X ENCONTRO DE ESTUDOS EM ESTRATÉGIA - 3Es 2023
São Paulo - 16 - 18 de mai de 2023
2177-2452 - versão online

The Effect of Innovation and Strategic Resources on Capital Structure

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Agradecimentos
"This study was financed in part by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - Brasil (CAPES) - Finance Code 001".

Resumo
This research aimed to identify the effect produced by the interaction of a strategy based on innovation and strategic resources on companies’ capital structure. Three strategic resources were observed: organizational capital, knowledge capital and intangible capital. The study assumed that companies with a strategy based on innovation and organizational capital, knowledge capital or intangible capital have fewer financial constraints. In addition, the key talent of the companies can dispute the residual cash flow with the shareholders, and the shareholders may prefer that the projects be financed by debt, which has more rigorous governance mechanisms. Additionally, there are agency problems between the company's key talents and shareholders, also causing the latter to prefer debt-based financing. The sample included American companies listed on either the NYSE, NASDAQ or AMEXX, covering 3,628 firms from 2008 to 2018. The results of this study confirm the three hypotheses proposed in this work. That is, the traditionally negative relationship between innovation-based strategy and financial leverage significantly decreases in the presence of organizational capital, knowledge capital, or intangible capital. Thus, this paper shows that a strategy based on innovation with any of these strategic resources indicates an increase in the financial leverage of the firm.

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ABSTRACT

This research aimed to identify the effect produced by the interaction of a strategy based on innovation and strategic resources on companies' capital structure. Three strategic resources were observed: organizational capital, knowledge capital and intangible capital. The study assumed that companies with a strategy based on innovation and organizational capital, knowledge capital or intangible capital have fewer financial constraints. In addition, the key talent of the companies can dispute the residual cash flow with the shareholders, and the shareholders may prefer that the projects be financed by debt, which has more rigorous governance mechanisms. Additionally, there are agency problems between the company's key talents and shareholders, also causing the latter to prefer debt-based financing. The sample included American companies listed on either the NYSE, NASDAQ or AMEXX, covering 3,628 firms from 2008 to 2018. The results of this study confirm the three hypotheses proposed in this work. That is, the traditionally negative relationship between innovation-based strategy and financial leverage significantly decreases in the presence of organizational capital, knowledge capital, or intangible capital. Thus, this paper shows that a strategy based on innovation with any of these strategic resources indicates an increase in the financial leverage of the firm.

Keywords: Innovation-Based Strategy; Capital structure; Resource-Based View; Organizational Capital; Knowledge Capital; Intangible Capital.

1. Introduction

A firm's innovation-based strategy (IBS) is important in defining its financing policy. A company that adopts an IBS is one that has a greater intensity of investment in R&D than its sector rivals. (O'Brien, 2003). In turn, the financing policy is reflected in the leverage (equity and debt capital ratio) used by companies to finance their assets (Graham & Leary, 2011). The literature identifies the association of leverage in IBSs (e.g., Mina and Lahr, 2015). However, following the results of a causality analysis, and based on the "Granger-Causality" approach (Bartoloni, 2013), the discussion has been extended to include the association between IBS (cause) and leverage (effect). The results indicate a negative association between IBS and leverage. (Atanassov, 2015; Bah & Dumontier, 2001; Elkemali et al., 2013; Min & Smyth, 2016; O'Brien, 2003; Wang & Thornhill, 2010; Yuke & Xiaomin, 2015). In short, a company with a strategy based on innovation should adopt a financing policy with lower leverage.

However, we believe that this analysis of the relationship between a company's strategy and its leverage is incomplete and deserves further study, as most studies in the literature do not consider the effect of firms' strategic resources. It is necessary to understand organizational, knowledge and intangible capital by strategic resources (Eisfeldt & Papanikolaou, 2013; Peters & Taylor, 2017; Prescott & Visscher, 1980). The literature shows some positive effects of the presence of strategic resources on the efficiency of companies (Chen & Inklaar, 2016; Eisfeldt &

Papanikolaou, 2013; Hasan & Cheung, 2018; Lev et al., 2009), in increasing the productivity of companies (Barlevy, 2007; Baumann & Kritikos, 2016; Doraszelski & Jaumandreu, 2013; Li & Hou, 2019; Lööf & Heshmati, 2002), and on the competitive advantage of firms (Bryant, 2003). Therefore, a company with a strategy based on innovation and endowed with strategic resources is less likely to incur risk to the business and, consequently, has greater ease in obtaining loans. This means that the joint effect of an IBS and strategic resources would be one of greater leverage. Therefore, since strategic resources are not considered in the literature, we question the previously expressed negative association between IBS and leverage.

Considering this, we pose the question: “when do firms with an IBS structure a financing policy with greater leverage?” This study aims to show that the greatest leverage occurs when firms with a strategy based on innovation are endowed with strategic resources. In other words, firms with both an IBS and strategic resources (organizational capital, knowledge capital and intangible capital) are able to adopt a more leveraged capital structure. A study was carried out in this regard with US firms that are listed on the main American stock exchanges (The New York Stock Exchange (NYSE), NASDAQ Stock Market (NASDAQ) and American Stock Exchange (AMEX)), reaching a total of 3,628 firms. The period analyzed ranges from 2008 to 2018 for a total of 39,908 company-year observations, initially. The period was chosen to address the decade prior to the effects of the COVID-19 pandemic, considering that the first news of the virus emerged in China in late 2019.

The present work contributes to the literature by exploring a previously unaddressed point. We show that the presence of the three types of strategic resources identified in this research changes the leverage logic for companies with an IBS. On the one hand, the literature provides evidence of a negative relationship between leverage and the adoption of an IBS (for example, Brown et al., 2009; Hall, 2002; Min & Smyth, 2016; O’Brien, 2003; Yuke & Xiaomin, 2015), yet we still show that the insertion of these strategic resources reveals a positive relationship between leverage and an IBS. Regarding the practical contribution of this work, we highlight the fact that managers can borrow to finance the innovation-based strategy when the three types of strategic resources are present (organizational capital, knowledge capital and intangible capital).

