

UNIVERSITY OF SÃO PAULO  
SÃO CARLOS SCHOOL OF ENGINEERING

LUCAS SERRÃO MACORIS

Do minority acquisitions relieve financial constraints?

São Carlos

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UNIVERSIDADE DE SÃO PAULO  
ESCOLA DE ENGENHARIA DE SÃO CARLOS

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Vendas minoritárias relaxam restrições financeiras?

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Dissertation to be presented at the Master's Defense Examination of the Production Engineering Program of the São Carlos School of Engineering, University of São Paulo.

Concentration Area: Economics, Corporate Finance and Econometrics.

Advisor: Prof. Dr. Luiz Ricardo Kabbach de Castro

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Vendas minoritárias relaxam restrições financeiras?

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*Aos meus pais e irmãs.*

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## RESUMO

MACORIS, Lucas Serrão. Vendas minoritárias relaxam restrições financeiras? 2018. Dissertação (Mestrado) – Escola de Engenharia de São Carlos. Universidade de São Paulo, São Carlos, 2017.

Este trabalho pretende examinar a ocorrência e a efetividade de transações minoritárias de participação na presença de restrições financeiras nas empresas alvo. Transações minoritárias em empresas representam uma decisão estratégica com características peculiares em relação aos diversos tipos de integração empresarial. De fato, diversos autores afirmam que transações de partes minoritárias de empresas podem representar uma alternativa para aliviar restrições financeiras. No entanto, ainda existem poucos estudos que analisam empiricamente a relação entre restrições financeiras e a ocorrência de tais transações. Mais especificamente, não há evidência empírica que afirme de fato que compras minoritárias de participações em empresas podem aliviar suas restrições financeiras ao investimento. Utilizando um painel composto de aproximadamente doze mil transações minoritárias feitas entre adquirentes americanos e alvos internacionais, os resultados demonstram uma relação positiva entre a presença de restrições financeiras ao investimento em empresas e a ocorrência de transações minoritárias. Adicionalmente, há uma diferença significativa entre os indicadores de crescimento e alavancagem das firmas alvo em relação aos seus contrafactuais após o período da transação, indicando a efetividade dos processos de transações minoritárias em relaxar as restrições financeiras das empresas.

*Palavras-chave: Compras Minoritárias; Restrições Financeiras; Fusões e Aquisições.*

## **ABSTRACT**

MACORIS, Lucas Serrão. Do minority acquisitions relieve financial constraints? 2018. Dissertation (Master) – Escola de Engenharia de São Carlos. Universidade de São Paulo, São Carlos, 2017.

This study intends to examine the occurrence and effectiveness of minority block transactions in the presence of financial constraints in target firms. Minority transactions represent a strategic decision with specific characteristics if compared to the various forms of integration. In fact, several authors claim that minority block transactions may represent an alternative to alleviate financial constraints. However, there are still few studies that empirically address the relationship between financial constraints and the occurrence of such transactions. More specifically, there is no empirical evidence that states that minority transactions actually ease targets' financial restrictions and foster corporate investment. Using a panel composed of approximately 12.000 deals, results show a positive relationship between the presence of financial constraints in target firms and the occurrence of minority transactions. Moreover, there is a significant difference between on the growth of investment and leverage indicators of target firms' related to its counterfactuals after deal completion, indicating the effectiveness of minority transactions in alleviating such companies' restrictions.

*Keywords: Minority Transactions; Financial Constraints; Mergers and Acquisitions.*

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## 1 INTRODUCTION

A relevant part of the decisions regarding the boundaries of the firm shall rely not only on investment opportunities that firms may face, but also in whether they can avail of these opportunities due to financial constraints. For the matter, Mergers and Acquisitions (from now on referred as M&A) represent an option for access to capital, either by internal funding or by exploring new, integrated financial markets, enabling target firms to relieve financial constraints.

Within this context, minority acquisitions<sup>1</sup> represent a particular form of integration that has been studied by several authors due to its relevance for the field. For example, Fee, Hadlock and Thomas (2006) argues that minority acquisitions can mitigate incomplete contracts and facilitate cooperation between independent firms in the same business, while Allen and Phillips (2000) states that they can act certifying valuable opportunities for potential investors. Additionally, Edmans (2016) points out effects that blockholders can exert in firm's outcomes such as monitoring and investment. In this sense, such kind of transactions could address several firms' decisions, such as the possibility of easing financial constraints in a way that may foster corporate investment.

However, according to Liao (2014), despite the fact that there is a prevalence of minority block transactions, little is known about their motives or long run implications. Additionally, as stated by Ouimet (2013), minority transactions have specific characteristics that need to be addressed to understand its determinants. Finally, little has been discussed about the relationship between minority block acquisitions and its capacity to relieve financial constraints.

In this line, the discussion raises some important questions to be answered: giving financially constrained firms the possibility of accessing new funds, which characteristics could determine its decision to choose for a minority block transaction? Also, which firms' strategies could be used for easing market and credit frictions in order to avoid abandoning valuable investment opportunities? Overall, do minority transactions, in fact, relieve targets' financial constraints?

Using a large panel of minority acquisitions from 2000 to 2014, the study finds that financial constraints are a key driver of the occurrence of minority transactions. While

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<sup>1</sup> In this article, we use minority acquisitions, minority block transactions and minority transactions interchangeably to represent acquisitions involving less than 50% of the target's shareholdings.

financially unconstrained firms are smaller, less leveraged and with lower profitability and cash flow generation, they also have higher growth in gross sales and higher level of cash holdings, which can indicate a more dependence upon internal generation of cash. Econometric results using a panel logit model points to a positive relationship between the WW and SA Indexes and the occurrence of minority transactions. Furthermore, results of a propensity score matching procedure indicate that constrained firms that have been evolved in minority transactions have a 30% higher growth in Total Assets and Long-Term Debt on the post-deal period, compared to financially constrained firms which did not entered.

This study extends Liao (2014) work, shedding light in the financing and governance motive as a determinant of minority acquisitions, aswell as addressing the effectivity of such transactions for reliving financial constraints. To the best of the knowledge of the author, none of these improvements have been actually made in the literature. Therefore, there are several contributions to the expanding literature in such a way that the study i) focus on the decision making of firms' integrations strategies, and not on the long and short run capital market outcomes, such as announcement returns; ii) uses a combination of techniques in order to adequately identify the effect of financial constraints on the deal outcome; and iii) address the effectiveness of such transactions to ease financial constraints and foster corporate investment. Finally, the constructed database, which contains firm, country and transaction-level information can be used in future studies to expand the understanding of minority transactions and its relationships.

### **1.1 Why consider financial constraints in a minority block framework?**

According to Liao (2014), between 1990 and 2009, one in each seven firms was a target of a minority block acquisition. Overall, there has been more than 40.000 completed deals, totaling more than \$ 2 trillion in constant 2008 dollars. In order to understand such kind of transactions, several lines of research have been designed in financial economics to address possible explanations for minority block acquisitions. For example, minority block acquisitions could occur in situations where asset specificity is high, in a way that property rights are not clear and, therefore, contracting is difficult (AGHION; TIROLE, 1994). On the other hand, such kind of transactions could emerge as an opportunity to acquirer firms to improve corporate governance levels of target firms, benefiting with the decrease in agency costs (DOIDGE et al., 2009).

More specifically, partial integration can be vital for financially constrained firms whose investment opportunities might not be exploited due to a higher cost of capital. In fact, as suggested in Tirole (2006), market imperfections such as information asymmetry and agency costs may force financially constrained firms to hold cash as a precautionary motive in order to finance its growth opportunities. In this sense, minority transactions can be effective forms of contracting as i) information asymmetry that target firms are facing could be mitigated in transactions with better informed firms, compared to the traditional funding alternatives (LIAO, 2014); ii) a blockholder transaction can serve as a certification for other potential investors, thereby decreasing funding cost for target firms (HERTZEL; SMITH, 1993); and iii) as acquirers own large stakes, they'll have the incentives to vote for riskier investment opportunities, increasing the price that small, diversified owners would be willing to pay.

