Intangible assets and business performance in Latin America

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Abstract

Purpose – The intangible assets of a company have been presented by national and international surveys as a resource to influence the creation of value and the increase in organizational performance. In view of this, this study aims to analyze the relationship between intangibility and the performance of companies in Latin America.

Design/methodology/approach – For this purpose, multiple regression with panel data was used and three perspectives for measuring intangible resources were defined: representativeness of the intangible asset, accounting measure for measuring the intangible, degree of intangibility and Tobin' Q, the latter two representing economic and financial measures to determine intangibility. The study covered the period from 2011 to 2017 with a sample of 1,236 publicly traded companies located in some Latin American countries, namely, Argentina, Brazil, Chile, Colombia, Mexico and Peru.

Findings – The results demonstrated the existence of a significant and positive relationship between the variables of intangibility, degree of intangibility and Tobin's Q, and the performance variables, return on assets, operating margin and asset turnover, reinforcing the study hypothesis that the greater the investment in intangible resource, the greater the company's performance.

Research limitations/implications – The limitations of this study involve the lack of complete information about intangible resources in the financial statements of some companies and some countries, making it hard to analyze the proposed relationship more broadly and accurately. Another limitation involves the causal relationship that may have existed between the regressors of the models defined in the study and their error, thus generating an endogeneity problem in the proposed models. It is recommended for future research to use specific methods to mitigate possible problems of endogeneity in regressions.

Practical implications – Mainly the possibility of deepening the relationship between intangibility and business performance, thus obtaining new knowledge through the reflexes of this relationship on companies in Latin American countries, finding more consistent results.

Social implications – The study contributes to the decision-making process in the business world by informing the primary users of accounting information such as investors, administrators, accountants, regulators and creditors.

Originality/value – This research contributes by addressing a theme whose studies present many gaps, making it possible to deepen the relationship between intangibility and business performance and gain new knowledge through the reflexes of this relationship on companies in Latin American countries.

Keywords Latin America, Business performance, Intangible assets, América Latina, Ativos Intangíveis, Desempenho Empresarial

Paper type Research paper

Introduction

Better results regarding organizational performance are associated with technical evolution, innovation and the quality of human, structural and relational factors. In turn, these factors are strongly influenced by investment in education, research and development – in short, knowledge and intellectual capital management (Moura, Theiss, & Cunha, 2014; Moura & Varela, 2014; Gogan, Artene, Sarca, & Draghici, 2016; and Xu & Wang, 2018).

Intellectual capital, brand value and investment in research and development are related to intangible assets. For example, Decker, Ensslin, Reina and Reina (2013), Mazzioni, Rigo, Klann and da Silva Junior (2014), Dallabona, Mazzioni and Klann (2015), Cucculetti and Bettinelli (2015), Perez and Famá (2015), Ritta, Cunha and Klann (2017), Vasconcelos, Forte and Basso (2019), all highlighted the importance of intangible assets, the increase in their representativeness on companies' equity and their influence on business value, directly affecting the profitability of firms. For instance, studies involving Latin American countries have revealed that intangible assets play a significant and predominant role in business performance (Jardón & Susana Martos, 2009; Andonova & Ruíz-Pava, 2016; Sprenger, Silvestre, Brunozi Júnior, & Kronbauer, 2017; Ibarra Cisneros & Hernandez-Perlines, 2018).

Even though the studies mentioned above have highlighted the influence of intangibility on the performance of organizations, there are contradictory empirical results. For example, Nascimento, Marques, Oliveira and Cunha (2012), Kreuzberg, Rigo and Klann (2013), Miranda, de Vasconcelos, da Silva Filho, dos Santos and Maia (2013), Luca, Maia, Cardoso, Vasconcelos and Cunha (2014), Vogt, Kreuzberg, Degenhart, Rodrigues and Biavatti (2016) and Ritta *et al.* (2017) did not find that greater intangibility is related to greater profitability of companies.

Another recurring debate is the way intangibility is measured. Brazilian and international studies have addressed different proxies that define the intangible resources observed in large corporations. Our research used the market capitalization method, which presents an economic-financial view for calculating intangible resources by focusing on the value of the business market, measured by the degree of intangibility (DI) and Tobin's Q (Tobin). Also, our study used the intellectual capital direct method, which measures the representativeness of intangibles by observing the records of these assets in the companies' financial accounts.

Regarding the performance of organizations, this research used ROA (*return on assets*) as the main variable. Nissim and Penman (2001) state that the ROA variable is made of two components that have different properties in a time series: the operating margin (OM) and the asset turnover (AT). Therefore, OM and AT were adopted here as companies' performance variables to increase the robustness of the results.