2. Theoretical Framework and Development of Hypotheses

2.1. Capital Structure and Innovation

The literature on innovation financing has evolved considerably since the 1980s (Padilla-Ospina et al., 2018). Based on this literature, the present work is developed on the grounds of the definition of two concepts central to this research: IBS and leverage. Therefore, we follow the definition of O'Brien (2003), which points out that a company that adopts an IBS is one that has a greater intensity of investment in R&D than its sector rivals. That is, considering its peers, such a company would stand out in terms of R&D investment intensity. R&D investment intensity is defined as a firm's R&D expenditures divided by its total revenue. Therefore, companies that adopt an IBS would be those that stand out in their sector in terms of their ratio of R&D spending to total revenue. The second concept, leverage, comes from a company's capital structure. More specifically, the leverage (or indebtedness) ratio is the proportion between how much of the company is financed with debt capital (third-party resources) and how much is financed with equity (resources from partners or shareholders) (Graham & Leary, 2011).

The debate involving the relationship between IBS and leverage is not new. The association between these concepts is explored in different ways in the literature. While some studies have tested whether leverage explains IBS (e.g., Mina & Lahr, 2015), others have tested a reasoning that reverses the cause and effect logic of this association; that is, that IBS explains leverage (e.g., Elkemali et al., 2013). This same reversal of causality is found in studies that deal with the association of capital structure and company strategy. However, the results of a causality analysis based on the Granger causality approach support the view that a portion of a company's leverage is caused by innovation and not the other way around (Bartoloni, 2013). Therefore, following the literature, this article advances the idea that innovation-based strategy explains leverage.

In general, the literature points to a negative association between an IBS and the level of financial leverage of firms. Empirical evidence of the association of the two concepts was first presented in the 1990s and continued onward (O'Brien, 2003). Before that, Long and Maltiz (1985), for example, argued that investments in R&D create intangible assets that are likely to suffer from market failures (i.e., they cannot be efficiently traded in the open market), and therefore, they cannot serve as effective collateral to sustain a high level of debt. Along these lines, empirical studies show a negative association between innovation and leverage Bah & Dumontier, 2001; Elkemali et al., 2013; Min & Smyth, 2016; O'Brien, 2003; Wang & Thornhill, 2010; Yuke & Xiaomin, 2015) for companies of different sizes (Chen et al., 2010). Most studies posit a negative linear association between innovation and leverage, but there are also studies showing nonlinear associations (Aghion et al., 2004; Bragoli et al., 2020; Wang & Thornhill, 2010). Therefore, there is empirical evidence that supports a negative association between innovation and the financial leverage of firms.

2.2. Innovation, Leverage and Strategic Resources

The studies mentioned above assess the relationship between leverage and IBS from different perspectives. However, those studies do not consider the effect of firms' strategic resources (organizational capital, knowledge capital and intangible capital) on this association. Bearing in mind that the development of an IBS requires strategic resources (Barney, 1991; de Faria et al., 2019), it is important to account for such resources when analyzing, in firms, the relationship between financial leverage and innovation-based strategy. This is based on the idea that the strategic resources of firms generate several types of benefits. For example, a greater availability of organizational capital is associated with a greater efficiency of firms (Chen & Inklaar, 2016; Hasan & Cheung, 2018). Greater knowledge capital, on the other hand, is positively associated with increased company productivity (Baumann & Kritikos, 2016; Li & Hou, 2019), and greater intangible capital gives a competitive advantage to firms (Bryant, 2003). Thus, greater strategic resources can create better conditions for businesses so that they would have less difficulty paying debt. In this way, companies with an IBS that possess these strategic resources may face less difficulty in obtaining debt to finance their innovation, thus increasing their financial leverage.

2.3. Organizational Capital, Knowledge Capital, and Intangible Capital

Theoretical and empirical studies both emphasize the role of companies' resources and capabilities in achieving sustainable competitive advantage (Bryant, 2003; de Faria et al., 2019). Among these resources and capabilities, organizational capital (OC) has gained momentum in business and economic studies (Kaplan & Norton, 2004). OC is the most important intangible asset incorporated into a company's organizational structure and technological infrastructure, as it facilitates the flow of knowledge to improve the firm's operational efficiency (Lev et al., 2009).

In the present work, in line with Eisfeldt & Papanikolaou (2013) and Prescott & Visscher (1980), OC is seen as a partially company-specific set of resources. From this perspective, OC is embedded in highly specialized labor and is therefore distinct from physical capital. Examples of these talents are found in the administrative and technical departments of companies. To the extent that these talents may leave the company, this aspect of organizational capital is considered mobile. On the other hand, the efficiency of organizational capital is specific to the company, as it involves a set of resources that is greater than its human capital, including historical dependence, causal ambiguity and social complexity (Barney, 1991).

In addition to organizational capital, another resource that has recently gained prominence in the literature is knowledge capital (KC). Several studies have defined KC in diverse ways. For example, KC can be considered the product of innovation as measured by the percentage of innovation sales in relation to total sales (Lööf & Heshmati, 2002). However, this study acknowledges that a given innovation will hardly be representative of all the company's technical knowledge, which includes other innovations that are under development and have not yet reached the market. Thus, this study agrees with the definition stating that a company's current technical knowledge is determined by its current and previous investments in research and development (Griliches, 1979). In practice, observed R&D expenditures are used to construct a proxy for a company's state of knowledge (Griliches, 1979). Hence, in this research, KC is defined as the stock of investment in research and development (Peters & Taylor, 2017), and the concept is better detailed in the methodology section of this work.

Intangible capital (IC), on the other hand, was initially approached in the literature as different comprising specific types of expenses related to R&D activities, but this concept has progressively been framed in more sophisticated aspects, like human capital and organizational capital. However, relevant research has yet to develop a commonly accepted definition of IC (Venieris et al., 2015).

Considering that intangible assets are sources of future economic benefits that lack a physical incorporation (Lev et al., 2009), in this research, we follow Peters and Taylor (2017) and define intangible capital as the sum of the organizational capital (W. Chen & Inklaar, 2016; Eisfeldt & Papanikolaou, 2013; Hasan & Cheung, 2018; Lev et al., 2009; Tronconi & Vittucci Marzetti, 2011) and the knowledge capital of companies (Barlevy, 2007; Baumann & Kritikos, 2016; Doraszelski & Jaumandreu, 2013; X. Li & Hou, 2019; Peters & Taylor, 2017).

2.4. Hypothesis Development

Since the literature exposes a negative correlation between leverage and IBS (for example, Brown et al., 2009; Hall, 2002; Min and Smyth, 2016; O'Brien, 2003; Yuke and Xiaomin, 2015) and claims that the development of an IBS requires specific resources (Barney, 1991; de Faria et al., 2019), this study intends to identify the effect on the capital structure of companies that arises from the interaction between an IBS and strategic resources. From this perspective, three strategic resources were observed: OC, KC and IC.

