are called assets of foreignness, or AoF (Sethi & Judge, 2009; Nachum, 2009). The AoF approach can provide fine-grained contextual qualification of the influence and outcomes of foreignness (Taussig, 2017; Siegel et al., 2019).

There are several types of benefits for foreign subsidiaries (Mallon & Fainshmidt, 2017; Lu et al., 2022). Foreign subsidiaries can have advantages over domestic firms because they can leverage the knowledge and reputation of their parent companies (Buckley & Casson, 1976; Hennart, 1982; Caves, 1982). They can also benefit from incentives, such as host governments' tax subsidies [Mudambi & Navarra, 2002; Sethi et al., 2002; Sethi & Judge, 2009; United Nations Conference on Trade and Development (UNCTAD), 1997]. Foreign affiliates also enjoy greater legitimacy (Kostova & Zaheer, 1999; Insch & Miller, 2005), own unique firm-specific advantages (Dunning, 1980; Peng, 2001) and leverage their parent company's global network (Sethi & Judge, 2009). The country-of-origin effect, i.e. the transfer of the good image of a multinational enterprise (MNE) to the host country, can also be an advantage (Verleg & Steenkamp, 2008).

Recent studies have also broadened the scope of advantages of being foreign, including more significant opportunities for global networks and presence (Taussig, 2017), access to global and local talent in labor markets (Siegel et al., 2019), access to unique host-country foreign informal networks (Lee et al., 2022), more resilience against exogenous shocks, such as COVID waves (Pühr & Mullner, 2022) and more managerial adaptability to compete in uncertain and constantly changing host-country institutional environments (Cuervo-Cazurra & Genc, 2008; Mallon et al., 2022; Adarkwah & Malonaes, 2022).

This paper will follow the changing host-country institutional environments approach regarding host-country institutional and regulatory perspectives. Emerging economies are countries experiencing rapid economic and institutional changes in local regulations and policies encouraging economic growth. During that transition, these countries with “difficult” governance conditions can benefit emerging economies’ MNEs because they are used to operating in such volatile conditions (Cuervo-Cazurra & Genc, 2008). One of these AoFs of emerging economies’ MNEs is their managerial capability to deploy their fixed asset management from a politico-regulatory perspective. (Mallon et al., 2022). All these findings confirm that MNEs’ prior regulatory experience in similar environments can be related to their foreign affiliate performance (Perkins, 2014).

However, is there an advantage of foreignness when a host country adopts gradual regulations and governance that are closer to the best practices based on international regulation principles? We argue that MNEs may be familiar with similar principles of international regulations due to their own home-country regulation experience or prior international experiences. This familiarity can help their subsidiaries adapt faster to changes, thus providing them with an advantage over local firms. To test our arguments, we studied the Brazilian energy industry, which has been gradually deregulated since 1990.

We hypothesize that the magnitude of this domestic firms’ performance, measured by the return on assets (ROA), will be less significant than that of foreign subsidiaries, as their parent companies have experienced deregulation in their home countries. Also, foreign firms work in an environment with better governance. We know that firm performance (such as ROA) is the net result of advantages vs. disadvantages (Mezias, 2002). We chose a regulated industry to solve this potential problem and controlled for disadvantages by assessing psychic distance and host-country experience.

This paper makes a number of contributions to the AoF literature. First, our research argues that local regulatory ties are critical for competitiveness in host countries (Yang & Meyer, 2020). Our study also complements the current institutional and regulatory foreignness studies in emerging economies (Cuervo-Cazurra & Genc, 2008; Mallon et al., 2022). Second, this paper evidences that the MNE’s prior regulatory experience in a similar environment can affect its foreign affiliate’s performance (Perkins, 2014). Third, we confirm current literature that argues that knowledge and ability to operate in an institutionalized country can be transferred from a parent company to an affiliate. In the end, we find AoF when host governments improve the governance of their industries.

Literature review

Foreign influence on regulations in the Brazilian energy industry

In the past decade, the Brazilian energy industry underwent a second major wave of changes to guarantee affordable energy and social inclusion, especially through programs such as “Luz Para Todos” [National Energy Agency - Agência Nacional de Energia Elétrica (ANEEL), 2008]. Also, with the new model, the state re-assumed the responsibility for planning the energy industry. This regulatory change forced MNEs to bear external conformity costs (Kostova & Zaheer, 1999; Rosenzweig & Singh, 1991).

As predicted by the institutional approach, this regulatory uncertainty may cause LoF for foreign subsidiaries, especially for those from developed countries (MNEs) because they are not used to these highly volatile business environments (Cuervo-Cazurra & Genc, 2008; Mallon et al., 2022). However, in the Brazilian energy industry case, this regulatory change may be easier for foreign subsidiaries than for local firms to adapt. Historically, Brazilian regulations in the energy industry have been greatly influenced by foreigners. This influence is not voluntary but forced by MNE bargaining power. We mention, for instance,

the case of foreign-invested enterprises such as the Brazilian Traction, Light and Power Co. The price-cap model was used as a regulation regime for energy Law No.8.987/95 and Law No. 9.427/96 to promote free competition and privatization (Brito, 2017). This type of regulation was first established in the UK in 1980, and the “reference company” concept was imported from Chile in 1982 (Sales, 2009).

Foreign influence is still present in the Brazilian energy industry. The recent agreement between the Brazilian Energy Regulatory Authority (Agência Nacional de Energia Elétrica [ANEEL]) and the Portuguese Energy Regulatory Authority (Entidade Reguladora dos Serviços Energéticos de Portugal [ERSE]) was designed to “promote and amplify the dialogue and information exchange, as well as identify best practices in order to modernize regulations” [Agência Nacional de Energia Elétrica (ANEEL), 2019].

The introduction of the revision of the concession rules renewal of the Provisional Presidential Decree no. 579 of September 11, 2012 (converted later into Law no. 12.783 of January 11, 2013) is another local regulation that adopts international regulation principles. The decree was the “tsunami” of the energy industry due to the government’s arbitrary attempt to promote an average 20% reduction in energy tax rates. The reduction was motivated by the claim that the utilities’ generation, transmission and distribution assets were fully depreciated and should not be compensated for, as well as the decrease of some industry taxes (Costellini & Hollanda, 2014). As the timeline of each concession in Brazil is different, the effects of this decree only lasted a few years after 2012.