According to the literature, the effects of intangible assets on business performance are not conclusive. Therefore, this research seeks to answer the following problem:

Q1. What is the influence of the intangibility of public Latin American companies on their performance?

The study seeks to pursue two objectives empirically:

- to propose three perspectives for measuring intangible resources portrayed in the literature, but not previously studied together: representativeness of the intangible asset, DIA and Tobin and
- to analyze the relationship between intangibility and performance in Latin American countries.

The following criteria were used to select the Latin American countries that make up the sample:

- the country has companies whose data is available on Economatica® in the period from 2011 to 2017 and
- the country has adhered to the presentation of financial information following the international financial reporting standards (IFRS) in the selected period.

Therefore, the importance of this study lies in:

- addressing a theme that has gaps in the literature,
- contributing to deepening the investigations about the relationship between intangibility and business performance,
- obtaining new knowledge by understanding the effects of this relationship on companies in Latin American countries,
- finding more consistent results and
- contributing to the decision-making process in the business world by informing the primary users of accounting information such as investors, managers, accountants, regulators and creditors.

Theoretical framework
Intangible assets
In the 1970s, according to Schnorrenberger (2005), the market, in general, started to demand more from companies, which until then had settled in offering suitable products and services. However, from that decade onwards, the high competitiveness, the unstable market, the volatility of capital, the involvement of stakeholders and the advent of public policies to regulate the market have put considerable pressure on companies seeking competitive advantage (Schnorrenberger, 2005). For Nascimento *et al.* (2012), the search for differentiation in the face of such competition had managers include intangible resources' management in their strategic organizational planning.

Santos (2015) states that intangible heritage – knowledge and information – for modern companies have been considered critical in the composition of assets and the long-term strategic development when economically contributing to the organization. The criticality of intangible resources is also described by Kayo, Kimura, Martin and Nakamura (2006b) when reporting that such resources are valuable, rare, inimitable and irreplaceable; therefore, if institutions take advantage of such resources, they can generate exceptional profits, resulting in the creation of organizational value. Consequently, proper management of the intangible becomes essential, as it is responsible for increasing shareholders' wealth and obtaining competitive advantages for corporations, shielding them from competitive threats (Teh, Kayo, & Kimura, 2008).

Lev (2001) and Upton (2001) define intangible assets as those with no physical or financial body, but that provide future benefits for the company. The definition of intangible assets for Kayo (2002) focuses on a structured set of knowledge, practices and attitudes of the organization that, combined with tangible assets, will help create value for the company. Finally, Perez and Famá (2006) reasserted the production of future benefits from intangible assets and exemplified some of these resources: patents, franchises, brands, goodwill, copyrights, secret processes, licenses, developed software, databases, public concessions, exploration and operation rights, customer portfolio.

The international accounting standards board (IASB) – which is responsible for international accounting standards, through the international accounting standard (IAS) number 38 and, in Brazil, through the Technical Pronouncement CPC 04 – recognizes intangible assets as a resource that is non-monetary, identifiable and with no physical substance. According to Technical Pronouncement CPC 04, identifying an intangible asset follows two criteria: separable resource, which can be sold, transferred, licensed, rented or exchanged and resource arising from contractual rights or other legal rights.

Measurement of intangible assets
According to Kayo (2002), the value of intangible assets is associated with their potential to act as a management tool and increase companies' results. Thus, they enable companies to create value and increase profitability (Belém & Marques, 2012; Ventura, Pacheco, & Rover, 2019).

Studies on intangible assets have suggested ways of measuring intangible resources based on internal and external organizational aspects. Luthy (1998) established these measurement models, later complemented by Sveiby (2010), establishing the four major categories described below.

The first category is the *market capitalization methods*. This category will compose the measurement models based on calculating the difference between market value and organizational book value. This study addresses two perspectives for intangibles assets measurement categorized in Luthy's method: DI or book-to-market and Tobin.

The second category is the *return on assets method* (ROA). This measurement is determined by calculating pre-tax profits in relation to organizational tangible assets, resulting in a ROA value to be compared to the industry average. The difference found is multiplied by the tangible assets, resulting in the company's average annual gain of intangibles. By dividing the capitalization of the above-average industry by the company's average cost, one can obtain an estimate of the company's intangible assets or intellectual capital.

The third category is the *direct intellectual capital method*. This calculation seeks to estimate the value of intangible resources by identifying their various components, which allows the direct evaluation of intangibles, both individually or jointly, as a coefficient. This study will incorporate this perspective of measurement of intangible resources defined by the representativeness of intangible assets (RIA), which is part of Luthy's method.

