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What drives emerging market firms' performance? The role of macroeconomic environment, industry, and slack.

O que impulsiona o desempenho da firma em mercados emergentes? O papel do ambiente macroeconômico, da indústria e da folga de recursos.

Alexandre Teixeira Dias[1]
Centro Universitário Unihorizontes
alexandretdias@yahoo.com.br

Marcelo Barbosa Costa[2]
Universidade FUMEC
marcelo.barbosa2006@yahoo.com.br

Jersone Tasso Moreira Silva[1]
Centro Universitário Unihorizontes
jersonemoreira@hotmail.com

Marcos Antônio de Camargos[3]
Universidade Federal de Minas Gerais - UFMG
marcos.camargos@professores.ibmec.edu.br

Pedro Verga Matos[4]
Universidade de Lisboa
pvmatos@iseg.ulisboa.pt

Abstract: The purpose of this research is to describe the influences of macroeconomic context, competitive environment, and firm's slack of resources on the performance of BRICS' firms, operating between 2006 and 2016. The model was estimated by four levels multilevel modelling, and results indicate that firms' slack of resources does

[1] Centro Universitário Unihorizontes – Santo Agostinho – CEP - 30180-121 - Belo Horizonte (MG) – Brasil
[2] Universidade FUMEC – Cruzeiro – CEP 30310-190 - Belo Horizonte (MG) – Brasil
[3] Universidade Federal de Minas Gerais (UFMG) — Pampulha - CEP 31270-901 - Belo Horizonte (MG) – Brasil
[4] Universidade de Lisboa - Alameda da Universidade - 1649-004 Lisboa, Portugal

influence firms' performance over time, and that the effects of macroeconomic context, as measured by means of gross domestic product and market reference interest rate, exceed the effects exerted by industry, as measured by dynamism, concentration, and munificence. This article brings to light the discussion about the roles played by macroeconomics, industry and firm factors that simultaneously influence firm's performance across time. Our contribution to the advance in the field of research resides on the exploration of the proposed relationships in the context of emerging markets, before, during and after the 2008 global financial crisis. The main contribution of the research is to bring a new point of view about the factors that influence performance variance, when considering time, firm, competitive environment, and macroeconomic context in the same multilevel model.

Keywords: Emerging Markets; Firm's Performance; Multilevel Modeling.

Resumo: O objetivo desta pesquisa é descrever as influências do contexto macroeconômico, do ambiente competitivo e da folga de recursos, no desempenho de firmas do BRICS, operando entre 2006 e 2016. O modelo foi estimado por modelagem multinível de quatro níveis e os resultados indicam que a folga de recursos da firma influencia o desempenho ao longo do tempo, e que os efeitos do contexto macroeconômico, medido por meio do produto interno bruto e da taxa de juros de referência do mercado, superam os efeitos exercidos pela indústria, medidos pelo dinamismo, pela concentração e pela munificência. Este artigo traz à tona a discussão sobre os papéis desempenhados pela macroeconomia, pela indústria e por fatores da firma que influenciam simultaneamente o desempenho ao longo do tempo. Nossa contribuição para o avanço no campo da pesquisa reside na exploração das relações propostas no contexto dos mercados emergentes, antes, durante e depois da crise financeira global de 2008. A principal contribuição da pesquisa é trazer um novo ponto de vista sobre os fatores que influenciam a variância de desempenho, quando se considera o tempo, a firma, o ambiente competitivo e o contexto macroeconômico em um mesmo modelo multinível.

Palavras-chave: Mercados Emergentes; Desempenho da Firma; Modelagem Multinível.

Introduction

Several studies aim to identify elements that affect firms' competitive capacity, how organizational and market characteristics affect competitive actions and interactions, and how these actions, in turn, influence firms' performance (Bini et al., 2020; Hughes-Morgan et al., 2018; Nieuwoudt and Hall, 2022; Zaniboni and Montini, 2017). Some of these elements are generated through the dynamics presented by the macroeconomic environment, which puts pressure (Paredes and Oliveira, 2017) on firms to adapt to the constant changes in the competitive landscape. The macroeconomic environment is guided by events beyond the firms' control and can represent both a threat and an opportunity (Bini et al., 2020; Egbunike and Okerekeoti, 2018; Tournus et al., 2023).

Competitive environment configuration is another player that should be considered when managers make decisions about how to guide the firm to achieve better performance levels, by means of the adequate use of slack of resources (Zhang et al., 2022; Zhu et al., 2022).

One of the ways managers deal with macroeconomic and competitive environment changes, with the objective of achieving better performance, is by means of the management and the application of slack of resources. Agustí et al. (2021) points that research that approaches slack-performance relationships have presented high level of cohesion, indicating the relevance of the theme for the field of study. Several researchers have approached the relationships between firms' slack of resources and performance under different points of view: Argilés-Bosch et al. (2018) proposed and tested a model that considered the effects of slack on firm performance as curvilinear; Geiger et al. (2019) studied the effects of levels of each type of slack on different levels of performance; Agustí-Perez et al. (2020) studied the temporal symmetry and duration of effects; Rau and Flores (2021) approached financial and resource slack as moderators of the effects exerted by planning on performance.

In line with previous studies, the objective of this paper is to approach the effects exerted by resource slack on the performance of firms, considering the roles played by macroeconomic and competitive environments, over time. The research sample is comprised by firms from Brazil, Russia, India, China, and South Africa (BRICS) active in the period between 2006 and 2016.

This article brings to light the discussion about the roles played by the macroeconomic environment, the competitive environment and the firm's factors that simultaneously influence firm's performance across time. Our

contribution to the advance in the field of research resides on the exploration of the proposed relationships in the context of emerging markets, before, during and after the 2008 global financial crisis.

Theory

Macroeconomic Environment

It is important to consider the influences of macroeconomic factors on the performance of firms since their growth also depends on the interaction between macroeconomic factors and the characteristics of the firms and the industry (Egbunike and Okerekeoti, 2018; Paredes and Oliveira, 2017), influencing the amount and cost of financial resources available to firms (Verma and Bansal, 2021).

