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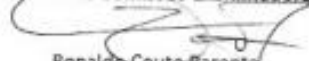
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ABSTRACT

This thesis presents three papers in the Business Management field. Specifically, those papers are also related to the Accounting and Finance fields. In Chapter 1, I reported empirical evidence connecting the inflows of Foreign Direct Investment and Economic Complexity. There is a possibility that FDI affects ECI, and simultaneously ECI could impact FDI. If this is true, the association between FDI and ECI are dynamic and bidirectional. Using data from 42 countries in a time range of 45 years (1970-2015) and the Dumitrescu & Hurlin Test, which allows me to test Granger-causality in panel data, I report evidence of how ECI enhances FDI through positive externalities and business spin-offs.

In Chapter 2, I examined the relationship between firm life cycle persistence and the cost of capital. The firm life cycle persistence occurs when a firm stays at the same life cycle stage for several time-periods displaying cash flow consistency. My hypothesis lies that investors strongly change their perception of risk to firms in persistence "mode" due to a reduction in informational asymmetry, and this results in changes in the cost of capital. Also, I analyze the moderation effect of market concentration in this context.

In Chapter 3, I examined the participation of women in executive positions on the advisory and executive board of large corporations in Brazil. The purpose of this study is to go beyond an ethical and moral discussion of gender equality in the opportunity to access the top positions of large corporations. Even so, the aim was an investigation into the relationship between corporate value and women's presence in high-ranking positions.

RESUMO

Esta tese apresenta três trabalhos no campo da Administração. Especificamente, esses artigos também estão relacionados à Contabilidade e Finanças. No capítulo 1, relatei evidências empíricas conectando as entradas de investimento direto estrangeiro (FDI) e a complexidade econômica (CE). Existe a possibilidade de que o FDI tenha um efeito sobre o CE e, simultaneamente, o CE possa impactar o FDI. Se isso for verdade, a associação entre FDI e CE é dinâmica e bidirecional. Utilizando dados de 42 países em um período de 45 anos (1970-2015) e o Teste Dumitrescu & Hurlin, que me permite testar a causalidade de Granger em dados de painel, relato evidências de como a EC aprimora o FDI por meio de externalidades positivas e “*business spin-offs*”.

No capítulo 2, examinei a relação entre a persistência do ciclo de vida da empresa e o custo de capital. A persistência do ciclo de vida da empresa ocorre quando uma empresa permanece no mesmo estágio do ciclo de vida por vários períodos, exibindo consistência do fluxo de caixa. Minha hipótese é que os investidores mudam fortemente sua percepção de risco para as empresas no "modo" de persistência devido à uma redução na assimetria informacional e isso resulta em alterações no custo de capital. Além disso, analiso o efeito de moderação da concentração do mercado nesse contexto.

No capítulo 3, examinei a participação de mulheres em cargos executivos no conselho consultivo e executivo de grandes corporações no Brasil. O objetivo deste estudo é ir além de uma discussão ética e moral da igualdade de gênero na oportunidade de acessar as principais posições das grandes corporações. Mesmo assim, o objetivo era investigar a relação entre valor corporativo e presença de mulheres em posições de alto escalão.

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“You must take your opponent into a deep dark forest where $2+2=5$, and the path leading out is only wide enough for one.”

Mikhail Tal, *The Magician of Riga*.

THESIS INTRODUCTION

Although the 3 articles are under the umbrella of the Business Management, each article deals with distinct themes. This choice is based on the need to demonstrate my ability to deal with different research problems and to examine in different units of analysis. I also chose to work in 3 different units of analysis (countries, firms, and boards of directors) as a way to demonstrate the specifics of each one and enhance my ability to develop ideas and find evidence regardless of the context.

Those 3 papers connect to each other from a methodological line where I use several statistical processes to report evidence that can contribute to the fields not only of Business Management but also in Finance and Accounting.

Chapter 1 is devoted to a macroeconomic analysis of the FDI determinants, and for this reason it differs from the other 2 chapters in the unit of analysis and methodological aspects. Chapters 2 and 3 are focused on the reality of emerging markets, especially the Brazilian context. This context has been little explored in the academic literature and there is little evidence in the comparative literature. Therefore, my findings contribute towards demonstrating similarities and differences from the reported evidence from developed countries.

CHAPTER 1

ECONOMIC COMPLEXITY AND FOREIGN DIRECT INVESTMENTS: THE MODERATING ROLE OF ECONOMIC FREEDOM

Abstract: In this paper, we report evidence of the relationship between FDI and economic complexity (ECI). Also, we analyze the moderating effect of economic freedom, as a proxy of institutional quality, on this relationship. Using panel data non-causality tests (Dumitrescu & Hurlin, 2012) and FDI inflows from 42 countries throughout 1970-2015, we find that economic complexity positively impacts on FDI inflows, but not the opposite. Also, we report evidence of the positive moderating effect of economic freedom on FDI-ECI relationship. However, our results also suggest that economic complexity may decrease the FDI inflows in environments with low levels of economic freedom.

Keywords: Foreign Direct Investment. Economic Complexity. Institutional Quality. Granger-causality

Introduction

Since the 1990s, Foreign Direct Investment has become the primary source of external finance and a vital factor of the economic strategies by developed and developing countries. According to OECD data, Foreign Direct Investments (FDI) inflows increased more than eight times between 1990 (US\$ 203,772 million) and 2011 (US\$ 1660,558 million) (Villaverde & Maza, 2015). This global phenomenon has given rise to growing academic research into the determinants of FDI over the last three decades.

In the latest years, however, scholars have been investigating the main factors that affect a country's level of FDI attractiveness which was focused on economic factors such as market size, labor market, political stability and institutional quality as the explanatory factors in countries' ability to attract FDI (Dunning, 1980; François et al., 2020; Jin et al., 2019; Uddin et al., 2019). While these studies have contributed to understanding the factors on FDI attractiveness, they often lack consistency in their results, presenting conflicting among different papers. For instance, some

scholars find that tax rates are negative and statistically significant correlated to FDI attractiveness (Chakrabarti, 2001; Esteller-Moré et al., 2020), while others find no statistically significant relationship between the two variables. Hence, the relationship between political stability and FDI is also dubious: while some researchers found a positive and statistically significant association (Sethi et al., 2003; Seyoum & Ramirez, 2019), others find no meaningful relationship (Globerman & Shapiro, 2003).

To shed light on the topic, the present paper pursues an exploratory study of the relationship between Economic Complexity (ECI) and Foreign Direct Investments (FDI). Since existing literature already establishes an association of both FDI inflows (Alfaro et al., 2004; Iamsiraroj, 2016; Iamsiraroj & Ulubaşoğlu, 2015) and ECI (Felipe et al., 2012; Hidalgo & Hausmann, 2009) with economic growth of the host country.

So, using the seminal paper of Hidalgo & Hausmann (2009), this paper examines the path that FDI has an effect on ECI and simultaneously ECI could impact FDI. If this hypothesis holds, then the association between FDI and ECI is dynamic and bidirectional, suggesting a strong presence of endogeneity.

In their study, economic complexity follows two attributes: the diversity of the country's export portfolio and the ubiquity of a product, which in simple words means how rare is a given product measured by the number of countries that can produce and export it. Hidalgo & Hausmann (2009) explain that the theoretical mechanism is that countries have different sets of skills and capabilities. As a result, countries have a different level of economic complexity, which ultimately impacts economic development.

Relying on this framework, scholars estimated a positive association of economic complexity and economic outcomes, for instance, GDP (Gao & Zhou, 2018; Hidalgo & Hausmann, 2009) or inequality (Gao & Zhou, 2018; Hartmann et al., 2017). However, countries tend to diversify their exports by entering products that are related to their current exports, and this may result in lower levels of growth (Pinheiro et al., 2018).

In contrast, the literature established that MNEs, on average, possess a firm-specific advantage, are more efficient (Dunning & Lundan, 2008; Girma et al., 2019), faster and more innovative than local incumbents (Cai et al., 2007). Also, MNEs possess ownership advantages that allow them to overcome the additional cost of overseas investments as the presence of such advantages indicates that there is a potential for knowledge and business spillovers to domestic firms.

Considering the internationalization reasons based on the seminal work of Dunning (1980, 1995), we argue that MNEs invest abroad when economic complexity is growing in the host country. Mostly, because MNEs are overly sensitive to market interaction, and this allows MNEs to link with local business spin-offs and gain access to new knowledge/capabilities and actively take advantage of potential spillovers within a sector in the host country (positive externalities). Reversely, we also argue that the entry of MNEs bringing firm-specific assets possibly impacts the economic complexity of the host country, resulting in a Granger-causality relationship.

The contribution of this paper is twofold. First, since our primary purpose is theoretically describing the association between FDI and ECI, we report cross-country evidence of the unexplored relationship between FDI and ECI. Moreover, once the previous findings show a lack of research on moderating factors (Bailey, 2018) and in line with recent papers discussing FDI (Bailey, 2018; Bailey & Li, 2015; François et al., 2020; Hartmann et al., 2017; Uddin et al., 2019), we report evidence of the moderation role of institutional economic quality. We argue that an appropriate policy environment with dynamic economic institutions will create the necessary conditions to attract more FDI once policymakers should design initiatives that directly impact the accumulation of adequate human capital and the development of physical infrastructure (Dunning, 2006).

The remainder of the paper is structured as follows. Section I reviews empirical studies related to the determinants of Foreign Direct Investments. The next section reveals our hypotheses and our arguments linking ECI and FDI. Also, it illustrates the moderating effect of economic freedom. Section II describes the data and methods. Section III reports empirical evidence. In Section IV, we discuss the evidence, and in section V, we conclude and propose future research.

Literature Review: Foreign Direct Investments

Determinants of Foreign Direct Investments Inflows

Various factors may trigger the FDI process. Limitations in the domestic market and the desire for diversification to spread risk are classic examples of why MNEs invest abroad. However, some of these factors originate from opportunities in the host country.

François et al. (2020) divided the evidence of the determinants of FDI into two general categories: macroeconomic conditions and institutional characteristics. In the first category, an extensive effort has been paid to examine the host country's macro components. They consider the market size measured by GDP and GDP growth since they are correlated with potential revenues. For instance, Chakrabarti (2001), using the Extreme Bound Analysis, tested a variety of macroeconomic factors for FDI, including the market size of the host country measured by GDP per capita for a broad cross-section dataset. He reported that market size has a positive and statistically significant impact on FDI. However, factors like tax, wage, openness, exchange rate, and trade balance are susceptible to alterations in the conditioning information set.

According to Buckley et al. (2007), unpredictable rates of inflation has a negative and statistically significant impact on FDI inflows. Mostly because unpredictable inflation rates in the host country increase uncertainty and make long-term planning difficult. Also, high inflation rates may decrease export-oriented FDI on the local market by increasing prices locally and losing the cost advantage in other markets.

Natural resources have also been found to affect FDI. Hirsch et al. (2020) reported evidence of resource-seeking: water availability for rainfed crop production increases the number of hectares acquired by investors in a target country for Foreign Land Acquisition, a specific type of FDI. They explain that the rush for land is driven by the increased demand for products from the primary sector, which is met by a constrained supply of scarce resources of land and water.

The second category of studies includes those that tested institutional determinants of FDI. Some scholars report evidence of the impact of democracy and political stability on FDI. Holmes Jr

et al. (2013) divided formal institutions into three categories: regulatory, political, and economical. Their evidence suggests that the country's informal institutions, in the form of the cultural dimensions of collectivism and future orientation, shape the country's formal institutions. In turn, each of the three formal institutions affects the country's level of inward foreign direct investment differently. Also, they point out that the democratic government attracts more FDI than autocratic ones.

Okada (2013) examines the hypothesis that the effect of financial globalization on international capital inflows depends on a country's institutional quality. Despite financial openness and institutional quality do not individually have significant impacts on foreign capital inflows, their interaction effects are significant and positive influence on capital inflows.

Pajunen (2008) analyzes how and why countries with different institutional constraints attract or not more FDI inflows. He establishes that the same kind of institutions may be associated with a different outcome in different regions. The findings also show that specific countries may not be attractive or unattractive because of a single institutional factor.

Hypotheses Development

Connecting Foreign Direct Investments and Economic Complexity

Earlier authors on Industrial Organization stated that FDI is not only a way to transfer financial assets to other countries, but also a way to transfer different types of tangible and tacit assets (Hymer, 1960; Sethi et al., 2003). Once firms exist as a form of reducing transaction costs (Coase, 1937), IB researchers expand the field studying firms (MNEs: multinational enterprises) with internalized value-adding processes capable of exploiting where the transaction cost is high. Then, firms will compete overseas when they are capable to internally explore its assets to aggregate value and reduce costs to the point that makes the benefits offset the costs (Parente et al., 2018) and outperform local incumbents. In the microeconomic perspective, Dunning (1980) established the OLI (Ownership, Location, and Internalization) paradigm, which explains the necessary conditions for firms to involve abroad.

The (O)wnership advantage refers to exclusive assets possessed by firms and can be transferred to transnational firms at a low cost. Firms create O advantages through intangible assets prepared to be distributed globally, such as superior technology and intellectual property (IP).

The (L)ocation refers to country-specific advantages in determining which country will host transnational operations. In sum, it relies on the level of country attractiveness in terms of quality of institutions and government policies, infrastructure, social and cultural differences between home and host country. Furthermore, the (I)nternalization refers to basically about the entry mode. Dunning (1980) explains different reasons and ways in which firms can explore their asset advantages, doing agreements that might be signed by host country firms.