Regarding these strategic resources, the literature highlights that OC has a strong positive effect on the efficiency of companies (Chen & Inklaar, 2016; Eisfeldt & Papanikolaou, 2013; Hasan & Cheung, 2018; Lev et al., 2009) and that KC has a strong positive effect on increasing the productivity of companies (Barlevy, 2007; Baumann & Kritikos, 2016; Doraszelski &

Jaumandreu, 2013; Li & Hou, 2019; Lööf & Heshmati, 2002). In addition, the literature points out that IC has a strong influence on the composition of companies' competitive advantage (Bryant, 2003). It was also observed that these resources contribute to increasing the value of companies (Chen & Inklaar, 2016; X. Li & Hou, 2019) and to higher returns on capital (Doraszelski & Jaumandreu, 2013; Eisfeldt & Papanikolaou, 2013).

Bearing that in mind, this study assumes that, even when innovative companies suffer from financial constraints, the positive effects of these three types of resources can overcome or mitigate such constraints. In this sense, the present study assumes that companies with both an IBS (as defined in O'Brien (2003)) and the resources of OC, KC or IC) have fewer financial restrictions regarding the achievement of higher leverage.

Furthermore, investment in these resources (OC, KC, and IC) reflects the expenses of hiring, training, and maintaining the salaries of the main talents in the company (Prescott & Visscher, 1980). As previously mentioned, in practice, most investments in R&D are destined to pay the salary of highly technically qualified talent. To the extent that this knowledge is tacit, it is embedded in the human capital of employees and is therefore lost if they leave the company (Hall, 2002). As a result, the costs of adjusting KC are greater than those of adjusting physical capital, given that the former generally requires the replacement of highly trained employees (Brown et al., 2009).

Thus, as with OC (Eisfeldt & Papanikolaou, 2013; Prescott & Visscher, 1980), both KC and IC can also be seen as being partially company-specific sets of resources. On the one hand, they are mobile resources because part of the company's intangible capital is embedded in its talents, and it is possible that these talents might leave the company. On the other hand, the technology developed by its IC (knowledge that is mostly organizational) is specific to the company, as it involves a set of resources greater that are than its human capital, as they involve historical dependence, causal ambiguity and social complexity (Barney, 1991; Tronconi & Vittucci Marzetti, 2011).

If, on the one hand, these talents contribute to increasing productivity, innovation, and overall company value, then on the other hand, they can demand higher remuneration when the market is more favorable to them. This can occur as a response from a key-talent employee when faced with a scenario where he or she considers leaving the company because the value of an external option exceeds that of his or her option to stay with the current company. In this sense, this would be a harmful scenario for a firm since the departure of qualified inventors is associated with a subsequent decline in the company's innovation activity (Bernstein et al., 2012). Since the departure of highly specialized technical talent can delay or even disrupt the flow of research and development, shareholders should consider offering higher compensation to these types of employees to induce them to stay in the company. In this way, a company's key-talents would reduce the firm’s residual cash flows as those employees would earn higher rewards (Eisfeldt & Papanikolaou, 2013). In this sense, top technical talent and shareholders have a joint claim to the cash flows produced by the firm. The financing of this demand can be accomplished through the injection of equity (shareholders’ money) or third-party capital (acquiring more debt). Considering that the cost of equity capital is often higher than the cost of debt capital (Jackson et al., 2013) and that the strategic resources (OC, KC, and IC) of companies with an IBS can reduce the firm's risk and therefore their cost of debt, it would be reasonable to assume that such firms would choose to meet the aforementioned demand using debt financing (third-party capital) rather than by using equity.

Furthermore, the literature shows that incurring debt in R&D projects imposes cash flow obligations. The resulting increase to the threat of bankruptcy causes companies to persist until achieving satisfactory results. Thus, in the case of a company that uses debt to finance R&D projects that do not generate returns, the continuity of control over the developed knowledge and the salaries of the involved talent may depend on satisfactory cash returns. In case of failure, it is possible that this talent might develop a bad reputation in the job market and face fewer, or worse, future job opportunities. Therefore, the reason that debt is effective concerns the significant costs imposed by the increased risk of bankruptcy. Talent (technical or otherwise) that does not generate adequate returns faces hostile intervention and the loss of project/knowledge control or reduced employment prospects under debt governance, as bankruptcy (at the firm or project level) is a clear sign that they were unable to generate cash flows and meet obligations. In this way, the personal costs to the talent involved in these projects are significant (Choi et al., 2016).

On the other hand, in equity-financed projects, it is possible that the company's key-talents might overinvest in exploration and experimentation at the expense of shareholders without actually seeking to adequately engage in exploration that generates returns. In this case, the investment would be channeled by the talent that has an interest in promoting their own abilities. Since at least part of the knowledge generated is specific to human capital, this talent can transport the knowledge to other companies. From the shareholders' perspective, this agency problem creates a dilemma, as it is difficult to differentiate between managers who genuinely seek to maximize the company's value and those who seek to learn and promote human capital at the company’s expense (Choi et al., 2016). In this sense, debt provides a potential solution to these problems by linking talent to the company and ensuring that talent engages in exploration meant to meet cash flow obligations (Choi et al., 2016).

Thus, since (i) this study assumes that companies with an IBS and OC, KC or IC resources have fewer financial constraints, (ii) the companies' key-talents can compete with shareholders for residual cash flow and, from this perspective, shareholders may prefer that projects are financed by debt as it has more rigorous governance mechanisms, and (iii) there are agency problems between key talents of the company and its shareholders, this study proposes the following hypotheses:

H_1 – Companies with an IBS and OC stock have greater leverage.

H_2 – Companies with an IBS and KC stock have greater leverage.

H_3 – Companies with ab IBS and IC stock have greater leverage.

3. Methodology

This chapter details the criterion used to select a sample to test the study's hypotheses, as well as explains the methodology used to handle the main variables used in this study, such as IBS, OC, KC, and IC. This chapter also details the industry classifications used to ensure the robustness and comparability (with other studies) of the results presented here. The multiple linear regression models used in the study are also described, as well as the control variables.

3.1. Sample

The Capital IQ database was chosen as the data source of the accounting-financial and general data compiled for our sample. We selected our sample from US companies listed on the main American stock exchanges (The New York Stock Exchange (NYSE), NASDAQ Stock Market (NASDAQ) and American Stock Exchange (AMEX)), resulting in a total of 3,628 firms. The period analyzed ranges from 2008 to 2018 for a total of 39,908 initial firm-year observations. The chosen period spans a full decade without including effects of the COVID-19 pandemic, as the first news of the virus emerged in China in late 2019. Accounting data refer to the end of each company's fiscal period. Furthermore, the sample does not include investment funds listed on those stock exchanges.

