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Impact of internationalization on the working capital requirement of Brazilian companies[1]

Impacto da internacionalização na necessidade de capital de giro das empresas brasileiras

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Abstract

Purpose: This study aims to analyze the effects of crisis periods on the relationship between internationalization and the working capital requirement (WCR), from 2010 to 2018, using publicly-traded Brazilian firms as a sample.

Originality/value: This paper contributes to the literature by addressing a topic that is still little explored regarding the relationship between WCR and internationalization, as well as analyzing the influence of the economic crisis on this relationship, using, for that, three internationalization proxies for the robustness of the results.

Design/methodology/approach: To achieve this goal, a regression by the generalized method of moments (GMM) with panel data was used. For this, three databases were used for data collection: Economatica, Securities and Exchange Commission (Comissão de Valores Mobiliários – CVM), and J. P. Morgan.

Findings: More internationalized Brazilian firms tend to have a higher WCR and use stock as a way to protect themselves against possible unforeseen events arising from import processes. In addition, internationalization is shown as a way for firms to maintain their level of activity during national crisis periods.

Keywords: working capital, internationalization, crisis, import, GMM

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Resumo

Objetivo: O objetivo deste estudo foi analisar os efeitos dos períodos de crise na relação entre internacionalização e necessidade de capital de giro (NCG), no período de 2010 a 2018, tendo como amostra as empresas brasileiras de capital aberto.

Originalidade/valor: O artigo contribui para a literatura por abordar um tema ainda pouco explorado no que tange à relação entre NCG e internacionalização, além de analisar a influência da crise econômica nessa relação, utilizando, para tanto, três *proxies* para internacionalização para fins de robustez dos resultados.

Design/metodologia/abordagem: Para alcançar o objetivo, usou-se uma regressão pelo método dos momentos generalizado (GMM) com dados em painel. Para isso, foram utilizadas três base de dados para a coleta dos dados: Economatica**,** Comissão de Valores Mobiliários (CVM) e J. P. Morgan.

Resultados: Constatou-se que as empresas brasileiras mais internacionalizadas tendem a ter uma maior NCG e utilizam o estoque como forma de proteção de possíveis imprevistos oriundos de processos de importação. Além disso, a internacionalização se mostra como uma forma de as empresas manterem seu nível de atividade em período de crise nacional.

Palavras-chave: capital de giro, internacionalização, crise, importação, GMM

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INTRODUCTION

The management of short-term resources, although already a consolidated theme in the literature, normally receives less attention from managers, with most studies based on long-term resources, such as investment decisions and the distribution of dividends to shareholders. Working capital planning is essential for the longevity of organizations and when poorly executed it can lead firms to bankruptcy (Smith, 1973; Seidel & Kume, 2003; Nazir & Afza, 2009).

In this sense, the management of these resources must be prioritized by managers so that the firm has the availability to fulfill its short-term obligations, which are essential for its operation and, at the same time, the firms must avoid the excess of this type of resource in order to take advantage of investment opportunities (Nazir & Afza, 2009; Gill, 2011). Furthermore, the management of these resources allows for a greater balance between liquidity and profitability in companies (Olangm & Graça, 2017).

The internationalization of firms, in turn, which is an emerging theme in the finance literature, allows the firms to reach new markets. Thus, this factor can be a source of competitive advantage, reducing dependence on the market of origin and increasing the profitability of the target firm in this process (Johanson & Vahlne, 1977; Wu et al., 2016). Based on the Uppsala Internationalization Model and Upstream-Downstream and Pecking Order theories, it is expected that there is a relationship between working capital requirement (WCR) and internationalization (Johanson & Wiedersheim-Paul, 1975; Myers & Majluf, 1984; Kwok & Reeb, 2000).

Furthermore, periods of economic crisis are characterized by fluctuations in demand and uncertainties regarding receivables, which requires even more caution on the part of managers in the administration of the firms' short-term resources. In this sense, it is expected that, during negative periods, firms reduce their WCR, due to the reduction in economic activities (Baños-Caballero et al., 2010; Wasiuzzaman & Arumugam, 2013; Moussa, 2019).

However, considering that internationalized firms have more diversified revenues and less dependence on the domestic market, it is expected that they will be able to mitigate the negative effect of periods of economic crisis on their WCR (Saito & Hiramoto, 2010; Wasiuzzaman & Arumugam, 2013; Ribeiro et al., 2017; Moussa, 2019). In this sense, this study presents the impact of the economic crisis on the WCR of firms in general and those that are internationalized, as well as the factors that influence the WCR of

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firms, thus contributing to the decision-making of managers regarding the management of the working capital, especially in the context of their internationalization.

Thus, based on the papers by Gill (2011), Pereira (2013), Wasiuzzaman and Arumugam (2013), and Moussa (2019) for the study design and econometric model, the following research problem arises:

- What is the moderating effect of periods of crisis on the relationship between internationalization and the WCR?

And the objective is to analyze the effect of the crisis on the relationship between internationalization and the WCR, in the period from 2010 to 2018, using publicly-traded Brazilian firms as a sample.