Considering that the IB literature typically categorizes internationalization reasons according to what firms are searching for in foreign markets (Conti et al., 2016), most scholars classify internationalization motives as resource-seeking, asset-seeking, efficiency-seeking, and market seeking (Dunning, 1995). Of four types of FDI, our theoretical arguments are most closely with asset-seeking and efficiency-seeking: MNEs are sensitive to the market interaction and potential spillovers within a sector. So, MNEs are actively looking for ways to improve and make the best use of their core O-specific advantages (Dunning, 1995), but in some cases, complementary assets are not accessible on the local market and only can be bought in foreign markets.

Moreover, foreign direct investment frequently requires the establishment of bilateral relationships, then MNEs are sited near related partners who make it possible to quickly capture additional benefits and positive externalities associated with the gathering and the propagation of information, and the cross-fertilization of ideas and learning experiences (Dunning, 1995).

Some rare studies examine the variation of Economic Complexity (ECI) on FDI context. Pernet (2014) evaluates the impact of economic complexity on the location of foreign direct investment in China. The results suggest that access to exclusive and diverse capabilities is the key determinant of FDI inflows. Also, he provides evidence of the existence of agglomeration economies: foreign firms that are not from Hong-Kong, Macao, and Taiwan are more likely to invest in a city

where numerous firms of the same industry have already invested, potentially increasing the amount of knowledge embedded. Based on the above arguments, we can derive our baseline hypothesis:

Hypothesis 1_A. Economic complexity has a positive effect on FDI, *ceteris paribus*.

Most of our arguments rely on how Economic Complexity is correlated with FDI. However, once previous literature does not cover this relationship in both ways, and the proxy of Economic Complexity is recent. Only a few papers have been used; we are assuming a rigorous position to not presuming which variable is affecting the other. Because of that, our hypothesis 1_B will evaluate the opposite proposed by hypothesis 1_A. So, based on that, our hypothesis 1_B:

Hypothesis 1_B. FDI has a positive effect on Economic Complexity, *ceteris paribus*.

The moderating effect of Economic Freedom on FDI and ECI

Although the economic complexity may play an essential role in the host country's FDI attractiveness, however, FDI itself cannot fully exert a positive influence on the host country if the initial conditions are not appropriate. Balasubramanyam et al. (1999) argue that the minimal level of proper human capital, physical infrastructure, and an appropriate policy environment are the necessary conditions for enhancing FDI.

However, on those three conditions, it is clear that an appropriate policy environment has a significant role once policymakers should design initiatives that directly impact the accumulation of necessary human capital and the development of physical infrastructure. For instance, economic institutions can encourage capital investments by increasing the capital availability and maintain an adequate money supply to ensure the availability of the capital necessary to fund investments and increase the opportunity costs of keeping capital in cash form, thereby encouraging investment.

Besides that, policymakers also should pay attention to the role of institutions once the transaction costs of economic activity rise when countries become more complex and specialized (North, 2006). So, the host country's institutional background will be essential to enhance some

actions to create the appropriate conditions to deal with the increment of complexity, which ultimately increases the volume of FDI. Considering this, our hypothesis is:

Hypothesis 2. Economic Freedom will positively moderate the positive relationship between FDI and Economic Complexity, *ceteris paribus*.

Research Method

Data and sample

To examine our hypotheses, we use the FDI data from World Bank's World Development Indicator Database, which has been used in other studies (Agrawal, 2015; Bailey, 2018; Cannizzaro & Weiner, 2018; Villaverde & Maza, 2015). We also collect data from the World Bank's World Development Indicator Database for the control variables. This database includes information of almost all countries in the world, updated annually and available for a large number of years. For economic complexity (ECI), I collected from the Observatory of Economic Complexity created by the MIT Media Lab (Hidalgo & Hausmann, 2009).

Initially, the sample covers countries with all time-points for both the variables without missing values. As a result, the sample is a strongly balanced panel data set consisting of 42 countries in the period between 1970-2015, and the final dataset has 1932 observations, for hypothesis 1_A and hypothesis 1_B. For the moderation analysis of hypothesis 2, the data became available only in 2000. So, our study covers the period between 2000-2015, and after all, exclusions result in a dataset of 640 observations.

Variables and measures

Dependent variable

For our dependent variable, we use the foreign direct investment, which is defined by the World Bank as the net inflows of investment to obtain a lasting controlling interest (at least 10% of

voting stock) in a company operating in a different economy of the investor. It is the sum of equity capital, reinvestment, long-term capital, and short-term capital, as shown in the balance of payments.

We use FDI inflows from 1970 to 2015 to test hypothesis 1. For the other hypotheses, we cover only the period between 2000 and 2015 because moderators started to be updated annually only from the year 2000. The reason to choose FDI inflows in our analysis instead of other internationalization modes (such as exporting) as the former requires higher financial commitment with the host country and allows MNEs to access and take advantage of local knowledge.

Independent variable and moderator

Economic Complexity

The Economic Complexity Index (ECI) is the complexity of a country's productive structure, and it is calculated by merging data on the diversity of a country (the number of products it exports), and the ubiquity of its products, which is the number of countries that export that product.

The ECI captures comparatively the level of sophistication and diversity of an economy. Hidalgo & Hausmann (2009) claims that sophisticated economies are diverse and export products that have low ubiquity since only a few distinct countries can make sophisticated products. In contrast, less sophisticated economies produce a few ubiquitous products. ECI uses the variation in the product diversity of countries and the ubiquity of products to measure of a country's productive structure that incorporates information about the sophistication of products.

ECI is calculated from export data connecting countries to the products in which they have Revealed Comparative Advantages (Hidalgo & Hausmann, 2009). The Revealed Comparative Advantage (RCA) of a country a in a product b is:

$$RCA_{ab} = \frac{X_{ab} / \sum_{b'} X_{ab'}}{\sum_{a'} X_{a'b} / \sum_{a'b'} X_{a'b'}}$$

Where X_{ab} is the sum of the total export of the country an in product b, RCA is larger than one if a country's export of a product is larger than what would be expected from the size of the

country's export economy and the product's global market. RCA is used to define a Matrix M_{ab} . And $M_{ab} = 1$ if $RCA_{ab} \geq 1$ or $M_{ab} = 0$ if $RCA_{ab} \leq 1$.

The matrix M_{ab} classifies the country's diversity and the ubiquity of a product, as the number of products that are exported by a country with comparative advantage, and the number of countries that export a product with comparative advantage (Hidalgo & Hausmann, 2009).

$$Diversity = k_{a0} = \sum_p M_{ab}$$

$$Ubiquity = k_{b0} = \sum_c M_{cp}$$

And the ECI is defined as

$$ECI_a = \frac{K_a - \langle K \rangle}{std(K)}$$

Where K_a is the eigenvector of \tilde{M}_{aa} , associated with the second largest eigenvalue – the vector associated with the largest eigenvalue is a vector of ones (Hartmann et al., 2017).

Economic Freedom

In this study, we use the Economic Freedom of the World-index (EFW), which is published by the Fraser and The Cato Institutes, and several previous studies used as a proxy of institutional quality (Bengoa & Sanchez-Robles, 2003; Paramati et al., 2016; Uddin et al., 2019). The last edition includes five categories available for 150 countries. The index contains five unweighted average categories, reproduced for a country's institutional quality regarding 1) Size of Government; 2) Legal Structure and Security of Property Rights; 3) Access to Sound Money; 4) Freedom to International Trade; and 5) Regulations of the Credit market, labor market, and Business. The EFW applies a 0-to-10 scale for each category, calculating an average of these five categories to obtain the overall index. In this index, zero represents the lowest quality of economic institutions, and 10 represents the highest level. The data of the EFW index is available annually only from 2000. Our sample begins in 1970 and, hence, our moderation analysis will cover the period between 2000 and 2015.

Control Variables

To isolate the effects of other factors that may influence FDI inflows, we control for the country characteristics used in previous studies. Thus, we follow the FDI literature and consider the following economic variables as controls: income (GDP per capita) measured in constant 2010 US dollars. In line with François et al. (2020), we expect a positive effect. We also include the GDP growth rate in the host country and expect a positive impact (Bailey & Li, 2015). We use Trade as economic openness, which is operationalized by total exports and imports as a percent of GDP, and we expect a positive impact.

We use industry employment (percent of the total population) as a proxy of the country's absorptive capacity and expect a positive effect on FDI attractiveness. We capture the influence of market size using the population (logarithm of the population)¹ As a proxy, and we expect a positive impact. We assume that inequality (Gini index) and Consumer Price Index (inflation) has a negative effect. We capture the effect of natural resources exploitation on FDI with the portion of natural resources rents in GDP (Resource rents) and expect a positive impact. Finally, we control for financial freedom, and following Okada (2013), we expect a positive effect.

Analytical Strategy

We divided the analytical strategy into two steps. First, We investigate a bivariate framework using the Granger causality approach between two variables: Foreign Direct Investment (FDI), measured by the net inflow of foreign direct investment into a host country and Economic Complexity (ECI). Then, we tested hypothesis 2, the moderating effect of economic, institutional quality on FDI, and ECI.

¹. We take the natural logarithm to reduce multicollinearity.

Granger-causality in panel data

To address the first hypothesis, we evaluate the nature of the directionality between FDI and ECI using Granger causality (Granger, 1969), but in the panel data context. Granger (1969) stated if the previous values of x are significant predictors of the current value of y when previous values of y have been included in the right side of the equation, then x Granger-causes y . Suppose that x_t and y_t are stationary. The equation (1) tests where x Granger-causes y based on F test under the following null hypothesis:

$$H_0: \beta_1 = \beta_2 = \beta_3 = \dots = \beta_k = 0$$

If H_0 is rejected in the following model

$$y_t = \sum_{k=1}^p \gamma^{(k)} y_{t-k} + \sum_{k=0}^p \beta^{(k)} x_{t-k} + \mathcal{V}_t \quad (1)$$

it is possible to conclude that x Granger-causes y . It is possible to test bidirectional Granger-causality interchanging x and y .

Dumitrescu & Hurlin (2012) extend the Granger test design to detect causality in panel data. This procedure allows the use of cross-sectional and time-series information simultaneously to test Granger-causality between x and y . The Dumitrescu & Hurlin Test (DHT) improves the Granger causality test because it increases sample size (n), which raises the degrees of freedom that ultimately improves the efficiency of the Granger-causality test. Considering a time-stationary VAR representation modified to a panel data context, for each individual i we have $\forall t \in [1, t]$:

$$y_{i,t} = \sum_{k=1}^p \gamma_i^{(k)} y_{i,t-k} + \sum_{k=0}^p \beta_i^{(k)} x_{i,t-k} + \mathcal{V}_{i,t} \quad (2)$$

with $p \in \mathbb{N}$ and $v_{i,t} = \alpha_i + \varepsilon_{i,t}$ and $\varepsilon_{i,t}$ are independent and identically distributed $(0, \sigma_\varepsilon^2)$.

Assuming that lag orders, K is identical for all cross-section units of the panel, and the panel is

balanced. Also, we allow the autoregressive parameters $\gamma_i^{(k)}$ and the regression coefficients slopes $\beta_i^{(k)}$ to differ across groups. As in Granger (1969), the null hypothesis is

$$H_0: \beta_{i1} = \beta_{i2} = \beta_{i3} = \dots = \beta_{ik} = 0 \quad \forall i \in [1, \dots, N] \quad (3)$$

The Dumitrescu & Hurlin test assumes there can be Granger-causality for some individuals but not automatically for all. So, the alternative hypothesis is

$$H_1: \beta_{i1} = \beta_{i2} = \beta_{i3} = \dots = \beta_{ik} = 0 \quad \forall i \in [1, \dots, N_1]$$

$$\beta_{i1} \neq 0 \text{ or } \beta_{ik} \neq 0 \quad \forall i \in [N_1 + 1, \dots, N]$$

where $N_1 \in [0, N - 1]$, and it is indefinite. If $N_1 = 0$, x Granger-causes y for all individuals in the panel. However, N_1 needs to be smaller than N ; otherwise, the H_0 is not rejected, and there is no causality for all individuals.

To solve that, DHT proposes run N separate regressions implicitly enclosed in (2), make F tests of the K linear hypotheses $H_0: \beta_{i1} = \beta_{i2} = \dots = \beta_{ik} = 0$ to calculate individual Wald statistic W_i , and calculate the mean Wald statistic \bar{W} :

$$\bar{W} = \frac{1}{N} \sum_{i=1}^N W_i$$

We highlight that the DHT test is designed to identify Granger-causality at the panel level, and

rejecting H_0 does not exclude non-causality for some entities. Dumitrescu & Hurlin (2012) show that \bar{W} is asymptotically properly performed using Monte Carlo simulations and can be applied to examine Granger-causality in panel data.

Under the assumption that the W_i , are independently and identically distributed across entities, and it can be shown that the standardized \bar{Z} , when T is large relative to N , follows a normal distribution:

$$\bar{Z} = \sqrt{\frac{N}{2K}} \times (\bar{W} - K) \xrightarrow{T, N \rightarrow \infty} N(0,1) \quad (4)$$

Also, for a fixed T dimension with $T > 5 + 3K$, the standardized statistic \tilde{Z} follows a normal distribution. The testing process of the H_0 in (3) is based on \bar{Z} and \tilde{Z} . If these are larger enough than the critical values, then H_0 is rejected and conclude that Granger causality exists.