Even though its prevalence in corporate reorganization, Liao (2014) states that little is known about minority block acquisitions determinants and its long run implications. More specifically, regarding the financing motive, literature has not evolved significantly with a deeper understanding of the mechanism which minority transactions can help relieving targets' financing constraints. Therefore, there is a need for better understanding for the channels which minority transactions can help mitigate the credit frictions, opening a potential gap to be further explored in regarding research in corporate finance.

## **1.2 Objectives of the study**

Taking into consideration all of the points presented, the main objective of the study is to assess the effect of targets' financial constraints in minority transactions. In order to better identify various sources that can determine the attempt and effectivity of a minority block transaction in the presence of financial constraints, the following specific objectives will be considered to address the research problem:

1. Do target firms' financial constraints affect the likelihood of a minority block transaction to occur?
2. Which target firm and country-level characteristics explain minority block transactions?

### 3. Are financial constraints relieved after post-deal period?

Answering to these questions shed up some light in the way that financially constrained firms may decide in order to enhance the capability of funding investment opportunities that may create wealth for its shareholders. Therefore, it is clear that a deeper understanding of the effects of minority transactions in the presence of targets' financial constraints can foster financial policies that can alleviate market and credit frictions, providing adequate basis for policies that seek to walk towards a more efficient economy.

The study is organized as follows. First, a theoretical background relating the main concepts and findings of the field will be presented. Second, the methodological approach used, as well as the data used will be fully detailed. Finally, the last part of the study will discuss the results and findings, connecting them to the most recent literature in the fields of corporate finance, financial constraints and minority acquisitions.

## **2 THEORETICAL BAKCGROUND**

In this chapter, the study will present the main concepts related to the purpose of the work, as well as the most recent findings regarding the fields of M&A and financial constraints. All of these concepts, theories and results form the basis of the study, which aims to provide a deeper understanding of the subject of the research.

First, theoretical work in M&A will be introduced, emphasizing its historical relevance to the academic field. Given its importance for the study, a more particular discussion regarding minority acquisitions will be provided, emphasizing the main sources of difference between partial and complete integration, as well as the most recognizable findings and studies regarding this form of ownership reorganization.

Second, the vast academic literature in financial constraints and corporate investment will be analyzed, relating its main concepts, findings and how it has corresponded to the development of empirical corporate finance research, highlighting several channels that corporate investment may be affected by financial policies. Additionally, given the relevance of financial constraints measures for the study and its historical significance in terms of academic discussion, a more detailed framework regarding identification of these phenomenon will be presented.

Finally, a more detailed background regarding the interaction between financial constraints and merger activity will be given, pointing the main discussions in the literature. More specifically, research in minority block acquisitions and financial constraints will be provided, presenting its main directions and discussions within the literature, highlighting the relevance of the theme, the particularities between this type of reorganization and addressing the gap which the research questions pretend to fill.

## **2.1 Mergers and Acquisitions (M&A): academic research and practical implications**

According to Rossi and Volpin (2004, p. 278): “In a perfect world, corporate assets and investments would be channeled toward their best use. Mergers and acquisitions (M&A) help this process by reallocating control over companies.” M&A activity, in fact, has been fundamental to corporate strategies to reach objectives such as expansion plans, synergies, increases in productivity, incremental cash flows, margins, internationalization and reductions in cost of capital. In fact, the value of cross-border M&As in 2007 accounted for approximately 70% of the total value of global foreign direct investment (UNCTAD, 2008).

Paralleling these important practical issues both in monetary and strategic terms, M&A research has evolved significantly from an academic point of view. In fact, according to Haleblan et al. (2009), global investment in M&A has been increasingly growing. Together with its practical importance, merger activity has also become interest of academic literature in several fields, such as announcement and long-term returns, determinants of successful mergers, the relationship with corporate governance practices, among others.

### **2.1.1 What drives deal activity?**

The neoclassical theory sees M&A activity as a way to improve efficiency due to industry shocks, such as antitrust policies or deregulation (MITCHELL, MULHERIN, 1996). Therefore, it is plausible to suggest that it has a great explanatory power over M&A Activity. For example, as stated by Andrade, Mitchell and Stafford (2001) and Holmström and Kaplan (2001), the wave of related acquisitions occurred in the 90’s was characterized by a significant consolidation of the industry, but also as a response to deregulation. In fact, there are other

several examples of ways to understand merger activity as a response due to specific environmental and industry factors which can be seen during the century.

However, as stated by Shleifer and Vishny (2003) the neoclassical view of mergers and acquisitions does not fully explain merger activity. While it focuses in responses to industry specific shocks that may create economic inefficiency, it does not explain aggregate movements in merger activity during the years, unless this phenomenon consists of several industry shocks at the same time. Additionally, the neoclassical theory also cannot explain the choice between cash or equity as the payment method for the transaction, as other managerial decisions that affect deal characteristics, such as institutional investors impact (Andriosopoulos and Yang, 2015), bidding strategies and takeover premiums (Eckbo, 2009) and cross-border investment (ROSSI, VOLPIN, 2004; FRANCIS et al., 2008).

In sum, the neoclassical theory cannot fully understand what drives M&A besides the overcoming of particular economic inefficiencies. As a consequence, the relationship between merger activity, aggregate shocks and macro and micro environmental factors are not entirely considered, leading to a misunderstanding of other relevant factors that could explain M&A transactions over time. This lack of understanding of the full picture of merger activity has resulted in the development of important advances in academic literature both in macro and microenvironment. In line with the latter, it is crucial to understand the main engine behind the process of merger activity.

### **2.1.2 The market for corporate control**

It is clear that M&A activity has been a key component of corporate strategies during the years. From this point of view, it is appropriate to quote the Nobel Laureate Paul Samuelson about merger activity, which understands M&A as a “*form of Darwinian industrial selection promoting social welfare*”. Notably, the engine for this selection process is the market for the corporate control (ECKBO, 2014).

Effective monitoring of managerial action doesn't come solely from shareholder action: in fact, the demand for higher performance comes from different sources. That said, a well-functioning governance system consists not only of a board of directors and external auditors, but also several other disciplining mechanisms – legal, regulatory and market-driven – which can influence management to act towards shareholder's main interests. In this sense,

the market for corporate control disciplines managers to act on behalf of shareholder's aspirations, putting pressure on its performance as it puts a risk of corporate takeover by firms that may be better aligned and capable of the task.

That said, the market for corporate control consist of all types of mergers and acquisitions settings – from friendly settlements to hostile takeovers, from equity buyers to competitors. Manne (1965) states that the logic behind the effective monitoring by the market for corporate control surfaces the following problem: considering that the stock price reflects firm's management performance, the lower the stock price relative to what it could be with an efficient corporate management, the more attractive the takeover becomes to outside players whose believe that can manage more efficiently, and, as a consequence, the higher the pressure on the actual management towards a better performance. In fact, Jensen (1988) states that the threat of a takeover attempt is one of the most important governance mechanisms in order to align interests between managers and shareholders.

Particularly in the case of a classic agency framework, the manager-shareholder conflict of interest will arise because managers have the control over firms' assets, but do not own significant equity stakes. As a consequence, managerial decisions that may affect stock performance could be misaligned with shareholders' interests, especially when managers are entrenched and have power for pursuing non-profitable but power-enhancing investments (GLENDERING et al., 2016). In this way, there is a need for governance mechanisms that may alleviate such conflicts of interests, and the market for corporate control can be an efficient way to discipline managerial action for several reasons.

More recently, Billet and Xue (2007) proposes an interesting view of how open market stock share repurchases can sign for a deterrent effect on takeover attempts. As a commonly cited motive for signaling undervaluation, funding management option plans and adjusting the capital structure, share repurchases also may reduce agency costs and make a firm less attractive to a disciplinary takeover due to mismanagement effects. The results show that firms' repurchase activity increases in around a high takeover probability, supporting the hypothesis of open market repurchases as a deterrent effect for undesirable takeovers.

### **2.1.3 Blockholders and Minority Acquisitions**

Shareholders with a small fraction of firms' equity have little or no incentive to monitor management behavior since the benefits they receive from monitoring activities will rarely offset their costs. Consequently, this form of ownership leads to the free-rider problem, as shareholders will not have incentives to individually bear such monitoring costs (TIROLE, 2006). In fact, the seminar article by Berle and Means (1932) points the agency problems that can arise from the separation of ownership and control. In this way, as suggested by Edmans (2016), managers have inadequate stakes in their firms, resulting in insufficient effort, wasteful investments, and excessive salaries and perks. Overall, the separation of ownership and control may lead to a misalignment between managerial action and shareholders' interests.