Few studies are investigating the relationship between both variables, especially in the context of the Brazilian stock market. In this sense, this paper differs from other studies, such as Rezende et al. (2014) and Moreira et al. (2018), by analyzing how periods of crisis can affect the relationship between internationalization and WCR and considering endogeneity through the generalized method of moments (GMM). Still, three internationalization proxies are used for robust results: imports, debt in foreign currency, and issuance of American Depositary Receipt (ADR). Furthermore, Rezende et al. (2014) and Moreira et al. (2018) found divergent results on the relationship between internationalization and the WCR. Thus, this research contributes by investigating a relationship that still lacks consensus in the national literature.

In addition, this study contributes to the advance of the field by investigating the influence of the period of economic crisis on the WCR of firms, considering that these periods are characterized by increasing uncertainties regarding, for example, demands from the consumer market, prices inputs, and the consolidation of company receivables (Wasiuzzaman & Arumugam, 2013; Tsuruta, 2019). The results show that more internationalized firms have higher WCRs and, also, that these firms tend to have advantages in times of crisis compared to those with lower levels of internationalization, thus managing to maintain their level of activity (Saito & Hiramoto, 2010).

These results help managers to make decisions about the internationalization, as well as to better plan the WCR during this process. Also, the results contribute to investors regarding the risk of assets in periods of crisis, as they indicate that more internationalized firms have an advantage in terms of activity level in relation to others during these periods. Finally, credit agencies can also use these results, considering the mentioned advantage.

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LITERATURE REVIEW

Working capital management

Regarding working capital models, the traditional ones stand out, such as the analysis of current, dry, or general liquidity ratios, and the dynamic ones, such as the WCR, treasury balance, and financial cycle. Wilhelm and Theiss Júnior (2007) performed a comparison between the two types of models and found that, when applied, both can improve the company's financial condition.

Thus, the dynamic working capital model is more efficient in management, as this model considers the aforementioned fluctuations, helping managers in decision making regarding sufficient resources to maintain or expand the company's activities according to the investment strategy and sales (Marques & Braga, 1995; Wilhelm & Theiss Júnior, 2007; Ambrozini et al., 2014).

In this sense, the WCR presents itself as a more optimized way of keeping the firm's business sustainable over time, since its analysis allows greater control of its current operating assets and liabilities accordingly to the risk sought by managers and their working capital strategy (aggressive or conservative). In addition, this indicator may reflect variations in stock, production terms, payment, receipt, and even economic activity levels (Fusco, 1996; Seidel & Kume, 2003; Ambrozini et al., 2014).

According to Nazir and Afza (2009), internal and external factors to the company affect the components that determine the company's WCR. In this sense, optimal levels of working capital lead firms to maintain or even gain competitiveness in the market against their competitors, as it will allow them to fulfill their short-term obligations and, in addition, take advantage of investment opportunities in permanent assets, for example, without having liquidity problems (Nazir & Afza, 2009; Gill, 2011).

Previous studies sought to identify the determinants of the WCR in organizations. Azeem and Marsap (2015), for example, using non-financial firms from Pakistan as a sample, found that the level of economic activity in the country (the gross domestic product – GDP – growth rate) is not related to WCR. And Gill (2011), in line with Azeem and Marsap (2015), found that the components that influence the firms' WCR change according to the industry's field of activity and the country where the firms are located.

Also seeking to identify the determinants of WCR, Wasiuzzaman and Arumugam (2013) found an inverse relationship between company size

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and WCR and that, in times of economic recession, firms have lower levels of working capital. As for Egyptian firms, Moussa (2019) points out that efficient working capital management promotes a greater generation of operating cash flows and, for this, lower levels of working capital and shorter cash conversion cycles would be needed.

In the national literature, Palombini and Nakamura (2012) analyzed Brazilian publicly-traded firms and observed that organizations with higher indebtedness levels tend to maintain lower working capital levels, confirming the pecking order theory and in line with Silva et al. (2019). Also, in the national context, Almeida and Eid Jr. (2014) state that changes in the working capital levels of firms are related to their market value, since this part of the asset is related to the company's operating activities.

Internationalization of firms

According to Kwok and Reeb (2000), due to the downstream effect, firms from more stable markets that internationalize to markets with less stability tend to increase their risk due to the insecurity generated by operating in a market with less stability, leading to higher chances of obtaining debts. Thus, the tendency is to reduce their indebtedness level. Emerging-market companies, according to the upstream effect, that internationalize to developed markets, that is, which have greater stability, tend to reduce business risk, given that these firms will not be totally dependent on the market of the country of origin (Kwok & Reeb, 2000).

The Upstream-Downstream theory was tested in Brazil by Saito and Hiramoto (2010), who, based on the results found, confirmed the applicability of the theory in the national context. Ribeiro et al. (2017) also tested the theory in the Brazilian context and pointed out that firms that have a greater degree of internationalization tend to have higher levels of indebtedness. In turn, Cardoso et al. (2018) indicate that the most internationalized Brazilian firms find it easier to increase their fundraising abroad.