This loss of pre-emption right, or mandatory anticipation, of the concession principles renewal, was also applied in the energy industry of European countries – a French example: “EDF still benefited from a pre-emption right for the renewal of existing concessions provided since 1919, which was abolished in 2006 by Act No. 1772. The end of the preference towards the current concessionaire was demanded by the European Commission, which understood that the right generated distortion to competition, incompatible with the objective of liberalization of the energy market.” (Pinto Junior & Dutra, 2022, p. 195). A Portuguese example: “Decree-Law No. 240 of 2004 determined early termination by means of compensation for stranded costs” (Pinto Junior & Dutra, 2022, p. 211).

Another example was the Public Consultation No. 33/2017 regarding the legal framework of the Brazilian free market for energy to all consumer classes by 2026. As the energy industry is a free market in European Union countries, European companies, such as the Portuguese EDP, have brought their experiences (EDP Energias do Brasil S.A., 2017). Recently, international references in countries such as Germany, Colombia, the USA (California), Spain, Portugal, the UK and Sweden have also contributed to the model proposed by ANEEL Technical Note No. 10/2022 – SRM/ANEEL (01/31/2022). Therefore, Brazilian energy industry regulation has not adopted 100% of the model of any specific country. Best practices and previous experiences from different countries were implemented in Brazil.

These strong government ties between foreign subsidiaries and local energy regulators will be one of the key competitiveness drivers in Brazil. Weaker local government ties may cause LoF to foreign subsidiaries because they reduce their ability to compete with local firms (Yang & Meyer, 2020). In this study, we have shown that Brazil’s energy regulatory changes were inspired by the regimes in existence in developed countries, and foreign subsidiaries have strong ties with Brazilian regulators. In our case, foreign subsidiaries will have conditions to act aggressively to compete with Brazilian local firms in the domestic energy industry. This should have led to lower conformity costs for foreign companies than domestic ones. Hence, our first hypothesis:

H1. The negative influence of Brazilian regulatory reforms on operating performance has been lower for foreign subsidiaries than domestic firms.

Home country corporate governance environment

We have demonstrated that the development of the Brazilian energy industry, adopting standards from developed countries, may tip the scale into favoring foreign subsidiaries. These advantages of foreign subsidiaries are caused by the institutional asymmetry between home and host country (Mallon & Fainshmidt, 2017). Moreover, this multinational, foreignness and institutional ambiguity will enable foreign affiliates to implement strategic responses to the changes in host institutions (Regner & Edman, 2014). In other words, the home country environment can also be a determining factor since it drives MNEs to develop specific resources and capabilities to overcome the additional cost of adapting to regulatory changes. They may do so at a lower cost than domestic firms.

MNEs that are more familiar with a more advanced governance environment have less difficulty adapting to regulatory changes (Ferner & Quintanilla, 1998). In particular, corporate governance stakeholders will shape firms' globalization strategies due to the choices and interactions of five main governance actors: board of directors, shareholders, top management teams, employees and government (Aguilera & Yip, 2004).

Each country has its own deregulation process and pace. Also, the way each government uses regulatory intervention to encourage investment and trade in a particular industry is different. The degree to which a government intervenes in company affairs for ideological, political or legal reasons is also different. This implies that differences among European corporate governance systems can significantly explain variations in the globalization of an MNE. For example, a country may have a different degree of encouragement for their companies to go international (Aguilera & Yip, 2004).

Thus, companies need to constantly adapt their strategies as changes and variations in a deregulation process occur. Changes in strategy and corporate governance are interdependent. Different types of organizational learning are needed in different systems and levels of governance maturity (Zahra & Filatotchev, 2004; Filatotchev et al., 2006).

In addition to being used to more flexible strategies, a company with good corporate governance performs better operationally speaking (Keasey & Wright, 1993; Tricker, 1984). Good governance positively impacts future operating performance and encourages management turnover in poorly performing firms (Bhagat & Bolton, 2008).

Regarding Brazil's energy industry, multinationals from different origins and levels of institutional development have used different solutions to solve the potential loss resulting from the new regulations that transferred all risks. To achieve cost minimization, foreign subsidiaries can choose a mix of organizing methods (hierarchy and the price system) for organizing transactions (Hennart, 1993). For instance, Energia Sustentável do Brasil (ESBR), a consortium formed by the French company Engie (40%), the Japanese company Mitsui (20%) and the Brazilian company Eletrobras (40%) worked with its own capital structure to absorb a predicted loss of R\$2.3bn in GSF expenses from the Jirau Hydroelectric Dam, in 2018 (Valor Econômico, 2018).

On the other hand, EDP Energias do Brasil has adopted a different strategy. EDP uses hedging strategies through MWh (megawatt hour) amounts of non-contracted energy. The company would have lost R\$300m in 2017 if not for a hedge of 18% of its physical guarantees by converting part of the produced energy for short-term trading purposes to boost its overall result (Canal Energia, 2017). Simultaneously, EDP also started operating in the entire value chain of the energy industry to internalize the transactions and become less

dependent on price negotiation in the market. Before this expansion, EDP only operated in the energy industry through its hydroelectric plant (EDP *Energias do Brasil S.A.*, 2019).

Therefore, a subsidiary with headquarters in a country with good corporate governance tends to adopt better strategies that mitigate the cost of potential conflicts between the main governance actors. This mechanism results in a better operational advantage for MNE affiliates, as the marketplace wherein they operate abroad becomes more mature and institutionalized. Such is the case of the Brazilian energy industry, in which the government has been adopting a series of regulatory measures “imported” from developed countries with long-standing experience in the subject. Hence, our second hypothesis goes as follows:

H2. The better the environment and governance quality of the subsidiary’s original country, the better its operational performance.

Psychic distance

Despite the advantages that can give them greater returns over local businesses, these affiliates are still exposed to LoF in their host countries. [Zaheer \(1995\)](#) provides four main reasons for these LoFs: difficulties foreign parent companies have in managing their subsidiaries at a distance; constraints put on the subsidiary by home government policies; discrimination by host country governments; and lack of knowledge on how to do business in a foreign country.

