

## INTANGIBLE ASSETS INFLUENCE FINANCIAL PERFORMANCE AND MARKET VALUE OF FAMILY PUBLICLY TRADED COMPANIES?

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### ABSTRACT

The study aimed to verify the influence of intangible assets on the financial performance and market value of the publicly traded companies listed in B3. For this, a descriptive, documental and quantitative research was carried out. The data were obtained through the Reference Form and the Economática database for the period from 2010 to 2017. To identify the family companies, the chain of ownership was traced until the last controlling shareholder was identified. In relation to intangible assets, the percentage of total assets was calculated for each company and in each year. Financial performance was analyzed through ROA and ROE and market value through the market-to-book (MTB) index and Tobin's Q. In relation to intangible assets, the results showed that they corresponded to approximately 6% of total assets. Regarding financial performance, the means tests showed that the differences in ROA and ROE were not significant among family companies that had larger and smaller investments in intangibles. However, they confirmed that the group with the highest percentages of intangibles had the highest averages of MTB and Q of Tobin. Finally, the multivariate analysis revealed that the level of intangibility was statistically significant only in the models referring to the market value.

Submission on 1/23/2019. Review on 11/19/2019. Accepted on 3/2/2020. Published on 4/22/2020.

Then, it was concluded that in family businesses intangibles influenced only to a greater market value.

**Keywords:** Intangible assets. Financial performance. Market value. Family publicly traded companies.

## 1 INTRODUCTION

In the last few decades, there has been a fundamental shift in the structure of organizations. While the process of creating value in more traditional and conservative companies was based mainly on physical assets and traditional factors of production, such as property, raw materials, production and work facilities, adding value in more modern organizations has been achieved through combinations of physical and intangible assets, such as innovations, information and communication technologies and quality of human resources (Moeller, 2009).

Intangible assets consist of immaterial resources that assist in the production process, are necessary for the creation and sale of new or improved products and processes, represent a competitive advantage and improve financial performance. They may be generated internally (such as projects, plans, capital brand, internal software and construction projects) or acquired externally, in the form of technology licenses, patents and copyrights, economic skills acquired through purchasing and consulting services (Arrighetti, Landini, & Lasagni, 2014).

Intangible assets such as reputation, patents or *know-how* are difficult to copy or imitate, because, in addition to being protected by legal property rights, they are also characterized by high levels of specificity that prevent the easy purchase of similar assets in the markets (Andonova & Ruíz-Pava, 2016). Carmeli (2001) mentions that, unlike tangible assets, the intangibles are very difficult to copy and practically inimitable. Furthermore, it highlights that, as society becomes a collectivity of services, of increasing sophistication, in which knowledge and information are the pillars of business growth, the importance of intangible resources shall be increasingly greater.

Authors like Carmeli and Tishler (2004), Galbreath and Galvin (2008), and Andonova and Ruíz-Pava (2016), point out that a company's competitive advantage is based mainly on the possession of rare and valuable resources that cannot be copied by competitors. They emphasize the fact that intangible assets have these characteristics and, therefore, they can contribute to a substantial increase in the financial performance and market value of companies.

In this sense, in the current scenario, more than in the past, managers of – public, family, non-family, for-profit or non-profit companies, for example – find it difficult to deal with an increasingly uncertain environment. As a consequence, they are sensing the conclusion that rules have changed and need differentials, such as intangible assets, in order to outperform competitors and increase performance (Arrighetti *et al.*, 2014; Carmeli & Tishler, 2004).

The relationship between intangible assets, performance and market value, according to Arrighetti *et al.* (2014), has been investigated with greater intensity in companies from more developed countries, such as the United States, Japan, Italy, the United Kingdom, Finland and the Netherlands. Most of these surveys, such as Hall, Jaffe and Trajtenberg (2005), Greenhalgh and Rogers (2006), Surroca, Tribó and Waddock (2010), Sandner and Block (2011), Arrighetti *et al.* (2014), Andonova and Ruíz-Pava (2016) and Barajas, Shakina and Fernández-Jardón (2017) have been presenting the empirical evidence that intangibles really contribute positively to an increase in performance, as well as to a greater appreciation of companies in relation to the capital market.

However, in the particular case of emerging (or developing) countries, this evidence is still quite controversial (Moura, Mecking, & Scarpin, 2013; Andonova & Ruíz-Pava, 2016). In Brazil, while some studies have identified positive influence of intangible assets on financial

performance and market value, such as Perez and Famá (2006), Rojo, Sousa and Trento (2012), Decker, Ensslin, Reina and Reina (2013), Oliveira, Schossler, Campus and Luce (2014) e Medrado, Cella, Pereira and Dantas (2016), others found no relationships, case of Carvalho, Kayo and Martin (2010), Nascimento, Oliveira, Marques and Cunha (2012) and Miranda, Vasconcelos, Silva Filho, Santos and Maia (2013). Therefore, this matter still presents gaps that require investigation in the Brazilian scenario.