Following Leary and Roberts (2010), we excluded firms with capital structures governed by regulation, firms in the financial sector (Standard Industrial Classification (SIC) codes 6000-6999) and those in the utilities sector (SIC codes 4900-4999). Companies with an invalid classification industry code (SIC codes 9900-9999) were also excluded from the sample. This last group (SIC 9900-9999) consisted mostly of companies formed with the goal of carrying out mergers, asset acquisitions, stock purchases, reorganizations or combining companies with diversified businesses. The companies in this last group (SIC 9900-9999) had no relevant operational activity. In addition, we also follow Peters and Taylor (2017), as well as following the standard in the intangible capital literature, and exclude from our sample any observations with missing data on Total Assets and Revenues or with less than 5 million US dollars in Net Fixed Asset. This resulted in a final number of 2,208 different firms within the period from 2008 to 2018 and a total of 19,081 firm-year observations. Full descriptive statistics are available in Table 4.

In addition, the final indicators used in the regressions were winsorized in the 1% tails (upper and lower). This winsorization is relevant to mitigate the effects caused by outliers and influential observations of the original sample.

3.2. Constructs (dependent and independent variables)

One objective of this research is to analyze the effect arising from OC, KC and IC in the presence of an IBS. Thus, this joint effect on firms' leverage is tested by using the approach developed by Eisfeldt and Papanikolaou (2013), with some adaptations, to define the constructs of (i) OC, (ii) KC, and (iii) IC.

Definition of constructs

The idea of measuring OC, KC, and IC in this study touches on the idea of stock, or, on how much of each of these three types of resources that firms have accumulated over the course of their existence up to a given moment. For OC, the base-variable of accumulation, taken from Eisfeldt and Papanikolaou (2013), is the category of Selling, General & Administrative Expense (SG&A) in a firm's Income Statement. Therefore, OC is defined here as the stock of resources invested in SG&A throughout the life of the firms. Similarly, the authors use Research and Development (R&D) expenses as the basis for defining KC. Thus, the present study, based on Eisfeldt and Papanikolaou (2013), uses the stock of resources invested in R&D by firms over the years as the KC variable. IC is defined as the sum of OC and KC. To consider the transitory aspects inherent to the life of firms, we consider a depreciation factor in these constructs that have such an accumulative structure.

Another key variable for the present study, R&D Intensity, is defined as in O'Brien (2003) as the ratio between R&D expenditures and the total amount of sales. The variable that is derived from this aspect is critical to the hypotheses of this study the IBS. Following O'Brien, IBS is defined in this paper as a firm's R&D Intensity divided by the R&D Intensity of that firm's sector.

Table 1 summarizes and simplifies the constructs mentioned above.

Table 1. Simplified summary of constructs

Variable	Formula
Organizational Capital (OC)	Accumulated and depreciated SG&A expenses
Knowledge Capital (KC)	Accumulated and depreciated R&D expenses
Intangible Capital (IC)	Organizational Capital + Knowledge Capital
R&D Intensity	$\frac{\text{R\&D Expenses}}{\text{Total Revenue}}$
Innovation-Based Strategy (IBS)	$\frac{\text{Firm's R\&D Intensity}}{\text{Sector's R\&D Intensity}}$

The following subsections detail in greater depth the methodology behind the constructs defined above.

3.2.1 Construction of the Organizational Capital (OC) Proxy

The main idea behind OC is that the SG&A accounting item includes all commercial operating expenses used in the construction of operating profit. The idea of using SG&A in the construction of OC is based on the argument of Lev and Radhakrishnan (2005) that claims that there is a portion of labor expenses that cannot be directly attributed to any production unit. Thus, this disassociation causes part of this expense flow to be directed toward the construction of the firm's OC. In addition, Eisfeldt and Papanikolaou (2013) argue that a large part of SG&A is made up of information technology (IT) and employee expenses (training, consulting, and salaries, among others). Therefore, the expenditures in this accounting line (SG&A) can be reflected in employee incentives, distribution systems, communication systems and other OC resources (see Eisfeldt and Papanikolaou, 2013; Lev and Radhakrishnan, 2005).

Like Eisfeldt and Papanikolaou (2013), we use the idea of the OC stock being equal to the accumulated and deflated value of SG&A, as defined by Equation 1 below:

$$OC(1-\ \delta_0)*OC_{i,t-1}+\frac{SG\&A_{i,t}}{cpi_t}, \tag{1}$$

where $OC_{i,t}$ refers to the amount of OC stock of firm *i* at time *t*;
δ_0 refers to the depreciation rate;
$SG\&A_{i,t}$ refers to the amount spent on SG&A expenses by firm *i* at time *t;* and
cpi refers to the consumer price index.

Since this proxy construction refers to the value of a stock of OC, an initial stock value as a starting point must exist. In this sense, determining the value of OC in the initial period is essential, since in Equation 1, there is a term that multiplies by the organizational capital from the previous period. To accomplish that, the equation detailing the initial OC stock and the insertion of a depreciation rate (δ0) are defined below. Nonetheless, following the model of Eisfeldt and Papanikolaou (2013), the initial OC stock of each company is defined in Equation 2:

$$OC_{i,t_0}=\frac{SG\&A_{i,t_0}}{g_i+\delta_0}, \tag{2}$$

where OC_{i,t_0} refers to the amount of initial OC stock of firm *i*;
$SG\&A_{i,t_0}$ refers to the amount spent on SG&A expenses by firm *i* at the initial moment (first observation of the sample);
g refers to the average annual growth rate of SG&A Expenses of firm *i* in the sample; and
δ_0 refers to the depreciation rate.

Following Eisfeldt and Papanikolaou (2013), we used a depreciation rate of 15% in both equations. The measure of OC above has been validated in several ways, as in Bloom and Van Reenen (2007), Eisfeldt and Papanikolaou (2013), Nicholas Bloom et al. (2012), and Tronconi and Vittucci Marzetti (2011).