Several authors have concluded that volatility in macroeconomic factors negatively influences firms' performance (Bayar and Ceylan, 2017; Demir, 2009; Egbunike and Okerekeoti, 2018; Ntshangase et al., 2016; Pervan et al., 2019). Demir (2009) asserts that increasing macroeconomic uncertainty and capital flow volatility have a negative effect on firms' profitability. In other words, an equilibrium macroeconomic environment is a prerequisite for firm profitability to be healthy, robust, and sustainable (Bayar and Ceylan, 2017; Mangla and Din 2015; Ntshangase et al., 2016; Shahbaz et al., 2010). In alignment with these theoretical assumptions, positive influences of GDP growth on firm performance have been identified (Dewi et al., 2019; ; Egbunike and Okerekeoti, 2018; Issa and Antwi, 2017; Lee, 2014; Pacini et al., 2017, Rehman et al., 2014) and negative effects of market interest rate increment on firms' performance (Hussain et al., 2021; Pacini et al., 2017; Ruhomaun et al., 2019).

The effect of some macroeconomic variables may vary from one market to another and from one period to another. As far as this study is concerned, the Gross Domestic Product (GDP) and the market reference Interest Rate (IR) were used, in alignment with the research of Barakat et al. (2016).

Considering the objective of this study and the previous arguments, the following hypotheses are made:

Hypothesis (H1.1). *The lower the variation in the Gross Domestic Product, the greater the firms' performance over time.*

Hypothesis (H1.2). *The lower the variation in the Interest Rate, the greater the firms' performance over time.*

Competitive Environment

Firm performance can be linked to differences in a firm's specific context and especially to differences in its task (competitive) environment (Child, 1975). Thus, the competitive environment is operationalized consistently with the resource dependence of the interaction between firm and environment (Dess and Beard, 1984). De-Carvalho et al. (2018, p. 3) found the following:

> When assessing the environment in which a business operates, one should reflect on which firms make up the environment, that is, which operate in the same industry as the firm under analysis.

Žiković (2018) emphasized that while firm-specific variables play an essential role in determining performance variation, external variables are important in understanding fluctuations in the probability of firms' survival (Egbunike and Okerekeoti, 2018), demonstrating that survival and growth also depend on the interaction between macroeconomic factors and their peculiar characteristics.

The concept of environmental munificence proposed by Dess and Beard (1984) considers that firms seek poignant environments that enable growth and organizational stability. Firms operating in highly resource-rich environments have maximum strategic options, minimal competitive pressures, and relative harmony among their organizational constituents (Castrogiovanni, 1991). According to De-Carvalho et al. (2018, p. 9):

> Firms that operate in environments characterized by a higher degree of munificence tend to obtain higher performance thresholds with a moderating effect of the interaction between industry munificence and sector munificence.

According to Dess and Beard (1984), turnover, lack of pattern and unpredictability are the best measures of environmental stability and instability, i.e., the intensity and the rate of change in the elements that compound the competitive environment are representative of environmental dynamism (Carvalho and Rosseto, 2014). As for Li and Liu (2014), dynamism is seen as the change and innovation in each industry, as well as the uncertainty or change in customer behavior. In this context, firms that operate in a dynamic environment should create a strategic mechanism to obtain sustainable competitive advantage by developing strategies, differentiated policies, and investment in dynamic capabilities (Cingöz and Akdoğan, 2013; Li and Liu, 2014). As a result, firms that perceive the environment as dynamic have a competitive advantage that enables them to have a greater propensity to see opportunities in pursuit of differentiation (Tan, 2019).

The Economic Theory indicates that concentration is an essential determinant of the market behavior and firms' results (Claudia, 2012). According to Hamza et al. (2012, p. 70):

> The analysis of the market concentration degree and its evolution over time is essential for the firms to have subsidies for better strategic formulation.

The environment is considered the main limiting factor in the development of businesses (Child, 1972). De-Carvalho and Dias (2016, p. 505) state that:

> The definition of the industry in the analysis of the environment should cover precisely which firms, effectively, compete with each other, because it is from them that the firm will suffer the impact of the actions resulting from its strategic decisions.

Based on the previously presented studies it is possible to define that a favorable competitive environment would be an environment with lower dynamism, providing lower levels of uncertainty; with lower market concentration, which enables competition; and with lower munificence index due to lower availability of resources in the industry. It's important to highlight that we consider that a low level of resources availability in the industry have as a counterpart that there are considerable resources in the pursuit of the firm under consideration. Thus, the following hypotheses are proposed.

Hypothesis (H2.1). *The lower the dynamism in the competitive environment, the greater the firms' performance over time.*
Hypothesis (H2.2). *The lower the munificence in the competitive environment, the greater the firms' performance over time.*
Hypothesis (H2.3). *The lower the market concentration in the competitive environment, the greater the firms' performance over time.*

Organizational Slack

Slack represents potentially usable resources in a firm that exceeds the minimum required to achieve organizational goals (Lee and Wu, 2016). Thus, slack is critical to meet higher demands, reduce internal conflicts, and provide flexibility and experimentation in projects (Alessandri et al. 2014; Bourgeois III and Singh, 1983; Cheng and Kesner, 1997; Tan, 2003). According to Tan (2003), regardless of the degree to which they were committed to the production process, slack resources contributed positively to firm performance. However, slack resources can also lead managers to promote unnecessary or self-interested spending, reduce firms' motivation to

enact competitive actions, weakening firms' strategic response (Cheng and Kesner, 1997; Chiu and Liaw, 2009; Hughes-Morgan et al., 2018; Wiersma, 2017).

Available slack consists of highly available resources (Bourgeois III and Singh, 1983; Guha, 2016; Marlin and Geiger, 2015). In other words, Cheng and Kesner (1997) emphasize that available slack consists of resources that are not yet committed to the organizational design or a specific expenditure. The available slack can provide the benefit of protection in times of crisis and of opportunities arising from the environment. Still, it can also lead managers to act contrary to the firm's objective (Goldszmidt, 2010). The practical example of available slack would be the maintenance of cash resources beyond those needed for the company's activity, which could be used to face unexpected situations, take advantage of business opportunities (purchase of inputs at lower prices or, depending on the accumulated amount, be used to acquire other companies or the company's own shares on the market).