Thus, this study contributes to this research gap found in the literature review and, based on the above, the problem question that guides it is: What is the influence of intangible assets on the financial performance and market value of family-owned companies? Thus, the main goal of this study is to verify the influence of intangible assets on the financial performance and the market value of family-owned companies listed in the B3.

It is also noteworthy that the number of empirical studies on intangible assets, financial performance and market value, specifically in family businesses is still small, although this type of company plays an important role in the development and economic growth of countries. Along these lines, Shim and Okamura (2011) highlight that, even though family businesses are the dominant type worldwide, few investigations are carried out on them.

Feito-Ruiz and Menéndez-Requeijo (2010) describe that familiar companies, compared to the unfamiliar ones, present different internal relationships, differences in information asymmetries and a different mobilization of resources. On one hand, the resulting adverse selection and opportunism can favor the downside of altruism, allowing for nepotism and entrenchment, which would aggravate management problems (Villalonga & Amit, 2006; Peng & Jiang, 2010; Liu, Yang & Zhang, 2012); but, on the other, family ownership favors strong relationships with several stakeholders, efficient investment of capital, thrift in times of crisis and scarcity of resources and care for reputation and long-term vision, which could reduce management problems (Anderson & Reeb, 2003; Feito-Ruiz & Menéndez-Requeijo, 2010; Cai, Luo & Wan, 2012; Liu, Yang & Zhang, 2012).

Therefore, analyzing the influence of intangible assets on the performance of family owned companies is relevant and original. Furthermore, while verifying the existence of a relationship between these variables, this study contributes, not only in a theoretical way, but also in an empirical way.

## **2 INTANGIBLE ASSETS, FINANCIAL PERFORMANCE AND MARKET VALUE**

It is extremely important to evaluate financial performance and market value, considering that this process aims to assist managers in the analysis of taken strategies, making it possible to measure the degree of efficiency of the management itself and of all the company's actions in general (Nascimento *et al.*, 2012). In search for better performance and market valuation, Perez and Famá (2015) highlight that globalization and technological advances intensify competition among companies, encouraging them to differentiate themselves from their competitors.

In this sense, the competitive advantage, when based only on tangible assets, may be of short duration. This happens because tangible assets are always subject to imitation and replacement threats. Therefore, whether companies are not able to create specific capacities and exclusive competencies, they shall be subject to loss of competitiveness. That is, a company's competitive advantage depends fundamentally on the possession of rare and valuable resources, which are difficult to imitate and replace, characteristics present in intangible assets (Andonova & Ruíz-Pava, 2016).

Thus, one of the main reasons for the growing importance of intangible assets is that they are differentiated and often exclusive, while tangible assets, in a way, are easy to obtain. For this reason, intangibles are important guarantors of advantages in negotiations, valuable, rare and inimitable, even granting greater future economic benefits. (Kayo, Kimura, Martin, & Nakamura, 2006).

Intangible assets often present many of the attributes necessary to become a source of competitive advantage. Thus, assets such as reputation, licenses, brands, patents and concessions, in addition to being protected by legal property rights, are characterized by high levels of specificity that make it difficult for competitors to purchase similar resources in the markets or else the imitation (Arrighetti *et al.*, 2014).

In the literature, the term intangible asset has often been used as a synonym for intangible, intellectual, invisible resources, deprived of physical form or existence, intangible resources, among others. (Devalle, Rizzato & Busso, 2016; Moura, Dalchiavon, Scheren, & Zanin, 2018; Tsai, Lu & Yen, 2012). CPC 04 (R1) (2010, p. 6) defines an intangible asset as “an identifiable non-monetary asset without physical substance”. In addition, an intangible asset meets the definition of Pronouncement CPC 04 (R1) (2010) only if it is identifiable, controlled by the company and generates an economic benefit.

The identification criterion is accepted if the intangible is separable and if it results from contractual or other legal rights. Regarding control, according to CPC 04 (R1) (2010, p. 7), the entity possesses it “when it has the power to obtain future economic benefits generated by the underlying resource and to restrict third party access to those benefits”. As for future economic benefits, according to CPC 04 (R1) (2010, p. 8), “they may include revenue from the sale of products or services, cost reduction or other benefits resulting from the use of the asset by the entity”.

In general, intangibles are immaterial resources that assist in production processes and are necessary for the creation and sale of products. They can be generated internally, such as projects, brands, internal software and construction projects, or acquired externally, such as technology licenses, patents and copyrights, concessions and economic skills acquired through the purchase of management and consultancy services (Arrighetti *et al.*, 2014; Devalle *et al.*, 2016).