We have seen that a good governance environment in the home country may strengthen MNEs to respond quickly and efficiently to regulation changes. Foreign firms with less familiarity and experience with good institutional governance in their home countries are more likely to be exposed to LoF, particularly to more significant barriers in acquiring local information. Literature has discussed these barriers and has called them “psychic distance.” [Johanson and Wiedersheim-Paul \(1975, p.308–9\)](#) see psychic distance as “factors preventing or disturbing the flow of information between firm and market.” Examples of such factors are differences in language, culture, political systems, level of education and level of industrial development, to name but a few. [Dow and Karunaratna \(2006\)](#) argue that a comprehensive index should include differences in religion, education, political system, economic development and geographical distance. [Perkins \(2014\)](#) finds that the survival rate of foreign telecom subsidiaries in Brazil results from the psychic distance between their home countries and Brazil.

However, to analyze the effect of advantages and disadvantages of foreign subsidiaries, it is necessary to control other important factors that influences LoF ([Lu et al., 2022](#)). For instance, local overseas learning experience ([Petersen & Pedersen, 2002](#)); [Zaheer and Mosakowski \(1997\)](#) argue, in line with [Johanson and Vahlne \(1997\)](#), that the operation itself can teach how to operate in foreign markets due to its experimental nature. [Mezias \(2002\)](#) finds that older foreign subsidiaries face fewer labor lawsuits at the state level but not at the federal level. According to [Gu et al. \(2017\)](#), frequent issuers – firms that issue foreign bonds in the same bond market more than once during the sample period – tend to have lower costs of debt, *ceteris paribus*, than first-time issuers. [Perkins \(2014\)](#) finds that firms with prior experience in the host country are less likely to fail. [Daamen et al. \(2007\)](#) document how Korean firms in The Netherlands learn from their initial cultural mistakes and correct them. Based on these discussions, we posit our third hypothesis:

H3. The greater the psychic distance between Brazil and the foreign subsidiary’s home country, the worse its operational performance.

Methodology

Data

The data comes from the following sources:

- a Valor Econômico ([Valor Econômico, 2018](#)) study of the 1,000 largest Brazilian companies;
- the Economatica database;
- financial statements of the companies studied available on their websites; and
- information available at the Brazilian Securities and Exchange Commission (CVM). The analysis period ranges from 2002 to 2021.

We selected companies with revenues over R\$1bn and excluded companies working exclusively with energy trading, leaving a final sample of 35 companies. The companies were classified as domestic or foreign as of the end of each year. We decided on this method because some companies were originally domestic and became foreign within the analysis period. Thus, we have an unbalanced panel.

We also carried out an ownership evolution analysis over the 2002–2021 period ([Table 1](#)). Our sample size is 35, of which 16 companies are considered foreign. In [Table 1](#), we identified each company, the year in which there was foreign control, the percentage of control and performance in the year and the year after. There is no significant variation in the performance of companies after foreign control. Companies with foreign control that returned to being national in the period are only two: AES Tietê, which in 2020 had only 47% foreign control, and Eletropaulo, which in 2016 and 2017 was considered national while the exchange of control from the USA (2015) to Italy (2018) took place.

Foreigners with change of control in the period				ROA (%)	
Company	Country	% Control	Year	Performance year	Performance year after
AES TIETÊ	USA	62	2015	6.4	8.2
CPFL	China	95	2017	2.1	3.0
CPFL RENOVÁVEIS	China	63	2012	1.8	-0.7
CTG	China	100	2013	3.5	4.6
EDF NORTE FLUMINENSE	France	100	2012 ^a	7.9	6.3
EDP	Portugal	62	2004	3.8	5.3
ENEL BRASIL	Italy	97	2012	14.9	15.2
ESBR	France	60	2010	-0.2	-0.2
STATE GRID	China	100	2015 ^b	-13.3	10.8
CTEEP	Colombia	89	2005	19.2	13.8
ENEL GREEN POWER	Italy	100	2008 ^c	-6.3	
Foreigners throughout the period				ROA (%)	
Company	Country	% Control	Year	Performance year	Performance year after
COELCE	Spain	92	2002	3.4	3.7
ELETROPAULO	USA	78	2002	-7.1	0.7
ENGIE	France	78	2002	-2.8	8.0
PARANAPANEMA	USA	100	2002	-1.6	2.2
TAESA	Italy	100	2002	7.8	6.3

Notes: ^aacquired in 2004 but data from 2012 only; ^bacquired in 2010 but data from 2015 only; ^cacquired in 2008 but only 2016 data available

Source: Table by authors

Table 1. Ownership evolution over the 2002–2021 period

Variables

Following [Wu & Salomon \(2017\)](#) and [Peris \(2017\)](#), our dependent variable is a firm's ROA, i.e. the ratio of its net income to its average total assets. It is costly for firms to conform to regulations quickly, but the cost can be reduced if companies are able to understand the deregulation process, find proper solutions and reduce the adaptation time. Studies tend to use panel data regression that controls profitability, investments, capital structure, working capital and revenue growth ([Bortoluzzo, Bortoluzzo, & Ferreira, 2023](#); [Carral et al., 2017](#); [Rezende, Miranda, & Pereira, 2014](#)).

We used the following independent variables:

Foreign: is a dummy variable that takes value 1 for firms over 50% owned by parent companies headquartered outside Brazil and value zero for Brazilian-owned firms.

Reg1: is a dummy variable that takes value 1 for the years 2012–2021, the period of greatest regulatory turbulence in the Brazilian energy industry.

Ranking: is the difference in Worldwide Governance Indicators (WGI) between Brazil and the MNEs' home countries. WGI ranges from approximately –2.5 (weak) to 2.5 (strong). The six WGI governance dimensions are voice and accountability, political stability and absence of violence/terrorism, government effectiveness, regulatory quality, rule of law and control of corruption. We believe these measures tend to be high in countries that have deregulated their energy industry ([World Bank, 2019](#)).