Recoverable slack consists of expenses and costs used in firms' activities as a form of surplus resources (Bourgeois III and Singh, 1983; Guha, 2016; Marlin and Geiger, 2015). However, these resources can be recovered during times of contraction in economic activity, with expense cuts or organizational redesign, without disrupting the firm's operations (Bourgeois III and Singh, 1983; Cheng and Kesner, 1997; Goldszmidt, 2010). Two examples of recoverable slack would be idle installed capacity and low operational efficiency. These two situations can be optimized in times of declining performance or during times of crisis, without resulting in a reduction in the quality and quantity of the company's production. In these situations, it is common for companies to make efforts to reduce their costs and operating expenses to achieve the desired performance.

Potential slack consists of the firm's ability to generate extra resources through third-party resources, either through external funding (additional debt or debt financing from external sources) or by increasing equity (Bourgeois III and Singh, 1983; Cheng and Kesner, 1997; Guha, 2016; Marlin and Geiger, 2015). Practical examples of potential slack would be: 1. maintaining a good credit history with the financial market, in order to facilitate the future contracting of resources, whether in case of need or for the implementation of expansion strategies; 2. maintaining a good reputation in the capital markets can facilitate the raising of own resources through the issuance of new shares; 3. maintaining good relationships with suppliers can result in the negotiation of more favorable prices and terms for the company, freeing up resources for other areas.

Several authors (Altaf and Shad, 2017; Daniel et al., 2004; Jifri et al., 2016; Marlin and Geiger, 2015; Tan, 2003) have been studying the relationship between organizational slack and performance. Authors such as Argilés-Bosch et al. (2018), Daniel et al. (2004), Javid et al. (2020), Marlin and Geirger (2015), and Tan (2003) found a positive relationship between resource slack and firm performance. Marlin and Geiger (2015) stated that firms with higher levels of slack outperform those with lower levels of slack, suggesting a positive relationship between slack and firm performance.

In his study, Tan (2003) emphasized that organizational slack had a positive impact on firm performance. However, Altaf and Shad (2017) evidenced that the availability of financial slack limits firms to strive for good performance as managers may remain distracted due to opportunistic tendencies. Thus, the following hypotheses are presented:

Hypothesis (H3.1). *The greater the available slack of resources, the greater the firms' performance over time.*
Hypothesis (H3.2). *The lower the recoverable slack of resources, the greater the firms' performance over time.*
Hypothesis (H3.3). *The lower the potential slack of resources, the greater the firms' performance over time.*

Firm Size as a Control Variable

Common sense is that larger firms tend to be more profitable than their smaller counterparts (Lee, 2009). However, empirical evidence has not been able to verify the 'size matters' hypothesis (Kioko, 2013). There are several criteria to define firm size. Examples include total assets, total investment, firm's equity, and the number of employees (Vij and Farooq, 2016). For this study, firm size was measured in terms of Total Assets.

Tan (2003) found a negative relationship between size and performance, suggesting that larger firms had less desirable performance measured by profitability. However, Chandrapala and Knápková (2013), Charles et al. (2018), Lee (2009), and Wiersma (2017), using the control variable firm size as calculated by total assets, concluded that size is positively related to performance.

Research Context

The 2008 global financial crisis was the starting point of a transformation of the global governance landscape, bringing to the fore the importance of developing countries. Thus, the importance of BRICS within the global governance structure increased due to the improved economic capabilities of these powers and the fact that economic interdependence made the world more sensitive to the economic policies of these nations (Petropoulos, 2013).

Although the BRICS emerged as an articulated economic group on the world stage, the prolonged global recession has highlighted more significant differences in their ability to sustain their long-term growth (Nassif et al., 2016).

The period between 2006 and 2016 is characterized by significant variation in GDP among the BRICS countries – Figure 1. Brazil's GDP was on the rise from 2006 to 2008, falling in 2009 - the index closed negative (-0.13) -, demonstrating economic slowdown. In 2010 GDP reach 7.54, the peak during the period, with the next two years in consecutive drops, with indexes of 3.99 in 2011 and 1.93 in 2012. In 2013 there was a slight recovery,

closing at 3.01. However, from 2014 to 2016, there was a fall in the index, going from 0.51 to -3.47. These ups and downs in the GDP index bring high levels of uncertainty to the competitive environment and, consequently, to decision-making processes by the firm's managers.

In Russia, during the period under analysis, the GDP index achieved the highest levels in the years of 2006 (8.15), and 2007 (8.54). In 2008, the index reached 5.25, but in 2009 the Russian GDP plummeted to -7.82. In 2010 there was a recovery, with an index of 4.50, and in 2011, with an index of 5.28. From 2012 to 2015, the index fell from 3.66 to -2.83. In 2016, the index closed at -0.22 per cent, already showing a recovery trend, despite being negative. As for Brazil, these ups and downs in the Russia's GDP index brings high level of uncertainty to competitive environment and, consequently, to decision making processes by firm's managers.