According to the Uppsala Internationalization Model, before going international, firms seek to consolidate their business in the market of origin, getting to know it and gaining experience until realizing that the potential for business expansion in the current market is reaching the limit. In this sense, based on the Uppsala model, internationalization tends to occur after the company has sufficient internal resources to ensure the operationalization of this process, and it should occur gradually to adapt to the information flows of the new environment (Johanson & Wiedersheim-Paul, 1975; Johanson & Vahlne, 1977; Jain et al., 2019).

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Bonfim et al. (2018), based on the Uppsala theory, in the context of decision-making by managers regarding internationalization, highlight that tolerance to ambiguity does not show up significantly, which is an antecedent of the aforementioned risk. In turn, Hernandes Júnior et al. (2020) state that the impact of internationalization on profitability is variable due to the difficulties faced by new market entrants regarding the learning process and the costs involved.

The Pecking Order theory reinforces what is exposed by the Uppsala model, according to which firms tend to internationalize when they have their own resources, in order to provide more security to the internationalization process. Studies confirm the Pecking Order theory in the Brazilian context, such as those by Pamplona et al. (2020) and Oliveira and Kayo (2020).

Internationalization and working capital

Few studies analyze the relationship between internationalization and working capital, whether in the national or international context. The relationship between the two variables is based on the fact that more internationalized firms need more resources to maintain their activities abroad, such as an increase in accounts payable because they need a greater number of employees and the rent to maintain the facilities abroad (Johanson & Vahlne, 1977; Ribeiro et al., 2017).

These are some of the factors that make firms wait until they obtain a greater consolidation in the domestic market before going international (Johanson & Wiedersheim-Paul, 1975; Hernandes Júnior et al., 2020), deciding to use internal resources (Johanson & Vahlne, 1977; Myers & Majluf, 1984; Pamplona et al., 2020; Oliveira & Kayo, 2020). In addition, if necessary, obtaining credit from these firms may be more or less easy, considering the characteristics of the market of origin, the new market in which the company operates, and, also, its degree of internationalization (Myers & Majluf, 1984; Kwok & Reeb, 2000; Saito & Hiramoto, 2010; Ribeiro et al., 2017). However, the fact that a company is internationalized could increase its competitiveness and profitability (Wu et al., 2016). Thus, the degree of internationalization of firms would be related to their working capital.

Moreira et al. (2018), analyzing Brazilian multinational firms, found a statistically significant negative relationship between internationalization – as measured by the Degree of Internationalization (DOI) – and working capital – as measured by the cash conversion cycle. Also, according to the authors, the size of firms negatively affects the cash conversion cycle of publicly-traded Brazilian firms.

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Rezende et al. (2014) did not find a relationship between WCR and internationalization, demonstrating that there is still no clear consensus in the finance literature on the subject, which is considered recent. The authors also found a negative relationship between the WCR and the standard deviation of sales. Free cash flow and market to book presented a positive relationship with the variable.

In this sense, the Uppsala model and the Upstream-Downstream and Pecking Order theories indicate a relationship between internationalization and companies' working capital policies. Thus, from the literature review carried out, the following research hypothesis emerges:

- *Hypothesis 1*: There is a relationship between internationalization and the WCR of Brazilian firms.

In addition, this study will also seek to identify the moderating effect of periods of crisis on the relationship between internationalization and working capital.

The study by Tsuruta (2019) identified that, in Japanese firms in the study sample, the negative relationship between the WCR and performance was more significant in periods of crisis, this being an effect that stood out in larger firms. In line with these results, Enqvist et al. (2014) also identified that the impact of the business cycle on the relationship between working capital and performance is more evident in periods of crisis, considering a sample of firms in Finland.

International studies have shown that, in general, firms tend to reduce their productive activity in periods of crisis due to the decrease in demand and, consequently, the increase in uncertainty in the consolidation of company receivables (Baños-Caballero et al., 2010; Wasiuzzaman & Arumugam, 2013), contributing to a decrease in the WCR of firms in these periods.

In this sense, according to the Upstream theory, firms that internationalize to more stable markets tend to present a lower risk and a lower dependence on the domestic market (Kwok & Reeb, 2000; Jain et al., 2019), having, thus, more diversified recipes (Kwok & Reeb, 2000; Saito & Hiramoto, 2010). Due to these factors, it is expected that, in periods of crisis, more internationalized companies will tend to have a higher WCR compared to firms that have lower levels of internationalization. This relationship is also expected because the profitability of activities abroad can offset the drop in profitability in the domestic market – on which the internationalized firms have less dependence – during periods of instability, besides the possible benefits previously mentioned from the internationalization process (Kwok & Reeb, 2000; Saito & Hiramoto, 2010; Cardoso et al., 2018; Jain et al., 2019).

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- *Hypothesis 2*: The crisis variable moderates the relationship between internationalization and WCR with a positive effect.

METHODOLOGY

Data and sample

To achieve the general objective of the research, which was to analyze the relationship between internationalization and the WCR in national firms in the period from 2010 to 2018, information was collected from the Economatica database to obtain the economic and financial data of the firms. Data referring to the issuance of ADR were collected in the following databases: Economatica, Securities and Exchange Commission (Comissão de Valores Mobiliários – CVM), and J. P. Morgan.