In this study, the number of lags K was selected based on an information criterion (AIC/BIC). In this process, all estimations were merged on a common sample to be nested and, therefore, comparable. Both AIC and BIC information criteria resulted in $K = 1$. In addition, to avoid the cross-sectional dependence across countries, we tested using the bootstrap procedure recommended by Dumitrescu and Hurlin (2012) with 1000 replications.

Model Specification

We use cross-sectional OLS regression with robust standard errors to test hypotheses 2. Given the stability in the variance across time in economic complexity and FDI, we choose cross-sectional OLS instead of a longitudinal panel study as our statistical model. We employ robust standard errors to control for potential bias produced by non-constant error variance. All independent variables related to GDP are measured in the year 2010, as we are trying to predict the pattern of FDI inflows from 2000 to 2015. Also, we employed a one-year lag between the dependent and independent variables to help mitigate the possibility of the error term being correlated with the independent and dependent variables. To test hypothesis 2, our full model is:

$$FDI_t = \beta_0 + \beta_1 ECI_{t-1} + \beta_2 EcoQuality_{t-1} + \beta_3 ECI_{t-1} \times EcoQuality_{t-1} + \beta_4 Controls_{t-1} + \varepsilon$$

Where,

FDI is the foreign direct investment;

ECI_{t-1} is the economic complexity variable lagged by one year;

$EcoQuality_{t-1}$ is the economic freedom variable lagged by one year;

And $Controls_{t-1}$ are the control variables lagged by one year;

ε is the error term.

Data Analysis and Results

Descriptive Analysis and Correlation Matrix

Table 1 presents the descriptive statistics and correlation matrices. The average FDI inflows over the 2000–2015 period was 3.8% of GDP. The average of GDP income is twice greater than reported by Bailey & Li (2015). A comparison between datasets shows that our GDP income is higher due to a more considerable time-period analysis (2000-2015 in our case, 2006-2011 on Bailey & Li(2015)) and different countries on the (40 countries in our case; 110 countries on Bailey & Li (2015)) dataset. The correlations matrix, as well as preliminary analysis of various results, indicated the presence of some collinearity. However, we found no severe multicollinearity problems as the variance inflation factor (VIF) tests from the full model average 2.01, fairly below the limit for regression models of 10 (Hair et al., 1998). To minimize potential multicollinearity, we also mean-center the moderation terms.

Table 1. Descriptive statistics and correlation matrix*

Variable	Mean	Std. Dev.	1	2	3	4	5	6	7	8	9	10	11	12
1 FDI inflows	3.80	6.07	1	0.19	0.24	-0.05	0.08	0.18	-0.13	0.15	0.21	-0.13	-0.01	-0.11
2 Economic Complexity	0.24	1.01	0.19	1	0.63	-0.47	-0.28	0.71	0.01	0.09	0.19	-0.46	0.55	-0.37
3 Economic Inst. Quality	7.10	0.91	0.24	0.63	1	-0.31	-0.04	0.68	-0.14	0.07	0.16	-0.33	0.36	-0.19
4 Inflation	4.28	4.56	-0.05	-0.47	-0.31	1	0.16	-0.43	0.08	-0.15	-0.15	0.29	-0.31	0.05
5 GDP growth	3.23	3.58	0.08	-0.28	-0.04	0.16	1	-0.24	0.02	-0.02	-0.10	0.21	-0.12	0.15
6 GDP per capita	22484.04	22111.32	0.18	0.71	0.68	-0.43	-0.24	1	-0.22	0.18	0.30	-0.63	0.36	-0.04
7 Market Size	16.74	1.20	-0.13	0.01	-0.14	0.08	0.02	-0.22	1	-0.21	-0.22	0.09	-0.05	-0.27
8 Trade	76.19	11.07	0.15	0.09	0.07	-0.15	-0.02	0.18	-0.21	1	0.57	-0.37	0.15	-0.02
9 Financial Freedom	59.80	17.47	0.21	0.19	0.16	-0.15	-0.10	0.30	-0.22	0.57	1	-0.38	0.16	-0.17
10 Gini Index	39.59	7.10	-0.13	-0.46	-0.33	0.29	0.21	-0.63	0.09	-0.37	-0.38	1	-0.17	0.11
11 Industry Employment	20.39	6.17	-0.01	0.55	0.36	-0.31	-0.12	0.36	-0.05	0.15	0.16	-0.17	1	-0.04
12 Natural Rents	5.81	10.29	-0.11	-0.37	-0.19	0.05	0.15	-0.04	-0.27	-0.02	-0.17	0.11	-0.04	1

*All correlations greater 0.10 or less than -0.10 are significant at the 0.05 level. N = 640

In this data, the top-3 highest correlations are observed between Economic Complexity and GDP income (0.71), GDP income and Economic Institutional Quality (0.68), and Economic Institutional Quality and Economic Complexity (0.63). The correlation coefficients indicate that FDI and ECI are positively correlated and significant at 1% level.

ECI-FDI Granger causality analysis

Before to report the Granger causality analysis, we test for the stationarity of FDI and ECI variables, using Levin-Lin-Chu unit-root test (hereafter LLC) proposed by Levin et al. (2002). This test has several advantages. First, LLC assumes that each unit in the panel shares the same AR(1) coefficient, but allows for individual effects, time effects and time trend which may provide improvements in statistical power in comparison to performing a separate unit root test for each time series (Chang et al., 2007). Also, LLC works better for a panel of moderate size in industry-level or cross-country econometric studies (Levin et al. (2002) define between 10 and 250 individuals, and 25 –250 time-series observations per individual). Moreover, the error variance and the pattern of higher-order serial correlation are also allowed to vary freely among individuals.

Also, we conducted the Hadri Lagrange multiplier (LM) test because the null and alternative hypotheses are reversed, which help to reject or not reject conclusions based on tests with the null hypothesis being non-stationarity. Hadri (2000) notes, classical hypothesis testing requires substantial evidence to the contrary to reject the null hypothesis. Table 2 shows the results of both tests.

Table 2. Panel-based unit root tests

Variable	LLC	Hadri LM
FDI	-6.331*	3.67
FDI (First Diff)	-27.8592*	-6.24
ECI	-3.1907*	5.93
ECI (First Diff)	-8.2367*	-4.12

* p<0.01; LLC is Levin-Lin-Chu unit-root test; Hadri LM is Hadri Lagrange multiplier (LM) test

We find that the LLC result rejects the null hypothesis of non-stationarity for both variables. Also, the Hadri LM result does not reject the null hypothesis of stationarity. The results of both tests are the same for the first differences in FDI and ECI. In Table 3, we reported the results of the Granger causality test on the full sample. We find \bar{Z} (2.88; p-value < 0.01) and \tilde{Z} (2.43 p-value < 0.02) are significant at 1% level, and 5% level, respectively rejecting the null hypothesis of FDI does not

Granger-cause ECI. The same can be said for the opposite: we find \bar{Z} (6.84; p-value < 0.01) and \tilde{Z} (6.06; p-value < 0.01) are significant at 1% level rejecting the null hypothesis of ECI does not Granger-cause FDI.

Table 3. Granger Causality test

H_0 : FDI does not Granger-causes ECI		
\bar{W}	1.62	
\bar{Z}	2.88	(0.003)
\tilde{Z}	2.43	(0.014)
H_0 : ECI does not Granger-causes FDI		
\bar{W}	2.49	
\bar{Z}	6.84	(0.000)
\tilde{Z}	6.06	(0.000)
n=1,932; p-values in parenthesis		

Those results together are initial evidence of a possible reverse causality phenomenon which does not reject hypothesis 1_A and 1_B. However, to avoid type II error, we conduct a bootstrap analysis of 1,000 repetitions reported in Table 4 below. Considering those results, we can reject hypothesis 1_B once the probability of having a different \bar{Z} or \tilde{Z} increases (p-value > 0.2), and \bar{Z} -stat and \tilde{Z} -stat is far away from the 95% critical values.

Table 4. Bootstrap Analysis

H_0 : FDI does not Granger-causes ECI		
\bar{W}	1.61	
\bar{Z}	2.79 (0.025)	95% Critical = 4.72
\tilde{Z}	2.35 (0.025)	95% Critical = 4.11
H_0 : ECI does not Granger-causes FDI		
\bar{W}	2.31	
\bar{Z}	6.03 (0.003)	95% Critical = 3.85
\tilde{Z}	5.29 (0.003)	95% Critical = 3.32
n=1,932; p-values computed using 1000 bootstrap replications (in parenthesis)		

In sum, here we provide evidence that supports hypothesis 1_A but not support 1_B, and in conclusion, we may confirm that the direction of Granger-causality run from ECI to FDI. Unreported robustness check has shown that this evidence holds in the different *time-window* analysis.

ECI-FDI Regression Analysis and Economic Freedom Moderating Role

Considering previous evidence, Table 5 below reports the evidence of this relationship considering control variables. Model 4, we include only the control variables. GDP Growth, GDP per capita, Industry Employment, Market Size, and Financial Freedom are positive and significant (at 1% level for the first four and significant at 5% level for Financial Freedom).

This evidence suggests that countries growing, with higher income, more possible customers, better absorptive capacity, and financially free attracts more FDI. On the opposite, Natural Rents are negative and significant at 1% level, which suggests that countries with unexplored natural resources receive more FDI. Model 1 and 2 include the main independent variable ECI and the moderator '*Economic Freedom*'. As hypothesized, the main effect of ECI is positive and significant at 1% level. This evidence suggests that countries with exclusive production factors or resources and a higher level of diversification in the export basket attract more FDI, *ceteris paribus*.

Table 5. OLS regression results

Variables	(1)	(2)	(3)	(4)	(5)
	FDI	FDI	FDI	FDI	FDI
Economic Complexity	1.03*** (0.17)		-7.76*** (-1.28)		-5.08** (-0.84)
Economic Freedom		1.47*** (0.22)	1.39*** (0.21)		1.33*** (0.20)
E. Complexity x E. Freedom			1.10*** (1.33)		0.90*** (1.08)
Inflation				-0.01 (-0.01)	0.02 (0.02)
GDP growth				0.21*** (0.13)	0.16*** (0.09)
GDP per capita				0.00*** (0.18)	-0.00** (-0.10)
Market Size				-0.47*** (-0.09)	-0.52*** (-0.10)
Trade				0.02 (0.05)	0.03 (0.05)
Financial Freedom				0.05** (0.13)	0.06*** (0.17)
Inequality				0.04 (0.05)	0.05 (0.06)
Industry Employment				-0.11*** (-0.11)	-0.18*** (-0.18)
Natural Rents				-0.08*** (-0.14)	-0.00 (-0.01)
Constant	3.51***	-6.66***	-6.76***	6.24**	-1.87
R-squared	0.03	0.05	0.07	0.10	0.14
r2_adjusted	0.0275	0.0467	0.0640	0.0831	0.124

Robust normalized beta coefficients in parentheses; n = 600

*** p<0.01, ** p<0.05, * p<0.1

In Model 3, the main effect of the moderation variable, Economic Freedom, is positive and significant, indicating that be economically free is an important step to attract FDI investments. In models 4 and 5, we add moderation analysis. We find support for hypothesis 2: economic freedom has a positive moderating effect on the relationship between FDI and ECI (p-value < 0.01).

This result suggests that the role of economic complexity in attracting FDI also depends on how well established are the economic institutions. Moreover, it is essential to highlight the negative effect of economic complexity in FDI in environments of low levels of economic freedom. This evidence strengths the notion defended by North (2006) that the importance of economic institutions to deal with a more complex and specialized environment.

Discussion and Conclusions

In this paper, we investigate whether the host country's economic complexity has an impact on FDI inflows. We also moderate this relationship with a proxy of institutional quality. Our main conclusion is that countries with higher levels of economic complexity attract more foreign direct investments, but not the contrary. This suggests that when economic complexity grows, the number of production factors grows, which allows one to combine the new set of skills with existing resources and create new products (or produce with lower levels of cost). Which attracts more foreign investors since MNEs view them as an opportunity to stay close and invest in spin-offs, which are in line with asset-seeking and efficiency-seeking strategies.