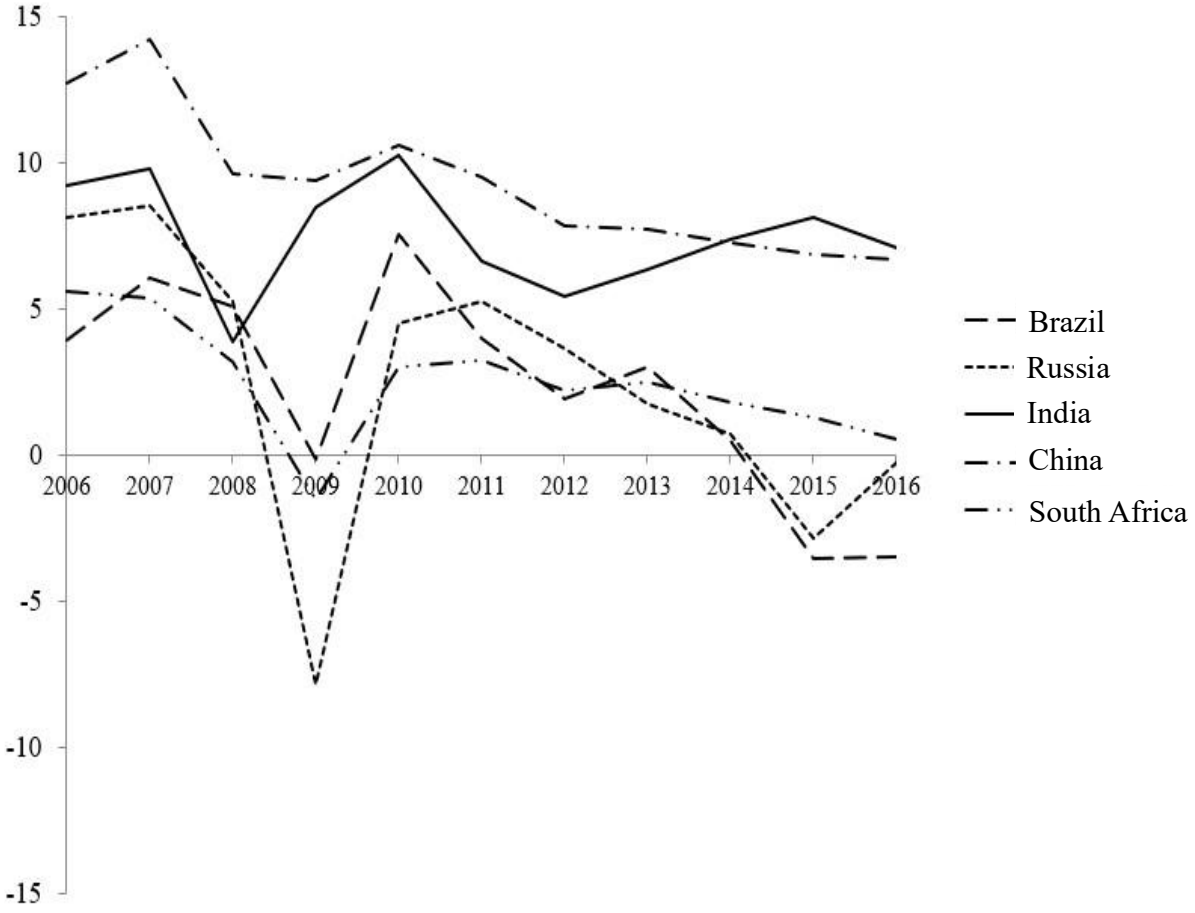

Figure 1.

BRICS' countries' GDP across time

Source: Prepared by the authors.

India presented positive numbers in the period from 2006 to 2016. From 2006 to 2007 there was an increase in the GDP index of 0.54. In 2008, there was a drop, and the index closed at 3.89. In the two following years, 2009 and 2010, there were increases of 4.59 and 1.79, respectively. The index remained positive during the period from 2010 to 2016. The India's competitive environment presents a moderate level of macroeconomic turbulence.

China, as well as India, presented positive GDP index throughout the period under consideration. From 2006 to 2007, the index increased by 1.51 but suffered two consecutive drops, in 2008 and 2009, of 4.58 and 0.25, respectively. In 2010 the GDP index closed at 10.64, an increase in relation to 2009. However, from 2011 to 2016, the index fell – it closed at 9.54, in 2011; in 2012 it closed at 7.86. At the year of 2013, GDP closed at 7.76 and at the next years at 7.30 (2014), 6.90 (2015) and 6.70 (2016). These numbers indicate a tendency of decrease in the resources available at the Chinese economy, increasing the level of complexity of the decision-making process in terms of resources allocation.

From the years 2006 to 2008, South Africa closed with positive GDP index, but in 2009 it was not possible to sustain growth and closed the index at -1.54. In 2010 and 2011, the South Africa showed economic recovery with indexes of 3.04 and 3.28, respectively. However, in 2012 this number fell to 2.21; in 2013, it closed at 2.49; and fell consecutively from 2014 to 2016 (from 1.85 to 1.28) and closed 2016 at 0.57. As for Brazil and Russia, South Africa macroeconomic environment presented high level of turbulence, making the process of managing slack of resources harder and crucial for firm's achievement.

CONCEPTUAL MODELS

The longitudinal model estimated in this study consists of four levels (Figure 2). First level consists of the Time variable expressing the repeated measurements, proposal that allows us to consider the correction for autoregressive effects of lag one, in the parameter's estimation. The second level (Firm) consists of the firm's Slack and firm's Size variables. The third level (Competitive Environment) deals with the industry in which a firm operates and its effects on the firm's performance. Finally, the fourth level (Macroeconomic Environment) contains macroeconomic variables referring to the countries in the sample and deals with their effects on performance.