The fourth and final category is the *scorecard method*. This method identifies the various components of intangible assets that will form indicators and indexes displayed in the form of scorecards.

Given the methods presented, the discussion below deals with the three perspectives for the measurement of intangible resources.

The first perspective is the ratio of intangible assets to the total assets of a company, also referred to as *representativeness of the intangible*. Studies by Moura *et al.* (2014), Luca *et al.* (2014) and Ritta *et al.* (2017) suggested the measurement of intangible resources under this aspect. Considered an innovative model for calculating intangibles, this perspective aimed to identify the representativeness of intangibles in companies in relation to their total assets. It represents an accounting view of the calculation of intangibles by means of the records of intangible assets in companies' financial statements.

The second perspective is the DI (or book-to-market), which has also been widely used in previous studies. Authors such as Kayo (2002), Perez and Famá (2006), Ritta and Ensslin (2010), Nascimento *et al.* (2012) and Santos (2015) used this metric based on the quotient

between a company's market value and equity. According to the authors, the greater the DI found, the greater the participation of intangible resources in the organization structure. This method is based on market capitalization, as it reflects the difference between the amount paid by the market per share and its par value (Santos, 2015). Characterized by an economic-financial view, this metric deems intangible resources responsible for generating future benefits (Lev, 2001).

Finally, the third perspective of intangibility addressed in this study is Tobin's Q metric. According to Famá and Barros (2000), Tobin's Q can be used:

- as a parameter for new investment opportunities;
- as the company's value in the performance conception; and
- as a dependent variable representing the company's value when investigating a causal relationship with others variables.

As it involves market value in its metrics, Tobin's Q is a measure of organizational intangibility also based on market capitalization, reflecting an economic-financial calculation view (Villalonga, 2004). In line with the model proposed by Villalonga (2004) and Carvalho, Kayo and Martin (2010), our study used the approximate Tobin's Q calculation made by Chung and Pruitt (1994), measured by the sum of market values and the company's total debts in relation to their total assets.

Intangible assets and organizational performance
Recent studies have investigated the relationship between intangible assets and organizational performance at both international and national levels; for instance, Mazzioni *et al.* (2014) analyzed the influence of DI on the economic performance variables of public companies in Brazil, Russia, India, China and South Africa. The results indicated statistically significant relationships between intangibility and economic performance, corroborating the literature that suggests that the presence of intangible resources improves organizational performance.

Dallabona *et al.* (2015) investigated the influence of DI on the economic performance of companies headquartered in countries with economic turbulence – Portugal, Ireland, Italy, Greece and Spain – in 2011. The results revealed a significant relationship between DI and the performance of the companies sampled, whereas Cucculetti and Bettinelli (2015) examined the factors that affected the performance of small and medium-sized Italian companies from 2000 to 2010, analyzing the influence of changes in business models and investments in intangible assets on economic performance. Their results indicated that both factors affected companies' performance, emphasizing investing in intangibles to improve business performance.

Perez and Famá (2015) presented the strategic characteristics of intangible assets, defined in the study by the variables DI, economic value-added and shareholder value creation and found a significant correlation between intangible assets and the economic performance of companies with shares traded on the American stock exchanges – NYSE and NASDAQ – from 1997 to 2002. The researchers concluded that intangible assets are relevant in the performance of companies with shares traded on the leading US exchanges, thus generating greater value for shareholders.

Sprenger *et al.* (2017) studied the effects of DI and its intensity, defined by the intensive tangible and intangible dummy variable, on economic-financial performance [ROA, return on equity (ROE), AT, net margin (NM) and earnings per share] in companies based on GLENIF countries – Argentina, Brazil, Chile, Colombia, Mexico and Peru – from 2008 to

2014. Their results showed positive associations between DI and companies' economic and financial performance in the countries analyzed. The authors also observed that intensive intangible companies have better economic-financial performance than intensive tangible ones.

Among studies on Brazilian companies, Nascimento *et al.* (2012) investigated companies in the information technology and telecommunications sectors of BM&FBovespa, considering the relationship between the following variables: DI and the performance indicators AT, NM, ROA and ROE. However, the study showed no relationship between the variables of the defined sectors. Decker *et al.* (2013) analyzed the relationship between DI and the performance indicators ROA and ROE in Brazilian companies listed in the Bovespa index and concluded that there is a positive relationship between intangibility and performance, considering the variables studied. Additionally, Kreuzberg *et al.* (2013) assessed the relationship between intangibility and performance of companies listed on BM&FBovespa by investigating DI and the economic indicators NM, ROA and ROE. However, their results showed no significance for the relationship portrayed.