As a form of relieving this lack of managerial monitoring, blockholders arise as a solution to mitigate incomplete contracts. Formally, blockholders refers to shareholders with more than 5% of total outstanding shares, but less than 50%, leaving them with no firm majority, but a substantial form of influence<sup>2</sup>. Thus, this kind of shareholders represents a form of ownership that has the incentives to provide an effective monitoring of management actions, as the benefits from their actions will exceed the monitoring costs. To observe such phenomenon empirically, Lins (2013) studied 18 emerging markets and found that Tobin's Q is positively related to the fraction of control rights held by the aggregate non-management blockholders. Additionally, the effect is higher for countries with low investor protection, which lead us to understand that is where Corporate Governance is needed the most to assure shareholder protection.

More recently, Clifford and Lindsey (2013) analyzed effects of activism actions by blockholders in several firm outcomes. The results point to the fact that several blockholder types which are related to activism, such as hedge funds, are associated with firms' profitability and increased performance sensitivity of CEO pay.

In sum, blockholders can positively affect firms value by aligning managerial actions with shareholders' interests. However, as Edmans (2016) argues, there are situations where blockholders can, in contrast, destroy firm value, as they exacerbate conflicts of interest rather than mitigate. For example, blockholders pressure may negatively affect managerial initiative.

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<sup>2</sup> Attention need to be paid for what Edmans (2016, p. 33) considers about the definition of blockholder: "In the United States, a blockholder is typically defined as a 5% shareholder. However, rather than being motivated by theory, this definition arises because investors are required to file a Schedule 13 disclosure upon crossing a 5% threshold. Thus, unless otherwise stated, the papers reviewed below study the United States and define a blockholder as a nonofficer who owns a stake of at least 5%."

More importantly, even mitigating the Principal-Agent problem (referred as Agency Problem I), blockholders can create another form of agency cost between small and larger shareholders, known as Agency Problem II or Principal-Principal. In this line, blockholders may exert influence to expropriate benefits from small shareholders. One of these situations is where such kind of shareholders can influence negotiations at inflated prices with firms that they also have stakes, expropriating benefits from the small shareholders.

Overall, there has been several studies which seek to empirically test the impact of blockholders activity. However, most of the studies focus on a static ownership situation, trying to identify effects of already existing blocks in firms' outcomes and policies. As stated before, minority acquisitions can mitigate incomplete contracts in several situations. Therefore, there is a need for understanding blockholders in a dynamic framework, identifying effects of ownership changes in firms' outcomes. Therefore, as stated by Park *et al.* (2007), analyzing partial acquisitions rather than insider blockholder activism is somewhat similar to dynamically extend the relationship between insider ownership and firm value to investigate market reactions to insider trading.

Choi (1991) states three possible explanations for the positive market reaction around minority acquisitions: a monitoring effect, a takeover anticipation effect, and an undervaluation opportunity. Additionally, Park *et al.* (2007) indicates three main reasons for a positive market reaction after minority acquisitions: shareholder activism, investment, and strategic alliances. The first relates closely to what has been discussed earlier about the market for corporate control: if managers are not exerting the necessary efforts in order to maximize firm value, adequate monitoring could influence managerial actions and therefore enhance stock prices. Alternatively, investment purposes are related to passive monitoring, as financial players such as hedge funds, mutual funds and investment companies whose intentions are solely investing for investment purposes could sign for undervaluation. Finally, strategic alliances can also play a role in minority acquisitions as blockholders can exploit synergies between firms as they influence managerial actions.

In line with this proposition, there are studies which aims to identify effects of partial acquisitions on several firms' outcomes, in a way to extend the already validated effects of insider blockholder. Following this line, Park *et al.* (2007) studied the effects of partial acquisitions in firms' announcement returns, analyzing how outside block formation could lead to higher abnormal returns. The results point to the fact that activist blockholders can bring

monitoring benefits to target of partial acquisitions, depending on some of target, acquirer and deal characteristics, such as block size, pressure sensitivity and the existence of any outside block or managerial ownership.

In sum, blockholder activism – either static or dynamic – can impact firms' outcomes in different forms that majority transactions can exert influence. Thus, it is extremely relevant to understand how literature has evolved in order to address several questions, such as how firms are sold, what drives minority and/or minority acquisitions and which target, acquirer, deal and institutional characteristics could exert influence in the deal success and firms' outcomes *ex-post*, as well as how to correctly identify the effects of such transactions.

#### **2.1.4 Academic research in M&A: antecedents and where does we actually stand**

The framework of the market for corporate control and minority block transactions shows a path to understand how firms can achieve economic efficiency and pursue value-increasing decisions for its shareholders. However, it is not always the case where a transaction will deliver a better performance. Frictions such as transaction costs, information asymmetries and agency problems are famous examples of corporate finance frictions that may disorient fundamental firms' objectives.

In line with the latter, one of the most antique references for the matter is found in Palepu (1986), which highlights several methodological flaws that earlier studies made in attempts to understand the determinants of transaction behavior. For example, Simkowitz and Monroe (1971) multiple discriminant model reports an 83% of targets and 72% non-targets in-sample corrected predictions, but only 64% and 61% out-of-sample correct estimates, respectively.

From that point on, several academic studies sought to better understand this relationship. Rossi and Volpin (2004) studied the determinants of cross-border mergers and acquisitions, focusing on the differences between several regulations and laws across countries. The authors found that investor protection is positively associated with more merger activity and attempted takeovers, but fewer cross-border transactions. In this way, target firms facing low governance standards in their countries opt out of a low investor protection regime by entering on transactions with firms that are in an environment of better corporate governance levels. Thus, the study clearly points the importance of institutional differences in determining

cross-border merger activity, considering that this kind of reorganization could effectively increase the level of governance standards.

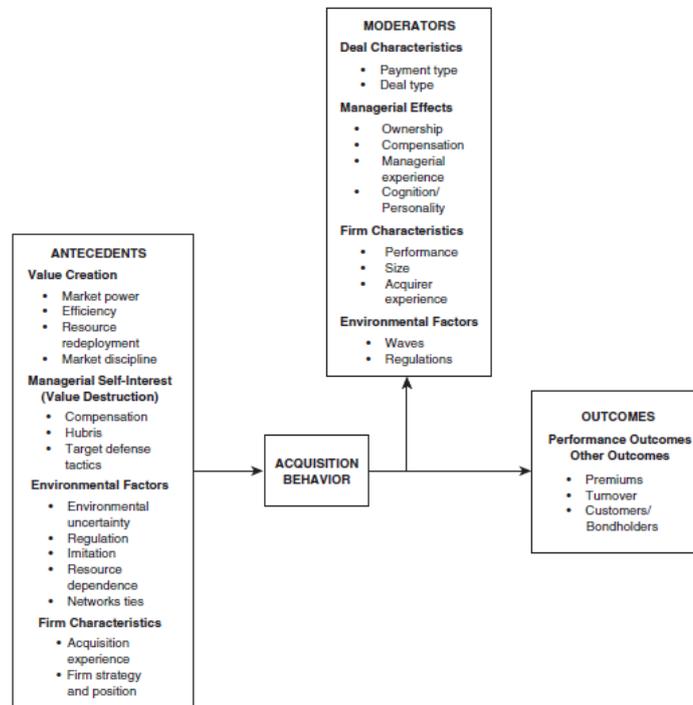
On the other hand, using a sample of 2.166 minority acquisition between 1994 and 2006, Ouimet (2013) finds that minority acquisitions are more common when maintaining some target managerial incentives are important, as well as in the presence of financial constraints in target firms and a need for certification for outside parties, such as banks and strategic partners. Likewise, minority acquisitions also appear more in situations where target valuation is uncertain, in a way that a minority stake, rather than taking the ownership control of the firm, will reduce the information asymmetry faced by the acquirer firms.