3.2.2 Construction of the Knowledge Capital Proxy

KC is the base variable used to test H_2 and, indirectly, H_3. Like OC, KC cannot be extracted directly from a balance sheet line, as it is not directly accounted for in assets. Even when considering M&A context, accounting numbers can only refer to external acquisition of IC – therefore not considering part of the human capital value. However, in cases where the firm develops human capital through training or knowledge management, for example, this value is included in the SG&A expense (captured in this model, therefore, as OC). Knowledge, patent, or software development expenses are accounted for as R&D expenses in an income statement and are rarely accounted for in a firm's assets on a balance sheet. The controversy in accounting for R&D expenses relies on the issue of these expenses not including all the defining characteristics of an asset (see Kieso et al., 2019).

In this context, the present research uses a proxy for KC borrowed from Peters and Taylor (2017), who claim that a firm builds KC through R&D spending. The same idea as used in constructing the stock of OC (Eisfeldt & Papanikolaou, 2013) is used by the authors in the construction of the KC stock. However, instead of the central marker being SG&A expense, the construction is accomplished using R&D expense. Therefore, the equations used are similar and given as follows:

$$KC_{i,t} = (1 - \delta_0) * KC_{i,t-1} + \frac{R\&D_{i,t}}{cpi_t}, \quad (3)$$

where $KC_{i,t}$ se refers to the amount of KC stock of firm *i* at time *t*;
δ_0 refers to the depreciation rate;
$R\&D_{i,t}$ refers to the amount of R&D expenses incurred by firm *i* at time *t;* and
cpi refers to the consumer price index.

As in the case of the OC equation, we need a value for initial KC stock so that the values can follow the proposed logic. The same solution is used, generating Equation 4:

$$KC_{i,t_0} = \frac{R\&D_{i,t_0}}{g_i + \delta_0}, \quad (4)$$

where KC_{i,t_0} refers to the amount of initial KC stock of firm *i*;

$R\&D_{i,t_0}$ refers to the amount of R&D expenses incurred by firm i at the initial time (first observation of the sample);
g refers to the average annual growth rate of R&D expenses of firm i in the sample; and
δ_0 refers to the depreciation rate.

In the present study, we chose to use the depreciation rate of 15% for R&D in Equation 4, which is the most commonly used in other studies in the field according to Li and Hall (2020). The results of this study undergo virtually no change when tested at a 25% depreciation rate.

3.2.3 Construction of the Intangible Capital Proxy

For the construction of the IC variable, the methodology is simpler. IC is defined as the sum of the OC stock and the KC stock. Peters and Taylor (2017) use the same sum to define IC. Although an imperfect proxy, the authors' research showed robust results in the literature in several ways regarding the measurement of IC.

3.2.4 Construction of the Innovation-Based Strategy Proxy

The IBS component is also fundamental to testing the hypotheses of this work. In addition to the level of spending on R&D being fundamental in the construction of the KC and IC variables, its ratio to a company's sales is also used. This is termed R&D intensity and is, therefore, defined by dividing R&D expenditures by sales volume.

A time series analysis of this variable can show how much a particular company has been more (or less) willing to seek innovations to yield future gains. Furthermore, the measure can be expanded by comparing this indicator for each firm with that of other firms in the same sector. A new indicator is created by doing so. This new indicator represents a firm’s tendency to invest in innovation relative to the average of that tendency across its own sector. A high ratio to peers, thus, can be seen as an indicator of how well a company is positioning itself to compete in an innovative market. This indicator, then, represents how much a firm uses an IBS (O’Brien, 2003). Thus, like O'Brien, we establish that the IBS construct is defined by the intensity of a firm’s R&D relative to that of the sector itself. That is, the IBS is defined by the R&D intensity of a firm divided by the average R&D intensity of that firm’s sector. Therefore, this work considers that the importance of innovation in a firm's strategy is manifested not only in absolute terms but also in relation to its industry peers. The extent to which the firm adopts an IBS is one of the main variables in testing the hypotheses of this work.

To build this indicator, we first need data on firms' R&D expenditures. The Compustat database has a greater number of observations with complete data than the Capital IQ database. Thus, it was decided to use Compustat to gather the data for the indicator. In addition to a firms' R&D expenditure data, the R&D intensity variable was first created by dividing the amount spent on R&D by the sales value of each company (represented by the "Total Revenue" value found in the Capital IQ database). To determine the sector's R&D intensity, the same ratio was used but the value of the sum of the sectors' R&D expenditures (in both SIC or PMS classification) was used for the numerator, and the sum of the sales value of all companies in the sector (SIC or PMS) was used for the denominator. Thus, the IBS variable serves as a proxy for firms' relative R&D intensity. It is important to note that in our sample, no company is classified as participating in more than one industry (using both the SIC and the PMS approaches). This allows for greater identity consistency over time for better comparability. In the end, higher values in the IBS variable indicate that a firm invests more robustly in R&D than its competitors.

3.3 Definition of Industries (SIC and Pavitt-Miozzo-Soete)

As in any comparative study, it is important to define the parameters in such a way that companies can be compared (or not) to each other. In this sense, this research uses two industrial classifications, one that is more traditional in the literature (SIC codes) and another that is designed for innovation characteristics (Pavitt-Miozzo-Soete's taxonomy (Castaldi, 2009; Castellacci, 2008)).

The Standard Industry Classification (SIC) categorizes industries using a four-digit code. However, it also groups more specific industries into more general industry sets. In these cases, the number of digits progressively decreases from four digits (representing a more industry-specific classification) to just one digit in the code (representing a wider industrial classification). Considering that there are fewer companies in each group at the more specific level than there are at the broader levels, this research opted to use SIC codes with two digits to provide greater variance within the sample while still maintaining a relevant number of observations per category. In this way, it settled on forty-one different SIC industrial sets.

While the creation of this system is old (1937), nor is its last revision recent (1987), the SIC classification is interesting because of its wide use in the most diverse studies involving companies. The fact that it is a common and reasonably simple categorization facilitates the comparability of results among different surveys.

The second industrial classification used in this study comes from Pavitt's taxonomy (1984). This taxonomy was born from a rich database capturing key details of innovative activity. The author used a database from the University of Sussex on innovations in England from 1945 to 1979. This database covered approximately 2,000 innovations, including more than half of the products of the British manufacturing industry, a fact that ensures a considerable representation in time and space (Pavitt, 1984).