Miranda *et al.* (2013) included DI in the study of the relationship between intangibles and financial performance. Their research focused on Brazilian companies classified by the Brazil Index of Innovation as active in the most innovative industries. The results did not indicate any influence of intangible assets on the performance of companies, even though they indicated a positive influence of intangible resources on the market value of companies.

Luca *et al.* (2014) also investigated the relationship between intangible resources and the economic performance of innovative companies. Unlike other studies, they measured intangible assets by their representativeness in relation to total assets. However, their findings revealed no significant relationship between intangible resources and the performance of innovative companies.

In a more recent study, Ritta *et al.* (2017) sought to identify the causal relationship between intangibles. They calculated intangible assets through the variable RIA and economic performance through the variables ROA and ROE of Brazilian companies listed on BM&FBovespa. Unlike previous studies, Ritta *et al.* (2017) analyzed data using the Granger Causality Test, but their results did not indicate a causal relationship between intangible assets and performance indicators for most companies studied.

Methods

To achieve its purpose, this work used both descriptive and quantitative approaches. The sample consisted of Latin American companies that published their financial information in the Economatica® database from 2011 to 2017 following the IFRS. Companies in the financial industry were excluded due to their peculiar accounting information, which could skew the results. We also excluded companies that did not provide information for the variables and years investigated, as well as companies with negative equity – as the calculation of some indicators would be unfeasible in this case.

The matrix was unbalanced data, resulting in a final sample of 1,221 companies: 78 Argentine, 608 Brazilian, 234 Chilean, 34 Colombian, 127 Mexican and 140 Peruvian. Companies' data were extracted from the annual, consolidated and dollar balance sheets to standardize sample composition. In addition, dependent, independent and control variables were used in our study, as presented in Table 1.

ROA was considered the primary performance-dependent variable in this study, for it indicates the efficiency of Latin American companies in using their available assets to generate profits (Sprenger *et al.*, 2017). To offer greater robustness to the results presented,

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Variables	Metric	Expected relationship	Authors
Dependent variables			
Return on assets	(ROA) Operating profit in relation to total assets	Dependent variable	Nascimento *et al.* (2012), Decker *et al.* (2013), Kreuzberg *et al.* (2013), Ritta *et al.* (2017) and Sprenger *et al.* (2017)
Operating margin	(OM) Operating profit in relation to the net sales	Dependent variable	Nascimento *et al.* (2012), Kreuzberg *et al.* (2013) and Sprenger *et al.* (2017)
Asset turnover	(AT) Net sales in relation to total assets	Dependent variable	Nascimento *et al.* (2012), Mazzioni *et al.* (2014), Ritta *et al.* (2017) and Sprenger *et al.* (2017)
Independent variables			
Representativeness of the intangible asset	(RIA) Total intangible assets in relation to total assets	Positive	Moura *et al.* (2014), Luca *et al.* (2014) and Ritta *et al.* (2017)
Degree of intangibility	(DI) Total market value of the stocks in relation to net equity	Positive	Kayo (2002), Perez and Famá (2006), Ritta and Ensslin (2010) and Nascimento *et al.* (2012)
Tobin's Q	(Tobin) Relationship between the market value of a company plus total debts and the total value of assets	Positive	Villalonga (2004) and Carvalho *et al.* (2010)
Control variables			
Current liquidity	(CL) Relationship between current assets and current liabilities	Positive	Bomfim *et al.* (2011)
Operational efficiency index	(OE) Relationship between operating cash flow and net income	Positive	Bomfim *et al.* (2011)
Indebtedness	(IND) Total debt in relation to net equity	Negative	Antunes and Martins (2007), Mazzioni *et al.* (2014) and Sprenger *et al.* (2017)
Size	(SIZ) Natural logarithm of total assets	Positive	Mazzioni *et al.* (2014) and Sprenger *et al.* (2017)

Source: Prepared by the authors.

Table 1.
Variables of interest in the relationship between intangibility and performance

two other performance variables were used: OM and AT, which measure different aspects of a company's operation (Soliman, 2008). According to Nissim and Penman (2001), these variables represent two components of ROA and have different properties in the time series. OM measures a company's ability to control costs to generate sales and shows the variability in operating profit caused by the company's price structure and product cost. AT captures the company's efficiency in using operational assets to generate sales; it is considered the measure of asset utilization by managers. Therefore, the model investigating the relationship between OM and intangibility variables aims to verify whether intangibility positively affects companies' operational, financial performance. Models with AT as a dependent variable were used to understand the impact of intangibility on sales efficiency.