For the composition of the sample, financial firms were excluded because they have specific characteristics that could affect the research results. After the mentioned procedure, the sample consisted of 387 publicly-traded Brazilian firms, including those that were canceled or suspended by the CVM decision. The target period of the analysis was from 2010 to 2018. It was chosen due to the change in Brazilian accounting legislation that occurred in 2009 through Law no. 11,941, which sought to adapt Brazilian accounting standards to international ones.

Study variables

The dependent variable of the research is the WCR, which is calculated by the sum of short-term resources (cash and equivalents, inventories, and accounts receivable) subtracted from the sum of short-term obligations (accounts payable and other accounts payable), and the resulting amount is divided by the total assets so that the variable is standardized according to the size of the firm (Gill, 2011; Wasiuzzaman & Arumugam, 2013).

Regarding the variables of interest, three internationalization proxies were used for this research: import – IMP (Santos, 2016; Costa et al., 2017); debt in foreign currency – DIVE (Santos et al., 2015; Duarte et al., 2019); and issuance of ADR (Santos et al., 2017; Duarte et al., 2019).

Table 1 presents a description of the other variables used in the econometric model.

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Table 1

Variables of the econometric model

Variable	Initials	Calculation	Expected signal	Authors
Dependent variable				
Working capital requirement	WCR	[(Cash and cash equivalents + Inventories + Accounts receivable) - (Accounts payable + Other accounts payable)] / Total assets		Gill (2011) and Wasiuzzaman and Arumugam (2013)
Variables of interest				
Import	IMP	Foreign suppliers / Total suppliers	-	Gill (2011) and Santos (2016)
Debt in foreign currency	DIVE	Short and long-term debt in foreign currency / Total liabilities	-	Saito and Hiramoto (2010), Pereira (2013), and Santos (2016)
American Depositary Receipt issuing firms	ADR	Dummy: 1 for firms that issue ADR	+	Souza et al. (2011)
Crisis period	Crise	Dummy: 1 for crisis years	-	Baños-Caballero et al. (2010) and Wasiuzzaman and Arumugam (2013)
Control variables				
Size	TAM	ln (Total assets)	-	Gill (2011) and Moussa (2019)
Leverage	ALAV	Gross debt / Total assets	-	Gill (2011) and Palombini and Nakamura (2012)
Tobin's Q	QTB	(Gross debt + Equity) / Total assets	+	Gill (2011) and Moussa (2019)
Company age	IDC	ln (Age of the company)	-	Wasiuzzaman and Arumugam (2013)
Operating cycle	COP	Economatica (days)	+	Azeem and Marsap (2015)
Growth	CRES	$(Sales_{t} - Sales_{t-1}) / Sales_{t-1}$	-	Azeem and Marsap (2015) and Moussa (2019)
Return on assets	ROA	Net income / Total assets	+	Gill (2011) and Azeem and Marsap (2015)

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Table 1 (conclusion)

Variables of the econometric model

Variable	Initials	Calculation	Expected signal	Authors
Industrial sector	IND	Dummy: 1 for industry	+	Gill (2011), Palombini and Nakamura (2012), and Moussa (2019)
Commercial sector	COM	Dummy: 1 for commerce	+	Palombini e Nakamura (2012)

Source: Elaborated by the authors.

The crisis variable consists of a dummy in which 1 was assigned for periods of crisis and 0, for periods of non-crisis. The years 2015 and 2016 were considered periods of crisis, as these were the years with the greatest contraction of Brazilian economic activity within the period analyzed by the survey, with a drop in GDP of 3.6 % and 3.4%, respectively. In addition, consumption and investment in 2015 and 2016 were strongly negative, unlike what happened in the other years analyzed in the survey. Furthermore, supply shocks only occurred at the end of 2014 and, in 2017, the economy was already starting to recover (Amorim Neto, 2016; Barbosa Filho, 2017; World Bank, 2019; Franzotti & Valle, 2020). Amorim Neto (2016) and World Bank (2019) emphasize that the years 2015 and 2016 were characterized by presenting a deep political and economic crisis.

Method

To verify the presence of autocorrelation, the Woodridge test was performed. The Wald test was performed to verify the presence of heteroscedasticity. To treat the outliers in the sample, the winsorinzing technique was used at a level of 5% (Stock & Watson, 2003; Fávero et al., 2009).

For the analysis, a multiple linear regression with panel data was used as a statistical method, as suggested by Wooldrigde (2010) and Baltagi et al. (2005). The Stata software was used to estimate the coefficients using the systemic GMM. The Arellano-Bond tests – AR (1) and AR (2) – for serial correlation of first and second orders and the Sargan test for overidentification were also performed.

Baños-Caballero et al. (2010) and Moussa (2019) state that, when working capital is analyzed concomitantly with variables related to sales and

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firm performance, endogenous associations occur. Thus, the GMM was used because working capital is associated with some control variables (intrinsic to firms) used, such as growth and return on assets (ROA), since these associations are sources of endogeneity.