In the original 1984 work, Pavitt includes the entire taxonomy of services under the category “supplier dominated activities”. The fifth category included in Pavitt et al. (1989), “information intensive services”, still fails to provide greater categorical detail on services (Castaldi, 2009). Thus, Castaldi (2009) and Castellacci (2008) do not use this fifth category (from 1989) in gathering together the works of Pavitt (1984) and Miozzo and Soete (2001) to form a new, broader classification called the Pavitt-Miozzo- Soete (PMS). Thus, the new arrangement resulted in eight final categories for the PMS categorization. In summary, the later model contains the following categories (Castaldi, 2009; Castellacci, 2008):

Table 2. Industry categories by Pavitt-Miozzo-Soete (PMS)

Transformation industry	Service Industry
Science-based (SB)	Supplier Dominated Services (SDS)
Specialized suppliers (SS)	Scale-Intensive Physical Networks (PN)
Scale intensive (SI)	Scale-Intensive Information Networks (IN)
Supplier dominated (SD)	Knowledge Intensive Business Services (KIBS)

Source: Prepared by the authors.

The main database used in this study (Capital IQ) bases its central industry parameters on the SIC classification. Therefore, to arrange the companies according to the PMS categorization, we needed a transcription key between the SIC and PMS codes. The work of Capasso et al. (2015) presents a table in which the necessary transcription can be found, which is also used in the work of Castaldi (2009). Thus, we chose this model to define which PMS sector each company belongs to.

The present study therefore uses SIC sector classification and PMS categorization to test its hypotheses.

3.4 Regression Model

To analyze the hypotheses presented in this work, we use multiple linear regressions with panel data and winsorized data. The models were run twice, with the first instance using the SIC industrial classification and the second using the sector PMS classification. We followed Graham et al. (1998), who also used the leverage variable as a dependent variable, and we use the Tobit regression that censors negative values. This is a rational usage in that it avoids negative values for leverage.

In the case of the first hypothesis (H_1), the objective is to test the joint effect of IBS and OC on a firm's financial leverage. To that end, the linear regression model used is given in Equation 5:

$$Lev_{i,t} = \beta_0 + \beta_1 * \left(IBS_{i,t} * OC_{i,t}\right) + \beta_2 * IBS_{i,t} + \beta_3 * OC_{i,t} + \gamma X + \varepsilon_{i,t} \tag{5}$$

where $Lev_{i,t}$ refers to the proportion of financial leverage of firm *i* at time *t;*
$IBS_{i,t}$ refers to the proportion of how much firm *i* employs an IBS at time t*;*
$OC_{i,t}$ refers to the amount of OC stock of firm *I* at time *t*;
X is a vector of control variables.

For the second hypothesis (H_2), the aim is to test the combined effect of IBS and the firms' KC on the financial leverage of the firm. This is achieved by applying the linear regression model represented by Equation 6:

$$Lev_{i,t} = \beta_0 + \beta_1 * \left(IBS_{i,t} * KC_{i,t}\right) + \beta_2 * IBS_{i,t} + \beta_3 * KC_{i,t} + \gamma X + \varepsilon_{i,t} \tag{6}$$

where $Lev_{i,t}$ refers to the proportion of financial leverage of firm *i* at time *t;*
$IBS_{i,t}$ refers to the degree to which firm *i* employs an IBS at time t*;*
$KC_{i,t}$ refers to the amount of KC stock of firm *i* at time *t*;
X is a vector of control variables.

The third and final hypothesis (H_3) joins OC and KC into IC. The joint effect of the IBS and the company's IC on the firm's financial leverage is verified. The linear regression model based on Equation 7 depicts this test:

$$Lev_{i,t} = \beta_0 + \beta_1 * \left(IBS_{i,t} * IC_{i,t}\right) + \beta_2 * IBS_{i,t} + \beta_3 * IC_{i,t} + \gamma X + \varepsilon_{i,t} \tag{7}$$

where $Lev_{i,t}$ refers to the proportion of financial leverage of firm *i* at time *t;*
$IBS_{i,t}$ refers to the degree to which firm *i* employs an IBS at time *t;*
$IC_{i,t}$ refers to the amount of IC stock of firm i at time t;
X is a vector of control variables.

In defining the logic and the detailed metrics used for the central variables of this research, it is important aim for as accurate a result as possible. As the objective is to analyze the joint effect of an IBS with OC, KC, and IC on a firm's leverage level, it is essential to control for the effect of other variables that could also be correlated with the firm's financial leverage level. Thus, in the three linear regression models presented above, 'controls' refers to a set of variables designed to mitigate this problem. The control measures are firm size (Bragoli et al., 2016; Danis et al., 2014; O'Brien, 2003), firm profitability (Return On Assets, ROE) (Aghion et al., 2004; Bragoli et al., 2016; Danis et al., 2014; O'Brien, 2003), firm tangibility (Danis et al., 2014), firm capital intensity (O'Brien, 2003), sector profitability (ROE) (O'Brien, 2003) and the sector's market-to-book (O'Brien, 2003). It is noteworthy that although the literature indicates the effect of a firm's R&D intensity on leverage (O'Brien, 2003), it was decided not to use this variable as a control, as it is already reflected within the IBS variable. Below is a table presenting the description of all the variables used.

Table 3. Variables used in the models

Variable	Formula	Variable Type
Leverage	$\frac{\text{Total Liabilities}}{\text{Total Assets}}$	Dependent
Organizational Capital (OC)	$OC_{i,t} = (1 - \delta_0) * OC_{i,t-1} + \frac{SG\&A_{i,t}}{cpi_t}$	Independent
Knowledge Capital (KC)	$KC_{i,t} = (1 - \delta_0) * KC_{i,t-1} + \frac{R\&D_{i,t}}{cpi_t}$	Independent
Intangible Capital (IC)	Organizational Capital (OC) + Knowledge Capital (KC)	Independent
Innovation-Based Strategy (IBS)	$\frac{\text{Firm's R\&D Intensity}}{\text{Sector's R\&D Intensity}} = \frac{\frac{R\&D\ Expenditure_{firm}}{Total\ Revenue_{firm}}}{\frac{R\&D\ Expenditure_{sector}}{Total\ Revenue_{sector}}}$	Independent
Size	Natural logarithm (Total Assets)	Control
Profitability (ROE)	$\frac{\text{Net Income}}{\text{Total Equity}}$	Control
Tangibility	$\frac{\text{Net Fixed Assets}}{\text{Total Assets}}$	Control
Capital Intensity	$\frac{Total\ Assets}{\text{Total Revenue}}$	Control
Sector Profitability (ROE)	$\frac{\text{Net Income}_{Sector}}{\text{Total Equity}_{Sector}}$	Control

Sector Market-to-book	$\frac{\text{Market Value}_{Sector}}{\text{Total Assets}_{Sector}}$	Control

Note: prepared by the authors.