As examples of intangible assets, CPC 04 (R1) (2010) describes software, patents, copyrights, customer lists, franchises, customer or supplier relationships, customer loyalty, market share and marketing rights. However, we warn that if an item covered by the Pronouncement does not meet the definition of an intangible asset, the expense for its acquisition or internal generation should be recognized as an expense.

In Brazil, while investigating a group of publicly-held companies that presented financial information to BM & FBovespa and NYSE in the years 2006 and 2007, Ritta, Ensslin and Ronchi (2010) found that, among the intangibles disclosed in the financial statements, the goodwill was present in 74.94% of them, software in 15% and contractual rights in 8.66%. Cunha *et al.* (2011) investigated 40 publicly-held companies listed on Bovespa and identified that in the years 2005, 2007 and 2009 the most evident intangible assets by companies were software, present in 72% of them, goodwill of 37.5% and brands and patents at 30%.

Moura and Varela (2014) demonstrated that in 2009, among the intangibles evidenced by the 260 publicly traded companies in the sample, software stood out, disclosed by 85% of them, and the goodwill on investments, evidenced by 49% of the companies. Concession contracts and brands and patents were also relevant, being evidenced by 36% and 31% of companies, respectively. Zittei, Moura and Hein (2015) investigated 192 publicly-held companies in 2010 and demonstrated that, among the intangibles evidenced, software stood out, evidenced by 78%, brands and patents by 39%, premium on investments by 39% and concession contracts by 36%.

These studies indicate that the most prominent intangibles in Brazilian public companies are software and goodwill, as well as brands, patents and concession contracts. Such assets are examples of intangibles that have unique characteristics and can help Brazilian companies to obtain market advantages and increase performance and market value in comparison with other companies.

With regard to the influence of intangibles on performance, while some research has shown that intangibles do not influence the companies' performance or market value, others have shown that there is an association between intangibles, performance and market value.

As an example of studies that have not identified this relationship, we mention Carvalho *et al.* (2010), who investigated 228 publicly traded Bovespa companies from 1996 to 2007, noting that the companies' intangible assets did not contribute to a superior and persistent performance.

St-Pierre and Audet (2011) researched 267 small and medium-sized Canadian companies from 2000 to 2007 and found that not all types of intangibles influenced performance. Another example is the study from Nascimento *et al.* (2012) who surveyed twelve Brazilian companies in the telecommunications sector and five in the information technology sector in 2008 and also have not found superior performance in companies with greater investments in intangibles.

Authors like Carvalho *et al.* (2010), Nascimento *et al.* (2012) and Miranda *et al.* (2013) describe that, in Brazil, the majority of publicly traded companies operate in sectors that are more intensive in tangible than in intangible capital. They also report that there is still a greater appreciation of tangible assets in Brazilian companies and lower investments in intangibles, in comparison with companies in other countries, such as the United States, for example, which would justify the lack of relationship between intangibility and performance.

As an example of studies that identified the relationship between intangibles and performance, we mention Oliveira, Rodrigues and Craig (2010), who researched Portuguese companies in the period from 1998 to 2008 and found that the reported goodwill and other intangible assets were highly associated with the stock price. Decker *et al.* (2013) investigated whether there was a relationship between intangible assets and the profitability of companies listed on the Bovespa Index from 2006 to 2011, and the results found showed that the degree of intangibility of intangible-intensive companies was higher than that of tangible-intensive companies.

During the period from 2003 to 2008, Oliveira *et al.* (2014) compared the performance of two portfolios: one composed by companies with a high proportion of intangibility and the other relative to companies that had a small proportion of intangibility. The results showed that the portfolio of companies with a higher proportion of intangibility performed better in the vast majority of periods and indicators evaluated.

Medrado *et al.* (2016) researched a set of publicly-held companies on the BM & F Bovespa's IBrX 100 index from 2008 to 2014 and found a positive and significant association between the level of intangibility and the degree of appreciation of the shares. Barajas *et al.* (2017) investigated 1,600 European publicly-held companies in the period from 2004 to 2013 and found that intangibles were exclusive advantages for companies and made them more competitive, contributing to greater speed of recovery and obtaining superior performance in post-crisis periods.

Miranda *et al.* (2013) analyzed the influence of intangibles on the performance and market value of a sample of 174 Brazilian companies comprising the years 2008 and 2009 and the results indicated that investments in intangibles were not related to performance, but, on the other hand, influenced at market value.

In general, the authors claim that intangibles are a valuable source of competitive advantage, contributing to increased performance, and that the market values companies that have among their characteristics the investment in knowledge, brands, new technologies and other intangibles. According to Medrado *et al.* (2016), the valuation comes from the perception that tangible assets, due to their availability in the market, produce the return by the average, while intangibles are responsible for generating a return above the average.