After data collection, multiple linear regression with panel data was performed using the Stata® software. Such analysis started from the following econometric model:

$$\text{Performance}_{it} = \beta_0 + \beta_1 \text{Intangible Assets}_{it} + \beta_2 \text{CL}_{it} + \beta_3 \text{OE}_{it} + \beta_4 \text{INDit} + \beta_5 \text{SIZ}_{it}$$
$$+ \varepsilon_{it}$$

Considering the defined econometric model, our study hypotheses are posited in Table 2.

Results

The companies' data were analyzed and the outlier treatment by the winsorization method was performed at 0.05 of each variable in the proposed models before panel data analysis was carried out. Initially, the Shapiro-Wilk test tested data normality. The results showed that the sample data does not follow a normal distribution when rejecting its null hypothesis.

The variance inflation factor (VIF) was applied to all variables and in all proposed econometric models to verify the multicollinearity between variables. The results showed a VIF coefficient lower than 10, meaning no multicollinearity between the econometric model variables.

The Wald and Wooldridge tests were used to check for heteroscedasticity and serial autocorrelation problems, respectively. The tests indicated these two problems in all situations, which we solved by adopting White's robust estimators in the regressions.

Performance	Hypothesis	Description
ROA	H1a	There is a positive relationship between companies' RIA and ROA
	H2a	There is a positive relationship between companies' DI and ROA
	H3a	There is a positive relationship between companies' Tobin's Q and ROA
OM	H1m	There is a positive relationship between companies' RIA and OM
	H2m	There is a positive relationship between companies' DI and OM
	H3m	There is a positive relationship between companies' Tobin's Q and OM
At	H1g	There is a positive relationship between companies' RIA and AT
	H2g	There is a positive relationship between companies' DI and AT
	H3g	There is a positive relationship between companies' Tobin's Q and AT

Notes: Variables: RIA – Representativeness of intangible assets; DI – Degree of intangibility; ROA – Return on assets; OM – Operating margin; AT – Asset turnover
Source: Prepared by the authors

Table 2.
Hypotheses between
intangibility and
performance

Breusch-Pagan and Hausman's test determined the type of panel be used to calculate regressions – panel data with fixed, random or pooled effects. In both tests, the null hypothesis was rejected, indicating that the fixed effects model was the most appropriate in the regressions of the proposed econometric models.

The results of the tests and regressions are in Tables 3, 4 and 5.

The relationship between ROA and RIA was significant and negative only for Brazil. In this country, the lower the proportion of intangible assets over companies' total assets, the greater profitability. This result can be explained by the recognition of intangibles. According to Perez and Famá (2006), intangible resources are essential from an operational perspective and may be responsible for providing cash flows that enable companies to perform better against the competition. However, intangible assets which were not recorded in the financial statements significantly influenced the performance of these organizations. This significant and negative relationship between intangibility and performance corroborates the study by Ferla, Muller and Klann (2019).

Regarding DI and Tobin's Q, results were positive and significant for companies in Argentina, Brazil, Chile, Mexico and Peru. In these countries, results revealed that the greater the intangibility measured by its market value, the greater the profitability over companies' total assets.

As to the relationship between ROA and CL, there was a significant and positive association for companies in Argentina, Chile and Peru, reflecting that greater availability of capital in relation to short-term obligations influences greater profitability over assets in these countries.

Only the sample of Brazilian companies presented a significant positive (1%) relationship between ROA and OE, which corroborates the study by Bomfim, Almeida, Gouveia, Macedo and Marques (2011). Although Brazil did not have the highest values for OE on average, the regression portrayed a strong influence of this variable on ROA.

The relationship between ROA and IND proved significant and negative for all companies (i.e. high level of indebtedness and low return on assets). Such results are in line with the studies by Antunes and Martins (2007), Mazzioni et al. (2014) and Sprenger et al. (2017). Also reinforcing these studies, the relationship between ROA and SIZ was significant and positive for companies in Brazil, Chile and Colombia.

The relationship between OM and RIA was also significant and negative only for Brazil, indicating that the lower the proportion between intangible assets and companies' total assets, the greater the return provided by sales obtained using intangible assets. According to Perez and Famá (2006), one of the possible causes of this negative relationship may be the lack of information available to stakeholders on recognizing intangibles in the financial statements, thus not affecting organizational performance.

Regarding the relationship of OM with DI and Tobin, companies in Argentina, Brazil, Chile and Peru showed that the greater the intangibility measured by its market value, the greater the profitability of companies' sales. However, this relationship was lower for Argentine and Chilean companies, as the significance between variables was 5%. This result corroborates Lauretti's (2011) study regarding the relationship between economic performance and Tobin's Q, which showed no significance.