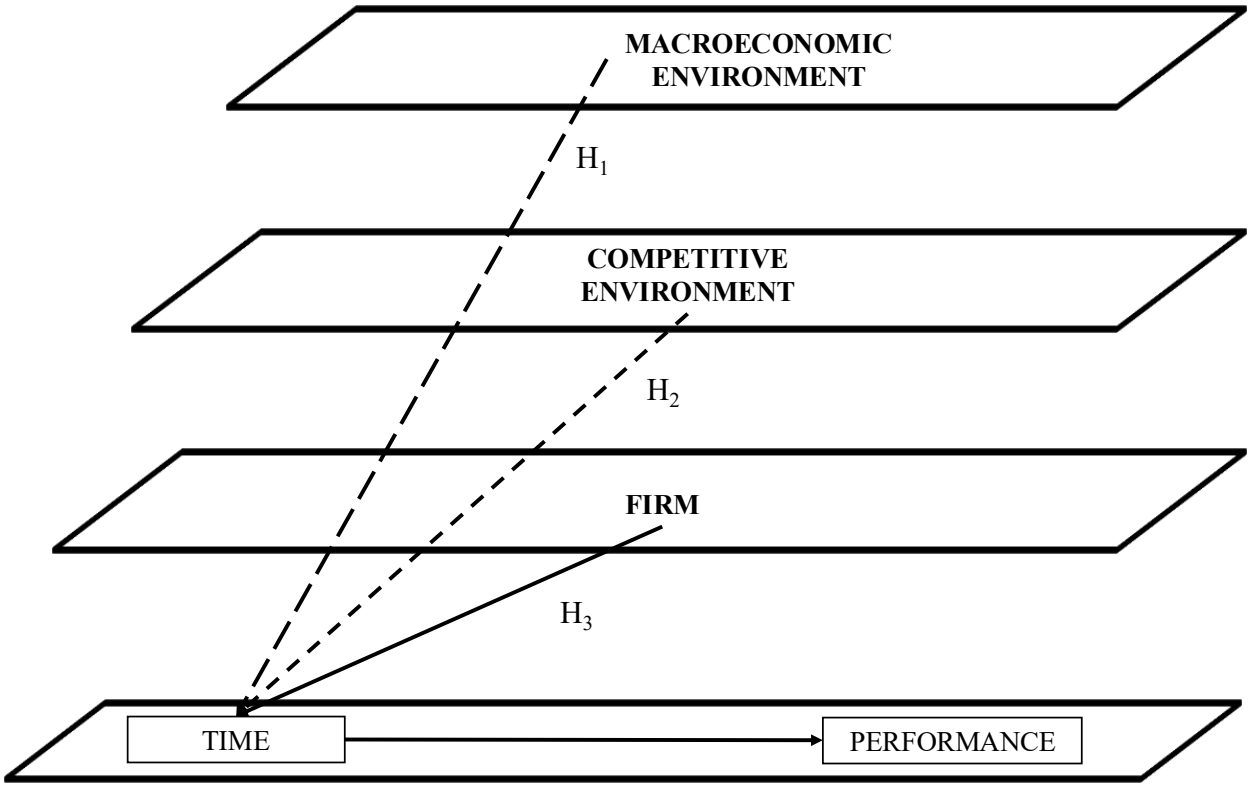

Figure 2.

Theoretical Multilevel Model

Source: Prepared by the authors.

To check the adequacy of multilevel modeling to approach the effects of fixed and random models on the performance of firms that comprise the sample, we estimate a non-conditional model - Equations 1 to 4.

$$Y_{ijkl} = \pi_{0jkl} + \varepsilon_{ijkl} \quad (1)$$

$$\pi_{0jkl} = \beta_{00kl} + r_{0jkl} \quad (2)$$

$$\beta_{00kl} = \gamma_{000l} + \mu_{00kl} \quad (3)$$

$$\gamma_{000l} = \delta_{0000} + v_{000l} \quad (4)$$

Where:

Y_{ijkl} = performance for the firm-year *i* in firm *j*, industry *k* and country *l*;

π_{0jkl} = average performance for firm-year *i* in firm *j*, industry *k* and country *l*;

β_{00kl} = Firm level average firm's performance

γ_{000l} = Industry level average firm's performance

δ_{0000} = Country level average firm's performance

To test the influence of time on the variability of firm's performance we estimate a model with the variable TIME – Equations 5 to 8 – as level 1 independent variable. The result of parameters estimating will guide the adjustment of the quadratic model when testing the research hypothesis.

$$Y_{ijkl} = \pi_{0jkl} + \pi_{1jkl}(TIME) + \varepsilon_{ijkl} \quad (5)$$

$$\pi_{0jkl} = \beta_{00kl} + r_{0jkl} \quad (6)$$
$$\pi_{1jkl} = \beta_{10kl} + r_{1jkl}$$

$$\beta_{00kl} = \gamma_{000l} + \mu_{00kl} \quad (7)$$
$$\beta_{10kl} = \gamma_{100l} + \mu_{10kl}$$

$$\gamma_{000l} = \delta_{0000} + v_{000l} \quad (8)$$
$$\gamma_{100l} = \delta_{1000} + v_{100l}$$

Where:

Y_{ijkl} = performance for the firm-year *i* in firm *j*, industry *k* and country *l*,

π_{0jkl} = average performance for firm-year *i* in firm *j*, industry *k* and country *l,*

π_{1jkl} = expected rate of change in firm's performance for firm-year *i* in firm *j*, industry *k* and country *l* when time changes one unit,

β_{00kl} = average performance for firm *j*, industry *k* and country *l*,

β_{10kl} = expected rate of change in firm's performance across firms in industry *k* and country *l* when time changes one unit,

γ_{000l} = average firm's performance for industry *k* and country *l*,

γ_{100l} = expected rate of change in firm's performance in industry *k* and country *l* when time changes one unit,

δ_{0000} = average firm's performance for country *l*,

δ_{1000} = expected rate of change in firm's performance across firms in country *l* when time changes one unit.

In the quadratic model (Equations 9 to 12), which express the research hypotheses, all the variables were included in both linear and quadratic forms, except for firm size (SIZE). In level 1 we included TIME as independent variable. The variables that represent firm's slack (SLACKA, SLACKR, and SLACKP), and firm's size, were included in level 2. Level 3 encompasses variables that represent competitive environment (DYN – dynamism, CON – concentration, and MUN – munificence). Level 4 is composed of macroeconomic variables (IR and GDP).