It is possible to identify studies in the literature that suggest that intangibles contribute to greater performance and market value. However, this is not a unique conclusion, as there are also

studies whose findings show that there is no effect of intangibles on performance and market value. Thus, such a relationship remains a gap that this research aims to help filling.

### 3 METHODOLOGICAL PROCEDURES

In order to meet the proposed objective, descriptive research, document analysis and quantitative data approach have been carried out. The population was made up of a set of family-run public companies listed in the B3 S.A. - Brasil, Bolsa, Balcão. The companies who exercised financial activities were excluded from the sample due to the peculiarities of the sector, which could cause bias in the calculation of performance variables. Those that did not have the necessary information to calculate all variables were also excluded. After these procedures, the final sample was made up of 122 family owned companies.

In order to identify these companies at B3, the methodology of La Porta, Lopez de Silanes and Shleifer (1999) was employed, which traced the chain of ownership until identifying the last controlling shareholder. The authors considered as the last controlling shareholder the person who, directly or indirectly, had control of the company of the researched sample. Any company in which a family or an individual was the final owner (in terms of voting rights), with a minimum participation of 10%, was considered as family. The same procedures have been adopted in this research.

Information about the controlling shareholder have been manually collected each year (2010-2017), for each company in the sample, in the Reference Forms: Section 6.3 – Brief history; Section 8.1 – Description of the economic group; Section 15.2 – Shareholding position; Section 15.4 – Shareholder organization chart; Section 15.5 – Shareholders' agreement.

Regarding intangible assets, the percentage of intangible assets in relation to total assets has been calculated for each company, in each year, as they have in Oliveira *et al.* (2010), Ritta *et al.* (2010), Moura *et al.* (2013), Arrighetti *et al.* (2014) and Medrado *et al.* (2016). Data have been obtained at the Economática database and refer to the period from 2010 to 2017. The year 2010 has been adopted as the starting point to constitute the initial period of full adoption of international accounting standards (IFRS) in Brazil.

After calculating intangibility, as in the case of Perez and Famá (2006), Decker *et al.* (2013) e Oliveira *et al.* (2014), the companies have been split by the median into two groups: a) higher percentages of intangibility (61 companies); b) lower percentages of intangibility (61 companies). That is, groups of companies that had intangibility percentages higher than the sample median and others that had percentages below the median.

Performance has been analyzed using the return on assets index (ROA), like as in similar studies of Carvalho *et al.* (2010), St-Pierre and Audet (2011), Nascimento *et al.* (2012), Decker *et al.* (2013) and Andonova and Ruíz-Pava (2016), and the return on equity (ROE) index, like in Nascimento *et al.* (2012), Decker *et al.* (2013) and Miranda *et al.* (2013). For the calculation of ROA, profit before interest, taxes, depreciation and amortization (Ebitda) were used, so that it is possible to evaluate profit only for the business (Ebitda/Total asset). The ROE has been calculated as dividing the net income by equity. Data have been obtained at the Economática database and refer to the period from 2010 to 2017.

The market value has been analyzed using the *market-to-book* index (MTB), a procedure used in similar studies from Oliveira *et al.* (2010) and Medrado *et al.* (2016), and by Tobin's Q, according to Carvalho *et al.* (2010) and Surroca *et al.* (2010). MTB has been calculated using the ratio between market value and equity value (market value/equity). Tobin's Q has been calculated as the ratio between the market value of the assets and their replacement cost. The market value corresponds to the sum of the book value of the liabilities plus the redemption value of the preferred shares, plus the market value of the common shares; and the replacement cost is replaced by the value of total assets. These data have also been obtained at the Economática database and refer to the period from 2010 to 2017.

Then, data on control variables have been collected, that is, on other factors that can also influence the performance of companies. The variables, their respective metrics and the base authors are shown in Figure 1.

Variable	Metrics	Database	Base authors
Indebtedness	(Current liabilities + Non-current liabilities) / Total assets	Economatics	Surroca <i>et al.</i> (2010); Astawa, Sudika e Yuliarimi (2015).
General Ratio	(Current Assets + Long-Term Assets) / (Current Liabilities + Non-Current Liabilities)	Economatics	Arrighetti <i>et al.</i> (2014).
Size of the Company	Natural logarithm of the carrying amount of the company's total assets	Economatics	Surroca <i>et al.</i> (2010); Medrado <i>et al.</i> (2016).
Company growth	Asset growth rate	Economatics	Arrighetti <i>et al.</i> (2014); Astawa <i>et al.</i> (2015).

**Figure 1.** Search control variables

Source: Own elaboration.