4 Analysis

Before proceeding to an analysis of multiple linear regressions meant to analyze leverage in firms using an IBS, table 4 below presents the descriptive statistics of the main base variables used to compose the indicators for the regressions.

Table 4. Descriptive Statistics

This table presents the means, medians, 1st and 3rd quartile values, minimum, maximum, standard deviation of the averages and the number of observations for each of the main variables of the study. Net tangibility is the value of net fixed assets divided by total assets. The values of SG&A and total revenue are also relativized by dividing them by total assets. The last column, N, refers to the number of observations for each item in the table. The other variables follow the same formulas and corresponding patterns as those in previous tables.

Variable	Mean	Median	Q1	Q3	Min	Max	Std. Dev.	N
Organizational Capital	0.71	0.47	0.22	0.92	0.02	4.18	0.01	18,868
Knowledge Capital	0.18	0.07	0.01	0.22	0.00	1.67	0.00	11,693
Intangible Capital	0.98	0.73	0.39	1.26	0.05	4.94	0.01	11,650
Total Debt	0.25	0.21	0.05	0.38	0.00	1.15	0.00	19,060
Leverage	0.55	0.52	0.35	0.69	0.07	1.68	0.00	19,081
ln(Size)	7.06	7.01	5.77	8.28	2.96	11.67	0.01	19,081
SG&A	0.22	0.15	0.08	0.29	0.01	1.10	0.00	18,859
R&D Intensity	0.33	0.03	0.00	0.12	0.00	13.01	0.01	11,608
Net Tangibility	0.26	0.18	0.09	0.37	0.01	0.91	0.00	18,887
Total Revenue	1.04	0.86	0.52	1.38	0.03	4.02	0.01	19,081
ROE	0.05	0.09	-0.02	0.18	-3.33	3.38	0.01	19,060

Note: prepared by the authors.

It is also relevant to note that in Table 4, the average of the OC stock is 71% of the companies' total assets. As expected, the numbers for this variable are comparatively higher than those for KC (average of 18%). Thus, it is interesting to note the importance of the proportion of OC to the total assets, mostly physical, that are recorded in the firm's balance sheet to contribute to the generation of cash flow. Added together, the value of the company's IC appears, on average (98%), almost as relevant (in size) as the company's entire total assets.

In relation to leverage as presented in Table 4, the mean and median values for leverage in table 4 are similar. As presented in the methodology chapter, leverage appears to be more heterogeneous when analyzed by industry than it is in the general overview of the sample. The following table provides further details for this analysis.

4.2 Effect of Strategic Resources and IBS on the Capital Structure

This section exposes the regressions used to evaluate the hypotheses proposed in this research. As the definition of one of the key variables (IBS) is based directly on the industrial classification, the use of two distinct types of categorizations (SIC and PMS) works to corroborate the robustness of the results. The variable that mostly aids in understanding H_1, H_2 and H_3 is the combination of IBS with each type of strategic capital (OC, KC, and IC). This moderating effect aims to explore the effects on leverage exerted by the joint presence of these two factors.

To choose the best method of grouping the data, the tests of Breusch and Pagan (1980) (Lagrange multiplier) for random effects and the test of Hausman (1978) were used, which together indicated that the use of random effects was the most appropriate method for all regressions used. Furthermore, the normality of the residuals did not present a problem in any regression.

Table 5. Tobit regressions of the joint effect of the IBS and strategic resources on leverage – SIC Industry

This table provides the results of 6 (six) censored Tobit regressions on the joint effect of IBS and strategic resources (OC, KC, and IC) on leverage (dependent variable). All variables follow the formulas and patterns previously mentioned. The symbols ***, ** and * denote statistical significance at 0.1%, 1% and 5%, respectively. Standard errors (in parentheses) are robust and grouped at the company level.

	(1) OC Without Controls	(2) OC With Controls	(3) KC Without Controls	(4) KC With Controls	(5) IC Without Controls	(6) IC With Controls
IBS	-0.002***	-0.001**	-0.002***	-0.001***	-0.002***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
OC	0.025***	0.045***				
	(0.005)	(0.005)				
IBS * OC	0.002***	0.002***				
	(0.000)	(0.000)				
ln(Size)		0.046***		0.047***		0.050***
		(0.002)		(0.002)		(0.002)
ROE		0.013		0.015*		0.013
		(0.007)		(0.007)		(0.007)
Capital Intensity		-0.002*		-0.007***		-0.003**
		(0.001)		(0.001)		(0.001)
Net Tangibility		0.217***		0.225***		0.219***
		(0.018)		(0.018)		(0.017)
ROE (Industry)		-0.188***		-0.173**		-0.179**
		(0.052)		(0.055)		(0.054)
Market-to-Book (Industry)		0.057***		0.034***		0.052***
		(0.009)		(0.009)		(0.009)
KC			0.017	0.106***		
			(0.016)	(0.018)		
IBS * KC			0.004***	0.003***		
			(0.001)	(0.001)		
IC					0.022***	0.049***
					(0.005)	(0.005)
IBS * IC					0.002***	0.002***
					(0.000)	(0.000)
Constant	0.503***	0.082***	0.517***	0.143***	0.498***	0.044*
	(0.004)	(0.022)	(0.004)	(0.020)	(0.005)	(0.022)
Observations	10,842	10,756	10,540	10,459	10,490	10,409
Pseudo R^2	0.037	0.354	0.057	0.442	0.066	0.446
Industry Dummy	No	Yes	No	Yes	No	Yes
Year Dummy	No	Yes	No	Yes	No	Yes

Robust standard errors are in parentheses
**** p<.001, ** p<.01, * p<.05*

Table 6. Tobit regressions of the joint effect of IBS and strategic resources on leverage – PMS Industry

This table provides the results of 6 (six) censored Tobit regressions of the joint effect of IBS and strategic resources (OC, KC, and IC) on leverage (dependent variable). All variables follow the formulas and patterns previously mentioned. The symbols ***, ** and * denote statistical significance at 0.1%, 1% and 5%, respectively. Standard errors (in parentheses) are robust and grouped at the company level.