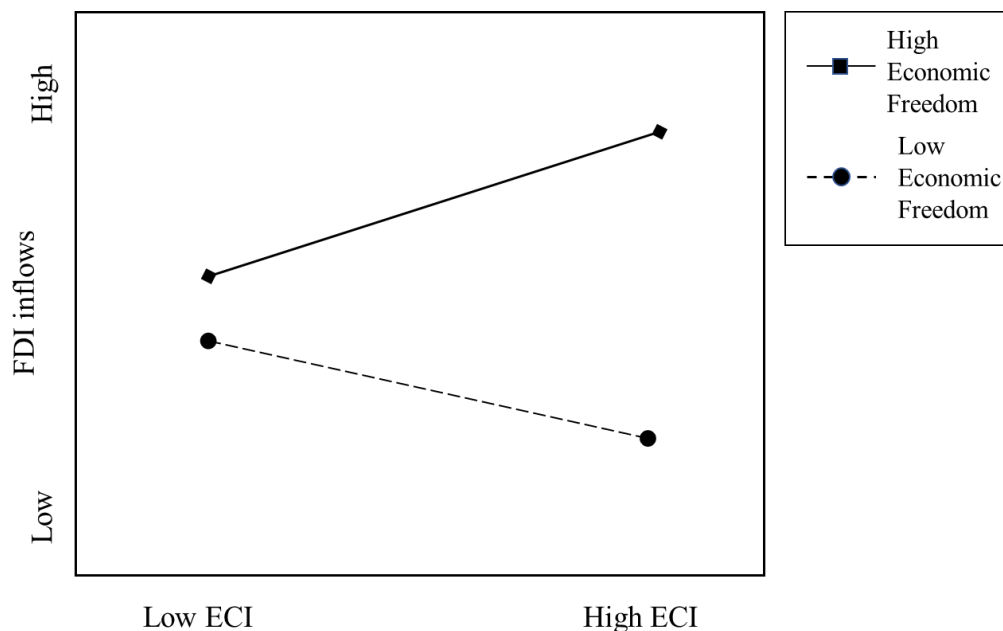


Figure 1. The moderating effect of economic freedom on the ECI-FDI relationship

However, we also obtain strong evidence of the moderating effect of economic freedom. In particular, we find that depending on the level, and institutional quality significantly changes the impact of economic complexity on FDI, lending support for the notion that is increasing the economic complexity itself attract more FDI. But, may shrinkage the FDI inflows in cases of lower levels of economic freedom. This implies that a host country with a high level of economic complexity, but institutionally weak will generate a negative impact in FDI inflows (see Fig. 1).

We have a hypothetical reason why this may occur. Countries where economic freedom is low and the economic complexity is high (such as Russia) probably suffer from political unpredictability, which will exert a negative impact in the institutional structure such as labor and credit market regulations, crucial points in the foreign investor's decision making. In sum, these results are following the extensive evidence of institutional theory but adding the evidence of negative impact even in complex and specialized countries.

In this paper, we reported results that have implications for both academics and policymakers. From an academic standpoint, this study is an extension of the OLI paradigm (Dunning, 1995). We have documented an important factor, such as Economic Complexity, that has significant impacts on FDI inflows and reported evidence of how countries may take full advantage in attracting more FDI evaluating institutional factors and the economic complexity as an integrated system. From the policy standpoint, our pieces of evidence provide guidelines to policymakers to attract more foreign investors.

Limitations and Future research

We identify two limitations, which represent opportunities for future research. First, we focus on the unexplored FDI-ECI relationship to observe the direction of the effect in the aggregate country-level data. It will be interesting to examine and observe micro-level data such as state-level in a country to explore the potential differences when the states receive, in theory, the same institutional quality from the federal level. Also, studies focused on economic complexity at the state-level in emerging countries will contribute to the literature once those countries have historically institutional imperfections and political instability.

CHAPTER 2

FIRM LIFE CYCLE PERSISTENCE, THE IMPLIED COST OF CAPITAL AND MARKET CONCENTRATION

Abstract: This study examines the relationship between life cycle persistence and the cost of capital moderated by the level of market concentration. Market concentration has an important role in market transactions, especially in the different life cycle stages: in a struggle to survive, external fundraising can be more expensive to new entrants in comparison to stable firms. By looking at São Paulo Stock Exchange firms (BOVESPA), we found a negative association between life cycle persistence and implied cost of capital. Further, our findings show that lowering market concentration, a sustainable situation in operating, investing, and financing issues lead to a reduction in the inherent risk and, consequently, reduce the implied cost of capital. The findings highlight important implications. First, in the decision-making process, investors and financial institutions taking into consideration the firm life cycle persistence as a signal of stable firm resource configuration lowering the premium risk. Also, managers can use firm life cycle persistence as a signalization tool to fundraise more efficiently. Theoretically, we add to the literature by bringing a novel and complementary proxy to the firm life cycle theory.

Keywords: Life Cycle Persistence; Market concentration; Implied Cost of Capital.

INTRODUCTION

This study contributes to the existing literature on the firm life cycle theory by proposing a complementary approach to the estimation of the firm life cycle. Following Dickinson's (2011) life cycle proxy², we introduce the concept of firm life cycle persistence and examine the association between life cycle persistence and implied cost of capital. Also, we investigate the moderating effect of market concentration on this relationship. To better understand the phenomenon, we extend our analysis to examine the systematic relationship between the implied cost of capital and the persistence in specific firm life cycle stages.

Our primary purpose is to investigate how the market's perception of risk is associated with life cycle persistence, and then examine how this perception varies across life cycle stages. Considering that the market tends to consistently adopt different discount rates to firms given their

² Dickinson (2011) created a firm life cycle proxy using the signal combination (positive or negative) of the three cash flow statements (Operating, Investing and Financing) grouping firms in five stages: introduction, growth, maturity, shake-out, decline.

accounting fundamentals, industry characteristics and the macroeconomic “quality” of the country (Fama & French, 1989; Gebhardt et al., 2001; Dittmar & Lundblad, 2017), we argue that using firm life cycle persistence has the potential to improve the analysis of firm valuation and investment decision-making purposes.

The literature suggests that the ability to move and adapt in a chaotic environment must be reflected in the growth of the firm since growth should be the primary focus of the firm during its first years of existence (Mueller, 1972; Jensen, 1993; Arikian & Stulz, 2016). To grow, firms tend to invest in specific assets to boost its inimitability and develop a sustainable competitive advantage (Porter, 2008). However, the use of these assets as collateral may affect the asset valuation due to informational asymmetry. Thus, from the perspective of a financial institution, it is a tough task to determine which firms will be financed in a given industry considering asset specificity, and consequently, firm heterogeneity.

Therefore, due to asymmetric information and from an outsider perspective, it can be a problematic task to identify which resources or combination of resources drive firm performance, considering it is possible to see the effects of performance, but not its causes. The insight here is that independently of the specificity of the resource, its causes will be captured by firm life cycle persistence with the implied cost of capital vary accordingly. Mostly, because the firm life cycle persistence is an informational disclosure approach, which has the primary function of mitigating the information asymmetry problem by providing value-relevant information to investors and capital suppliers.

Moreover, firms make operational decisions that ascend from market equilibrium, which is the result of strategic interactions between rivals, which in turn, affect the level of risk and, ultimately, the implied cost of capital. Thus, market competition has a systematic risk that impacts the requirements of capital suppliers (Bustamante & Donangelo, 2017). Therefore, based on the theoretical foundations of industrial organization (Bain, 1954), we explore the moderating effect of market concentration on firm life cycle persistence and the implied cost of capital.

We contribute to prior research on the firm life cycle (Dickinson, 2011; Hasan et al., 2015), first by developing and testing a theoretical framework that examines the relationship between firm-level life cycle persistence and implied cost of capital. To the best of our knowledge, researchers have not yet tested this relationship, since the construct is a combination of many overlapping product life cycle stages in different moments (Dickinson, 2011). Moreover, the implied cost of capital is commonly calculated in previous studies using only *ex-post* returns, which is invariably inaccurate (Fama & French, 1997; Hou et al., 2012; Li & Mohanram, 2014; Drobetz et al., 2018). Following Gebhardt et al. (2001), we estimate expected returns by adding a discounted residual income model in the equation, without relying on *ex-post* returns, which consistently improves estimation (Li & Mohanram, 2014; Drobetz et al., 2018).

Another significant contribution is that, to our knowledge, near to zero studies have explored the effect of firm life cycle theory on the implied cost of capital in emerging markets. Research reports evidence from developed countries, which may not apply to emergent markets. Thus, this research contributes to the literature by focusing on a transitional economy with substantial changes in market structure over the last decades since the start of the economic opening in early 1990: the end of trade barriers increased the access to better quality inputs forcing the national industry to improve its products and methods of production. These factors contributed to increases in productivity and competition (Rossi Jr. & Ferreira, 1999; Reis et al., 2018).

Additionally, this study has real implications for emerging markets and transitional economies: our evidence demonstrates that the policies have an economic consequence of lowering the cost of capital through market restructuration. Also, our evidence contributes to financial development with a better mechanism of firm valuation, which facilitates and intensifies investment transactions in the economic system.

A body of literature has investigated the life cycle theory to explain the relationship between the firms' stages of development and several phenomena of interest. For instance, there is research on the relationship between life cycle and the cost of capital (Cheynel, 2013; Francis, Nanda, & Olsson,

2008; Erosa, & González, 2019) and life cycle and corporate risk-taking (Habib & Hasan, 2017). However, different from all previous studies, we propose the use of firm life cycle persistence to capture value-relevant information from Dickinson's (2011) life cycle approach and used it to tackle the phenomenon of interest.

Conceptually, being a persistent firm consistently stays at the same life cycle stage for several time-periods, signaling to investors the resource allocation uniformity of the firm strategy. Given that the literature provides evidence of explanatory power in the life cycle related to profitability and earnings persistence (Dickinson, 2011), dividend payout policies (Bulan et al., 2007; DeAngelo et al., 2006; Trihermanto & Nainggolan, 2018) and other performances measures (De Angelo et al., 2010; Habib & Hasan, 2017), it is a reasonable insight that the persistence status can provide information to outsiders about the internal resource configuration of the firm and shifts the cost of capital.

Our findings suggest advances in the approximation between strategic management and accounting literature. Our evidence adds to the broad stream of work that focuses on financial decisions under uncertainty and the financial implications of the firm life cycle.

Overall, our research exposes the role that the firm life cycle plays in determining the implied cost of capital and how the firm life cycle persistence approach offers managers an analytic tool to evaluate firm's transitory state and may help optimize the resource configuration to surpass competitors and keep the firm on the desirable firm life cycle stage. Additionally, our persistence life cycle proxy enables a reexamination of the existing body of evidence using life cycle theory in different contexts.

The remainder of the paper is structured as follows. Section I reviews interrelated studies and explains the life cycle theory through Dickinson's (2011) life cycle approach, then we explain the concept of life cycle persistence and how to construct it. Also, this section reveals how we motivate the hypotheses linking life cycle persistence to the implied cost of capital. Also, this section illustrates the moderating effect of market concentration. Section II describes the data and methods. Section III

reports empirical evidence. In Section IV, we discuss the pieces of evidence, and in section V, we conclude and propose future research.

THEORY AND HYPOTHESES

The emerging-market context

In the last few decades, emerging economies became significant players in the global business environment through market restructuring, improvements in the information flow, and communication technologies. As a result, developing countries increase financial and market integration, which induces a structural change in the local capital market.

According to financial development theories, policymakers need to promote the structural change to enforce mechanisms that strengthen economic transactions and help to develop financial markets that provide reductions in transaction costs and information asymmetry such as the cost of capital.

In this context, Brazil is an interesting scenario because it presents some factors that differ from developed countries that could have a significant impact on firms' performance. For instance, Brazil had rapid population growth, a low level of corporate governance mechanisms, a high level of social inequalities, and a lack of ethics in management procedures. Also, Brazil presents a complex structure of financial services, and the capital market is small in comparison with the banking system. For that reason, capital suppliers are still not able to finance long-term investments. In this context, the government becomes the primary long-term capital provider.

The consideration of these aspects is crucial as they allow a better understanding of how the context of several financing constraints impacts the implied cost of capital. Accordingly, understanding the Brazilian case may help to shed light on alternatives to overcome these issues and to make external resources less costly for investment decisions.

Life Cycle Theory and the formulation of Life Cycle Persistence

Firm life cycle theory explains how a firm is born, grows, and declines. Like an organism tends to progress through stages of development from birth to decline. Also, strategies, resource configuration, and actions correspond to their stages of development (Hasan et al., 2015). The life cycle theory's primary purpose is to group similar firms in categories (stages) then use these categories to analyze how varying incentives, restrictions, limitations, and strategies over a firm's life cycle are associated with firm performance (Drake, 2013).

Recent studies in accounting and finance present a growing contribution of firm life cycle theory to understanding performance issues (Costa et al., 2014; Dickinson, 2011; Drake, 2013; Jenkins & Kane, 2004; Alhadi et al., 2018) demonstrating that the firm life cycle has significant influence in management and business strategy (Hasan et al., 2015).

Using life cycle theory, there is research related to governance (Chiang et al., 2011), incentives and competitive advantage (Liao, 2008), research and development and capital expenditures (Ahmed and Jinan, 2011), and firm payout policy (Bulan & Subramanian, 2009; Huang & Chiu, 2018).

Two possible explanations for the growing application of life cycle theory in the literature emerge. First, firms are accumulations of different products, with different life cycle stages competing in many industries (Dickinson, 2011), which makes a firm-level life cycle desirable and easy to comprehend. And second, a firm is influenced by internal factors (strategy choices and financial resources) and the external environment (macroeconomic factors) to reach its goals (Dickinson, 2011), and the result of these interactions can be captured by firm life cycle.

Existing literature proposes different ways to define the stage in which the firm is in the life cycle. Anthony & Ramesh (1992) propose a model that demonstrates the utility of firm life cycle theory in the explanation of market performance. To group firms in life cycle stages, they used monotonic sorts of performance measures such as dividend payout, sales growth, and age. They

reported significant differences in accounting performance measures across life stages and the explanatory power of non-earnings data to explain the firm's stock returns.

However, monotonic sorts of performance measures are nonlinearly associated with the firm life cycle, and its use may result in misclassification. Additionally, this sort of univariate measure makes a distributional assumption of uniformity that is not supported by economic theory (Dickinson, 2011).