Figure 1 shows that the utilized control variables were debt, general liquidity, size and growth of the company:

a) Indebtedness: may present a disciplinary effect, able to contribute to the improvement of the company's performance, therefore higher levels of indebtedness may be related to higher performance (Surroca *et al.*, 2010; Astawa *et al.*, 2015);

b) Liquidity: may also influence the company's performance, considering that it can reflect superior skills in the use of resources, as well as for obtaining new assets linked to projects that generate higher revenues (Arrighetti *et al.*, 2014);

c) Company size: an important variable that may also influence performance, as large companies have greater capacity to generate cash and exploit economies of scale, and may be more effective in protecting their shares than smaller companies. Moreover, large companies are also more able to withstand a greater share of uncertainty associated with investments compared to smaller companies (Surroca *et al.*, 2010; Medrado *et al.*, 2016);

d) Growth: the performance of companies can be influenced by their growth opportunities, given that growing companies may perform better continuously (Arrighetti *et al.*, 2014; Astawa *et al.*, 2015).

After data collection, the analysis has been performed using descriptive statistics, Student's t-test, in order to compare performance averages between the group that had the highest percentages of intangibility and the one with the lowest percentages. In addition, multiple linear regression was employed to verify the influence of intangible assets on the financial performance and market value of family-owned companies.

It is noteworthy that before applying the t-test, the assumptions described by Spiegel (1993) have been observed as necessary: normality of the data, verified by means of the Kolmogorov-Smirnov test; and homogeneity of variances, verified via the Levene test. In the case of linear regression, normality assumptions have been observed, also by means of the Kolmogorov-Smirnov test; multicollinearity, using the variance inflation factor – VIF and Tolerance; homoscedasticity, via the Pesarán-Pesarán test; and absence of serial autocorrelation, using the Durbin-Watson test.

#### 4 DESCRIPTION AND ANALYSIS OF DATA

This section presents the data description and analysis. Initially, an analysis of the average percentages of intangible assets in relation to the total assets of family and non-family companies, from 2010 to 2017, has been made. Next, the average ROA and ROE indicators and

the average *Market-to-book* and Tobin Q indicators are presented. Finally, the regression coefficients that make it possible to analyze the influence of intangible assets on the performance and market value of the companies in the sample, are presented.

Table 1 shows the data on the representativeness of the intangible assets of the family companies in the sample from 2010 to 2017.

Table 1

**Representativeness of intangibles of family companies in the sample from 2010 to 2017**

Period	Number of companies in the sample	Average values of intangible assets	Average percentages of intangibles in relation to total assets
2010	122	446,688.28	6
2011	122	440,824.86	6
2012	122	335,415.95	5
2013	122	430,319.29	6
2014	122	456,696.19	6
2015	122	509,153.25	6
2016	122	493,785.27	6
2017	122	510,698.47	5
<b>2010 to 2017</b>	<b>976</b>	<b>452,947.69</b>	<b>6</b>

Source: Research data.

Table 1 shows that, in general, the average values of intangibles in family owned companies were equivalent to R\$ 452,947.69 in the period from 2010 to 2017. In 2010, first year of the analysis, the average value was R\$ 446,699.28, decreasing in 2011 and 2012, rising again in 2013 and 2014 and reaching R\$ 509,153.25 in 2015. In 2016, the average value decreased again and then, in 2017, it reached the highest average value in the period, equivalent to R\$ 510,698.47.

As for the average percentage of intangibles in relation to total assets, it is possible to verify that there were no major fluctuations. The average percentage, equivalent to 6% in 2010, remained like that until 2012, when it then decreased to 5%. It increased again to 6% in 2013 and remained stable until 2017, last year of the analysis, when it decreased again to 5%.

The average percentage of the period (6%) is lower than the one found by Ritta *et al.* (2010), who investigated the representativeness of intangibles in the total assets of a group of companies that presented financial information to BM & F Bovespa and NYSE, in the years 2006 and 2007, and that obtained an average representativeness index equivalent to 12%. It is also inferior to the found by Medrado *et al.* (2016), who analyzed a set of companies participating in the IBrX 100 index of BM & F Bovespa over the period 2008 - 2014 and found an average percentage of 15.89%, still lower than the one from Moura *et al.* (2018), who investigated a sample of publicly-held companies listed on B3, in the period from 2010 to 2016, and found that the proportion of intangibles, in general, was equivalent to approximately 12% of total assets.

It is important to note that the difference in results may be due to the criteria for the formation of the sample, however, when comparing the results, it appears that the family businesses in the sample had lower average percentages of intangible assets than those identified in other types of samples. Thus, we believe that family businesses tend to be more conservative about this type of investment.

In order to check if there were statistically significant differences between the performance of the group of companies that had a higher proportion of intangibles in total assets and the group with lower proportions, the t-test has been calculated. The result is shown in Table 2.