After all, the scope of research of how to understand merger activity is vast. In this sense, there has been few papers which tries to summarize the research in M&A activity, its determinants, when they occur, why they are clustered and how to correctly predict future behavior and merger outcomes, such as abnormal returns. Haleblian et al. (2009) proposes an interesting framework for understating actual and prospective research in the main fields of merger activity: antecedents, moderators, and outcomes. Figure 1 summarizes a framework for the study of M&A in an academic scheme.

In line with the suggested framework, Martynova and Renneboog (2011) points several directions for future research in order to explore new fields on M&A academic literature. According to the authors, although the has been developed a general understanding of the process, little attention has been paid for the decision mechanism that firms undertake to corporate restructurings. In this sense, what could explain the decision to enter (or to accept/deny) a transaction? Moreover, it is also important to consider other types of corporate restructuring, such as spin-offs, recapitalizations and other forms of transfer of control. Furthermore, it is also important to stress the differences between majority and minority transactions, which can have different motivations in terms of corporate governance. Therefore, understanding the decision process regarding shareholder decision on these issues remains a promising study field for future research.

**Figure 1 - M&A Research Framework**

Source: Haleblian et al. (2009)



Finally, it is important to stress the lack of research in the decision process regarding some of the most addressed corporate finance issues, such as the role of financial constraints. Is there an incentive to sell stakes for funding new projects that couldn't otherwise be? In this case, what firms' and deal characteristics could positively or negatively influence the likelihood of a successful deal? Understanding the need for funding may lead to a deeper knowledge of the drivers that affect the decision process of target firms in a transaction, advancing in one of the frontiers for the study in M&A transactions.

## 2.2 Financial Constraints and Corporate Investment

In a world of perfect capital markets, business strategies should not be affected by financial decisions or firm's financial status, implying that capital structure must not affect its value (MILLER; MODIGLIANI, 1958). However, in the absence of such conditions, firms may face uncertainty relative to its future perspective of raising capital and, therefore, use it to appropriate growth opportunities that may lead to increases in shareholder's wealth. In this line,

financial constraints emerge as a friction that potentially misaligns managers from enhancing firms' value.

As stated by Cleary (2009), problems such information asymmetry and agency costs impact both costs of equity and debt, in a way that firms that operate in such environment may be dependent upon internal cash generation to finance its growth opportunities. In this sense, if investments in new projects are sensible to the availability of internal funds, it is understood that corporate investment and financing decisions are interdependent (FAZZARI et al., 1988).

In line with the latter, one of the main discussions related to investment decisions refers to the effect of financial constraints on corporate investment (KALATZIS; AZZONI, 2009). Due to the relevance of the question, as well as its relation to other fields, such as financial development, internal capital markets, liquidity management, risk management and capital structure, this line has been intensely discussed throughout the related literature on financial economics in a way to understand corporate investment by financially constrained and unconstrained firms.

According to Kaplan and Zingales (1995), a firm is considered financially constrained if the cost or availability of external resources prevents it from undertaking new projects that would be accepted if there were internal resources to meet the necessary investments. Beginning with the seminal paper entitled "*Financing constraints and corporate investment*", by Fazzari, Hubbard and Petersen (1988) - FHP, where firms were classified into different groups according to their dividend payment policy, the results indicate a greater sensitivity of the investment to the cash flow for the firms with low dividend payment, and served as the basis for the development of numerous studies that addressed the relationship between financial constraints and corporate investment.

For example, Campello and Chen (2010) finds evidence that financial constraints may affect asset returns, as these measures are priced in the capital markets due to a riskier behavior of the financially constrained firms' stocks, a similar result found by Perez-Quiros and Timmerman (2000), where small firms' stock returns were more sensitive to credit tightening periods. Additionally, Khatami, Marchica e Mura (2015) shows evidence that financial constraints of target companies increase acquisition premiums and abnormal returns for both of the involved parties, as they may indicate positive NPV (Net Present Value) opportunities that wouldn't be taken solely by the target firm.

### **2.2.1 Measuring and identifying financial constraints**

Although FHP has been the main reference for several studies that sought to identify financially constrained firms, Kaplan and Zingales (1997) made an important contribution to the extent of the literature stating that, at that moment, there have not been any study which has been concerned with implicit propositions that were fundamental to the model. The first critique is related to the fact that the main variable of the study – the cash flow sensitivity – may reflect the effect of future profitability and growth opportunities in investment decisions that are not captured by the model. In these circumstances, the authors state that the cash flow sensitivity is biased by the effect of future investment opportunities as profitable firms are likely to have more valuable investment opportunities, indicating that they should invest more.

Therefore, investment cash flow sensitivities require a good control for investment opportunities in order to correctly identify effects of shocks in corporate investment due to financial constraints. Although adopting Tobin's Q - the ratio of a firms' Market Capitalization by its Book Value – as a control variable, studies show that it is a poor proxy for the matter since investment opportunities are fundamentally unobservable (for more details, see Erickson and Whited, 2000).

Secondly, FHP's strategy relies on sorting firms according to proxies for financial constraints, an implicit proposition that the cash flow sensitivity increases monotonically with the degree of firms' financial constraints. However, investment-cash flow sensitivities do not necessarily increase with the degree of financial constraints (KAPLAN; ZINGALES, 1997). In fact, recent papers such as Erickson and Whited (2000) and Almeida and Campello (2006) show that constrained firms have lower cash flow sensitivities than unconstrained firms in particular periods.

To overcome such limitations, an alternative approach used by the literature is to group firms in a way that future investment opportunities may be controlled, allowing cash flow and other financial variables to explain the corporate investment behavior. For example, while the original FHP framework has used payout policy to classify firms, other criteria such as size, maturity and growth has been used by Devereux and Schiantarelli (1990). On the other hand, Hsiao and Tahmiscioglu (1997) and Castro et al. (2015) opt to classify by a degree of capital intensity. Additionally, other studies have used indexes that try to represent more trustful measures of financial constraints, such as the KZ Index (Kaplan and Zingales, 1997) and WW Index (WHITED; WU, 2006).

However, recent work by Hadlock and Pierce (2010) using qualitative information from financial filings estimated several ordered logit regressions in order to test the predicting performance of the main used indexes for the matter. The results cast serious doubt on the reliability of these indexes in order to correctly identify financially constrained firms. In fact, regarding this point, Hadlock and Pierce (2010, p.1909-1910) address that:

“While there are many possible methods for measuring financial constraints, considerable debate exists with respect to the relative merits of each approach. This is not surprising, since each method relies on certain empirical and/or theoretical assumptions that may or may not be valid. In addition, many of these methods rely on endogenous financial choices that may not have a straightforward relation to constraints. For example, while an exogenous increase in cash on hand may help alleviate the constraints that a given firm faces, the fact that a firm chooses to hold a high level of cash may be an indication that the firm is constrained and is holding cash for precautionary reasons”

To sum up, it is clearly noted that identifying financially constrained measures is a challenge as endogeneity issues arising from firms’ policies biases the results. In this line, Hadlock and Pierce (2010) identifies that firm size and age are good predictors of financial constraints, proposing a new index based solely on these characteristics – the Size Age Index – which has been used as a new standard for firms’ financial constraints in empirical corporate finance research.

### **2.3 Financing Constraints and Merger Activity**

Campello and Chen (2010) suggests that real world frictions, such as asymmetric information, agency problems and incomplete contractibility impose some firms to pay higher interest rates and rely more on contractual covenants to raise funds to avail investment opportunities. As suggested by Almeida, Campello and Weisbach., (2004), given the difficulty of financially constrained firms to access capital markets, these kind of firms typically has unexploited investment opportunities that needed to be forgotten due to the lack of capital at the moment of investment. This fact, according to Khatami, Marchica and Mura (2015), makes financially constrained firms very prone to takeover activity.

In this sense, for larger firms which operate in well-developed and integrated financial markets, it is expected the effect of financial constraints on investment to be lower. However, especially for firms that operate in segmented and less sophisticated capital markets, access to capital in sufficient conditions for the firm's financial sustainability may difficult the acceptance of projects that could otherwise add value to the firm's shareholders.

In this way, acquisition represents a strategy that can mitigate this problem if acquirers' access to capital relieves such constraints, allowing the target firm to pursue profitable investment opportunities given its capacity to generate and retain a higher volume of internal cash flows, as well as its ability to access larger, sophisticated capital markets (EREL; JANG; WEISBACH, 2015).