In this sense, Barros et al. (2020) state that the estimation of models with endogenous regressors can result in wrong inferences, considering that there can be a bias in the estimators that ignore this problem or make them inconsistent. And, in theory, one of the ways of solving endogeneity would be to find, for each of the suspected endogeneity regressors, strictly exogenous variables. These variables are also called instrumental variables and, in practice, variables with these characteristics that still have a high correlation with the regressors are hardly found in studies in the area of corporate finance (Cameron & Trivedi, 2005; Barros et al., 2020).

According to Roodman (2009) and Barros et al. (2020), an efficient and effective alternative to mitigate or even eliminate the endogenous problems in the area of corporate finance is the use of estimators based on the GMM applied to panel data. This occurs through the assumption of sequential exogeneity of the regressors, even though there are no good instruments that are exogenous to the model.

Based on the use of the GMM, three econometric models were used, so that, in all of them, the WCR is the dependent variable. Thus, we decided to include the IMP, DIVE and ADR variables individually in each of these models, since these three variables were used as proxies for the internationalization of firms. And, also, in the three models, the dummy variable for crisis was included, as well as its interaction with each internationalization proxy. The econometric models used are presented below, in which i represents the firm; t, the year; β_0, the intercept; and ε, the error.

$$WCR_{it} = \beta_0 + \beta_1(IMP_{it}) + \beta_2(Crise_t) + \beta_3(IMP_{it}\ x\ Crise_{it}) + \beta_4(ALAV_{it}) + \beta_5(\mathrm{QTB}_{it}) + \beta_6(IDC_{it}) + \beta_7(COP_{it}) + \beta_8(CRES_{it}) + \beta_9(ROA_{it}) + \beta_{10}(COM_i) + \beta_{11}(IND_i) + \varepsilon_{it} \quad \text{(Model 1)}$$

$$WCR_{it} = \beta_0 + \beta_1(DIVE_{it} + \beta_2(Crise_t) + \beta_3(DIVE_{it}\ x\ Crise_{it}) + \beta_4(ALAV_{it}) + \beta_5(\mathrm{QTB}_{it}) + \beta_6(IDC_{it}) + \beta_7(COP_{it}) + \beta_8(CRES_{it}) + \beta_9(ROA_{it}) + \beta_{10}(COM_i) + \beta_{11}(IND_i) + \varepsilon_{it} \quad \text{(Model 2)}$$

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$$WCR_{it} = \beta_0 + \beta_1(ADR_{it}) + \beta_2(Crise_t) + \beta_3(ADR_{it}\ x\ Crise_{it}) + \beta_4(ALAV_{it}) + \beta_5(\mathrm{QTB}_{it}) + \beta_6(IDC_{it}) + \beta_7(COP_{it}) + \beta_8(CRES_{it}) + \beta_9(ROA_{it}) + \beta_{10}(COM_i) + \beta_{11}(IND_i) + \varepsilon_{it} \quad \text{(Model 3)}$$

ANALYSIS OF RESULTS

Descriptive statistics of variables

Table 2 presents the descriptive statistics of the variables used in the model after the treatment of outliers. According to this table, it is observed that the variable WCR, which is the dependent of the study, presents 4,465 observations. Regarding the variables of interest, it is possible to notice that there was an increase in firms that issue ADR, since the average of this variable is higher when compared to the average found by Santos et al. (2015).

Table 2

Descriptive statistics of study variables

Variable	Observations	Mean	Standard deviation	Minimum	Maximum
WCR	4,465	0.01	0.45	-1.43	10.01
IMP	3,277	0.04	0.09	0	0.36
DIVE	2,692	0.15	0.46	0	1.97
IDC	4,625	2.68	0.69	1.10	3.47
CRES	4,313	0.02	0.21	-0.41	0.51
COP	3,736	137.14	181.78	-5,871.06	620.45
TAM	4,478	13.78	2.60	6.96	17.37
ALAV	4,475	0.30	0.25	-0.00	0.85
QTB	4,475	0.57	0.52	-1.27	1.06
ROA	4,062	-0.03	0.2	-0.81	0.18
ADR	919	0.90	0.29	0	1

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Table 2 (conclusion)

Descriptive statistics of study variables

Variable	Observations	Mean	Standard deviation	Minimum	Maximum
Crise	7,164	0.22	0.42	0	1
IND	7,164	0.26	0.44	0	1
COM	7,164	0.05	0.21	0	1

Source: Elaborated by the authors.

It was also possible to observe a DIVE increase in Brazilian firms, considering the average of this variable in relation to what was observed by Santos (2016). Imports, however, had a lower average when compared to that found by Santos (2016), indicating a reduction in imports by Brazilian firms. In addition, the average of the COP) variable indicates the time between the purchase of raw material and the receipt of sales by Brazilian firms, which is approximately 137 days.

Analysis of correlation between variables

Table 3 presents the Spearman correlation matrix between the study variables. This correlation technique was used, as it was found, through the histogram analysis, that the variables do not present a normal distribution. In this sense, it is observed that the dependent variable WCR showed a significant correlation at 5% with the three dependent variables that are proxies for internationalization, confirming the first hypothesis. In addition, IMP showed a positive correlation with the WCR.