Table 2

**Averages test for performance associated with family companies that had higher and lower percentages of intangible assets**

PERIOD	ROA		T-test		ROE		T-test	
	> Intang	< Intang	t	Sig	> Intang	< Intang	t	Sig
<b>2010</b>	8.77	6.54	1.43	0.15	16.92	14.69	0.85	0.40
<b>2011</b>	7.39	6.16	1.17	0.24	15.31	12.54	1.37	0.17
<b>2012</b>	7.58	5.49	1.58	0.12	13.88	10.66	1.36	0.17
<b>2013</b>	6.35	8.07	-1.09	0.27	13.30	13.54	-0.09	0.93
<b>2014</b>	6.49	7.01	-0.35	0.72	12.19	12.93	-0.30	0.77
<b>2015</b>	6.63	6.57	0.04	0.97	14.68	14.71	-0.01	0.99
<b>2016</b>	6.62	7.48	-0.43	0.66	15.40	12.14	1.10	0.27
<b>2017</b>	6.53	7.38	-0.54	0.59	14.34	14.29	0.02	0.99
<b>2010-2017</b>	<b>7.04</b>	<b>6.85</b>	<b>0.36</b>	<b>0.72</b>	<b>14.51</b>	<b>13.18</b>	<b>1.37</b>	<b>0.17</b>

Source: Research data.

With regard to the general average for the period from 2010 to 2017, Table 2 shows that the group of family companies that had the highest percentage of intangible assets stood out with the highest ROA (7.04) and ROE (14, 51) averages. However, t-test results demonstrate that such differences in means are not statistically significant between the two groups.

Specifically in relation to ROA, it is possible to notice that, despite the general average being higher in the group with the highest percentage of intangibles, in four of the eight years analyzed, that is, in 2013, 2014, 2016 and 2017, ROA averages were higher than the one with the lowest percentage of intangibles. So, in the investigated period, the ROA of one group was not superior to the ROA of the other in a constant way or significantly.

In the case of ROE, in the period from 2010 to 2012 the averages were higher in the group with the highest percentage of intangibles between 2013 and 2015, the averages were lower in this group and from 2016 to 2017 they were high again. So once again, one group did not outperform the other steadily and significantly.

Thus, in relation to performance, the results were similar to those found by Carvalho *et al.* (2010), who investigated 228 publicly traded Bovespa companies from 1996 to 2007, noting that the companies' intangible assets did not contribute to a superior and persistent performance. The results are also aligned with those of St-Pierre and Audet (2011), who researched 267 small and medium-sized Canadian companies from 2000 to 2007, and found that not all types of intangibles influenced performance.

Equivalent findings have been elaborated by Nascimento *et al.* (2012) who surveyed twelve Brazilian companies in the telecommunications sector and five in the information technology sector in 2008 and also have not found superior performance in companies with greater investments in intangibles, and by Miranda *et al.* (2013), who analyzed 174 Brazilian companies, in the years 2008 and 2009, whose results indicated that investments in intangibles were not related to performance, only to market value.

These authors report that, in Brazil, the majority of publicly traded companies operate in sectors that are more intensive in tangible than intangible capital. In addition, there is still, in Brazilian companies, greater appreciation of tangibles and lower investments in intangibles, when comparing companies from other countries, such as the United States, which would justify why companies that have greater intangibility are not showing superior performance.

In order to check if there were statistically significant differences between the performance of the group of companies that had a higher proportion of intangibles in total assets and the group with lower proportions, the t-test has been calculated. Results are shown in Table 3.

Table 3

**Averages test for the market value, associated with family companies that had higher and lower percentages of intangible assets**

PERIOD	MTB		T-test		Q of Tobin		T-test	
	> Intang	< Intang	t	Sig	> Intang	< Intang	t	Sig
2010	2.07	1.43	1.57	0.12	1.05	0.67	2.91	<b>0.00</b>
2011	1.61	1.10	1.91	<b>0.06</b>	0.93	0.61	2.59	<b>0.01</b>
2012	1.92	1.22	2.19	<b>0.03</b>	1.11	0.68	2.82	<b>0.01</b>
2013	1.68	1.34	1.09	0.28	1.04	0.68	2.52	<b>0.01</b>
2014	1.59	1.06	2.10	<b>0.04</b>	0.95	0.59	3.08	<b>0.00</b>
2015	1.43	0.91	2.01	<b>0.05</b>	0.83	0.50	3.01	<b>0.00</b>
2016	1.07	0.62	2.08	<b>0.04</b>	0.73	0.48	2.16	<b>0.03</b>
2017	1.03	0.81	0.97	0.34	0.79	0.55	1.83	<b>0.07</b>
<b>2010-2017</b>	<b>1.55</b>	<b>1.06</b>	<b>4.73</b>	<b>0.00</b>	<b>0.93</b>	<b>0.59</b>	<b>7.30</b>	<b>0.00</b>

Source: Research data.