At a significance of 5% for Brazilian companies, the relationship between OM and CL proved to be significant and positive. Therefore, greater availability of capital in the short term leads to greater profitability of sales in Brazil. There was also a significant and positive relationship between OM and OE in Brazil. This result confirms Bomfim et al. (2011) findings, showing the strong influence of OE on profitability in Brazilian companies.

Countries Variables	Argentina			Brazil			Chile			Colombia			Mexico			Peru		
	H1a	H2a	H3a	H1a	H2a	H3a	H1a	H2a	H3a	H1a	H2a	H3a	H1a	H2a	H3a	H1a	H2a	H3a
RIA	-0.471			-3.456**						-0.906								
DI		0.712***			1.379***			0.757***			0.662			0.486**			2.442***	
Tobin			2.513***			3.884***			1.755***			0.970			1.259***			5.728***
CL	3.301***	3.078***	2.696***	0.045	0.047	0.015	0.066	0.0797	0.059	1.06**	1.05**	1.04**	0.052	0.030	-0.007	0.340*	0.342**	0.341**
OE	-0.023	0.001	0.004	0.087***	0.086***	0.086***	-0.0007	0.005	0.001				0.067	0.062	0.064	-0.014	-0.037	-0.011
IND	-2.31***	-2.70***	-2.32***	-1.94***	-1.99***	-2.09***	-2.19***	-2.08***	-2.25***	-2.78***	-2.54***	-2.54***	-3.40***	-3.41***	-3.27***	-2.83**	-2.70**	-3.54***
SIZ	0.591	0.398	0.619	5.535***	5.065***	4.766***	1.388***	1.159***	1.087***	1.96***	1.59***	1.66***	-1.131	-1.134	-1.007	-3.28**	-1.680	-1.539
Notes	386	386	386	3,668	3,668	3,668	1,403	1,403	1,403	202	202	202	769	769	769	817	817	817
Groups	78	78	78	608	608	608	234	234	234	34	34	34	127	127	127	140	140	140
R^2	0.3155	0.3543	0.3786	0.088	0.1081	0.1188	0.1232	0.1783	0.1788	0.1184	0.1155	0.1116	0.1542	0.1674	0.1720	0.052	0.1456	0.1819
VIF	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Breusch-Pagan	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hausman	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Significance levels: 1% (***), 5% (**), 10% (*). Variables: ROA – return on assets; RIA – representativeness of the intangible asset; DI – degree of intangibility; Tobin – Tobin's Q; CL – current liquidity; OE – operational efficiency index; IND – indebtedness; SIZ – size. The VIF test did not find multicollinearity among the variables of the econometric models. Breusch-Pagan and Hausman tests were applied, indicating the use of the panel data model with fixed effects. Chile, Mexico and Peru did not present a coefficient in the regressions for RIA because data for those countries was not available in the Economatica® database. Due to the collinearity with intangibility variables, OE was disregarded in the econometric model for Colombia
Source: Research data

Table 3.
Regression by country – performance variable return on assets – ROA

Countries Variables	Argentina H1m	H2m	H3m	Brazil H1m	H2m	H3m	Chile H1m	H2m	H3m	Colombia H1m	H2m	H3m	Mexico H1m	H2m	H3m	Peru H1m	H2m	H3m
RIA	−0.283			−0.134***						−0.093								
ID		0.006**			0.019***			0.005			0.007							
Tobin			0.026**			0.047***			0.028**			0.007		0.0024	0.0073		0.049***	0.113***
CL	0.018	0.020	0.019	0.010**	0.012**	0.011**	0.009	0.008	0.008	0.017	0.017	0.017	0.002	0.002	0.002	0.010*	0.009	0.009
OE	0.0001	0.0003	0.0002	0.003***	0.003***	0.003***	0.001	0.001	0.001				0.0005	0.0005	0.0005	0.001	0.001	0.001
IND	−0.03***	−0.03***	−0.03***	−0.048***	−0.048***	−0.049***	−0.047***	−0.047***	−0.049***	−0.12***	−0.11***	−0.11***	−0.095***	−0.095***	−0.094***	−0.04**	−0.04**	−0.05***
SIZ	0.086*	0.092*	0.098*	0.162***	0.145***	0.141***	0.106	0.108	0.111	0.122**	0.122**	0.120**	0.066	0.066	0.066	0.048	0.088**	0.088**
Notes	386	386	386	3,407	3,407	3,407	1,367	1367	1,367	207	207	207	769	769	769	815	815	815
Groups	78	78	78	567	567	567	228	228	228	34	34	34	127	127	127	137	137	137
R^2	0.1180	0.1366	0.1467	0.0969	0.0837	0.0984	0.0239	0.0245	0.0269	0.1905	0.1899	0.1884	0.0927	0.0932	0.0932	0.1198	0.0878	0.1072
VIF	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Breush-Pagan	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hausman	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Significance levels: 1% (***), 5% (**), 10% (*). Variables: OM – operating margin; RIA – representativeness of the intangible asset; DI – degree of intangibility; Tobin – Tobin's Q; CL – current liquidity; OE – operational efficiency index; IND – indebtedness; SIZ – size. The VIF test did not find multicollinearity among the variables of the econometric models. The Breusch-Pagan and Hausman tests were applied, indicating the use of the panel data model with fixed effects. Chile, Mexico and Peru did not present a coefficient in the regressions for RIA because data for those countries was not available in the Economatica® database. Due to the collinearity with the intangibility variables, OE was disregarded in the econometric model for Colombia
Source: Research data