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Table 3

Correlation matrix between variables

	WCR	IMP	DIVE	ADR	Crise	IDC	CRES	COP	TAM	ALAV	QTB	ROA	IND	COM
WCR	1													
IMP	0.1474*	1												
DIVE	0.0857*	0.2240*	1											
ADR	-0.0717*	0.0949*	0.1508*	1										
Crise	-0,025	-0,0004	0,0074	0,0386	1									
IDC	-0.2002*	0.0823*	-0,0298	0.1822*	0.0678*	1								
CRES	0.0534*	0,0126	0.0591*	-0.1182*	-0.2024*	-0.1532*	1							
COP	0.1479*	0.0790*	-0,0355	0,0613	-0,0263	0,0148	-0.0929*	1						
TAM	0.2078*	0.0924*	0.2747*	0.2593*	-0,0107	-0.1495*	0.1248*	-0,0223	1					
ALAV	-0,1173	0,0067	0.1285*	0,0658	0.0418*	0,0121	0,0229	-0,1114	0.2606*	1				
QTB	0.7996*	0.0579*	0.0941*	0,0039	-0,0085	-0.2121*	0.0998*	-0,0897	0.3651*	0,0154	1			
ROA	.3320*	0,0347	0.0914*	0,0594	-0.0546*	-0.0406*	0.1396*	-0,0621	0.5541*	0.0841*	0.4982*	1		
IND	-0,015	0.4427*	0.1204*	0,0384	0.0000	0.3057*	-0.0519*	0.1231*	0,0043	0,0171	-0.1062*	0,027	1	
COM	0,0284	-0.0694*	-0,0164	-0.1617*	0.0000	-0.0334*	0,0268	-0,0098	0.0346*	-0,0137	-0.0597*	0,012	-0.1332*	1

Source: Elaborated by the authors.

* significance at a 5% level.

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The variable DIVE also showed a positive correlation with the WCR. However, although the issuance of ADR has presented a weaker correlation with it than the other proxies for internationalization, it presented a negative correlation with the dependent variable. The crisis variable, which is also of interest to this study, did not show a statistically significant correlation with the WCR, although it was expected that firms would reduce their WCR, due to the tendency to reduce economic activities.

Analysis of regression models

The variance inflation factor (VIF) test was performed to verify the presence of multicollinearity between the model variables, and it was found that the models do not present this problem. To verify the presence of autocorrelation, the Wooldridge test was performed, which indicated that there is autocorrelation in models 1 and 3, and the Wald test indicated that there is heteroscedasticity in three models, both problems having been solved by using the GMM.

In Table 4, it can be seen that the IMP variable, which is used as a proxy for internationalization, showed a positive relationship with the WCR of Brazilian firms. This result is statistically significant at a 1% level and indicates that firms that matter more tend to have higher levels of WCR. The relationship between the variable DIVE and WCR was also positive, being statistically significant at a 1% level, indicating that firms with higher levels of debt in foreign currency tend to have higher levels of WCR.

Table 4

GMM model results

Model	1	2	3
Y	WCR	WCR	WCR
IMP	0.1840***		
	(7.54)		
IMP x Crise	0.0914**		
	(2.56)		
DIVE		0.0148***	
		(3.15)	

(continue)

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Table 4 (continuation)

GMM model results

Model	1	2	3
Y	WCR	WCR	WCR
DIVE x Crise		0.0366***	
		(5.04)	
ADR			-0.0068
			(-1.61)
ADR x Crise			-0.0166**
			(-2.28)
Crise	-0.0132***	-0.0186***	-0.0044
	(-2.99)	(-3.96)	(-1.08)
IDC	0.0049	0.0077**	-0.0004
	(1.51)	(2.23)	(-0.14)
CRES	-0.0454***	0.0153	-0.0212***
	(-5.04)	(1.53)	(-2.68)
COP	0.0000***	0.0006***	0.0001***
	(3.57)	(31.12)	(6.44)
TAM	-0.0187***	-0.0172***	-0.0106***
	(-14.71)	(-11.89)	(-8.65)
ALAV	-0.0475***	-0.1589***	-0.0337**
	(-3.20)	(-9.98)	(-2.36)
QTB	0.7713***	0.6467***	0.7809***
	(108.78)	(81.84)	(115.98)
ROA	0.1055***	-0.0673***	-0.0181
	(6.06)	(-3.51)	(-1.12)
IND (dummy)	0.0412***	0.0271***	0.0773***
	(8.36)	(6.04)	(22.78)
COM (dummy)	0.1096***	0.0936***	0.1177***
	(16.84)	(12.34)	(21.14)

(continue)

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Table 4 (conclusion)

GMM model results

Model	1	2	3
Y	WCR	WCR	WCR
Constant	-0.1468***	-0.1349***	-0.2652***
	(-7.74)	(-6.09)	(-15.18)
N	1,832	1,337	2,359
VIF	1.35	1.30	1.36
Woodridge	0.000	0.087	0.000
Wald	0.000	0.000	0.000
AR (1)	0.000	0.000	0.000
AR (2)	0.929	0.203	0.259
Sargan	0.339	0.415	0.378

Source: Elaborated by the authors.