PDI: The Psychic Distance Index (PDI) between Brazil and the country headquarters of the foreign subsidiaries was obtained from [Sertã Rezende \(2013\)](#). His index is a modified version of [Dow & Karunaratna \(2006\)](#) and aggregates the geographic distance and differences in culture, language, religion, education, politics and economic development between Brazil and the focal country. Similar measures of psychic distance stimuli have been used by many authors (e.g. [Cuypers et al., 2015](#); [Dow & Larimo, 2011](#); [Drogendijk & Martin, 2015](#)) and have proved superior to the Hofstede-based Kogut and Singh index.

[Table 2](#) presents the description of the variables, including control variables.

Statistical model

As the sample consists of 35 companies over the 2002–2021 period, we use dynamic panel data linear regression ([Santos, Bortoluzzo, & Gonçalves, 2023](#); [Lemmon, Roberts, & Zender, 2008](#)), which allows us to consider the unobserved effects of time and company ([Wooldridge, 2002](#)). The estimation was done using the generalized moment method with random effect.

Our model is as follows:

$$ROA_{it} = X_{it}'\beta + Z_{it}'\gamma + \rho ROA_{it-1} + a_i + b_t + \varepsilon_{it},$$

In the model, i represents the company and t represents the year; a_i and b_t are the non-observed effects of firm and time, respectively, and ε_{it} is the idiosyncratic error. Also, X is the vector of explanatory variables, and Z is the vector of control variables, which is summarized in [Table 2](#).

The random effects method was used since some variables regarding interest do not vary over time (Foreign and Reg1). To account for endogeneity, we used two-stage least squares, using lags of explanatory variables as instruments. In this case, as we are using a dynamic panel to avoid bias in the coefficients, it is necessary to instrumentalize the ROA_{t-1} , which is the lagged response variable used as explanatory, based on ROA_{t-2} , with the *caveat* that there may still be endogeneity as decisions in

Type of variables	Variable	Form	Description	Sign	Main literature	
Dependent	ROA	Net profit average Total asset	Return on assets		Salomon & Wu (2017); Peris (2017); Wu & Salomon (2017)	
	ROE	Net profit average Equity	Return on equity		Salomon & Wu (2017); Peris (2017); Wu & Salomon (2017)	
	ROIC	EBIT (1-Taxes) Invested capital	Return on invested capital		Salomon & Wu (2017); Peris (2017); Wu & Salomon (2017)	
	REG1	0 = 2002 to 2011 1 = 2012 to 2021	Variable that seeks to identify the period of greatest regulatory turbulence in the Brazilian energy sector	(-)		
Main dependent	Foreign	0 = national 1 = foreign	Variable that identifies year by year if the company had foreign ownership	(+)	Hymen (1960); Zaheer (1995)	
	Ranking	WGI	Difference of WGI between host country (Brazil) and home country of MNEs as a variable. Estimate of Governance (franges from approximately -2.5 (weak) to 2.5 (Strong) governance performance	(-)		
Control	PDI	Psychic distance index	Psychic Distance Index between Brazil and the MNE's home country	(-)		
	Exper	Experience	Number of years the firm has operated in Brazil	(+)	Petersen & Pedersen (2002); Gu et al. (2017); Perkins (2014); Peris (2017); Szuster et al. (2013)	
	EBITDAMlg	EBITDA Net revenue	Indicator that aims to measure a company's operating profitability	(+)		
	INV/Eq	Investment Net Worth	Indicator that evaluates how much of the volume in investments in subsidiaries and others is financed by equity	(+)		
	Capex/Deprec	Tangible + intangible Depreciation + Amortization	Correlation between the composition of investments in CAPEX – Capital Expenditure and the depreciation or amortization of assets	(+)		
	CurLiq	Current assets Current liabilities	Corresponds to the ratio between current assets and current liabilities	(+)		
						(continued)

Table 2.
Description of the
variables and
references

Table 2.

Type of variables	Variable	Form	Description	Sign	Main literature
	NWC	Current assets (-) Current liabilities	Measures the need for working capital, or the amount that is needed to make a company's business happen	(+)	
	NetMg	Net profit Net revenue	Indicator that seeks to demonstrate the company's net gain in each sales unit	(+)	
	LogRev	Log (revenue)	Proxy for company size	(+)	
	Debt/Equity	Total debt Equity	Corresponds to the ratio between total debt and equity	(-)	
	IIEEXVar	IIEEX variation	Bovespa Electric Energy Index	(+)	
	Pandemic	0 = 2002 to 2019 1 = 2020 to 2021	Control for the pandemic years	(+)	

Source: Table by authors

corporate finance are taken with long time horizons. The Arellano–Bond approach was also used and gave similar results.

The sample size to test $H1$ was equal to 419 observations, while the test of $H2$ and $H3$ was performed with 180 observations since these hypotheses were tested using foreign companies only.

Results

Table 3 presents some descriptive statistics comparing foreign subsidiaries and domestic Brazilian firms. Foreign subsidiaries operating in the Brazilian energy industry have a better average performance (ROA) during the studied period than domestic firms, a statistically significant difference (t -test). The average ROA of foreign subsidiaries is about 168% higher than that of domestic ones.

Although Brazil is currently undergoing deregulation, the country's regulatory quality is still much lower than that of the home countries of the multinational companies operating in Brazil. Brazilian companies have, on average, lower operating profitability (EBITDAMg), higher equity-financed investments (Inv/Eq) and lower Capex/Deprec.

Correlations between numerical variables are presented in **Table 4**. The relationships between financial variables and performance are positive, as expected. Moreover, considering only the foreign companies, the higher the regulatory quality of the home country and the company's experience in Brazil, the higher its performance. On the other hand, companies from home countries with the greatest psychic distance from Brazil have lower performance.