For example, using a panel of 392 bidder firms, Himmelberg, Hubbard and Palia (2000) analyzes the 1960's merger wave, which typically involved diversifying acquisitions during that period, focusing on an internal capital markets approach. While at the time there were informational deficiencies in less developed capital markets, the study tests the hypothesis that internal budgeting could overcome such inefficiency, bursting a sizable and economically significant movement of merger activity. While controlling for several important variables, the results show that the highest returns were in the case where an unconstrained firm bids a financially constrained one. The effects hold for different financial constraints measures, giving robustness to their findings.

In the same vein, Khatami, Marchica and Mura (2015) defends that financial constraints are a key driver of takeover bids. Using a sample of US acquisitions made between 1985 and 2013, the authors studied the effect of several financial constraints measures on acquisition gains and acquisition likelihood. The results show that the effect is statistically significant, implying that not only the probability of being acquired increases but also shows that targets' financial constraints increase acquisition premiums and abnormal returns for both acquirer and targets. These findings are in line with the studies of Almeida, Campello and Weisback (2004), supporting the idea that acquisition strategies can be used to exploit good investment opportunities that otherwise would be foregone, therefore relieving targets' financial constraints. Finally, the results also point to the fact that acquisitions also increase targets' ability to access to funding by internal capital markets, as merger activity provides a better reallocation of resources within segments of the same company, or through an improved access to external markets, as suggested by Erel, Jang and Weisback (2015).

Paralleling these results, Almeida, Campello and Hackbarth (2011) states that investment funding is a key determinant of corporate liquidity policies. Thus, considering that acquisitions are a relevant part of investment strategies, it is expected asset reallocation to be a key driver of corporate liquidity. The model proposed by the authors shows that financially distressed firms, that is, firms which suffer from liquidity mismanagement, are also more prone to takeover activity. The model explains why a distressed firm has a substantially higher propensity to be acquired by a liquid firm, even if there are no operational synergies. This concept, as defined by the authors, was called “liquidity mergers.” The implications of their model hold for empirical evidence using merger activity data from 1980 to 2006.

Finally, managers will adopt policies that ensure that the most valuable investments for the firm continue to be preserved, in a way that financially constrained firms should hold cash as a precautionary motive (TIROLE, 2006; FERREIRA, VILELA, 2004). Consequently, as suggested by Almeida, Campello and Weisbach (2004), cash holdings and investment sensitivities on incremental cash flows should be higher for firms facing higher levels of financial constraints. Using a sample of 5.187 European acquisitions between 2001 and 2008, the authors measured cash and investment policies of target firms before and after a transaction and found that investment levels rose up after the deal was completed. The results found that not only cash holdings decline after a deal was completed, but also financial constraint measures represented by cash flow sensitivities has a statistically significant decline post-merger, being half of its original value.

### **2.3.1 Minority block transactions and Financial Constraints**

Several corporate finance theories relate financial policies that consider M&A as a way to ease market and credit frictions of financially constrained firms, allowing them not to abandon value generation investment opportunities. However, it is not the case that there is a homogeneity between target firms when facing integration opportunities: several factors could influence targets’ decisions for successfully completing a deal in a different form. Within this context, few studies point to a better understanding of the specific motives of minority acquisitions in firms’ integration decisions.

For example, Fee, Hadlock and Thomas (2006) provides evidence that partial equity ownership is a unique form of contracting that is at times preferable over a complete merge by firms with strategic alliances, such as supplier-customer relationships. Additionally, Ouimet

(2013) proposes to study the trade-off between partial and complete integration, making a detailed distinction between majority and minority acquisitions.

In this sense, target's financial constraints are also an important determinant of minority acquisitions, as a close-relationship acquirer might be better informed about target's financial constraints and aware of its investment opportunities. Moreover, the certification effect can also significantly impact the choice for a minority acquisition, as the acquirer firm acting as a blockholder can increase market attention for the target firm, shedding light on the investment opportunity for other potential investors.

For example, Liao (2014) studied minority acquisitions between 1990 to 2009 and found that target firms are financially constrained, with deal activity raising their stock prices at announcements and increasing investment expenditures *ex-post*, supporting the theory that equity stakes certify investment opportunities, as suggested by Ouimet (2013) and Allen and Phillips (2000).

Interestingly, minority block transactions have been studied to explain strategic alliances of related businesses. Fee, Hadlock and Thomas (2006) studied minority block transactions in a framework of product market relationships. Using a sample averaging 10,000 customer-supplier relationships, the authors found evidence suggesting that minority acquisitions can help alleviating contractual incompleteness and financial market frictions. For the former, it is suggested that financially constrained suppliers – proxied as being suppliers with negative free cash flows - are often financed by its own customers. Thus, customers act as a facilitator agent in alleviating suppliers' financing constraints as they serve as informed sources of capital. The findings are in line with Myers and Majluf (1984), which argues that in situations where informational problems could limit firms' arm's length to external finance, such as commercial banks and public placement, closely relationship firms could mitigate such lack of information by easing financing constraints and providing external finance. Moreover, the authors state that there is a limit for block size, as suppliers may be worried about customers' influence on relevant firm decisions. Therefore, concerns about control – or its proximity to as customer stakes increase - may put a limit for the block size controlled by such shareholders in situations where such relationships are closer.

In line with the latter, Allen and Phillips (2000) also studied product market relationships and minority block transactions between the parties and found similar results relating financing constraints. As stated by the authors, block equity purchases are a less costly due to an improved informational scheme between the parties. Thus, in situations of financially constrained targets, block transactions can alleviate market frictions as they I) certify investment opportunities for other potential investors; and II) provides direct funding via private placement. Moreover, findings shown *ex-post* announcement abnormal returns, increases in capital expenditures and operating cash flows as compared to industry peers and prior period, indicant not only a signaling effect for the stock market, but also a real increase in firms' outcomes. However, as firms with higher investments in research and development (R&D) are likely to have blurry contracts due to the difficult of making optimal settlements in property rights, the *ex-post* results should not be understood as solely caused by financial easing. In fact, the authors argue that in relationships with high asset specificity, contracting and monitoring benefits can offset its costs.

Finally, Pablo *et al.* (2000) made an interesting advance in understanding how minority block transactions can help alleviating capital constraints and the contracts' incompleteness. Comparing formed alliances which have been made with an equity link with those who not, the authors addressed the incremental impact of block ownership into firms' outcomes and promoted insights on how this kind of ownership reorganization could mitigate agency problems. Additionally, their findings suggest that, generally, target firms have more investment opportunities than its counterparts, but on the other hand, they are more financially constrained. Thus, strategic alliances help to alleviate such capital restrictions. Their results are in line with the findings of Baker and Wurgler. (2002), which argues that firms that are too exposed to their stock prices – equity dependent firms, such as younger firms that has low debt capacity – are less likely to proceed on an investment opportunity if they need to issue shares at an undervalued price.

### **3 DATA AND EMPIRICAL MODEL**

After presenting the theoretical highlights and the main studies of the field, this chapter seeks to introduce the materials and methods applied in order to pursue with the study's

objectives, which will be approached in a quantitative and exploratory manner. First, a fully detailed view of the data and sample used will be provided. Second, a formal approach to select explanatory variables, linking with the most adequate theoretical models and empirical findings for the purposes of the study will be presented. Third, the study will briefly discuss the main methods applied in order to address for a correct identification of the desired effects. Finally, the main benefits and caveats regarding the application of such methods will be presented in order justify its choice for this study.

### 3.1 Sample, Filters and Adjustements

In order to provide a deep understanding of the motives relating merger activity by the target view, several databases were merger seeking to match four relevant information sets: deal information (*cross-section*), company financials (*panel data*), countries' financial and market development (*panel data*) and countries' investor and creditor protection (*panel data*).

First, deal information was gathered in Zephyr. This dataset includes information on M&A, IPO, private equity, venture capital, deals and rumors. Zephyr is extremely comprehensive and coverage is approaching a million deals. Approximately 75.000 deals and rumors, of all sizes, are added per year depending on levels of deal activity. Quality of information is paramount and a rigorous quality control process is applied.