*, **, and *** indicate significance level at 10%, 5%, and 1%, respectively.

Thus, according to the results, the more internationalized a company is, based on the IMP and DIVE proxies, the greater its WCR is. Thus, H1 is partially confirmed, since the DIVE did not show statistical significance. The positive relationship is justified by the Uppsala theory, according to which firms seek to consolidate themselves in the domestic market and increase the availability of internal resources, which, according to the Pecking Order theory, will be primarily used for the process of internationalization, thus increasing its WCR (Johanson & Vahlne, 1977; Myers & Majluf, 1984; Jain et al., 2019; Pamplona et al., 2020). This corroborates the results found by Moreira et al. (2018) and diverges from those observed by Rezende et al. (2014), who did not find statistical significance in the relationship between the variables.

Specifically considering the IMP variable, the expected relationship with the WCR would be negative, since this account belongs to current liabilities. However, the result pointed to a positive relationship. A possible explanation for this is that firms use the stock as a form of protection against possible unforeseen events in the delivery of imported products, considering that the delivery time for international products is longer for and, still, the excess of national bureaucracy for imports is also a factor that increases uncertainty about the delivery time, as pointed out by Furlan and Pinto (2014).

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The crisis variable, which represents the period of economic crisis in the country, showed a negative and significant relationship at a level of 1% with the WCR in models 1 and 2, as expected. This relationship occurs since, in general, firms tend to reduce their activities in these periods, due to the decrease in demand for certain types of products and the uncertainty in the consolidation of receivables. These results are in accordance with Baños-Caballero et al. (2010) and Wasiuzzaman and Arumugam (2013) and in disagreement with Azeem and Marsap (2015), who found no relationship between WCR and the level of economic activity.

Through the interaction between the crisis and DIVE variables (model 2), it is observed that the relationship became positive, as well as to the interaction between the crisis and IMP variables. The positive relationship between the interactive variables and the WCR indicates that more internationalized firms tend to maintain their level of activity in periods of national economic crisis, standing out from the rest. This result can be justified by the upstream theory, proposed by Kwok and Reeb (2000), according to which firms that internationalize to more stable markets tend to reduce their risk, as they are less dependent on the domestic market and, therefore, manage to maintain their level of activity in periods of crisis.

Still in relation to the interactive variables, considering that more internationalized firms tend to have more diversified sources of income, as they operate in other markets, the impact of the crisis on these firms tends to be smaller. In addition, the access to financing sources tends to be facilitated for more internationalized firms (Kwok & Reeb, 2000; Saito & Hiramoto, 2010), so that increasing their debt in foreign currency can be a way to invest in their external activities and direct its efforts to increase revenues in markets that are not in crisis and, thus, offset possible declines in profitability in the domestic market and increase its WCR. Considering this context, the company would opt for external fundraising (DIVE), contradicting the Pecking Order theory (Myers & Majluf, 1984).

This increase in indebtedness may also be related to the ease of firms that internationalize to less risky countries to obtain credit, as predicted by the upstream theory (Kwok & Reeb, 2000), corroborating Ribeiro et al. (2017) and Cardoso et al. (2018). In addition, the import of inputs can also help the firm to maintain its activities in periods of crisis (Model 1), given that these inputs can have better quality or a higher cost-benefit ratio for the final product when compared to national ones, which represents a competitive advantage for the company.

In this sense, although the literature recommends a more conservative working capital management for periods of crisis, with debt reduction, in

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order to maintain liquidity (Scholleova, 2012; Ramiah et al., 2014), its increase for more firms' internationalization can be a form of strategy in periods of internal crisis, considering that these resources are applied to the external market – debt in foreign currency –, which is not going through a period of economic crisis. Furthermore, when analyzing the crisis and ADR variables together (Model 3), it is observed that there was a negative relationship with WCR, indicating that the fact that a firm issues ADR does not help the company to maintain its level of activity during periods of crisis, differently from the results when the period of crisis is analyzed with the IMP and Dive variables.

Thus, more internationalized firms tend to have a higher WCR, based on the import and debt proxies in foreign currency, so that these firms tend to be less affected by crises regarding WCR, compensating for the downturn of the national economy with its activities in the foreign market. Also, the second hypothesis of the study is partially confirmed, since it establishes a positive relationship between the interactive variables and the WCR, and, in Model 3, the relationship was negative.

Regarding the control variables, IDC had a positive relationship with WCR. This relationship was significant at a 5% level, indicating that firms that have been in the market the longest tend to have higher WCR levels. This positive relationship can be explained because these firms tend to retain more capital as their growth opportunities are reduced in probabilistic terms and they have easier access to the capital market compared to the younger ones, as assured by Wasiuzzaman and Arumugam (2013) and Moussa (2019).

The result for the CRES variable was aligned with the study by Palombini and Nakamura (2012), given the indication that firms with low sales growth have a greater tendency to use their working capital, possibly by resorting to internal sources of financing, as per the Pecking Order theory. In addition, as they are using internal resources to finance themselves, the number of resources available to invest in increased sales decreases, which may affect this indicator.