We can observe in **Figure 1** that foreign companies outperform average domestic ones throughout the period 2002–2021, even in years of regulatory shock. Considering the period with the greatest regulatory turbulence, from 2012 onwards, there seems to be a worsening of performance for all companies in the energy industry, together with an increase in the performance gap between foreign and domestic companies. An interesting fact observed in **Figure 1** is an increase in the difference in returns between foreign and domestic firms from 2010 onwards, remaining higher during the period of regulatory turbulence (2012–2021). Even with extra costs due to a change in regulatory requirements in 2016, foreigners showed higher returns more strikingly. In 2016, there was a change in the responsibility for paying the extra cost of energy generation every time hydroelectric generation was insufficient to satisfy long-term contract demand. For instance, utilities must pay for thermal generation to cover this deficit. For this reason, utilities must actively manage the share of energy they sell under long-term contracts and sell surpluses in the Free Contracting Environment (Ambiente de Contratação Livre).

Table 5 shows the results of linear regression with dynamic panel data and random effects. Model 1 contains only the control variables. Model 2 adds a variable that indicates whether the company is foreign. Model 3 also adds an indicator of the years of regulatory turbulence in Brazil (from 2012 onwards). Models 4 and 5 are estimated only for foreign companies to test whether the regulatory quality in the subsidiary's home country is related to performance (Model 4) and whether the psychic distance between Brazil and the subsidiary's home country is associated with performance (Model 5). As a robustness test, the analysis was done by return on equity (ROE) and the results were similar (**Table 6** and **Figure 2**).

We performed the residual analysis of each model, which detected heteroscedasticity; therefore, **Table 5** presents the robust standard errors. There is no serial correlation in the residuals.

Table 3.
Descriptive statistics
for local firms and
foreign subsidiaries

Variable	Period	Local firms				Foreign firms				Two-sample <i>t</i> -test t-Statistic (<i>p</i> -value)		
		Mean	Median	SD	Min.	Max.	Mean	Median	SD		Min.	Max.
ROA	2002-2011	0.03	0.04	0.08	-0.17	0.65	0.07	0.06	0.06	-0.07	0.29	-4.26 (<0.001)
	2012-2021	0.02	0.03	0.10	-0.41	0.48	0.06	0.06	0.06	-0.13	0.44	-3.49 (<0.001)
ROE	2002-2011	0.18	0.10	1.87	-6.75	8.82	0.16	0.14	0.14	-0.34	0.41	0.16 (0.873)
	2012-2021	0.57	0.11	2.53	-2.43	10.36	0.12	0.13	0.13	-0.39	0.62	2.33 (0.021)
ROIC	2002-2011	0.07	0.07	0.10	-0.34	0.86	0.11	0.10	0.06	-0.11	0.26	-4.20 (<0.001)
	2012-2021	0.06	0.06	0.18	-1.12	1.27	0.09	0.08	0.07	-0.06	0.55	-2.04 (0.043)
Ranking	2002-2011	-	-	-	-	-	1.57	4.85	25.85	-66.41	42.54	-
	2012-2021	-	-	-	-	-	-5.43	-4.66	10.33	-46.23	10.74	-
PDI	2002-2011	-	-	-	-	-	0.41	0.36	0.11	0.26	0.66	-
	2012-2021	-	-	-	-	-	0.47	0.44	0.16	0.00	0.66	-
Exper	2002-2011	-	-	-	-	-	7.87	7.00	3.66	1.00	15.00	-
	2012-2021	-	-	-	-	-	13.54	13.00	6.01	1.00	25.00	-
EBITDAMg	2002-2011	0.13	0.28	1.08	-2.46	1.44	0.41	0.35	0.21	0.09	0.90	-2.96 (0.003)
	2012-2021	0.21	0.22	0.68	-3.24	3.49	0.37	0.31	0.38	-2.06	1.57	-2.66 (0.008)
Inv/Eq	2002-2011	0.16	0.02	0.41	0.00	3.43	0.05	0.00	0.17	0.00	0.76	2.70 (0.008)
	2012-2021	0.13	0.08	0.67	0.00	1.64	0.09	0.00	0.13	0.00	0.60	0.88 (0.381)
Capex/Deprec	2002-2011	70.75	16.13	299.89	1.15	2580.64	266.20	17.52	859.62	0.51	936.23	-1.35 (0.182)
	2012-2021	41.90	16.39	168.26	-2.71	1914.61	334.29	15.08	430.71	1.51	864.30	-0.99 (0.326)
CurrLiq	2002-2011	1.36	1.10	1.38	0.18	10.81	1.14	1.05	0.50	0.47	3.19	1.68 (0.095)
	2012-2021	1.30	1.15	0.76	0.01	5.80	1.26	1.05	0.80	0.14	5.90	0.47 (0.641)
NWC	2002-2011	0.03	0.02	0.12	-0.29	0.77	0.01	0.01	0.08	-0.22	0.19	1.39 (0.167)
	2012-2021	0.01	0.04	0.18	-1.27	0.56	0.01	0.01	0.07	-0.17	0.17	-0.14 (0.884)
NetMg	2002-2011	0.18	0.08	1.24	-2.60	5.19	0.17	0.16	0.13	-0.15	0.53	0.05 (0.963)
	2012-2021	0.04	0.08	0.95	-10.33	3.77	0.12	0.10	0.30	-1.63	1.21	-1.04 (0.299)
LogRev	2002-2011	14.57	14.79	1.64	8.21	17.31	14.66	14.71	0.85	12.83	16.12	-0.48 (0.633)
	2012-2021	15.09	15.06	1.45	10.79	17.92	15.24	15.08	1.10	11.91	17.58	-0.96 (0.337)
Debt/Equity	2002-2011	15.30	0.79	48.95	0.00	202.17	0.77	0.65	0.40	0.10	2.38	3.47 (<0.001)
	2012-2021	5.67	0.97	22.88	0.00	149.16	0.95	0.78	0.64	0.00	2.93	2.69 (0.008)

Notes: Sample size of local firms: 419 (19 firms) and sample size of foreign firms: 180 (16 firms); *significant at 10%; **significant at 5%; ***significant at 1%