Secondly, company financial and categorical data was obtained in OSIRIS, a fully integrated public company database and analytical information solution produced by Bureau van Dijk (BvD). Working with specialist data providers from around the world, BvD makes OSIRIS one of the most accurate and comprehensive information tool available for the world's public companies. OSIRIS provides financials, ownership, news, ratings, earnings and stock data for the world's publicly quoted companies, including banks and insurance firms from over 130 countries. In order to provide information regarding target and acquirer financial data, all companies with consolidated financial data between 2000-2014 at the end of the year were considered. Finally, firm-year financial data was merged to deal information using *Bureau Van Dijk (BvD)* identification codes.

Additionally, country-year data regarding financial and market development was collected in *Global Financial Development Data (GFDD)*, by the *World Bank*. The *GFDD* is an extensive dataset of financial system characteristics for 206 economies. The database includes measures of (1) size of financial institutions and markets (financial depth), (2) degree

to which individuals can and do use financial services (access), (3) efficiency of financial intermediaries and markets in intermediating resources and facilitating financial transactions (efficiency), and (4) stability of financial institutions and markets (stability). Country-year data were gathered for all target and acquirer's countries between the period 2000-2014.

Moreover, investor and shareholder protection data were gathered in *Centre for Business Research - University of Cambridge (CBR)* database, comprising two indexes which cover 1990- 2013 (24 years) for 31 countries, a total of 7,440 observations. Such could be useful in addressing cross-country differences regarding institutional environment, which can severely affect business transactions.

Finally, stock information was gathered in *Orbis*, another *BvD* database which comprises information on over 200 million companies worldwide. Thus, target firms' yearly returns were calculated using yearly closing prices from 2000 to 2014. On the other hand, target firms' yearly volatility was calculated as the monthly variance in targets' stock returns within the years.

At the end, the resulted database contained, for each deal: the following data: i) acquirers' and targets' country characteristics and targets' country and financial data for the 2000-2014 period; ii) countries' 2000-2014 financial and market development indexes; iii) countries' investor and creditor protection measures; and iv) target stock's yearly returns and volatility for the 2000-2014 period.

All deals that have informed an initial, acquired or final equity stake for the acquirer higher than 50% of targets' shares were dropped. Likewise, all deals that did not informed Target BvD Number – the codification for gathering financial data – were excluded. Additionally, all deals containing target firms within the financial sector – SIC (*Standard Industry Classification*) Codes between 6000 and 6999 - were dropped in order to work solely with the real economy. Also, SIC codes between 4000 and 4000 (Utilities) and 9000 to 9899 (Public Administration) for target firms were excluded, as they could employ a potential bias to the results.

Finally, all observations that have negative Total Equity, Total Debt or Total Asset Values were excluded. All variables and indexes created based upon such data were winsorized at 95% and 5% levels in order to avoid the effect of outliers. Overall, the final sample contained 11.926 unique minority transactions, with 248.402 deal-year observations for the period between 2000 and 2014.

### 3.2 Econometric Modelling

As in most of the studies in M&A, the study will adopt a microeconomic approach for addressing the determinants of minority transactions. For the present study, a panel logistic regression model will be fit in panel data observations seeking to explore the desired effects above mentioned.

In this way, as the dependent variable is dichotomic – takes 1 (one) if a minority acquisition occurs and zero otherwise -, binary dependent variable models such as Logit have desirable features to fit for the research design. Such models, according to Baltagi (2005), are used in cases where the dependent variable is categorical, which can be summarized as:

$$P(Y_i = 1|X_i) = \frac{e^{x\beta}}{1+e^{x\beta}} \quad (1)$$

In this case, it is possible to verify that when  $x \rightarrow \infty$ ,  $P \rightarrow 1$ , in the case of positive coefficients. Similarly, when  $x \rightarrow -\infty$ ,  $P \rightarrow 0$ . Therefore, *Logit* transformations can fit for the desired properties of the relationship between  $P(Y_i)$  and  $X_i$ . Compared to the *Probit* models, it is seen that they have a "heavier" tail, that is, the shape of the distribution differs at the ends. Although the coefficients are not directly comparable, their signals are usually similar for both models. However, it should be emphasized that *Logit* models have certain desirable properties that facilitate the interpretation of the results. Let  $P_i$  be the estimated probability of occurrence of an event for the individual  $i$ . It is possible to show that:

$$\frac{P_i}{1-P_i} = e^{x\beta} \quad (2)$$

which is called *odds ratio (OR)*. Such ratio is the relationship between the probability of occurrence and that of non-occurrence. In this sense, taking, for example, the probability of succeeding in a test as being 80%, the probability of the event not occurring is 20%. Thus, the odds ratio is computed as  $80\% / 20\% = 4$ . That is, the probability that the event occurs is 4 times the probability that it will not occur. Taking the natural logarithm in Equation 02, it follows that:

$$\ln\left(\frac{P_i}{1-P_i}\right) = x\beta \quad (3)$$

By means of such transformation, it is possible to verify that the previously non-linear estimation in the parameter vector was linearized so that linear estimation methods can be applied to obtain the coefficients. It is also possible to verify that, although the marginal effect on the odds ratio is linear and determined by  $\beta$ , the effect on the probability of occurrence is not, which is in accordance with the assumed assumptions. The great advantage of the *logit* model is that its result can be understood as the natural logarithm of the odds ratio. Thus, when estimating the model, the correct direct interpretation of the coefficients should be done based on the odds ratio, so that the marginal effect impacts to a certain magnitude the odds ratio between the occurrence or not of the event.

As the sample consists of panel-data observations, the estimators need to consider not only cross-section data but also its variation between time periods. Then, consider  $n$  subjects (or individuals), with  $T_i$  number of occasions at which the subject  $i$  has appeared. For the following,  $y_{it}$  is the outcome variable for the subject  $i$  at time  $t$ , and  $x_{it}$  is the vector of covariates of this the subject  $i$  for at time  $t$ . Therefore, the likelihood of a successful event in the matrix of probabilities  $P_{(i,t)}$  is defined as:

$$\pi(x_{it}) = p(y_{it} = 1|x_{it}) = \frac{\exp(x_{it}'\beta)}{1 + \exp(x_{it}'\beta)} \quad (4)$$

In line with the simpler models, estimates of probabilities for panel data for a static model – where the coefficients are constant between time periods - can be made using *logit* estimations following:

$$\text{Logit} = \ln\frac{\pi(x_{it})}{1-\pi(x_{it})} = X_{it}'\beta \quad (5)$$

Specifically, as a static model, estimation lies in the assumption that there is independence between the response variables  $y_{it}$  (outcome) given the covariates  $x_{it}$ . In other words, it is expected a static behavior regarding the time period, implying that the estimated coefficients remain constant over time. However, even though a static model has desired properties for the study, it still imposes restrictions that may be not fit well for the case.

In this sense, it was assumed that the heterogeneity between the several subjects  $i$  studied in  $T$  time periods is driven solely by the covariates  $x_{it}$ , implying that there are no other unobserved factors that may determine outcome behavior, i.e. homogeneous models. Notwithstanding, such assumption may be unrealistic for the present study, as most of the behaviors in corporate finance and/or corporate governance are considered endogenous as they are likely driven by firms' specific characteristics, such as management qualification, attributes and other unobserved factors.

Therefore, it is necessary to consider the role of unobserved covariates in determining the variation in the outcome variables for an adequate estimation of the effects. Therefore, a method to incorporate such unobserved heterogeneity is to include subject-specific parameters,  $\alpha_i$ , in a way that Equation 04 can be represented as:

$$\pi(\alpha_i, x_{it}) = p(y_{it} = 1 | \alpha_i, x_{it}) = \frac{\exp(\alpha_i + x_{it}'\beta)}{1 + \exp(\alpha_i + x_{it}'\beta)} \quad (6)$$

That is, the probability of success for the subject  $i$  at time  $t$  is conditional on  $\alpha_i$  and  $x_{it}$ . The intercept  $\alpha_i$  captures the variety of effects that determine heterogeneity in the outcome variable which remains constant over time. The inclusion of the term comes to address the problem of unobserved heterogeneity in the covariates that may bias the results due to omitted variables.