We can see in Table 3, in relation to the general average for the period 2010 to 2017, that once again the group of family companies that had the highest percentages of intangible assets stood out and presented the highest MTB average (1.55) and of Tobin's Q (0.93). However, for market value indicators, t-test results demonstrate that differences in means are statistically significant between the two groups, confirming that the market value is actually higher.

Specifically with regard to MTB, in addition to the highest overall average, the group with the highest percentages of intangibles had higher indicators in all years of the analyzed period, with the coefficients of the t-tests being significant in five of the eight years, confirming that the averages are superior.

As for Tobin's Q, the results were even more expressive, considering that the group with the highest percentages of intangibles had higher indicators and in the eight years the coefficients of the t-tests were significant, also confirming that the averages were higher.

Thus, again, the results are similar to those of Miranda *et al.* (2013), who also found that investments in intangibles were not related to performance, but that, on the other hand, they were related to the companies' market values. They are also aligned to those of Medrado *et al.* (2016), who researched a set of publicly-held companies of BM & FBovespa's IBrX 100 index from 2008 to 2014, and found a positive and significant association between the level of intangibility and the degree of appreciation of the shares.

These authors describe that the market values companies present among their characteristics investment in knowledge, brands, new technologies and other intangibles in general. According to Medrado *et al.* (2016), valuation comes from the perception that tangible assets, due to their availability in the market, produce the average return, while intangibles are responsible for generating an above average return.

Table 4 shows the results of the multivariate analysis (multiple linear regressions), which turned possible to verify the predictive power of intangibles in the performance and market value of the family companies in the sample.

Table 4

**Coefficients of the equation of influence of intangibles on the performance and market value of the sample companies**

<i>Variables</i>	<i>ROA</i>	<i>ROE</i>	<i>MTB</i>	<i>Q of Tobin</i>
(Constant)	<b>15.82*</b>	<b>18.18*</b>	<b>1.10**</b>	<b>0.37*</b>
Percent_Intang	0.07	0.14	<b>0.07**</b>	<b>0.05*</b>
Indebtedness	<b>9.13*</b>	<b>3.21**</b>	0.07	<b>0.72*</b>
GeneralLiq	<b>0.17***</b>	<b>0.62*</b>	0.03	<b>0.02**</b>
LogTam	<b>2.39*</b>	0.02	<b>0.40*</b>	<b>0.12*</b>
Growth	0.02	0.01	<b>0.02***</b>	<b>0.01*</b>
R2 Adjusted	0.20	0.13	0.20	0.24
F-Anova	<b>51.08*</b>	<b>7.75*</b>	<b>13.94*</b>	<b>61.20*</b>
VIF/Tolerance	< 10	< 10	< 10	< 10
Durbin Watson	1.82	1.79	1.93	1.93

\*Significant at 1%; \*\*Significant at 5%; \*\*\*Significant at 10%.

Source: research data.

In Table 4, we can see that the adjusted R<sup>2</sup> were between 13% and 24%, being similar to those registered in previous surveys of the same nature, such as that of Surroca *et al.* (2010), who showed regressions of R<sup>2</sup> of 11%, 15% and 23%; St-Pierre and Audet (2011), which were based on regressions of R<sup>2</sup> of 12%, 17% and 26%; and Barajas *et al.* (2017), which showed regression with an adjusted R<sup>2</sup> of 16%. Thus, the percentage explained by the independent variables can be considered acceptable.

The F-Anova tests were significant (0.01), that is, the set of independent variables indeed has an influence on the dependent variables. The results of the Durbin-Watson statistic, between 1.79 and 1.93, demonstrate that there are no problems of autocorrelation of the residues, since the value was close to two. Finally, we realize that the variance inflation factor (VIF) and Tolerance presented low values. Therefore, in this case, there is no problem of multicollinearity between the independent variables of the model. According to Hair Júnior, Anderson, Tatham & Black (2005), a VIF is considered high when it gets above ten.

It is also possible to see in Table 7 that the variable “Percent\_Intang”, which captures the percentage of intangible assets in the total assets of companies, presented positive coefficients in all models, however it was found to be statistically significant only in models referring to market value. So, these results indicate that intangible assets influence only a greater market value of family-owned companies, in line with the findings of Miranda *et al.* (2013) and Medrado *et al.* (2016), who also found a positive and significant association between the level of intangibility and the market value of companies.

All control variables showed positive coefficients and proved to be statistically significant in at least two models. In the case of the indebtedness variable, the coefficients were significant for Tobin's ROA, ROE and Q, confirming that indebtedness may have a disciplinary effect that contributes to improving companies' performance and market value, as described by authors such as Astawa *et al.* (2015) and Medrado *et al.* (2016).