Dickinson (2011) develops a proxy for firm life cycle using the three types of cash flow patterns: operating, investing, and financing. She argues that, instead of using a single measure to determine the firm life cycle, it is beneficial to use the cash flow pattern because it comprises the complete financial data set contained in operating, investing, and financing cash flows. Also, Dickinson (2011) reports evidence that her proxy outperforms other life cycle proxies from the literature and has more explanatory power regarding future profitability. Also, she uses earnings persistence to validate the life cycle proxy and documents evidence that the mature stage is associated with earnings persistence.

To calculate it, Dickinson (2011) uses the three cash flow activities (operating, investing, and financing), and each one can take a positive or negative sign, resulting in 8 different combinations. Then, the combinations collapse into five stages as follows:

Table 1 - Combination of Cash Flows Signals

Cash Flow	Intro	Growth	Mature	Shake-out			Decline	
From <i>Operating</i> Activities	-	+	+	-	+	+	-	-
From Investing Activities	-	-	-	-	+	+	+	+
From Financing Activities	+	+	-	-	+	-	+	-

Source: Dickinson (2011)

Each combination represents the firm strategy through resource allocations and operational capabilities. For instance, introductory firms suffer from insufficiency of customers due to a lack of market experience about potential revenues and costs, resulting in negative operating cash flows (Dickinson, 2011). As firms get older, profit margins are maximized during increases in efficiency,

when they invest less and payout some of their cash flow in the form of dividends and stock repurchases (Bulan & Subramanian, 2009; Faff et al., 2016), which means that the operating cash flow is positive in growth and maturity stages.

Previous literature documented differences in the firm strategies and characteristics of each life cycle stage. Also, it reports evidence of how the cash flow can be an appropriate measure to assess the current stage of the firm in its life cycle. For instance, uncertainty is the most inherent problem of firms in the introductory stage. Then, the entrepreneur needs to develop new products, marketing techniques, or a more efficient organizational structure to quickly move away from this stage and reach the growth stage. It involves “information, intuition, courage or luck to make correct investment decisions in the face of uncertainty” (Mueller, 1972, p. 200).

Therefore, it seems reasonable that the key to expansion (and the uncertainty reduction) relies on the ability to process and disclose useful information. This is why improvement in the financial accounting system is essential to be a reliable indicator of the current life cycle stage of the firm.

The formality of the financial accounting system depends on the stage. However, the growth stage dominates the need for a formal management accounting system when compared to other stages mainly because it is the stage when the firms start dealing with a more diverse and complex environment (Moores & Yuen, 2001; Bedford & Malmi, 2015).

Additionally, reaching the growth stage represents a need for radical changes in terms of policy and operations, such as adopting new production technologies, internationalization process, and seeking investors to finance the expansion plans (Liao, 2008; Wang & Singh, 2014). Hence, the firm financing position is an excellent measure to assess the actual life cycle stage and which firm financial characteristics will provide a possible transitory status.

For instance, Bulan & Subramanian (2009) explain that firms are at a high-growth stage when they adopt a full financing position by accumulating capital and not paying any dividends. At the maturity (low-growth) stage, firms pay dividends, and financing will be restricted to retained

earnings. Moreover, at the decline (negative-growth) stage, firms will be liquidating dividends. In sum, prior evidence suggests that the firm life cycle has significant implications as value-relevant information for financing decisions, particularly in the determination of the cost of capital.

In this study, we propose a new form to extract value-relevant information from Dickinson's life cycle approach (2011), which we call 'firm life cycle persistence.' A given firm will be called 'persistent' when consistently stays at the same life cycle stage for several time-periods: our proposition advocates the idea that the persistence status works as a signal about what is going on inside the firm. Moreover, capital suppliers use this signal even when some changes in strategy occur, but it will not be sufficient to change the sound stage, reinforcing the persistence status.

Firms generate cash flows through their actions in product markets and make operating decisions that affect the level of risk of their cash flows. However, sometimes operating decisions change the resource allocation but not the life cycle stage, which reinforces to capital suppliers a signal related to a previous level of risk.

For instance, a young firm that goes from introduction straight to maturity and then goes back to the introduction after one year indicates glitches in operating activities. On the other hand, a young firm that goes from the introduction stage straight to maturity and consistently remains in that stage, display performance consistency and stability, which can be captured by the persistence status. Then, in this case, capital suppliers use this information to recalculate the cost of capital.

Once there is quality information in the life cycle related to profitability (Dickinson, 2011) and earnings persistence (Drake, 2013), it is a reasonable insight that capital suppliers will perceive the persistence status and adjust the implied cost of capital. To illustrate, Figure 1 helps to visualize how persistence is achieved:

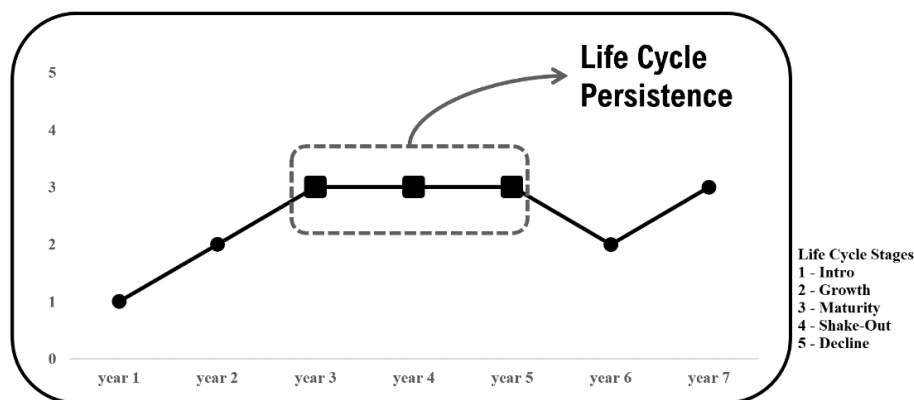


Figure 1 – Life Cycle Persistence Example

A firm reaches persistence when it remains in the same stage for at least three time-periods for two reasons. First, starting with the idea that persistence means being at the same stage consistently over time, less than three time-periods may be related to temporary issues, coincidences, or luck. Additionally, any number higher than three will be a discretionary choice without a theoretical explanation. Thus, at least three time-periods seem to be accurate to avoid the impact of coincidences and disregard of any discretionary decision.

Our proposition is based on the theoretical foundation of signaling theory (Spence, 1973; Ross, 1973; Connelly et al., 2010). Signaling theory is necessarily concerned with reducing information asymmetry between two agents. In our case, firms try to communicate positive information to transmit unobservable positive organizational qualities (Spence, 2002). Once capital suppliers make investment decisions with incomplete information, firms tend to disclose more (quantity) and better (quality) information to increase fundraising or decrease the cost of capital.

In this theoretical perspective, firm life cycle persistence has significant characteristics of effective signal because the source of this approach is the Cash Flow Statements. First, the signal cost is extremely low because the disclosure of the Cash Flow Statement is mandatory to public firms. Another essential characteristic is the high signal observability, which refers to the extent to which outsiders can notice the signal (Connelly et al., 2010).

However, since the cash flow is divided into three components (Operating, Financing, and Investing), the choice of which of the three cash flows is the most important to any investment decision becomes subjective. Therefore, the life cycle approach compresses the cash flows sign patterns in an intuitive and highly observable approach. What we propose and test with the firm life cycle persistence is whether there is a high signal fit between our approach and the implied cost of capital.

The literature documents variation in the cost of equity across different stages of life cycle stages (Hasan et al., 2015), and this evidence impacts their capacity to raise capital from the market. In comparison with other stages, mature firms are better known by capital suppliers, which improves information precision, lowering the level of uncertainty and, consequently, the cost of capital.

Also, mature firms are bigger and have more market experience and constant operational cash flows. So, analysts strongly scrutinize mature firms to deliver detailed forecasting reports to capital suppliers and investors. Hence, these firms are less risky once they have lower levels of informational asymmetry. In contrast, firms in the earlier stages are unknown and not evaluated by analysts, which increases the information asymmetry substantially and, consequently, the cost of capital.

Given that capital suppliers buy financial assets with the expectation of future cash flows, it is plausible that the current financial asset price represents the expectation of this future cash generation, discounted at its cost of capital. Therefore, managers attempt to create sustainable financial performance identifying efficient components to play with pricing strategies, signaling, and the control of information.

Thus, firms attempt to create an optimal capital structure in different environments resulting in a persistent status, which reduces the inherent uncertainty since capital suppliers assess firms considering resource allocation that creates future profits expectations.

Assuming that the required return from capital suppliers (we consider the implied cost of capital - ICC) is related to the level of firm uncertainty and also that firms play a game of structure adaptation to achieve persistence. We, therefore, hypothesize:

Hypothesis 1. The life cycle persistence is negatively associated with the Implied Cost of Capital, *ceteris paribus*.

The moderating effect of market concentration

Firms make revenues through their actions in the product market. They risk their cash flows in operational decisions that ascend from interactions with rivals, which determines the market structure. For instance, firms in competitive markets that adopt risk-taking and innovative strategies perform better. In contrast, a more conservative strategy is positively related to firm performance in concentrated markets.

Also, the current stage of the industry life cycle impacts firm performance. For instance, proactive firms (i.e., firms which act in anticipation of future demand) perform better in markets that are at introduction or growth stages. In contrast, firms with aggressiveness orientation (i.e., firms which act in response to a competitor's movement in the market) perform better in mature industries, where there are fewer opportunities, and the market concentration is higher.

These ideas are also related to the Structure/Conduct/Performance (S/C/P) paradigm (Bain, 1954), which connects industry production characteristics with the pricing behavior of the firm, which determines firm performance. S/C/P paradigm suggests delimitations in the market structure that can determine the conduct of the firm and, consequently, its performance.

For instance, the pharmaceutical industry demands a high level of investments in Research and Development, which drastically limits competition. So, these high investment needs are the entry barrier that delimits the number of competitors (structure). Thus, if the number of participants is low and the entry barrier is high, pharmaceutical firms would be able to keep the prices high (conduct) without worrying about new competitors, which results in abnormal positive cash flows

(performance). Therefore, this analysis suggests that entry barriers affect the number of possible competitors altering the pricing practices and consequently changing the risk characteristics. Therefore, we propose a second hypothesis:

Hypothesis 2. The reduction in market concentration reinforces the negative relation between life cycle persistence and the implied cost of capital.

RESEARCH DESIGN

Sample Selection

We use the Comdinheiro[®] database for the economic and financial data of Brazilian public firms. The sample is drawn from the population of firms listed on the São Paulo Stock Exchange (BOVESPA), covered by analysts between 2008 and 2014. Also, we take data from I/B/E/S database from Thomson Reuters[®] for analysts' information to calculate the dependent variable implied cost of capital.

We dropped firms classified as “banks and financial services” and “holdings” due to differences in accounting standards. We also dropped firms from the industries "agricultural and fishing," "electronics," and "software and data" because they exhibit only one firm each. Then, we select an unbalanced panel data with an amount of 576 firm-years observation, from 15 industries.

Analytical strategy and variable description

Using regression models (OLS and fixed effects), we first investigate the relationship between life cycle persistence and the implied cost of capital, and then the moderating effect of market concentration, considering that more competitive industries require faster decisions and considering that investors assess the firm by means of future profit expectations. To investigate the hypotheses 1 and 2, we test the following regression model:

$$ICC_{it+1} = \beta_0 + \beta_1 LCP_{it} + \beta_2 HHI_{it} + \beta_3 (HHI_{it} * LCP_{it}) + \sum_i^j \beta_j CV_j + \alpha_i + u_{it} \quad (1)$$

Where ICC_{it+1} represents the Implied Cost of Capital level; LCP_{it} is the Life Cycle Persistence, measured by a dummy variable that assumes 1 if a firm life cycle stage persists for more than 2 periods, otherwise 0; HHI_{it} is the Herfindahl-Hirschman Index of the firm i ; and $HHI_{it} * LCP_{it}$ captures the interaction of industry market concentration level of the firm i and the life cycle persistence; $\sum_i^j CV_j$ means the control variables Voluntary Disclosure, Size, Liquidity, and Market-to-Book ratio.

Our main variable of interest is LCP_{it} . Based on what was discussed in the previous section, we expect β_1 to be negative for hypothesis 1 and, β_2 and β_3 to be negative for hypothesis 2.

We reported fixed effects and pooled OLS models. The former is robust to control for time-invariant heterogeneity omitted variable bias (Chamberlain, 1978; Hausman and Taylor, 1981). The latter is effective in assessing the robustness of the results. The results of Hausman tests indicate that the random effect model may be inconsistent. Additionally, the hypothesis of fixed effects was rejected, providing additional validation for the modeling approach employed.