For that matter, the parameters  $\alpha_i$  can be treated as fixed or random. According to Cameron and Trivedi (2010), Fixed Effects (FE) represents a situation where the intercepts  $\alpha_i$  are permitted to be correlated with covariates  $x_{it}$ , allowing some form of endogeneity. Thus, considering the error equation as:

$$u_{it} = \vartheta_i + \varepsilon_{it} \quad (7)$$

where  $u_{it}$  is composed of two terms: a subject-specific error,  $\vartheta_i$ , and an idiosyncratic error,  $\varepsilon_{it}$ , which is subject and time specific. One of the main advantages of FE models is that it is possible to relax the assumption that there is no correlation between the covariates and the error term. More specifically,  $x_{it}$  is still assumed to be uncorrelated with the idiosyncratic error,  $\varepsilon_{it}$ , but can be correlated with  $u_{it}$  by its relation with  $\vartheta_i$ , thus allowing some limited form of endogeneity. A possible way to implement such behavior in panel data models is to jointly estimate  $\alpha_1, \alpha_2, \dots, \alpha_n$

and  $\beta$ , but as in most of the cases regarding microeconometrics, short panels impose difficulties for its implementation due to the fact that as the number of subjects increases, the number of fixed effects gets higher.

However, considering that the main interest lies in estimating  $\beta$ , a way to overcome such limitation is to differentiate the linear equation  $\alpha_i + x_{it}'\beta$  in order to eliminate  $\alpha_i$ . In this sense, assuming  $E(\varepsilon_{it}|\alpha_i, x_{it}) = 0$ , the marginal effect of the  $j$ -th regressor  $\beta$  is defined as:

$$\beta_j = \frac{\partial E(y_{it}|\alpha_i, x_{it})}{\partial x_{j,it}} \quad (8)$$

which yields a consistent estimation for the slope coefficients. However, as differentiating data eliminates the fixed effects  $\alpha_i$ , which are constant over time, such alternative also rules out any time-invariant coefficient. Thus, treating heterogeneity with FE restrain estimation of coefficients for time-invariant variables.

On the other hand, Random Effects (RE) represents situations where it is assumed that the coefficients  $\alpha_i$  are purely random, in such a way that there is no correlation with the covariates  $x_{it}$ , implying that  $y_{it}$  are conditionally independent given  $\alpha_i$  (CAMERON; TRIVEDI, 2010). In this way, as the model strictly assumes a specific form of correlation between errors and covariates, it is important to understand the main hypotheses regarding the behavior of the components of the error. As stated in Gujarati (2009), the habitual hypotheses regarding RE models can be represented as:

$$\begin{aligned} \vartheta_i &\sim N(0, \sigma^2_{\vartheta}) \\ \varepsilon_{it} &\sim N(0, \sigma^2_{\varepsilon}) \\ E(\vartheta_i, \varepsilon_{it}) &= 0; E(\vartheta_i, \vartheta_j) = 0, \quad \text{for } (i \neq j) \\ E(\varepsilon_{it}, \varepsilon_{is}) &= E(\varepsilon_{it}, \varepsilon_{jt}) = E(\varepsilon_{is}, \varepsilon_{js}) = 0, \quad \text{for } (i \neq j; t \neq s) \end{aligned} \quad (9)$$

that is, the subject-specific effects are not correlated with each other and with its idiosyncratic parts. Additionally, there is no correlation between idiosyncratic errors of the same subject at different periods, and between different subjects at the same or different periods. Also, it is extremely important to note that  $u_{it}$  is not correlated with the covariates  $x_{it}$ . Thus, since  $\vartheta_i$  is a component of  $u_{it}$ , it is not correlated with the covariates, by construction. However, if it is not the case where there is no relationship between the covariates and the subject-specific error, then the RE will provide inconsistent regression estimates.

On the other hand, a great advantage of this kind of model is that as RE considers all set of observations, estimations will produce coefficients with lower standard errors. However, considering that omitted variables may be correlated with the covariates, some of the results may be biased, which imposes a trade-off between bias and variance for the researcher.

After all, the choice for FE or RE depends upon several circumstances of the research, such as the nature of the relationship between covariates and possible omitted variables, the size of the panel and the characteristics of the covariates. Since differentiating may impose several restrictions to the sample as several variables of the study are time-invariant, RE estimates will be chosen in order to address the research objectives as FE may produce very high standard errors that may impede an adequate interpretation of the effects.

### 3.3 Empirical Model for Panel data

For the present study, a random effects panel-data *logit* model will be implemented to represent the following notation:

$$Y_{it} = \omega_i + \beta \text{Micro\_Variables}_{it} + \gamma \text{Macro\_Variables}_{it} + \delta \text{Controls}_{it} + u_{it} \quad (10)$$

where the dependent variable is measured as the deal attempt – assigned 1 if a deal attempt occurred, and zero otherwise - for a specific target firm  $i$  in period  $t$ . Regarding the variables,  $\omega_i$  is the individual term for the RE equation, assumed to have an equal mean for every subject, regardless of the time period,  $\text{Micro\_Variables}_{it}$  is the vector of independent variables measuring financing constraints and other micro characteristics, and is composed of *Cash Holdings (CH)*, *Cash Flow (CF)*, *Total Debt (TD)*, *Stock Yearly Returns (SR)*, *Volatility (Vol)* and indexes of financial constraints. On the other hand,  $\text{Macro\_Variables}$  represents a set of macro variables composed of *Creditor Protection Index Difference*, *Shareholder Protection Index Difference*, *Corporate Bond Issuance (CBI)* and *Bank Deposits (BD)*. Finally,  $\text{Controls}_{it}$  represents the control variables of the model, containing *Size*, *GDP*, and *Sales Growth*. Lastly,  $u_{it}$  represents the error term for Random Effects (RE) estimator, which is composed of an individual error effect,  $\alpha_i$ , that identifies cross-section variation between subjects, and by an idiosyncratic error. A detailed description of the variables used is found in Table 1

**Table 1 - Variable Definition**

Variable	Definition	Expected Sign
<i>KZ Index</i>	Kaplan and Zingales Index for financing constraints, where "1" denotes a financially constrained firm, while "0" denotes a financially unconstrained firm.	(+)
<i>SA Index</i>	Size Age Index for financing Constraints, where "1" denotes a financially constrained firm, while "0" denotes a financially unconstrained firm.	(+)
<i>WW Index</i>	Whited and Wu Index for financing Constraints, where "1" denotes a financially constrained firm, while "0" denotes a financially unconstrained firm.	(+)
<i>Cash Holding (CH)</i>	Target firms' level of cash holdings, defined as the ratio of firms' Total Cash and Short Term Investments to Total Assets.	(+)
<i>Cash Flow (CF)</i>	Target firms' level of cash flow, defined as the ratio of firms' Cash Flow to Total Assets.	(-)
<i>Ln(Size)</i>	Target firms' size, defined as the natural logarithm of firms' Total Assets.	(-)
<i>Total Debt (TD)</i>	Target firms' level of debt, defined as the ratio of target firms' Total Debt to Total Assets.	(-)
<i>Sales Growth (SG)</i>	Target firms' sales growth, defined as the annual growth in Gross Sales.	(+)
<i>CPI Diff.</i>	Credit Protection Index difference between Target and Acquiror countries (Armour et al., 2009).	(-)
<i>SPI Diff.</i>	Shareholder Protection Index difference between Target and Acquiror countries (Siems et al., 2009).	(+)
<i>Volatility (Vol)</i>	Target firms' yearly stock return volatility, defined as the yearly compound target firms' stock return volatility.	(+)
<i>Stock Return (SR)</i>	Target firms' yearly stock return, defined as the variation between yearly closing price.	(-)
<i>Bond Issuance (CBI)</i>	Ratio of new target countries' corporate bond issuance volume by private entities in industries other than finance, holding companies and insurance to GDP.	(-)
<i>Bank Deposits (BD)</i>	The total value of target countries' demand, time and saving deposits at domestic deposit money banks as a share of GDP. Deposit money banks comprise commercial banks and other financial institutions that accept transferable deposits, such as demand deposits.	(-)
<i>GDP</i>	Natural Logarithm of target countries' GDP at purchaser's prices is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products.	(-)

One important concern of the study is that contemporaneity may play an adverse role in identifying economically meaningful effects for the model. In this sense, as data is measured yearly and assuming in advance that minority transactions are a channel by which firms' policies may affect its financial characteristics, it may be the case where a deal attempt occurred

in period  $t$  may influence target firms' financial data. Specifically, consider a deal for a target firm  $i$  occurred in the June of year  $t$ . As data is collected for years' closing financial statements, if minority transactions have an immediate impact on that specific year on the size of assets, then financial constraints indexes that consider *Size* measures do not fully represent target firms' financial conditions in  $t-1$  (before the deal was made), since its value at year  $t$  was could have been affected.