In turn, COP presented a positive and significant relationship at 1% with the WCR, converging with the results found by Gill (2011) and Azeem and Marsap (2015). These results indicate that one of the ways a company can reduce its working capital levels is by reducing the number of days in its operating cycle, that is, the time between the purchase of goods and receipt of sales.

The size variable presented a negative and significant relationship at a 1% level with the WCR in the three models analyzed. This relationship can

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be explained as larger firms tend to have greater bargaining power with their suppliers their customers in relation to terms and conditions of payment or receipt, for example. In addition, larger firms tend to have more consolidated processes, with fewer flaws in them, as well as tend to be more diversified and have easier access to the capital market (Wasiuzzaman & Arumugam, 2013; Silva et al., 2019).

The result found for the size variable is in accordance with those observed by Wasiuzzaman and Arumugam (2013) and Moussa (2019). It may also indicate that smaller firms tend to follow WCR-related operational strategies more closely, as they would have fewer financing alternatives (Hill et al., 2010) and, therefore, these firms would prioritize the use of financing sources, thus confirming the Pecking Order theory.

The ALAV variable had a negative relationship with the WCR. The result indicates that more indebted firms require lower levels of working capital, as they will seek external resources to maintain their operations and will tend to pay more interest, which reduces their availability. This result is also in line with the Pecking Order theory, since, according to the results, more leveraged Brazilian firms tend to have more restricted working capital policies, as asserted by Palombini and Nakamura (2012) and Moussa (2019).

QTB variable, which represents the company's value, showed a positive relationship with the WCR of Brazilian firms, a significant result at 1%. This result indicates that higher levels of working capital generate positive expectations for investors, as they may express a potential for expansion of the company's business and the ability to finance its short-term obligations (Nazir & Afza, 2009; Moussa, 2019).

It is also possible to observe, based on Model 1, that ROA positively affects WCR, indicating that firms that obtain higher profits are less concerned with remaining at the optimal level of working capital, given that they have enough short-term resources to execute their investment projects, due to their high-profit rates, and, as a result, they have higher levels of working capital. This result is consistent with those found by Gill (2011) and Moussa (2019), but it is at odds with those observed by Azeem and Marsap (2015).

Model 2, in turn, presented a negative relationship between ROA and WCR. Previous studies indicate that high-performance firms maintain low levels of working capital (Moussa, 2019). In some cases, the fact that firms have high levels of working capital can cause a high opportunity cost and costs of this type of financing can also be high, and these aspects can affect the performance of firms (Baños-Caballero et al., 2014).

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Regarding the dummy variables for the sector, both presented statistical significance at 1% and a positive sign in the three models. This result may indicate that the company's sector of activity affects its WCR (Kieschnick et al., 2006; Nazir & Afza, 2009), as well as its practices in relation to WCR management (Moussa, 2019). The ADR internationalization proxy, however, did not show statistical significance.

FINAL REMARKS

This study aimed to analyze the relationship between internationalization and firms' WCR. Therefore, the GMM method was used and we observed more internationalized firms, based on the import and debt proxies in foreign currency, tend to have higher WCRs. This partially confirms the first hypothesis that there is a relationship between the variables, since the ADR will not present significant statistics. Besides, it was found that publicly-traded Brazilian firms use inventory as a way to ensure that unforeseen events and delays in the delivery of imported products/inputs do not affect their production line.

We also found that, in a period of crisis, Brazilian firms reduce their WCR, due to the decrease in their activities, as a response to contracting economic activities. However, the results show that more internationalized firms, still based on both internationalization proxies, tend to stand out and maintain their level of activity in periods of crisis, confirming the second hypothesis, which indicates a positive relationship between the moderating effect of the crisis and WCR, since the results indicated that the ADR variable does not help firms to maintain their activities during periods of time.

Thus, it is possible to note that the internationalization of firms, in addition to potentially increasing the company's revenues by reaching new markets, can also be a form of protection for firms in periods of internal crisis. In this sense, managers can use internationalization as a strategic form. However, this process has an impact on the company's WCR and should be done with caution and planning. Therefore, internationalization presents itself as a competitive advantage in periods of crisis and as an opportunity for firms to stand out from the rest and strengthen themselves during these periods.

The study contributes to the literature because the relationship between internationalization and working capital has been little explored in research, especially in the national context. It also uses three internationalization

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proxies and addresses the impact of the crisis on the WCR of Brazilian publicly-traded firms and the differentiation of internationalized firms in this regard. Furthermore, the results help managers to present how internationalization and corporate variables can impact the WCR of firms, allowing for planning in this aspect. Besides, the results contribute to investors by pointing to an advantage of more internationalized firms during periods of crisis, thus, allowing an allocation of resources more in line with their profile.

The limitations of the study are the amount of values absent from the sample due to the internationalization proxies used and the non-use of other proxies for working capital management, such as the cash conversion cycle and the average payment and receipt terms. In future research, the study could analyze other countries, carrying out a comparison between them regarding the WCR. Also, the analysis we did could be carried out with financial firms that were not covered by this paper, as well as the analysis of the structures of corporate governance mechanisms as a moderating effect on the relationship between internationalization and WCR.

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