$$Y_{ijkl} = \pi_{0jkl} + \pi_{1jkl}(TIME) + \pi_{2jkl}(TIME^2) + \varepsilon_{ijkl} \quad (9)$$

$$\pi_{0jkl} = \beta_{00kl} + \beta_{01kl}(SLACKA) + \beta_{02kl}(SLACKA^2) + \beta_{03kl}(SLACKR) + \beta_{04kl}(SLACKR^2) + \\ + \beta_{05kl}(SLACKP) + \beta_{06kl}(SLACKP^2) + \beta_{07kl}(SIZE) + r_{0jkl} \quad (10)$$

$$\pi_{1jkl} = \beta_{10kl} + r_{1jkl}$$

$$\pi_{2jkl} = \beta_{20kl} + r_{2jkl}$$

$$\beta_{00kl} = \gamma_{000l} + \gamma_{011l}(DYN) + \gamma_{002l}(DYN^2) + \gamma_{003l}(CON) + \gamma_{004l}(CON^2) + \gamma_{005l}(MUN) + \\ + \gamma_{006l}(MUN^2) + \mu_{00kl} \quad (11)$$

$$\beta_{10kl} = \gamma_{100l} + \mu_{10kl}$$

$$\beta_{20kl} = \gamma_{200l} + \mu_{20kl}$$

$$\beta_{01kl} = \gamma_{010l} + \mu_{01kl}$$

$$\beta_{02kl} = \gamma_{020l} + \mu_{02kl}$$

$$\beta_{03kl} = \gamma_{030l} + \mu_{03kl}$$

$$\beta_{04kl} = \gamma_{040l} + \mu_{04kl}$$

$$\beta_{05kl} = \gamma_{050l} + \mu_{05kl}$$

$$\beta_{06kl} = \gamma_{060l} + \mu_{06kl}$$

$$\beta_{07kl} = \gamma_{070l} + \mu_{07kl}$$

$$\gamma_{000l} = \delta_{0000} + \delta_{000l}(IR) + \delta_{0002}(IR^2) + \delta_{0003}(GDP) + \delta_{0004}(GDP^2) + v_{000l} \quad (12)$$

$$\gamma_{100l} = \delta_{1000} + v_{100l}$$

$$\gamma_{200l} = \delta_{2000} + v_{200l}$$

$$\gamma_{011l} = \delta_{0010} + v_{011l}$$

$$\gamma_{002l} = \delta_{0020} + v_{002l}$$

$$\gamma_{003l} = \delta_{0030} + v_{003l}$$

$$\gamma_{004l} = \delta_{0040} + v_{004l}$$

$\gamma_{0051} = \delta_{0050} + v_{0051}$

$\gamma_{0061} = \delta_{0060} + v_{0061}$

$\gamma_{0101} = \delta_{0100} + v_{0101}$

$\gamma_{0201} = \delta_{0200} + v_{0201}$

$\gamma_{0301} = \delta_{0300} + v_{0301}$

$\gamma_{0401} = \delta_{0400} + v_{0401}$

$\gamma_{0501} = \delta_{0500} + v_{0501}$

$\gamma_{0601} = \delta_{0600} + v_{0601}$

$\gamma_{0701} = \delta_{0700} + v_{0701}$

Where:

Y_{ijkl} = performance for the firm-year *i* in firm *j*, industry *k* and country *l*,

π_{0jkl} = average performance for firm-year *i* in firm *j*, industry *k* and country *l*,

π_{1jkl} and π_{2jkl} = expected linear and quadratic rates of change, respectively, in firm's performance for firm-year *i* in firm *j*, industry *k* and country *l* when time changes one unit,

β_{00kl} = average performance for firm *j*, industry *k* and country *l*,

β_{01kl} to β_{06kl} = expected rate of change in firm's performance across firms in industry *k* and country *l* when slack variables change one unit, both in linear and quadratic forms,

β_{07kl} = expected rate of change in firm's performance across firms in industry *k* and country *l* when firm's size changes one unit,

β_{10kl} and β_{20kl} = expected linear and quadratic rates of change, respectively, in firm's performance across firms in industry *k* and country *l* when time changes one unit,

γ_{0001} = average firm's performance for industry *k* and country *l*,

γ_{0011} to γ_{0061} = expected linear and quadratic rates of change in firm's performance in industry *k* and country *l* when competitive environment variables change one unit,

γ_{1001} and γ_{2001} = average expected linear and quadratic rates of change, respectively, in firm's performance in industry *k* and country *l* when time changes one unit,

γ_{0101} to γ_{0601} = average expected rate of change in firm's performance in industry *k* and country *l* when slack variables change one unit, both in linear and quadratic forms,

γ_{0701} = average expected rate of change in firm's performance in industry *k* and country *l* when firm's size change one unit,

δ_{0000} = average firm's performance for country *l*,

δ_{0001} to δ_{0004} = expected linear and quadratic rates of change in firm's performance in country *l* when macroeconomic context variables change one unit,

δ_{1000} and δ_{2000}= average expected linear and quadratic rates of change, respectively, in firm's performance in country *l* when time changes one unit,

δ_{0010} to δ_{0060} = average expected linear and quadratic rates of change in firm's performance in country *l* when competitive environment variables change one unit,

δ_{0100} to δ_{0600} = average expected rate of change in firm's performance in country *l* when slack variables change one unit, both in linear and quadratic forms,

δ_{0701} = average expected rate of change in firm's performance in country *l* when firm's size change one unit.

Table 1 presents the methods used to measure the variables used in the proposed multilevel models.

TABLE 1

Variable definitions

Variable	Category	Calculation Method
	Macroeconomic Environment	
GDP	GDP (Gross Domestic Product)	Variation of the index between the years analyzed.
IR	Interest Rate	Variation of the index between the years analyzed.
	Competitive Environment	
Munificence	Munificence Index according to De-Carvalho et al. (2018)	Average of the logarithm of rivals' total assets.
Dynamism	Dynamism index, according to Dess and Beard (1984)	(Standard error of the regression of sales values, in industry, on the year) / (average sales value, in industry, on the year).
Concentration	Herfindahl-Hrischman Index (HHI)	Degree of industry concentration according to the Herfindahl-Hirschman Index (HHI).
	Firm	
SLACKA	Available slack, according to Goldszmidt, (2010)	(Current Assets - Current Liabilities) / Sales
SLACKR	Recoverable slack, according to Goldszmidt, (2010)	General, administrative and sales expenses / Sales

SLACKP	Potential slack, according to Goldszmidt, (2010)	Total debt / Shareholders' equity
Performance	Return on Invested Capital (ROIC)	Net Profit / Book value of average invested capital
Size	Firm's Total Assets	ln (Total Assets)
Time	Year	Year of publication of the accounting and financial information

Source: Prepared by the authors.