Source: Table by authors

Variable	ROA	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) ROE	0.471	1												
(2) ROIC	0.618	0.268	1											
(3) Ranking ^a	-0.112	-0.059	-0.047	1										
(4) PDJ ^a	-0.245	-0.234	-0.191	0.055	1									
(5) Exper ^a	0.124	0.064	0.040	-0.262	-0.258	1								
(6) EBITDAMg	0.318	0.064	0.269	0.080	0.156	-0.193	1							
(7) Inv/Eq	0.141	0.301	0.192	0.059	0.038	0.049	0.090	1						
(8) Capex/Deprec	0.081	0.066	0.069	0.033	0.012	0.032	-0.576	-0.021	1					
(9) CurrLiq	0.150	0.040	0.030	-0.018	-0.130	0.034	0.093	0.027	-0.029	1				
(10) NWC	0.357	0.009	0.144	-0.084	-0.204	0.113	0.229	0.037	0.006	0.601	1			
(11) NetMg	0.214	0.031	0.143	0.036	-0.102	-0.066	-0.225	0.049	0.414	0.096	0.325	1		
(12) LogRev	0.125	0.010	0.103	-0.037	-0.240	0.351	0.202	0.107	-0.337	-0.149	0.103	-0.101	1	
(13) Debt/Equity	-0.072	-0.122	-0.046	-0.014	0.214	0.126	0.047	0.387	0.024	-0.109	-0.091	-0.024	0.070	1
(14) IEXVar	0.125	0.090	0.049	-0.085	0.001	0.101	-0.019	-0.029	-0.081	0.069	-0.093	-0.077	0.041	-0.024

Note: ^aonly foreign firms
Source: Table by authors

Table 4.
Correlations between
the numerical
variables

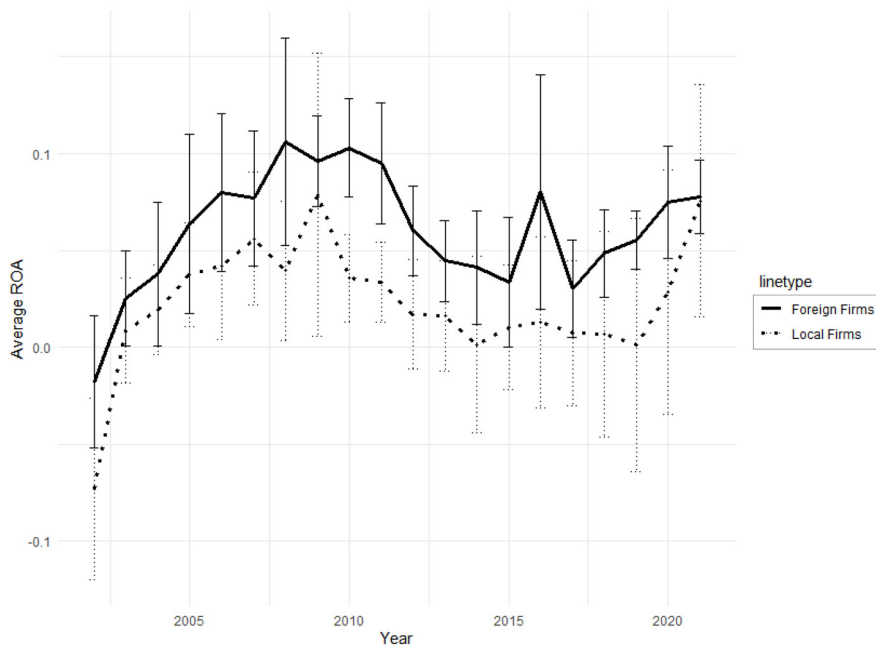


Figure 1.
Average performance (ROA) of domestic firms and foreign subsidiaries by year and 95% confidence intervals

Source: Figure by authors

The significant control variables (at a 5% significance level) (Model 1) were EBITDA margin, equity investment, current liquidity, net working capital, net margin and IIEEX variation. For example, an increase in an EBITDA margin of 10% generates an expected increase of 0.34 pp (coefficient of 0.034 – Model 1, [Table 5](#)).

[Peris \(2017\)](#) studied the performance of energy industry companies from 2010 to 2015 and also found the investment in equity and net margin variables significant in explaining the operating performance. From the point of view of the impact on corporate cash, the variables investment on equity, capex over depreciation and amortization and working capital showed a positive sign, as expected, demonstrating that the results of companies in this industry are correlated with the volume of their investments. This makes sense once the energy industry requires a high volume of investments. It is important to note that there is a certain persistence in the performance of energy companies in Brazil, as the yearly performance depends on the previous year's performance. This persistence in financial data has been previously reported in the finance literature, as in [Lemmon et al. \(2008\)](#).

In Model 2, we can observe a positive sign for the Foreign variable (coefficient 0.016 – Model 2, [Table 5](#)), indicating that the profitability of foreign companies is, on average, 1.6% higher than that of domestic companies, *ceteris paribus*. The reason is that the energy industry regulation has been based on foreign regulation, especially the English one ([Ferreira, 2000](#)). Also, 16 of the 35 firms operating in the industry are foreign-owned, and they participate in drafting new laws and regulations through public hearings and consultations prepared by the Ministry of Mines and Energy and ANEEL. These companies can, somehow, anticipate and mitigate the effects of regulation as they have more technical knowledge. This pattern is also confirmed by [Figure 1](#) (ROA) and [Figure 2](#) (ROIC).