Table 4.
Regression by country – performance variable operating margin – OM

Countries Variables	Argentina H1g	H2g	H3g	Brazil H1g	H2g	H3g	Chile H1g	H2g	H3g	Colombia H1g	H2g	H3g	Mexico H1g	H2g	H3g	Peru H1g	H2g	H3g
RIA	−0.538			−0.071						0.342								
ID		0.030***			0.016**			0.036***			0.033			0.014*			0.047***	
Tobin			0.106***			0.032			0.035*			0.031			0.029			0.103***
CL	0.050*	0.046*	0.040	−0.005**	−0.005**	−0.005**	−0.016**	−0.017**	−0.017**	0.019	0.013	0.014	−0.001	−0.002	−0.002	−0.001	−0.002	−0.002
OE	−0.004**	−0.003*	−0.003*	−0.0001	−0.0001	−0.0001	−0.001	−0.001	−0.001				0.0008	0.0006	0.0007	0.002	0.001	0.002
IND	−0.014	−0.029	−0.012	−0.006	−0.006	−0.007	0.0007	−0.0034	−0.0008	0.155	0.139	0.136	−0.026	−0.026	−0.022	−0.058	−0.056	−0.071**
SIZ	−0.34***	−0.33***	−0.32***	−0.029	−0.037	−0.039	−0.29***	−0.28***	−0.29***	−0.44***	−0.42***	−0.43***	−0.49***	−0.49***	−0.49***	−0.303***	−0.263***	−0.263***
Notes	386	386	386	3,668	608	3,668	1,385	1,385	1,385	207	207	207	769	769	769	829	829	829
Groups	78	78	78	608	608	608	233	233	233	34	34	34	127	127	127	140	140	140
R^2	0.1145	0.1193	0.1161	0.0073	0.0104	0.0092	0.0535	0.0702	0.0572	0.1765	0.1812	0.1710	0.1769	0.1851	0.1838	0.0827	0.1211	0.1282
VIF	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Breush-Pagan	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hausman	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Significance levels: 1% (***), 5% (**), 10% (*). Variables: AT – asset turnover; RIA – representativeness of the intangible asset; DI – degree of intangibility; Tobin – Tobin's Q; CL – current liquidity; OE – operational efficiency index; IND – indebtedness; SIZ – size. The VIF test did not find multicollinearity among the variables of the econometric models. The Breusch-Pagan and Hausman tests were applied, indicating the use of the panel data model with fixed effects. Chile, Mexico and Peru did not present a coefficient in the regressions for RIA because data for those countries was not available in the Economatica® database. Due to the collinearity with the intangibility variables, OE was disregarded in the econometric model in Colombia
Source: Research data

Table 5.
Regression by country – performance variable asset turnover – AT

The relationship between OM and IND proved to be significant and negative for companies in all countries analyzed. Therefore, indebtedness affects profitability in relation to company sales. These results corroborate the studies by Antunes and Martins (2007), Mazzioni *et al.* (2014) and Sprenger *et al.* (2017), which present the negative influence of indebtedness on companies' profitability. On the other hand, the relationship between OM and SIZ was significant at 1% and positive for companies in Brazil and significant at 5% and positive for companies in Colombia and Peru. This result demonstrates the coefficient present in Brazilian companies, where each unit of increase in size corresponds, on average, to an increase of 15 units of profitability on sales.

Considering the regressions carried out with AT, the results indicated no significant relationship between AT and RIA in any country in the sample. Therefore, the *H1g* hypothesis was rejected, in line with Nascimento *et al.* (2012), who found no relationship between AT and companies' performance indexes either.

The relationship between AT and DI proved to be significant and positive for companies in Argentina (at the 1% significance level), Brazil (5%), Chile (1%), Mexico (10%) and Peru (1%). It means that a company's higher market value, measured by its DI, reflects on the company's greater efficiency in generating revenues based on its assets, a result similar to those found by Mazzioni *et al.* (2014) and Sprenger *et al.* (2017).