Data And Methods

Data Sources and Sample

The research sample is comprised by publicly traded companies from the manufacturing industry (consumer goods, industrial goods, and basic materials) operating in the BRICS countries, that were active in the period between 2006 and 2016, which had their accounting information disclosed in Thomson Reuters Datastream® database. Macroeconomics data from BRICS countries were obtained from IndexMundi (2023) database.

Data Processing Method

Multilevel modelling is an approach to model hierarchically structured data (Fávero, 2008) according to the idea that subjects belonging to the same group share a set of common behavior (Fávero, 2008). An example, according to Steele (2008), is longitudinal data, with observations repeated over time, nested by individuals with effects varying randomly or not across levels (Finch et al., 2019; Townsend et al., 2013).

In this research, we used nlme package (Pinheiro and Bates, 2000) for R (R Core Team, 2021) to estimate the model's parameters and follow the guidelines from Ozkaya et al. (2023) and Erkan et al. (2016) to obtain a high-quality multilevel modeling analysis. Before checking for multilevel regression premises, independent variables from Country level were grand mean centered and the ones from Industry and Firm levels were group mean centered. Log transformation was applied to dependent variable ROIC. When checking for normal distribution of residuals we identified that data doesn't attend the premise of parametric estimation method, allowing the use of bootstrapping procedure when estimating the significance of coefficients.

Analysis And Results

Variance Decomposition Analysis

As one can see in Table 2, in all three models the firm and firm-year levels account for a large proportion of variance in firm performance (more than 90.0% in the Null and Time models, and more than 85.0% in the Quadratic model). In Null and Time models the country level accounts for less than 1.00%, and more than 2.5% in the Quadratic model. Industry level accounts for more than 3.0% in the Quadratic model, and less than 2.0% in the Null and Time models. These results, in addition to figures presented in Table 3, point to the adequacy of modeling all four levels and to the conclusion that Quadratic model presents a better fit to the data sample, due to the lowest AIC (Akaike Information Criterion), BIC (Bayesian Information Criterion), and Log-Likelihood ratios. Table 4 presents the comparison of Deviance between the three models with the Quadratic model presenting the lowest ratios.

TABLE 2

ICC comparison between models

Model	Country		Industry		Firm		Time		Residual Variance
	Variance Component	ICC	Variance Component	ICC	Variance Component	ICC	Variance Component	ICC	
Null	0.1291	0.0738	3.0884	1.7666	55.6180	31.8142	106.3950	60.8592	9.5910
Time	0.0584	0.0335	3.1924	1.8332	60.2187	34.5802	100.6044	57.7714	10.0684
Quadratic	4.7375	2.8065	6.4317	3.8101	52.2528	30.9542	95.2197	56.4076	10.1649

Source: Authors' own findings.

TABLE 3

Model fit comparisons

Informations	Models		
	Null	Time	Quadratic
AIC	176,364.182	175,589.685	174,331.699
BIC	176,420.401	175,653.934	174,540.509
LogLik	-88,175.091	-87,786.842	-87,139.849
Deviance	176,350.182	175,573.685	174,279.698

Source: Authors' own findings.

TABLE 4

Deviance comparisons

Information	Comparisons		
	Null x Time	Null x Quadratic	Time x Quadratic
Difference	776.497 ***	2070.483 ***	1293.986 ***

*** p-value <= 0.010; ** p-value <= 0.050; * p-value <= 0.100
Source: Authors' own findings.

Hypotheses Testing

When analyzing Time Model, as per Figure 3 and Table 5, one can observe that there is a negative and significant effect for TIME on firm performance. The negative coefficient (-0.721) indicates a reduction in firm's average performance as time goes by, a result that is consistent with the effects of the 2008 crisis on the dynamics of firms' performance. According to Nassif et al. (2016), even though the BRICS economies emerged as an articulated economic group on the world stage, the prolonged global recession with the 2008 crisis highlighted more significant differences in their ability to sustain their long-term growth.

Figure 3.

Average Firm's Performance Over Time

Source: Prepared by the authors.

TABLE 5
Estimated Parameters

Indicators	Null				Time				Quadratic			
	Estim.	Confidence Intervals		Sig.	Estim.	Confidence Intervals		Sig.	Estim.	Confidence Intervals		Sig.
		Lower	Upper			Lower	Upper			Lower	Upper	
Intercept	9.056	8.476	9.736	99%	13.033	12.390	13.649	99%	17.966	15.924	19.706	99%
TIME					-0.721	-0.773	-0.656	99%	-1.888	-2.290	-1.472	99%
$TIME^2$									0.080	0.051	0.106	99%

Firm level indicators				
SLACKA	0.010	0.001	0.019	95%
SLACKA^2	0.000	0.000	0.000	99%
SLACKR	-2.046	-2.595	-1.526	99%
SLCKR^2	0.030	0.010	0.045	95%
SLACKP	-5.606	-6.131	-5.183	99%
SLCKP^2	0.247	0.181	0.322	99%
SIZE	0.524	0.331	0.714	99%
Competitive Environment level indicators				
DYN	-7.134	-9.411	-4.394	99%
DYN^2	1.227	0.440	1.970	95%
COM	-11.765	-21.968	-1.134	90%
CON^2	24.470	-22.248	61.859	N.S.
MUN	-0.124	-1.209	0.919	N.S.
MUN^2	-1.833	-3.856	0.175	N.S.
Macroeconomic Environment level indicators				
IR	0.465	0.301	0.648	99%
IR^2	0.045	-0.013	0.107	N.S.
GDP	0.039	-0,028	0.103	N.S.
GDP^2	-0.035	-0.056	-0.013	99%

Estim. = Estimate; Sig. = Level of significance.
Source: Authors' own findings.