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Foreign		0.016** (0.007)	0.015** (0.010)		
Reg1			-0.025*** (0.008)	-0.018** (0.008)	-0.016** (0.008)
Foreign*Reg1			0.006 (0.012)		
Ranking				-0.0002* (0.0001)	
PDI					-0.013** (0.007)
Exper				0.0004 (0.0006)	0.0004 (0.001)
EBITDAMg	0.035*** (0.013)	0.034*** (0.013)	0.034*** (0.005)	-0.023 (0.027)	-0.022 (0.030)
Inv/Eq	0.023*** (0.006)	0.024*** (0.006)	0.025*** (0.007)	-0.032** (0.015)	-0.032** (0.016)
Capex/Deprec	0.00002 (0.00002)	0.00002 (0.00002)	0.00002 (0.00002)	0.00005* (0.0001)	0.0001 (0.00003)
CurrLiq	-0.008** (0.004)	-0.008** (0.004)	-0.007* (0.004)	0.001 (0.007)	0.0005 (0.007)
NWC	0.171*** (0.058)	0.179*** (0.055)	0.173*** (0.032)	-0.039 (0.071)	-0.034 (0.067)
NetMg	0.013*** (0.003)	0.021*** (0.003)	0.012*** (0.002)	0.152*** (0.036)	0.149*** (0.036)
LogRev	0.0007 (0.003)	0.0008 (0.003)	0.002 (0.002)	0.009 (0.007)	0.008 (0.006)
Debt	-0.007* (0.004)	-0.006 (0.004)	-0.007** (0.003)	-0.012 (0.007)	-0.011 (0.008)
VarIEEX	0.000001** (0.0000003)	0.000001** (0.0000003)	0.000001** (0.0000004)	0.0000002 (0.0000003)	0.0000002 (0.0000003)
Pandemic	0.004 (0.011)	0.003 (0.011)	0.012 (0.009)	-0.005 (0.013)	-0.005 (0.012)
ROALL _{t-1}	0.299*** (0.050)	0.277*** (0.048)	0.261*** (0.037)	0.200 (0.113)	0.199 (0.128)
Constant	0.018 (0.051)	0.010 (0.049)	0.002 (0.038)	-0.079 (0.106)	-0.063 (0.105)
sample size	419	419	419	180	180
R-squared	0.496	0.505	0.522	0.533	0.532
Wald test	1,523***	763***	442***	2,558***	2,314***

Notes: Robust standard error in (). *significant at 10%, **significant at 5%, ***significant at 1%

Source: Table by authors

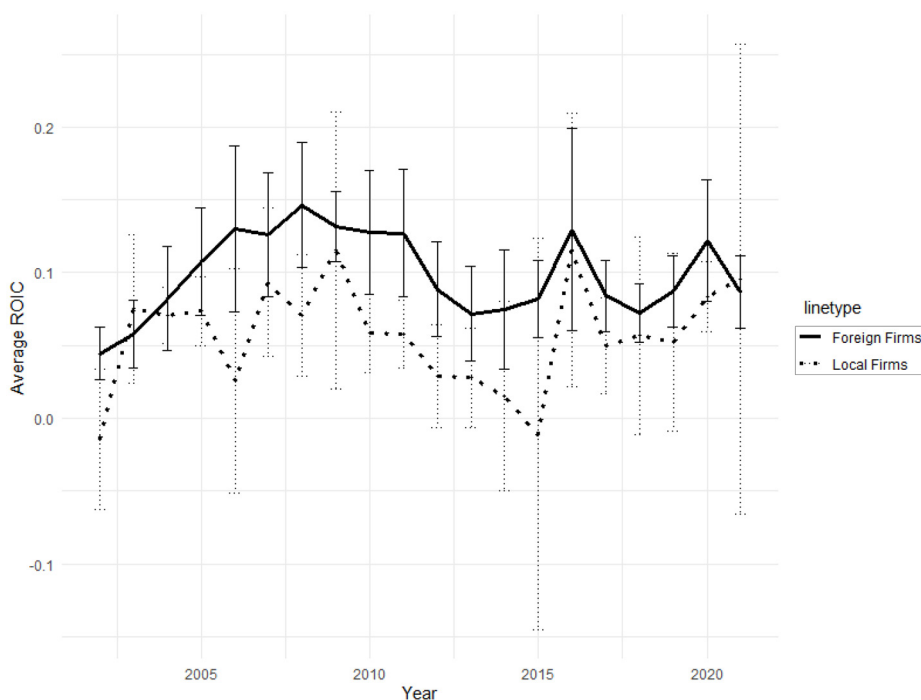
Table 5.
Results for
profitability (ROA) of
Brazilian electricity
generating
companies, 2002–
2021

Table 6.
Results for
profitability (ROE) of
Brazilian electricity
generating
companies, 2002–
2021

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Foreign		0.026** (0.012)	0.012** (0.006)		
Reg1			-0.095*** (0.035)	-0.050*** (0.016)	-0.044** (0.016)
Foreign × Reg1			0.033 (0.046)		
Ranking				-0.0004** (0.0002)	
PDI					-0.055** (0.021)
Exper				0.001 (0.001)	0.001 (0.001)
EBITDAMg	-0.005 (0.053)	-0.008 (0.056)	-0.009 (0.056)	-0.051 (0.038)	-0.043 (0.039)
Inv/Eq	0.287*** (0.064)	0.288*** (0.063)	0.289*** (0.062)	-0.046 (0.057)	-0.047 (0.057)
Capex/Deprec	-0.00008 (0.00006)	-0.00008 (0.00007)	-0.00008 (0.00007)	0.0001 (0.00005)	0.00009 (0.00005)
CurrLiq	0.006 (0.013)	0.007 (0.014)	0.010 (0.015)	-0.019 (0.016)	-0.021 (0.016)
NWC	-0.171 (0.200)	-0.163 (0.212)	-0.195 (0.216)	0.044 (0.161)	0.054 (0.160)
NetMg	0.006 (0.019)	0.006 (0.019)	0.004 (0.020)	0.331*** (0.055)	0.318*** (0.056)
LogRev	0.007 (0.015)	0.007 (0.014)	0.012 (0.016)	0.018 (0.008)	0.015 (0.008)
Debt	-0.05** (0.020)	-0.050** (0.020)	-0.052* (0.023)	0.024 (0.014)	0.026 (0.014)
VarHEX	0.000003*** (0.000001)	0.000003*** (0.000001)	0.000004*** (0.000001)	0.000001 (0.000001)	0.000001 (0.00001)
Pandemic	0.074*** (0.025)	0.073*** (0.025)	0.108*** (0.026)	0.030 (0.024)	0.031 (0.024)
ROALL _{t-1}	0.029 (0.070)	0.027 (0.068)	0.027 (0.068)	0.335*** (0.054)	0.335*** (0.054)
Constant	0.021 (0.215)	0.011 (0.206)	-0.008 (0.218)	-0.175 (0.127)	-0.116 (0.132)

Notes: Robust standard error in 0. *significant at 10%; **significant at 5%; ***significant at 1%

Source: Table by authors



Source: Figure by authors

Figure 2.
Average performance
(ROIC) and 95%
confidence interval
for domestic firms
and foreign
subsidiaries by year
and 95% confidence
intervals

Model 3 tests *H1*. The results show that during the period of regulatory turbulence, there was a decrease in the performance of companies in the industry, as shown by the coefficient of the indicator variable for the 2012–2021 period (Reg1), which is negative and statistically significant (coefficient -0.023 – Model 3, Table 5). That shows an average loss of 2.3% in the performance of companies operating in the Brazilian energy industry from 2012 onwards. Moreover, the relationship between the company being foreign and the turbulent period of regulation (Foreign \times Reg1) is positive, indicating that the performance of foreign companies in this period was less related to the measures than that of their Brazilian peers. In this case, foreign companies had an average performance of 2.1% higher than Brazilian companies (coefficient 0.021 – Model 3, Table 5). However, this result has no statistical significance, thus not confirming *H1*.