VARIABLES MEASUREMENTS

Dependent Variable

Implied Cost of Capital

We follow Gebhardt et al. (2001) and Hail & Leuz (2006) to calculate the implied cost of capital - ICC, based on the Residual Income Model (Ohlson, 1995). The ICC is understood as the required rate of return to maintain a firm's optimal capital structure. In investment decision, it is also the hurdle rate to screen the project. Then, it calculates the rate the market uses to reach the current stock price by solving the following equation:

$$P_t = bv_t + \sum_{\tau=1}^n \left[\frac{\dot{x}_{t+\tau} - r_e \cdot bv_{t+\tau-1}}{(1+r)^\tau} \right] + \sum_{t=n+1}^{\tau} \left[\frac{\dot{x}_{t+\tau} - r_e \cdot bv_{t+\tau-1}}{(1+r)^\tau} \right] + \left[\frac{\dot{x}_{t+\tau+1} - r_e \cdot bv_{t+\tau}}{r_e(1+r)^\tau} \right] \quad (2)$$

Where P_t is the median of the stock price of the firm at data t ; $\hat{x}_{t+\tau}$ is the expected future accounting earnings for the period $(t+\tau-1, t+\tau)$, either explicitly forecasted, generated by a linear fading rate or assumed to be constant; r_e represents the estimate of the ex-ante cost of capital calculated as the internal rate of return to solve the equation; and expected future accounting book value of equity at date $t+\tau$, where $bv_{t+\tau} = bv_{t+\tau+1} + \hat{x}_{t+\tau} - \hat{d}_{t+\tau}$ and $\hat{d}_{t+\tau}$ correspond to the expected future net dividends for the period $(t+\tau-1, t+\tau)$, derived from the dividend payout ratio k times the earnings forecast $\hat{x}_{t+\tau}$.

The firm value is equal to the accounting book value plus an infinite sum of residual incomes discounted to present value at a discount rate r (Hail & Leuz, 2006). This metric is based on some assumptions, including the Clean Surplus Relation (CSR) and, consequently, that no reference to the dividend is required.

Independent Variables

Firm Life Cycle Persistence

We assume that life cycle persistence is captured if a firm life cycle stage persists for more than three time-periods - such as seen for sustained superior performance in Vasconcelos & Brito (2004). So, the life cycle persistence will be measured by a dummy variable that assumes 1 if a firm life cycle stage persists for at least three periods, otherwise 0.

Market Concentration

We use the Herfindahl-Hirschman Index (HHI) as a measure of the intensity of market concentration through the degree of concentration across units. Following Besanko et al. (2004) we separate all into market concentration levels defined as $(x \leq 0.4)$ for low concentration; $(0.4 < x < 0.8)$ for the interquartile area, and $(x \geq 0.8)$ for monopoly.

Control Variables

We included some control variables to reduce omitted variable bias. According to the literature, we use the following variables:

- *SIZE*: measured by the natural logarithm of total assets. Firm size is a common control variable due to its association with firm performance. According to Agarwal and O’Hara (2007), bigger firms tend to appreciate less information asymmetry. Due to more reporting of voluntary information, considering the complexity of contracts and the requirement for greater transparency with investors, and also more analysts' coverage. Yet, Fama and French (1992) find that expected returns are negatively associated with size, which is also found in Botosan (1997).

Table 2 – Variables measures and sources

	Cod.	Variable	Measure	Source
<i>Interest</i>	ICC	Implied Cost of Capital	Described on page 8	Gebhardt et al. (2001); Verdi (2005); Hail and Leuz (2002, 2006)
	LC	Firm Life Cycle	Cash flow statement patterns combination described in page 4	Dickinson (2011)
	LCP	Life Cycle Persistence	Dummy equal to 1, if a stage persists at least 3 periods.	
	HHI	Herfindahl-Hirschman Index	$HHI_j = \sum_{i=1}^I S_{ij}^2$	Besanko et al. (2006)
<i>Control</i>	VD	Voluntary Disclosure	$VD_i = \sum_j^k \frac{Discl_i}{k}$, where <i>Discl_i</i> means the number of items reported by the firm each year, and K means the total of items comprised on the checklist.	Almeida and Rodrigues (2017)
	SIZE	Total Asset	$Ln(\text{Total Assets})$	Fama and French (1992); Botosan (1997); Al-Hadi, Taylor and Hossain (2015)
	LIQ	Liquidity	Stock liquidity	(Balakrishnan, Billings, Kelly, & Ljungqvist, 2014)
	MTB	Market-to-Book	Market Value/Book Value	Martins, Paulo, and Albuquerque (2013)

- *MTB*: which means the Market-to-Book ratio, indicating the growth opportunity measured by the market. Firms with lower MTB ratio are expected to present more information asymmetry (Martins, Paulo, and Albuquerque, 2013). Then, it is plausible to expect the opposite; that is, a higher MTB ratio is positively associated with a higher level of voluntary disclosure.

- *Voluntary Disclosure*: we control for voluntary disclosure to isolate the effect of high/low analyst's coverage: analysts are information intermediaries, and it is a proxy for quality informativeness because it is associated with higher firm valuation (Shi et al., 2014). We follow the voluntary disclosure index developed by Almeida and Rodrigues (2014). The index was created through 38 attributes collected from the accounting statements (annual reports, footnotes, and management reports). The calculation is based on the frequency scaled by the total of the attributes. Table 2 summarizes all the measures and variable sources.

RESULTS

Table 3 reports the descriptive statistics for the key variables included in the regression models segregated by life cycle stage. We observe that the ICC means are higher in initiating and declining firms, compared to others, but introduction presents the highest deviation coefficient (111%) due to the firm Vanguarda Agro (VAGR) in 2008, showing an implied cost of capital of 1.0792%. The management report of Vanguarda Agro revealed that this firm went public in 2006, after diversifying its object and activities, which may explain an uncertainty measured in that year.

Table 4 presents Pearson correlations using the implied cost of capital, life cycle persistence, market concentration, and control variables. Then, lower values of HHI reflect more intense market competition, with each firm having a small market share in its industry. As expected, the correlation between life cycle persistence and implied cost of capital is negative ($r = - 0.12$; $p < 0.01$).

Table 3 – Descriptive statistics by life cycle stage

Stage	Statistic	ICC	HHI	Discl	Size	MTB	Liquid
Introduction	Num. Obs.	80	80	80	80	76	80
	Mean	0.127	0.027	0.202	15.098	1.607	0.413
	Std Dev	0.142	0.097	0.099	1.223	1.167	0.564
	Minimum	0.000	0.004	0.041	11.555	0.000	0.000
	Maximum	1.079	0.750	0.431	19.434	7.233	2.995
Growth	Num. Obs.	193	193	193	193	180	193
	Mean	0.094	0.128	0.291	15.772	2.711	0.770
	Std Dev	0.065	0.252	0.122	1.557	3.141	1.702
	Minimum	0.000	0.000	0.102	12.264	0.000	0.000
	Maximum	0.580	0.967	0.616	20.439	21.179	15.173
Maturity	Num. Obs.	254	254	254	254	220	254
	Mean	0.101	0.071	0.302	15.384	3.864	0.565
	Std Dev	0.079	0.173	0.117	1.557	6.932	0.912

	Minimum	0.000	0.000	0.082	7.171	0.393	0.001
	Maximum	0.647	0.963	0.616	19.491	85.339	7.586
Shake-Out	Num. Obs.	31	31	31	31	31	31
	Mean	0.074	0.079	0.228	15.346	11.408	0.561
	Std Dev	0.067	0.176	0.097	2.088	48.808	0.702
	Minimum	0.000	0.000	0.061	12.376	0.428	0.003
	Maximum	0.223	0.829	0.452	20.275	250.658	2.380
		Num. Obs.	16	16	16	16	16
Decline	Mean	0.122	0.011	0.204	15.550	1.446	0.851
	Std Dev	0.123	0.012	0.085	0.908	0.904	0.673
	Minimum	0.000	0.000	0.102	12.687	0.302	0.065
	Maximum	0.375	0.048	0.349	16.549	3.527	2.456

Note: icc is the implied cost of capital; hhi is the Herfindahl-Hirshman index; size is the logarithm of assets; mtb represents the market-to-book; discl is the voluntary disclosure and liquid is the stock liquidity

The results suggest a significant positive association between SIZE and ICC ($r = 0.10$; $p < 0.05$), proposing that, on average, bigger firms tend to appreciate higher levels of implied cost of capital. We also observe a significant negative association between market concentration level and size ($r = -0.51$; $p < 0.01$). Consistent with Liao (2008), size is positively correlated with the level of voluntary disclosure ($r = 0.58$; $p < 0.01$), showing that bigger firms tend to disclose more.

Table 5 reports the outcomes regressions to test testing both hypotheses 1 and 2. Panels A and B represent OLS and Fixed Effects, respectively. In panel B (fixed effects regression), we specify year and industry dummies.

Table 4 - Correlation Matrix

Variables	ICC	Lcpersist	HHI	DISCL	SIZE	MTB	LIQUI
ICC	1						
Lcpersist	-0.123**	1					
HHI	-0.0495	0.0645	1				
DISCL	0.0144	0.135**	-0.239***	1			
SIZE	0.0995*	-0.0391	-0.517***	0.585***	1		
MTB	-0.0682	0.0546	0.0479	-0.0335	-0.154***	1	
LIQUI	0.0757	-0.0993*	-0.623***	0.375***	0.598***	-0.0328	1

Source: Author

Note: The values in the matrix are Pearson correlation coefficients and ***, **, and * denote significance at 1%, 5% and 10% levels, respectively (two-tailed test).

The regression results show a negative relationship between life cycle persistence and implied cost of capital, confirming hypothesis 1. This evidence is strong across models, even controlling size, market-to-book, voluntary disclosure, and liquidity. On average, a persistence status diminishes the implied cost of capital ($\beta_1 = -0.026$; $p < 0.01$) when controlling for size, market-to-book, voluntary

disclosure, and liquidity. The results also reveal that capital supplies request less risk premium when firms disclosure more voluntarily ($\beta_5 = -0.0155$; $p < 0.01$).

Also, hypothesis 2 is confirmed once there is a significant moderating effect of market concentration on the effect firm life cycle persistence on the implied cost of capital. We observe a significant negative β_3 (lcpersist x hhi) indicates that *ceteris paribus*, in the presence of a concentration environment, a firm with sustainable operating, investing, and financing issues (reflected on the firm life cycle persistence), tends to convey reliance to the market, which responds by reducing the cost of capital.

Table 5 – Estimated coefficients with OLS (Panel A) and Fixed Effects (Panel B)

	Panel A				Panel B			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
lcpersist	-0.020** (-2.380)	-0.019** (-2.338)	-0.021** (-2.404)	-0.025** (-2.572)	-0.016** (-1.910)	-0.017** (-1.969)	-0.018** (-1.988)	-0.026*** (-2.626)
hhi		-0.017 (-0.926)	-0.004 (-0.128)	0.027 (0.816)		0.077** (2.448)	0.085** (2.385)	0.107** (2.525)
lcpersist x hhi			-0.024 (-0.637)	-0.033 (-0.824)			-0.113** (-2.399)	-0.169*** (-3.380)
size				0.006 (1.504)				-0.010* (-1.887)
mtb				-0.000 (-1.049)				-0.000 (-0.779)
discl				-0.030 (-0.731)				-0.155*** (-3.117)
liqui				0.002 (0.479)				0.011** (2.086)
Constant	0.116*** (16.657)	0.115*** (15.890)	0.116*** (15.438)	0.037 (0.641)	0.101*** (3.956)	0.120*** (4.620)	0.114*** (4.387)	0.353*** (4.498)
Observations	574	574	574	518	574	574	574	518
R-squared	0.010	0.011	0.012	0.029	0.149	0.150	0.159	0.206
Industry FE	No	No	No	No	Yes	Yes	Yes	Yes
Year FE	No	No	No	No	Yes	Yes	Yes	Yes
Adj. R ²	0.81%	0.78%	0.68%	1.57%	11.70%	11.60%	12.40%	16.20%
F-Stat	5.665	3.261	2.307	2.175	4.604	4.425	4.520	4.699

Note: hhi is the Herfindahl-Hirshman index; lcpersist represents a persistent life cycle is defined as the permanence of any firm life cycle stage at least three periods; size is the logarithm of assets; mtb describes the market-to-book; discl is the voluntary disclosure and liquid is the stock liquidity; t-statistic in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

In Panels 6, we stressed the analysis and tested each life cycle stage separately (only reported maturity and growth; fixed effects estimation). Looking at the mature stage, we reported a significant negative main effect of life cycle persistence on the implied cost of capital. In panel A, the control variables increase the Adjusted R² from 11.9% to 14.7%, and all the 2, 3, and 4 estimators confirm

the moderating effect of market concentration on the relationship between firm life cycle persistence and the implied cost of capital.

Additionally, in Panel B of Table 6, analyzing persistence status in growth firms, we observe a significant moderation effect on implied cost capital. The direct effect of persistence in growth firms is not significant, but moderation suggests that persistence_grow becomes positively associated with the implied cost of capital as the concentration increases.