With relation to liquidity, the coefficients were also significant for Tobin's ROA, ROE and Q, showing that greater liquidity signals superior skills in the use of resources, reflecting in better performance and higher market value (Arrighetti *et al.*, 2014).

As for size, the coefficients were significant for Tobin's ROA, MTB and Q, confirming that larger companies can exploit economies of scale, be more effective in their governance practices, withstand greater shares of uncertainty associated with their investments, better protect and, consequently, present better performance and greater market value (Arrighetti *et al.*, 2014; Medrado *et al.*, 2016).

Finally, with regard to the growth variable, the coefficients were significant only for MTB and Tobin's Q, indicating that the growth of total assets influences only a higher market value (Arrighetti *et al.*, 2014; Astawa *et al.*, 2015).

## 5 CONCLUSIONS

This study aimed to verify the influence of intangible assets on the performance and market value of family owned companies. To this end, a descriptive, documentary and quantitative research has been carried out on a sample composed only of family-owned public companies that are listed on B3. Data have been obtained at the Economática database and refer to the period from 2010 to 2017. In order to identify family companies, the chain of ownership was traced to identify the last controlling shareholder. In relation to intangible assets, the percentage of intangibles in relation to total assets has been calculated for each company and each year. Performance has been analyzed using ROA and ROE indicators and market value using Tobin's Q and *market-to-book* (MTB) indicators.

Intangible assets were equivalent to approximately 6% of the total assets of family companies in the period. This average percentage is lower than the found by other researchers, such as Ritta *et al.* (2010), Moura *et al.* (2013) and Medrado *et al.* (2016), who have not specifically looked at family owned companies. The difference in results may be due to the criteria of formation of the samples, however the results indicate that the family companies in the sample had average percentages of intangible assets lower than those identified in other types of sample.

Regarding the performance of the group of companies that had a higher proportion of intangibles in total assets and the performance of the group with lower proportions of intangibles, it was verified, by means of t-test, that the differences between the two groups were not statistically significant. Therefore, the results were similar to those of Carvalho *et al.* (2010), St-Pierre and Audet (2011), Nascimento *et al.* (2012) and Miranda *et al.* (2013), who also have not found differences in the performance of companies with higher and lower investments in intangibles.

A justification for companies that have greater intangibility for not showing superior performance, according to the described authors, would be that in Brazil the majority of publicly traded companies operate in sectors that are more intensive in tangible than in intangible capital. Moreover, there is still, on the part of Brazilian companies, greater appreciation of tangible assets, when compared with companies from other countries, such as the United States, for example.

As for the market value, we found that the group of family companies that had the highest percentage of intangible assets stood out and presented the highest MTB and Q average of Tobin, in all years. The t-test results demonstrated that the differences in the means were statistically significant and that the market value was actually higher in the group that had higher percentages of intangibles. The results are similar to those of Miranda *et al.* (2013) and Medrado *et al.* (2016), who also found higher market value among companies that had higher percentages of intangibles.

Miranda *et al.* (2013) and Medrado *et al.* (2016) describe that market values companies that present, among their characteristics, investment in knowledge, brands, new technologies and other intangibles in general. According to Medrado *et al.* (2016), the valuation results from the perception that tangible assets, due to their availability in the market, produce the return by the average, while intangibles are responsible for generating a return above the average.

Linked to the main objective of the study, we found that the variable "Percent\_Intang", which captures the percentage of intangible assets in the total assets of companies, presented positive coefficients in all models. However, we found it to be statistically significant only in

models referring to market value. Therefore, it is concluded that intangible assets influence only a greater market value of family-owned companies.

The results, in general, provide additional evidence on factors that influence the performance and market value of publicly-held companies. More specifically, they contribute to the literature related to family companies, providing empirical evidence related to the Brazilian scenario, which still lacks researches of this nature.

Despite scientific rigor and methodological care, the research has limitations. In order to identify the type of ownership structure, for example, we used the methodology of La Porta, Lopez-de-Silanes and Shleifer (1999). Thus, an ownership structure has been considered familiar when the last controlling shareholder had a minimum percentage of 10% of the voting rights. This percentage, according to the authors, may be considered enough to gain effective control of a company. However, some authors, in a more conservative way, use other higher percentages, such as, for example, King and Santor (2008), Pukthuanthong, Walker and Thiengtham (2013), Schmid (2013) and Leung, Richardson and Jaggi (2014), who have considered a minimum percentage of 20%. Others used a minimum percentage of 50%, it is the case of Chernykh (2008) and Steijvers and Voordeckers (2009). These alternatives may be taken into consideration in future research.

We also recommend expanding the research universe, such as including privately held family companies. It would also be interesting employing other periods of time and conducting investigations by economic sector. Despite the limitations of this study, the researched topic is relevant and does not invalidate the results obtained, which can serve as a reference for further studies, mainly by the application of new techniques.

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