It can be observed at Table 5, with focus on the Quadratic model, that TIME exerts negative linear effect and positive quadratic effect on firm's performance, results that are in line with the results obtained for the Time Model.

For the Country level (Level 4), which is related to the macroeconomic environment, the variations that occurred in the Gross Domestic Product (GDP) and the Interest Rate (IR) were analyzed. The variation in the GDP, in its quadratic form, exerts negative and significant effect on firm's performance (-0.035). Despite the non-significance of the linear effect of GDP on firm's performance (0.039), the coefficients estimated points to an increase in firm's performance as GDP becomes more stable. These results support Hypothesis H1.1. On the other hand, positive and significant linear coefficient estimated for the IR variable indicates that a greater variation of the Interest Rate will lead to a greater level of performance, result that does not give support to Hypothesis H1.2, and have support on the perspective that, as performance was measured by Return on Invested Capital (ROIC), managers tend to invest the firm's financial resources on the financial market, which is more attractive, instead of investing in the firm, reducing the denominator and, in consequence, increasing the ROIC index.

For the Industry level (Level 3), which is related to the competitive environment, three variables were analyzed: dynamism, concentration, and munificence. Both linear and quadratic effects were non-significant for the

variable munificence (MUN), and the quadratic effect exerted by concentration (CON). Dynamism (DYN) presents significant effects in both linear (-7.134) and quadratic forms (1.227), indicating a reduction in the firm's performance the greater the variability in sales in the industry, i.e., the more dynamic the industry, the lower the firm's performance. Concentration (CON) presents a negative influence on the firm's performance (-11.765), pointing to an increase in the firm's performance as the less concentrated the market share in the industry. The results obtained for munificence do not support Hypothesis H2.2, reinforcing the strategic relevance of the better use of firm's resources instead of just pursuing them. On the other hand, the coefficients estimated for dynamism and concentration provide support to Hypotheses H2.1 and H2.3, respectively.

Available slack (SLACKA), when both in its linear and quadratic forms, does exert significant effect on firms' performance, despite the negligible effect estimated for its quadratic form, results that provide support to Hypothesis H3.1. The parameters estimated for the effect of recoverable slack (SLACKR), with negative (-2.046) and significant effect of the linear form, and positive and significant quadratic effect (0.030), does give support to Hypothesis H3.2 and allow us to state that the greater the recoverable slack, the lower the firm's performance, that is, the greater the proportion of firm's expenses in relation to total sales, the lower its performance, result that is in line with Alrashdan and Alnahedh (2023) who affirm that recoverable slack resources usually are allocated in non-productive functions, such as performance based executives' remuneration, or in the firm's operations, absorbing financial amounts that would reduce the firm's result, when measured by the proportion of general, administrative and sales expenses in relation to total sales. Similar results were estimated for the effects of potential slack (SLACKP) on firm's performance, with negative (-5.606) and significant effect in its linear form, and positive and significant effect in its quadratic form (0.247). These figures give support to Hypothesis H3.3. Based on these results we can affirm that the lower the proportion of firm's indebtedness in relation to total equity, the greater the firm's performance.

The positive effect estimated for the control variable SIZE (0.524) was significant, which demonstrated that the greater the firm, the greater the financial results obtained from capital investment.

Discussion and Conclusions

Our main purpose in this article is to describe the influences exerted by macroeconomic and competitive environments, as well as resource slack, on the performance of BRICS' firms operating between 2006 and 2016. Based on the processing of the multilevel model it is possible to identify that macroeconomic environment's variables do influence firm performance, with positive and linear effect of the variation in the Interest Rate and negative and quadratic effect of the variation in the Gross Domestic Product. Such results diverge from the results found by Bayar and Ceylan (2017), Demir (2009), Egbunike and Okerekeoti (2018), Ntshangase et al. (2016), and

Pervan et al. (2019). The authors concluded that volatility in macroeconomic factors negatively influences firms' performance.

We also found that Competitive Environment does influence firm's performance with negative effects exerted by Dynamism and Concentration. These results are in line with the research from Dess and Beard (1984) and Li and Liu (2014), who stated that market dynamism and concentration are fundamental factors in the process of defining the firm's competitive position and, consequently, performance. However, the effect exerted by Munificence was non-significant, demonstrating that the Munificence does not influence the firms' performance, a result that are in line with McArthur and Nystrom (1991) and contrary to the results presented by Andrews and Johansen (2012), De-Carvalho et al. (2018), and Porto et al. (2009).

With focus on the slack of resources, it is possible to observe that available slack does positively influence firms' performance. This result is in line with the findings presented by Daniel et al. (2004) and Wiersma (2017), who identified a positive correlation between available slack and firm performance. On the other hand, the findings of this research are contrary to the findings presented by Altaf and Shah (2017), who stated that the estimated coefficients of available slack are negative. The negative effects of recoverable and potential are in alignment with the findings of Wiersma (2017), who stated that recoverable slack has a negative impact on performance, and contrary to the findings of Daniel et al. (2004), who found a positive relationship between recoverable and potential slack on firm's performance.

The findings of this research are in line with the findings of Chiu and Liaw (2009), who provide evidence that the relationship between slack and performance has a range in which slack has a positive impact on performance and another range in which it has a negative impact. According to the authors, slack is neither beneficial nor harmful per se, and its effect depends on how managers use resources and whether firms are operating in an environment that includes possibilities for profit investments.

All these results should be considered in a time change context and, based on the negative effect estimated of the Time variable on firm's performance, that the return on invested capital will decrease as the time go passing by.

Theoretical Contribution

This paper brings to light the discussion about the roles played by macroeconomic, industry and firm's factors that simultaneously influence firm's performance across time. Our contribution to the advance in the field of research resides on the exploration of the proposed relationships in the context of emerging markets, after the global financial crisis, and the results give support to both the Industrial Organization Theory and Resource Based

View, with the estimation of the effects of macroeconomic and industry variables (Industrial Organization Theory), and of firm's slack of resources (Resource Based View) on firm's performance.

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