Table 6 – Regression coefficients with persistence in maturity and growth stages only (Fixed Effects)

Variables	Persist_Maturity				Persist_Growth			
	1	2	3	4	1	2	3	4
persist_mat	-0.015*	-0.018**	-0.016**	-0.018*				
	(-1.716)	(-2.035)	(-2.236)	(-1.755)				
persist_growth					0.003	0.005	-0.004	-0.006
					(0.344)	(0.594)	(-0.386)	(-0.582)
hhi		-0.068**	-0.071**	-0.083**				
		(-2.175)	(-2.268)	(-2.358)		-0.063**	-0.078**	-0.101**
						(-2.251)	(-2.315)	(-2.448)
persist_mat x hhi			-0.103**	-0.123**				
			(-2.211)	(-2.444)				
persist_grow x hhi							0.109**	0.152***
							(2.301)	(3.058)
size				-0.008				-0.007
				(-1.626)				(-1.418)
mtb				-0.000				-0.000
				(-0.849)				(-0.990)
discl				-0.134***				-0.157***
				(-2.676)				(-3.157)
liquidity				0.011**				0.011**
				(2.096)				(2.093)
Constant	0.096***	0.121***	0.135***	0.348***	0.110***	0.199***	0.225***	0.308***
	(3.972)	(4.799)	(4.675)	(4.368)	(4.640)	(7.553)	(7.873)	(3.955)
Observations	574	574	574	518	574	574	574	518
R-squared	15.10%	15.40%	15.50%	19.10%	14.60%	14.80%	15.60%	19.90%
Adj. R ²	11.90%	12.00%	12.00%	14.70%	11.40%	11.40%	12.10%	15.40%
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F	4.668	4.549	4.396	4.293	4.510	4.347	4.421	4.496

Note: hhi is the Herfindahl-Hirshman index; persist_mat represents the persistence in the mature stage; persist_growth represents the persistence in the growth stage; size is the logarithm of assets; mtb represents the market-to-book; discl is the voluntary disclosure and liquid is the stock liquidity; t-statistic in parentheses; *** p<0.01, ** p<0.05, * p<0.1

As expected, a greater voluntary disclosure may incentive an implied cost of capital reduction. In contrast, liquidity presents a significant positive relation with the cost of capital, denoting that greater liquidity conveys an idea of risk, which increases the return required to the investors.

DISCUSSION AND CONCEPTUAL CONTRIBUTION

In this study, we develop a proxy of life cycle persistence using Dickinson's (2011) life cycle approach as reference. Also, by looking at a sample of Brazilian firms, we test the association of our persistence proxy with the implied cost of capital to measure the signal fit between them. Our preliminary findings reveal a negative association was highlighting a recognition of the life cycle persistence by the investors and capital suppliers.

However, analyzing each stage separately reveals that mature firms in persistence status have a stronger signal fit in comparison with other stages. Investors and capital suppliers strongly recognize mature firms with persistence status and diminish the risk premium. One interpretation is the level of transience between stages: introduction, growth, shake-out, and decline has more transitory characteristics if compared with the mature stage, which makes the persistent status of mature firms more trustable.

Additionally, market concentration enhances the impact of firm life cycle persistence on the implied cost of capital. One possible explanation is that capital suppliers perceive concentration as an advantage in a chaotic context with low investment opportunities.

This study contributes to the literature in several ways: we offer to the growing body of research that focuses on the financial issues of the firm life cycle theory with an analysis of firm life cycle persistence showing a strong signal fit between persistence status and firm outcomes, in our case, the implied cost of capital.

In contrast with Hasan et al. (2015), our proxy revealed a strong negative association between mature firms with persistence status and implied cost of capital, but not for other stages. Possibly, the persistence status can be more relevant to mature firms because it is the desirable stage to be and providing to outsiders a signal of unobservable positive firm characteristics. In comparison with mature firms in persistence status, other stages may not give relevant signals because of the transitory features of the stage.

These results suggest several possible areas for future research. Our empirical evidence indicates the need to incorporate firm life cycle persistence in the body of literature through a reexamination of the outcomes used in life cycle theory. Also, provide pieces of evidence using a sample of Brazilian firms. The Brazilian market starts its financial integration in the last three decades, so we believe that the evidence of signalization through the persistence status can be more reliable in developed/industrialized markets and contributes to the literature.

CHAPTER 3

AN ANALYSIS OF FEMALE BOARDROOM PRESENCE ON FIRM VALUE: EVIDENCE OF BRAZILIAN CAPITAL MARKET.

Abstract: In recent decades, women had substantial advances in access to higher education and better job positions, but these achievements were not reflected in the top ranking of companies. The participation of women in executive positions on the advisory board of large corporations in Brazil is still unexplored. In this sense, factors such as patriarchy, male chauvinism, sexism, among others advances and do not allow the presence of women at the top of large companies, even when the literature reported evidence of female presence, is associated with better performance. Thus, the assumption of public policies related to gender diversity involves ethical issues and inclusion strategies that are going to improve company performance and value creation urge. In contrast, the completion of ideas and attitudes from the specificities of each gender can contribute to the company's economic and social development. This study aims to investigate the relationship between corporate value and the presence of women in high-ranking positions. Therefore, I collected data of companies listed on the BM&FBovespa and identified those with the presence of women on the board and the executive committee, checking the differences between them using parametric and non-parametric tests. The results suggest a positive relationship between company performance and the female presence on the board. The explanation relays on the female presence on the board to ensure diversity, meet precepts of ethics, equality, social responsibility, contributing to the better performance of firms, and generating shareholder value.

Keywords: Diversity, Gender, Board of Directors, Market Value.

Introduction

The diversity of gender has to receive considerable attention in the academic field. Given the nascent women's participation in the top management of large companies, several countries have established in recent years incentive policies to the female presence on company boards, intensifying the debate.

Factors such as patriarchy, sexism, and others do not allow significant advances of female presence in large senior companies, even when this presence is associated with better performance.

Silveira et al. (2014) show that between the years 1997 and 2012, the presence of women in senior positions in Brazilian still stagnated around 8%. They reported an improvement (4.2% to 7.7%) on the women's participation in the Executive Board, though there was a reduction going from 9.8%

to 7.5% of the female participation in the Board of Directors. The authors also pointed out that about half of public companies do not even have a female officer on the board, and 66% have no woman as part of the Executive Board.

Empirical research suggests disagreement on the relationship between women's participation in top management and financial performance (Terjesen & Singh, 2008). Some studies have investigated the effect of board composition on the firm value, concentrating on the proportion of inside directors (Agrawal and Knoeber 1996), the size of the board (Kini et al. 1995) and the frequency of executive directors' meetings (Brick and Chidambaran, 2007).

Nevertheless, there is congruence that executive boards and boards of directors with greater gender diversity reveal "good" corporate governance and commitment to social responsibility and ethics. Thus, public policy towards gender diversity, considering ethical issues and inclusion strategies possibly going to improve the performance of the companies.

Gender diversity has produced discussion about the influence of women on boardroom dynamics and, consequently, on firm performance. Although board gender diversity can create additional standpoints to board decision-making, it is essential to consider that women may have a negative impact if the decision to appoint them to the board is motivated by social pressure for better equality between the genders.

Empirical evidence indicates gender diversity on boards and superior financial performance (Erhardt et al., 2003). However, other evidence reported a negative correlation (Bohren and Strom, 2005) while other studies are inconclusive on the link (Rose, 2007).

The purpose of this paper is to go beyond an ethical and moral discussion of gender equality in the opportunity to access the top positions of large corporations. Also, the purpose is the analysis of companies in which there is a presence of women in high positions and observe if it exists a higher level of financial performance and value market. In sum, the main objective of this study is to investigate the relationship between performance, market value, and the presence of women on the board of companies listed on BM&FBovespa.

This paper contributes to the literature adding sparse empirical evidence on the valuation consequences of female directors. Most existing literature use data from countries with corporate governance and legal system based on common law. Here, we provide evidence from Brazil, which has a code law system, as do most of the majority of Latin countries.

The remainder of the paper is arranged as follows. In addition to this introductory section, section 2 reviews the theoretical background of diversity and gender in organizations, corporate governance, and performance. Section 3, we report empirical evidence. In section 4, we discuss the evidence, and section 5, we conclude and propose future research.

Theoretical Framework

Diversity and Gender in Organizations

In the latest years, women have had significant advances in higher education and the labor market, but these achievements were not reflected in the top ranking of companies. When they observed the foundation of businesses and middle management, the presence of women is expressive tending to balance the male presence, but when analyzed top management (directors and executive officers) female participation decreases intensely, with a sharper fall occurs when CEOs and Chairmen of the Board women are observed.

Nevertheless, the literature lists several benefits of gender diversity in top management that can contribute to business performance. In this sense, the presence of women can increase the performance of the company. In contrast, the participation of women on the board provides other points of view in decision making, providing greater efficiency in the process.

Thus the presence of women in high places should be discussed in the business outlook and moral perspective (Brammer, Millington and Pavelin, 2007), resulting in several benefits, such as increased creativity and innovation, given that attitudes and knowledge systematically vary from genre to gender; a better market understanding; more efficient solutions, while the homogeneity leads to a close look while diversity leads to a broader view (Robinson & Dechant, 1997).

Carter, Simkins, and Simpson (2003) found a positive relationship between the presence of women and the market value of 638 companies listed in the Fortune 1000. Therefore, Krishnan and Park (2005) analyzed the relationship between diversity in top management and the return on investment in the Fortune 1000 companies. The results showed a positive correlation between diversity and financial performance.

Rodríguez-Domínguez, García-Sánchez, and Gallego-Álvarez (2012) analyzed 117 companies listed on the Madrid Stock Exchange. The authors concluded that women have a higher performance in sectors dominated by men, such as energy, oil, construction, technology, and telecommunications.

Moreover, Campbell and Vera (2010) who analyzed the short- and long-term effect on the capital market when companies announce the presence of a woman in top management stock market reacts positively in the short term for the announcement of the appointments board female, suggesting that investors, on average, believe that female directors add value. The evidence also confirmed that female board appointments are positively associated with the company's value in the long term.

Lückerath-Rovers (2013) examined the financial performance of Dutch companies with and without women on their boards. The survey results show that firms with female directors have a better performance than those without women on their executive boards.

Once, studies have not established a positive relationship among women's presence in top management and financial performance. The study by Campbell and Mínguez-Vera (2008) showed that the presence of women on the board, only, does not affect the value of the company. Adams and Ferreira (2009) observed a negative effect between gender diversity and corporate performance.

The relevance, as well as the social and economic nature theme, produces attention from society, investors, shareholders, and managers causing reflections and influences for discussion.

Corporate Governance

Corporate governance is a set of legal norms, cultural and institutional arrangements that determine the actions, control, and monitoring of public companies. This set of practices determines,

therefore, that the public companies can do, as their control is exercised and how they are allocated their risks and returns (Blair, 2005).

Due to the importance of corporate governance has increasingly sought best practices from market incentives due to the increase of competitiveness to institutional and governmental initiatives (Silveira, 2015). The Brazilian capital market was established in 2001 to Law 10,303, which was a reform of corporate law to develop better protection for minority shareholders. The BNDES (Development National Bank) has adopted preferential lending requirements for the adoption of good governance practices and beyond the CVM establish recommendations on good corporate governance practices, key players of the capital market have edited governance codes that are guides that link good practices governance recommended by the Brazilian Institute of Corporate Governance.

An important advent to improve governance practices in Brazil was the creation of the Novo Mercado and differentiated Corporate Governance Levels by Bovespa in 2001, which were inspired by the experience of the German market. The process of innovation had this experience that there was no need to establish new legislation not impacting, therefore on companies that already had its publicly traded but opted to continue listed in traditional markets with weaker corporate governance mechanisms (Carvalho, 2002).

The corporate governance levels were created to highlight companies committed to best practices in governance. So, companies can voluntarily adhere to three different levels: Level 1 and 2 and Novo Mercado.

Companies listed in level 1 are committed to greater transparency in the information to the market and the free float. Already registered companies at level 2 include all Level 1 requirements plus a range of governance practices and additional rights for minority shareholders. The Novo Mercado, in turn, establishes a pattern of highly differentiated corporate governance and requires companies to meet the precepts of Level 2 and decide only issue common shares to the detriment of the preferred shares (without voting rights), and additional governance practices to those required the legal apparatus.

Moreover, Silveira (2015) points out that an efficient governance system should combine distinct internal and external mechanisms to ensure options in the best interest of the shareholders in the long term. The internal mechanisms can be developed by the company, such as an executive committee, ownership concentration, and remuneration system. As for the external mechanisms are governance practices of agents external to the corporation, such as legal protection to shareholders, the company's regulatory control and executive labor market (Jensen & Murphy, 1990; Silveira, 2015).

Thus the markets of incentives combined with legal, governmental and institutional measures can contribute to the strengthening of good corporate governance practices and consequently the Brazilian capital markets, providing the highest level of protection for investors thus feel safer to obtain higher returns, therefore willing to pay higher values for the shares. Indeed, companies increase the alternative use of the capital market for financing and capitalization of its business. Silveira (2004) classifies these relationships as a virtuous circle proposed for corporate governance in Brazil.

Performance and Market Value

The literature suggests that greater diversity can explain the carrying performance and the market value of firms in the command lines. Profits, prices, and rates of return are the conventional measurement of performance with appropriate use of accounting and financial ratios through various models applying techniques relevant statistics (Assaf Neto, 2010).

The financial indicators are most often used to measure the construct financial performance of companies was the most reported in empirical studies. Profitability measures are essential financial ratios to assess the profits of an enterprise to a particular level of sales, assets, or owner's investments. Profitability is substantial to attract investors and foreign capital (Carter, Simkins & Simpson, 2003; Rodríguez-Domínguez, García-Sánchez & Gallego-Álvarez, 2012; Lückerath-Rovers, 2013).

Once public companies must create corporate value generation to its shareholders, which is its main long-term objective, in this sense, are ample empirical investigations using market indicators as a performance measure to be explained by a set of governance and sustainability practices such as

diversity on the board and executive management (Campbell & Mínguez-Vera, 2008; Lückerath-Rovers, 2013).