Regarding Tobin's Q in relationship to AT, there was a positive and significant association at 1% in companies in Argentina and Peru. Furthermore, Tobin's Q coefficients obtained in these two countries were also higher than DI coefficients, showing a more significant influence of Tobin's Q over AT.

As for the relationship between AT and SIZ, the result is in line with Sprenger *et al.* (2017), who found a significant association between performance and size in the countries belonging to GLENIF. Argentina (1%), Chile (1%), Colombia (5%), Mexico (1%) and Peru (5%) showed significance in the relationship between AT and SIZ, however, negative.

Table 6 below summarizes the results found for the hypotheses proposed.

Because of the results and analyzes carried out in this study, only the hypotheses predicting a relationship between RIA and the proposed performance variables (ROA – *H1a*, OM – *H1m* and AT – *H1g*) were rejected, as none of the results found significant and positive relationship for those variables. These results can partly be explained by the difficulties in accounting for intangible assets, which may skew some data.

The relationships between performance variables and intangibles variables, DI and Tobin's Q were significant and positive for some countries as proposed in the hypotheses. A

Performance	Hypothesis	Argentina	Brazil	Chile	Colombia	Mexico	Peru
ROA	*H1a*	Rejected	Rejected	-	Rejected	-	-
	H2a	Confirmed	Confirmed	Confirmed	Rejected	Confirmed	Confirmed
	H3a	Confirmed	Confirmed	Confirmed	Rejected	Confirmed	Confirmed
OM	*H1m*	Rejected	Rejected	-	Rejected	-	-
	H2m	Confirmed	Confirmed	Rejected	Rejected	Rejected	Confirmed
	H3m	Confirmed	Confirmed	Confirmed	Rejected	Rejected	Confirmed
At	*H1g*	Rejected	Rejected	-	Rejected	-	-
	H2g	Confirmed	Confirmed	Confirmed	Rejected	Confirmed	Confirmed
	H3g	Confirmed	Rejected	Confirmed	Rejected	Rejected	Confirmed

Notes: Variables: ROA – return on assets; OM – operating margin; AT – asset turnover
Source: Prepared by the authors

relationship between intangibility and company performance in the samples and periods analyzed was partially evidenced.

Our findings contest those evidenced, for example, by Carvalho *et al.* (2010), Nascimento *et al.* (2012), Kreuzberg *et al.* (2013) and Ritta *et al.* (2017), who did not find a significant relationship between intangible assets and organizational performance. However, these study results are in line with Mazzioni *et al.* (2014), Dallabona *et al.* (2015), Perez and Famá (2015), Andonova and Ruíz-Pava (2016), Sprenger *et al.* (2017) and Ibarra Cisneros and Hernandez-Perlines (2018), who proved the importance of intangible assets, the increase in their representativeness on companies' equity and their influence on the creation of business value, hence acting directly on the increase of profitability in firms.

Final considerations

This study aimed to analyze the relationship between intangibility and performance of 1,236 public companies in some Latin American countries – Argentina, Brazil, Chile, Colombia, Mexico and Peru – from 2011 to 2017.

This research is justified because previous studies on the relationship between intangible assets and organizational performance showed no consensus, inviting further investigations on the topic. In addition, there are different ways of determining the intangibility of companies. This research expanded the analysis of the proposed relationship by calculating intangible assets from three perspectives, which, so far, had not been studied together: RIA, DI and Tobin's Q (Tobin).

The regression analysis of our econometric models suggests that, for some of the countries in the sample, there is a significant and positive relationship between ROA and intangibility variables (DI and Tobin), between OM and intangibility variables (DI and Tobin) and between AT and intangibility variables (DI and Tobin). However, among the defined hypotheses, the relationships between RIA and performance variables were rejected, as none of the results found a significant and positive relationship. In short, the existence of a relationship between intangibility and company performance was partially proved in the samples and periods analyzed.

One of the limitations of this study includes the lack of complete information about intangible resources in financial statements of some companies and countries, making it challenging to analyze the proposed relationship more broadly. Another limitation is the possible causal relationship between the model regressors defined in the study and their error, thus generating an endogeneity problem in the proposed models. Future research should use specific methods to mitigate possible endogeneity problems in regressions.

Despite these new findings, further investigation is needed to confirm the evidence. New studies may extend the sample study period and use other organizational performance variables that can better explain or even confirm the results found in this research. A comparative study of the periods before and after 2010 may also produce important insights due to the different conditions of those periods regarding accounting rules; this investigation may use other methods for data analysis. Other Latin American countries that were not included in our sample may also be studied.

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