	(1) OC Without Controls	(2) OC With Controls	(3) KC Without Controls	(4) KC With Controls	(5) IC Without Controls	(6) IC With Controls
IBS	-0.002***	-0.001**	-0.002***	-0.001***	-0.002***	-0.000*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
OC	0.016***	0.032***				
	(0.004)	(0.004)				
IBS * OC	0.003***	0.002***				
	(0.000)	(0.000)				
ln(Size)		0.044***		0.046***		0.049***
		(0.002)		(0.001)		(0.002)
ROE		0.011		0.013		0.011
		(0.007)		(0.007)		(0.007)
Capital Intensity		-0.004**		-0.007***		-0.004***
		(0.001)		(0.001)		(0.001)
Net Tangibility		0.233***		0.269***		0.263***
		(0.017)		(0.018)		(0.018)
ROE (Industry)		0.008		0.024		-0.034
		(0.064)		(0.066)		(0.066)
Market-to-Book (Industry)		0.015		0.011		0.012
		(0.034)		(0.035)		(0.035)
KC			0.036*	0.106***		
			(0.016)	(0.017)		
IBS * KC			0.004***	0.003***		
			(0.001)	(0.001)		
IC					0.026***	0.056***
					(0.005)	(0.005)
IBS * IC					0.002***	0.001***
					(0.000)	(0.000)
Constant	0.509***	0.116***	0.515***	0.172***	0.495***	0.064*
	(0.004)	(0.032)	(0.004)	(0.031)	(0.005)	(0.033)
Observations	11,383	11,293	10,494	10,413	10,444	10,363
Pseudo R^2	0.051	0.401	0.083	0.458	0.074	0.469
Industry Dummy	No	Yes	No	Yes	No	Yes
Year Dummy	No	Yes	No	Yes	No	Yes

Robust standard errors are in parentheses
**** p<.001, ** p<.01, * p<.05*

We note a remarkably high consistency between the results using each of the distinct types of sector/industry (SIC and PMS). For the main variables studied, the results showed strong statistical significance using both the PMS sector/industry and the SIC sector/industry. This further indicates robustness since the key-variable IBS compares the firm's R&D intensity with the same aggregate factor of the sector. Thus, sector occupies an important proportion in all regression results.

Together, Tables 5 and 6 demonstrate evidence to support H_1. The OC coefficients are positive and statistically significant, suggesting that the greater the stock of OC that a firm has, the greater its financial leverage. Because the regression has an interaction term, the OC coefficients also imply a positive relationship between leverage and OC when the IBS level is null (zero). In line with the literature (Atanassov, 2015; Bah & Dumontier, 2001; Brown et al., 2009; Hall, 2002; Min & Smyth, 2016; O'Brien, 2003; Yuke & Xiaomin, 2015), the IBS variable presents a negative coefficient in all regressions, demonstrating a trend in which the higher the IBS level of a firm is, the lower its leverage tends to be. In addition, the interaction variable, which is composed of the multiplication between OC and IBS, presented a positive significative coefficient in the regression. This set of signals from the three independent variables (OC, KC, and IC) contributes to H_1. This set says that although IBS alone indicates lower leverage, when combined with a stock of OC, leverage tends to be higher. That is, OC moderates the negative relationship between IBS and leverage so that this relationship weakens as OC increases. Thus, H_1 is confirmed.

H_2 and H_3 respectively deal with moderation related to KC and IC, and responses to these hypotheses are presented in Tables 5 and 6. Considering the resulting set of signs for the coefficients is the same as that regarding OC, we can reach similar conclusions. That is, both the coefficients of KC and of IC indicate a positive relationship between each one of those variables and leverage when the IBS level is null (zero). Furthermore, we can say that both KC and IC moderate (separately) the negative relationship between IBS and leverage in such a way that the relationships become weaker as these strategic resources increase (individually). Thus, H_2 and H_3 are confirmed.

Although the tables mostly present small coefficients in absolute values, their construction must be considered, especially the variable IBS. This indicator has in its denominator the sectors' R&D intensity, creating a ratio with the firms' R&D Intensity (numerator). Therefore, it makes sense that the effect on leverage would be proportionally small to an increase the level of IBS, as it cannot increase by one unit since the company is part of an industry. This means that an increase in the intensity of R&D of the firm would increase the sector's R&D intensity by the same amount.

5 Discussion and Final Considerations

This research aimed to identify the effect of the interaction between IBS and strategic resources on the capital structure of companies. To this end, we use three strategic resources: OC, KC, and IC. Considering this, this work proposed that strategic resources should be considered in firms' financing decisions.

Numerous studies use the resource-based view (RBV) as a background for their arguments and experiments. In this sense, the RBV literature brought aspects in need of consideration into the discussion of leverage for companies with an IBS in place. Whereas this view addresses the ability of strategic resources to cause, for example, sustainable competitive advantage (W. Chen & Inklaar, 2016; Doraszelski & Jaumandreu, 2013; Hasan & Cheung, 2018; Lev et al., 2009; X. Li & Hou, 2019), it would make sense to consider a lower business risk and consequent greater leverage capacity for firms.

Although several studies present evidence of a negative relationship between leverage and an IBS (Atanassov, 2015; Bah & Dumontier, 2001; Elkemali et al., 2013; Min & Smyth, 2016; O'Brien, 2003; Wang & Thornhill, 2010; Yuke & Xiaomin, 2015), we again emphasize that this literature does not consider the strategic resources addressed in the present study. Thus, as shown in this work, the correlation between leverage and the use of IBSs can be positive when including OC, KC, and IC in the consideration. These features are capable of mitigating risk and, therefore, making the procurement of loans more accessible. To this end, we can claim that OC brings more efficiency to companies (Hasan & Cheung, 2018; Lev et al., 2009), KC increases productivity (Barlevy, 2007; Li & Hou, 2019) and IC brings greater competitive advantage to firms (Bryant, 2003).

In addition, managers may be interested in considering financing their innovation through debt. In the case of managing a company with an IBS (i.e., a significant expenditure on R&D in relation to its revenue when compared to industry peers), strategic resources can be employed to aid in the financing of innovation with debt. Additionally, it may be interesting for managers to opt to use third-party capital due to the stricter governance mechanisms inherent in the use of debt. In this sense, there would be, in part, a dispute over the residual cash flow between the key-talents of the companies and its shareholders.

The results of this research are limited by a few points. First, this article used a database containing only US data and only considered a specific period. The differences in local characteristics around the world prevents a generalization of the results to companies in other countries. Thus, future research could replicate this study using a database with companies from countries other than the

United States of America. Second, another limitation is due to the COVID-19 pandemic limiting the period of data used in this work. With the changes in companies caused by the new reality of work (increase in work regimes that allow for remote work, for example) and possible new perceptions of risk and uncertainty in business, it would also be interesting to do a study considering the post pandemic moment.

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