Social Responsibility and Sustainability and Diversity in Organizations

Given the scale and increased concern for the environment and social and sustainable development, managers and investors have given more attention to the actions of sustainability and corporate social responsibility thus includes the environmental variable in the strategies and practices of companies. This perspective led financial markets to seek indexes that enable reflections on the performance of companies in efforts to corporate sustainability (Melo, Almeida & Santana, 2012).

Therefore, following the trend of the stock exchanges worldwide, BM&FBovespa launched in 2005 the Corporate Sustainability Index to reflect the return of a portfolio, which has in its composition stocks of companies that commit to corporate sustainability. Thus, the index also has the objective of being a catalyst for good practices in the Brazilian corporate environment (Bovespa, 2014).

For index composition, it was considered the 150 most liquid shares in the 12 months preceding the assessment, the fact of having been traded in at least 50 percent of trading sessions in the last 12 months and the service to the Sustainability Index sustainability criteria business. For both are sent performance evaluation of comprehensive questionnaires on four requirements: Economic Efficiency, Environmental Balance, Social Justice, and Corporate Governance. The completion of the survey is voluntary.

The ISE is, therefore, an index that measures the average return on a hypothetical portfolio composed of listed companies on the São Paulo Stock Exchange (BM&F Bovespa) and is characterized by strategic alignment to sustainability by adopting practices that contribute to sustainable development.

It is noteworthy also that the BM&FBovespa Corporate Sustainability was developed based on the concept "Triple Bottom Line" that involves the assessment of environmental, social, and

economic-financial aspects in an integrated manner. It even adopts indicators of corporate governance, as well as the nature and characteristics of the product.

Methodology

Definition of Research and Sample

The limitations of the research comprise in companies listed on the BM&F Bovespa. Among the listed companies was selected the top 100 companies on the liquidity of share trading. The selection of companies for the sample by the liquidity criterion should be the assumption that low liquidity companies have a lower probability of having fair prices to its real market value (Silveira, Barros & Famá 2003). Since there is no accepted standard in the literature to determine a satisfactory degree of liquidity, the number of companies established for the sample made use of concern for the sample size to conduct valid inferences and meet the assumptions of econometric modeling.

The years selected for the study were 2012, 2013, and 2014, amounting to 300 observations. Data were collected through software *Thomson Reuters* and *ComDinheiro*, portal B3, and reference forms available by CVM. Data analysis was performed using Stata 12 software.

Hypothesis

Founded on the principles of corporate governance, social responsibility, and importance of diversity in organizations was formulated the following research hypothesis:

H_0 : The presence of women on the board of directors is positively related to performance and creating corporate value, *Ceteris paribus*.

Operationalization of variables

To test the hypotheses, we selected some proxies based on the theoretical framework and available data. Our dependent variables are firm value and financial performance. Representing the financial performance, we choose ROA (return on assets), measured by net income divided by

average total assets. For the firm value, I used Tobin's Q, which is defined as suggested in Chung and Pruitt (1994):

$$Tobin's\ Q = (MVE + PS + DEBT)/TA$$

Where: MVE is the product of a firm's share price and the number of common stock shares outstanding; PS is the liquidating value of the firm's outstanding preferred stock; DEBT is the value of the firm's short-term liabilities net of its short-term assets, plus the book value of the firm's long-term debt, and TA is the book value of the total assets of the firm.

In the independent variable, the presence of women on the board was captured. They have also employed some proxies as a model of control, such as corporate governance from the company's ranking in the Novo Mercado, sustainability through the company's presence in the B3 Sustainability Index. The concentration of property, measured as the percentage owned by the three largest shareholders, the frame size of board members, and company size, measured by total assets, were included in the analysis. Table 01 summarizes the variables used in the study.

Table 1. Research general variables

<i>Dependent Variable*</i>		<i>Measurement method</i>	
Firm Value	TQ	Tobin's q = (VMA + D) / AT	
Performance	ROA	EBIT/Total Assets	
<i>Independent variables</i>		<i>Measurement method</i>	<i>Expected relation</i>
Female presence on the board	FEMALE	Dummy: 1 if there is any woman on the board, 0 otherwise.	Positive
Ownership	OWC	Relative property of the three principal owners	Control
Board size	SC	Natural logarithm of the number of board members	Control
Firm size	SIZE	Natural logarithm of total assets	Control
Governance	GOV	Dummy: 1 if the company belongs to Novo Mercado on BM&FBovespa governance classification, 0 otherwise	Control
Sustainability	ISE	Dummy: 1 if the company is part of the Sustainability Index (Indice de Sustentabilidade Empresarial) of BM&FBovespa, 0 otherwise.	Control

Data Analysis

Linear Regression

Gujarati (2012) points out that the linear regression seeks to measure the statistical dependence of a dependent variable with other explanatory variables and estimated the average value of the

dependent variable based on known values of other variables. Hair, Black, Babin, Anderson, and Tatham (2006) adds that the multiple regression analysis consists of a multivariate statistical technique used to examine the relationship between a dependent variable (criterion) and other predictors (explanatory) and can be expressed by the following basic formulation, as Fávero, Belfiore, Silva and Chan (2009):

$$y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_k X_k + \varepsilon$$

Where,

Y is the dependent variable;

X1 + X2 + X k are independent variables;

B1, β2 ... βk are the regression parameters;

And ε is the error term.

Employees' data were submitted to econometric analysis to give birth multiple linear regression (MLR) consisting of a regression model containing more than one regressor. Quantitative variables that represent the values of attributes that can be counted or measured in each element of the sample were used.

The form used to find the coefficients of the regression equation was the method of least squares (OLS Pooled). This method seeks to find the best fit for a set of data from minimizing the sum of squares of differences between estimated and observed values; these differences are the residuals (Wooldridge, 2010; Gujarati, 2012).

Thus, the econometric models designed to test the hypothesis research were described as the following models:

$$Performance = \alpha + \beta_1 Female_{it} + \sum_{j=1}^k \delta_j Control_{ji} + \varepsilon_i \quad (1)$$

$$FirmValue = \alpha + \beta_1 Female_{it} + \sum_{j=1}^k \delta_j Control_{ji} + \varepsilon_i \quad (2)$$

T-test mean differences and probit regression analysis was also proceeded to capture as performance and value variables influence the probability of the presence of women in high-ranking of the companies analyzed.

The t-test analyzes the means of two populations are statistically different. Thus, I examined the mean difference between groups of companies with women on the board and who do not. According to Favero et al. (2014), the t-test is obtained from:

$$T = \frac{(\bar{X} - \bar{Y}) - (\mu_1 - \mu_2)}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} \sim t_\nu$$

In the given variable has Student distribution with degrees of freedom, wherein:

$$\nu = \frac{\left(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}\right)^2}{\frac{\left(\frac{s_1^2}{n_1}\right)^2}{n_1-1} + \frac{\left(\frac{s_2^2}{n_2}\right)^2}{n_2-1}}$$

The probit regression analysis (ordered probit regression) is used to explain the behavior of a binary dependent variable depending on the cumulative distribution of a normal standard. It is the model that is derived from a variable called latent (Gujarati, 2012). where:

$$Y^* = \beta_0 + X\beta + \varepsilon$$

Where y^* is the latent variable, determined by β , x , the vector of explanatory variables, ε , the component error with a normal distribution.

$$\text{Prob}(Y_i=1|X_i) = F(x'_i \beta) = \Phi(x'_i \beta)$$

where $\Phi (\cdot)$ is the cumulative distribution function of a normal standard

In this case, the probit model was used to estimate the probability of female presence on the board. Soon the variable Y takes the value 1 for companies with women on their boards, and 0 otherwise. The probit regression models structured manner according to equations 3 and 4, the ROA and Q Tobin variables were included in different models given high serial correlation.

$$prob(Female) = 1|x) = \phi(\beta_1 Performance_{it} + \sum_{j=1}^k \delta_j Control_{ji}) + \varepsilon_i \quad (3)$$

$$prob(Female) = 1|x) = \phi(\beta_1 FirmValue_{it} + \sum_{j=1}^k \delta_j Control_{ji}) + \varepsilon_i \quad (4)$$

Results and Discussion

The regression results with the estimated coefficients, robust standard errors t, and the statistical coefficient of determination (R2) are shown in Table 02.

Table 2. Linear Regression Results

		(1) TQ	(2) ROA
INTERCEPT	β	1.575***	29.27***
	se	0.625	12.86
FEMALE	β	0.508***	15.50***
	se	0.251	5.16
SIZE	β	-2.66***	-4.88**
	se	1.03	2.12
SC	β	-0.074*	-1.70*
	se	0.047	.155
OWC	β	0.014*	.153
	se	0.007	.973
GOV	β	0.511*	5.19
	se	0.304	5.31
ISE	β	-0.900***	-13.55**
	se	0.258	6.269
R ²		0.3991	0.3447
F		6.61	5.02
Prob > F		0.000	0.000
Shapiro-Francia		0,16	0,11
Breuch-Pagan		0,54	0,25
Estat VIF Mean		2,25	1,38

Source: Research data

The results indicate that performance and corporate value showed a positive and statistically positive relationship with female participation on the board of the companies analyzed, confirming the hypothesis in the research. These results corroborate previous research findings (Carter et al., 2003; Krishnan & Park, 2005; Campbell & Vera, 2010; Lückcrath-Rovers, 2013 Rodríguez-Domínguez, García-Sánchez and Gallego-Álvarez, 2012.).

As for model validation tests were performed the Breuch-Pagan test indicating no problems with heteroscedasticity. The Shapiro-Francia test demonstrated that there are no problems with

normality in the selected sample, while the statistical VIF (Variance Inflation Factors) confirmed the absence of multicollinearity.

By making the average difference test, reported in Table 03, among the companies that have the presence of women on the board and those without, the null hypothesis of equal averages for variables (Tobin's Q and ROA) was rejected a 0.01 significance level. Thus, the results indicate that in the period analyzed, companies with a female presence on the board had a better financial performance, and better market value than the others analyzed in the sample.

Table 3. T-test for mean differences

		Companies with women on the board.	Companies without women on the board	Test's statistics	P-values
FirmValue	<i>t</i>	1.436	0.886	-2.249	0.000
Performance	<i>t</i>	9.42	5.21	-2.78	0.001

Source: Research data.

It was therefore proceeded to Probit analysis, used to measure the presence of women on board when the companies making up the sample. The results are shown in Table 04. In the first probit model, it is possible to identify a positive and statistically significant association between the market value and the company's likely to have women on their board of advisors. It is also observed a positive association of corporate governance and denial of ownership concentration in the probability of the presence of women on the boards of the analyzed firms. In the second model, the relationships are similar, marking the explanatory variable financial performance also shows a positive association with the dependent variable.

Table 4. Probit regressions results

		FEMALE (3)	FEMALE(4)
TQ	β	0.4048**	
	se	0.230	
ROA	β		0.083***
	se		0.016
OWC	β	-0.055***	-0.05***
	se	0.017	0.016
SIZE	β	3.88	4.43
	se	3.35	3.55
SC	β	0.068	0.098
	se	0.098	0.101
GOV	β	1.95***	1.91***

	se	0.7331	0.755
ISE	β	0.169	0.134
	se	0.582	0.5725
SECTOR		Yes	Yes
<hr/>			
Prob > chi2		0.0000	0.0000
Pseudo R2		0.3252	0.4269
Hosmer-Lemeshow (HL)		0.6689	0.8576
Correctly Classified		0.8395	0.8555
<hr/>			

The results are consistent with the literature, demonstrating that better performance association and creating corporate value with the presence of women at the top of organizations. It also points out that companies with best governance practices are more likely to have women in senior, despite the lower, the higher ownership concentration the possibility of female presence on company boards.

Another result can be seen from the insertion of control variables by sector of activity of the companies analyzed. Companies in the paper and pulp industry, energy, and transport, showed a negative and significant association with the predicted variable. In contrast, the oil sector and consumer staples showed a statistically positive association with the presence of women on the board.

Conclusion and Recommendations

This study aimed to analyze the relationship between market value performance and the presence of women on company boards of directors listed on the BM&FBovespa. To do so was established the hypothesis, based on the theoretical platform, that the presence of women on the board is positively related to performance and creating corporate value.

We report pieces of evidence of the relationship between the proportion of women in top positions and the financial/market performance of the companies, confirming our hypothesis that suggests the importance of greater female participation in senior management to improve performance and corporate social responsibility, serving performance perspective in business and ethical aspirations in the design of gender diversity.

Thus, it follows that it is essential to reflect on the development of women's access policies in the top management of Brazilian companies, seeking precepts of ethics, equality, social responsibility, and prepositions of better performance and corporate value. In this sense, the research provides practical results for shareholders, managers, investors, government, regulatory agencies, and Society.

One major limitation was the limited sample size and the fact that the sample embraces only public companies. Regarding the method, it is essential to consider the effects of endogeneity that can lead to reverse causality. Another limitation is the governance proxies for governance and sustainability that are based on the presence of indexes that cannot reflect completely such constructs.

It is suggested in future research to expand the sample and consider the use of study in private companies. As the governance variables and sustainability, it would be interesting to approach other metrics to measure them. It would be interesting to consider using dynamic models as a way to mitigate the potential effects of reverse causality. Finally, suggest studying the developments focusing on the management council and executive board separately and with the inclusion of variables that capture the social effects of the integration of women in those tables.

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