Consequently, the institutional approach's effect was unclear (Cuervo-Cazurra & Genc, 2008; Mallon et al., 2022) in this first test. A possible explanation is that the Brazilian regulator has not adopted 100% of the model of any specific country. Best practices and previous experiences from different countries were implemented in Brazil. To elaborate a Technical Note, for example, No. 10/2022 – SRM/ANEEL, of 01/31/2022, ANEEL usually highlights several international references in countries such as Germany, Colombia, the USA (California), Spain, Portugal, the UK and Sweden.

However, the significant association of institutional development approach is confirmed when we introduce the subsidiary's country of origin in our model. *H2* was

tested and confirmed based on the results of Model 4 (Table 5), which was estimated using only foreign subsidiaries' data. The coefficient for ranking, which indicates the regulation quality in the subsidiary's home country, is positive and significant. Therefore, as expected, the better the regulation quality of the subsidiary's country of origin, the better its performance in Brazil, as it has a greater capacity to reorganize its transactions to comply with the international regulatory standards implemented in the country. As a consequence, the institutional asymmetry between home and host country implies different advantages of foreign subsidiaries (Mallon & Fainshmidt, 2017).

Model 5 confirms *H3*, as the psychic distance index between Brazil and the subsidiary's country of origin (PDI) has a negative sign and is statistically significant. The coefficient was equal to -0.012 , indicating that an increase of one point in the psychic distance index relates to an expected decrease of 1.2pp in the performance of foreign companies. Therefore, the result indicates that the greater the psychic distance between Brazil and the subsidiary's country of origin, the worse its performance in the Brazilian energy industry. Our results are similar to the psychic distance effect that Perkins (2014) found with the survival rate of foreign telecom subsidiaries in Brazil.

As robustness tests of the model, we applied different cutoffs of ownership structure (La Porta et al., 1999; Barth, Gulbrandsen, & Schønea, 2005). We used 60% and 70% of control to consider the company as foreign and had similar ROA results. Also, we estimated the models for ROA using just firms that did not change ownership structure over time in the sample. We had a small sample size in the group "foreign": COELCE, ELETROPAULO, ENGIE, PARANAPANEMA and TAESA, but the results were similar. In addition, the models were estimated using a 1% and a 5% winsorization (lower and higher values) and the results were also similar.

Conclusions

From host country institutional and regulatory perspectives, this study found advantages of foreignness (AoF) in the operating returns of foreign subsidiaries when Brazilian authorities were adopting similar energy industry regulations and governance, i.e. a combination of the European and American regulations. This Brazilian experience suggests that adopting international regulatory standards is another benefit for foreign subsidiaries, like other incentives already studied in AoF literature, such as subsidies, tax benefits and reaching a middle ground in negotiations with foreign companies.

This study found that a strong tie with the Brazilian regulator has transformed LoF into asset of foreignness for foreign subsidiaries to compete with local energy firms, confirming the Yang and Meyer (2020) competitive argument. The cost reduction to comply with local energy industry legislation and regulations may be one of the reasons for this. Our results demonstrate that during the period of regulatory turbulence (e.g. Decree No. 579), there was a decrease in the performance of all companies in the industry. This is shown by the ranking coefficient for the period 2012 onwards (Reg1), which is negative and statistically significant. However, the performance of foreign companies in the period of regulatory turmoil was less affected than that of their Brazilian counterparts, but with no statistical significance.

This advantage is even more significant for foreign subsidiaries from countries with better governance quality (according to the Worldwide Governance Indicators of the World Bank). This confirms current literature that argues that knowledge and ability to operate in an institutionalized country can be transferred from a parent

company to an affiliate. This result also complements the current institutional and regulatory foreignness studies in emerging economies (Cuervo-Cazurra & Genc, 2008; Mallon et al., 2022) and confirms that prior regulatory experience of an MNE in a similar environment can be related to its foreign affiliate's performance (Perkins, 2014).

The results from Model 4 show that the better the regulation quality of the subsidiary's country of origin, the better its performance in Brazil. This confirmed Mallon and Fainshmidt (2017) institutional asymmetry between the home and host country argument. Multinationals from different origins and levels of institutional development can use a mix of transaction organizing methods (Hennart, 1993) to solve the potential loss resulting from the new local regulations that transferred all risks. In the case of Brazil, the different capital structure, governance, value chain organization and operational hedging strategies were adopted by foreign subsidiaries to increase their local adaptability and their ability to mitigate these regulation risk impacts. Different home countries may also have different globalization strategies (Aguilera & Yip, 2004).

Finally, this study also demonstrated the importance of psychic distance, which is the disturbance that affects a good continuous flow of information between foreign firm and local market institutional (Johanson & Wiedersheim-Paul, 1975). We found that AoF interacts with LoF in generating business operating results. Along with the positive effect of being a foreign company, we find that the greater the psychic distance between the host country and the foreign subsidiary's home country, the worse its operational performance. A foreign firm with more similarity to Brazilian culture and social background may have a quicker and more efficient response to Brazilian regulation changes.

The limitation of this study is that we have not been able to account for all the MNEs' overseas experiences due to a lack of information on their historical data in other countries. We have only tested their experience in Brazil. The length of their stay in Brazil (Experience) was not statistically significant in our study. This total global experience issue could be better investigated in future research.

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