In this sense, the study follows Liao (2014) approach and considers, for each observation in year  $t$ , lagged independent variables in  $t-1$  as a way to purge deal contemporary effects from the model. Notwithstanding, robustness tests were made considering dependent and independent variables within the same year.

On the other hand, related to the financial constraints, it is expected a positive relationship of successful minority transactions and targets' level of financing constraints. Since firms' financing constraints are not directly observable, empirical literature rely on indirect proxies that may indicate the presence of such constraints, like dividend payout, credit rating, among others (FARRE-MENSA; LJUNGQVIST, 2016). More often, empirical literature has adopted indexes that represent linear combinations of firms' characteristics in order to proxy for financial constraints. In this sense, following several approaches of studies which empirically tested the financing assumption, the study will adopt the Kaplan and Zingales Index (KZ), Whited and Wu Index (WW) and the Size-Age (SA) Indexes as variables for measuring financing constraints. The KZ Index, which is proposed in Lamont, Polk and Saa-Requejo (2001), will be calculated following:

$$KZ_{it} = -1.001909 \times \frac{CF_{it}}{K_{it-1}} + 0.2826389 \times Q_{it} + 3.139193 \frac{TD_{it}}{TA_{it}} - 39.3678 \times \frac{Div_{it}}{K_{it-1}} - 1.314759 \frac{CH_{it}}{K_{it-1}} \quad (11)$$

where *Cash Flow* is defined as the sum of Earnings After Tax plus Depreciation, Amortization and Depletion; *K* is the value of Property, Plant and Equipment lagged in one period ( $PPE_{t-1}$ ); *Total Debt* is the sum of Short-Term and Long-Term Debt; *Total Assets* is the book value of firms' assets. *Q* is proxied by the growth in gross sales for the period; *Dividends* is defined as the Ordinary Dividends paid. *Cash Holdings* is defined the sum of Cash and Short-Term Investment. All monetary values were presented in U.S dollars.

On the other hand, Whited and Whu (2006) proposed another index, the WW Index, which follows:

$$WW_{it} = 0.652 - 0.091 \times \frac{CF_{it}}{TA_{it}} - 0.062 \times Div\_P_{it} + 0.021 \times \frac{LTD_{it}}{TA} - 0.044 \times A_{it} + 0.102 \times IG_{it} - 0.035 \times SG_{it} \quad (12)$$

where *Dividend Pay* is a dummy variable which assigns “1” if the firm pays dividends at the period, and 0 otherwise; *Long Term Debt* is firms’ total long debt and liabilities; *Assets* is the natural logarithm of firms’ book value of assets; *Industry Growth* is defined as the growth in gross sales for the Three-Digit-SIC Code Industry Group; and *Sales Growth* is firms’ growth in gross sales in the period.

An important concern regarding the WW index is presented in Farre-Mensa and Ljungqvist (2016), which argues that the index was constructed based upon quarterly industry growth. However, to the best knowledge of the authors, such adjustment has never been done in the literature, as the common practice was to use the yearly growth rate. In order to follow the correct specification of the WW Index, *Industry Growth* and *Sales Growth* were transformed to a quarterly rate following  $(1+g)^{(1/4)} - 1$ . For robustness tests, unadjusted specifications for the WW Index were also used considering yearly growth rates, as well as using 2 Digit SIC code for basing *Industry Growth* instead of the traditional 3 Digit Code (Core Code). All results remain robust to the alternative specifications.

Finally, presented in Hadlock and Pierce (2010), the SA Index measures financially constrained firms by basically two exogenous variables, following:

$$SA\ Index = -0,737 \times Assets_{it} + 0,043 \times Assets_{it}^2 - 0,040 \times Age_{it} \quad (13)$$

where *Assets* is the natural logarithm of book assets deflated to the 2004 Consumer Price (CPI) Index levels capped at 4.5 billion U.S dollars, and *Age* is the difference between the actual year and firm’s year of incorporation, according to Osiris, capped at the limit of 37 years. All monetary values were presented in U.S dollars.

After computing for each year of the sample the three indexes of financial constraints, firms were classified into distinct groups regarding the presence (or not) of such constraints. In this sense, firms that belong to the 4<sup>th</sup> and 5<sup>th</sup> quintiles were classified as financially constrained. Alternatively, firms belonging to the 1<sup>st</sup> and 2<sup>nd</sup> quintiles were classified as financially unconstrained. Additionally, the 3<sup>rd</sup> quintile (between 40% and 60%) was excluded, as it could represent a possible zone of uncertainty regarding the classification. This procedure was

implemented for each year, in a way that a specific firm can change its classification during the time period considered for the sample. For robustness tests, firms' classification was also made considering terciles as the criteria to split the sample into financially constrained and unconstrained firms.

### 3.4 Propensity Score Matching

As in most of the studies in Corporate Finance and Corporate Governance, it is known that the empirical results reported could be subject to various endogeneity issues such as an omitted variable problem (KHATAMI; MARCHICA; MURA, 2015). In this sense, there may exist aggregate, industry, and firm-level variables that influence both financial constraints and firms' outcomes, leading to a seemingly significant relationship between the dependent variables for explaining merger activity. For example, industry differences in investment opportunities, target firms' financial policies, and other firms' decisions and outcomes could be driving the presented results rather than the studied variables in the *Panel Logit* model.

Furthermore, several authors in M&A literature criticize the results regarding deal determinants and/or performance, as non-merging firms may differ substantially from merged ones. For example, Weichselbaumer (2010) analyzes acquirers deal gains comparing the size of OLS and matched samples and argues that most of the results of OLS may be driven by endogeneity, as the latter represents just 1% of all the firms contained in the former.

Moreover, even if the desired results in the *Panel Logit* appears to be accurately controlling for endogeneity, another important concern within minority transactions literature is to determine if minority block acquisitions could serve as an effective way to ease targets' financial constraints rather than impacting the likelihood of a deal attempt. Therefore, understanding whether corporate investment is fostered after the deal was completed is an important topic that needs to be addressed as it i) serves as a form of robustness test for the models above mentioned; and ii) can indicate in which way the minority block transactions channel can promote a real impact in firms' corporate investment policies.

In order to overcome such limitations, the study employs a design Propensity Score Matching (PSM) as an alternative to the possible problems of identifying the models, since there may be omitted variables that influence the propensity of the company to engage in M&A activity. In fact, PSM methodology has been widely used in evaluating public policies due to

its potential explain causal effects (ANGRIST; PISCHKE, 2008). Specifically regarding M&A literature, it is surprising that there are few studies which apply such techniques for addressing omitted variable problems, as most of firms' decisions are endogenous and may play an adverse role in model interpretation.

However, there are recent studies which try to address the endogeneity bias in M&A decisions and firms' outcomes using PSM methodology. For example, Bertrand (2009) uses French innovative manufacturing firms' data over the period 1994-2004 to identify causal effects of foreign acquisitions in target firms' research and development (R&D) expenses. The results point to a boost in R&D spending after the deal was completed, indicating an increase in innovative activity after the transaction. Also, using deal data from takeover transactions, Khatami, Marchica and Mura (2015) studies the effects of financial constraints on acquisitions gains and acquisition likelihood and shows that the presence of financing constraints in target firms is one of the most important factors for determining not only takeover bids but also takeover premiums.

In this sense, it is clear that there is a concern within the literature to correctly identify sources of deal determinants and its outcomes. However, there has not been, to the best of the knowledge of the study, a similar framework for treating minority acquisitions. For example, Liao (2014) analyzes differences in debt and equity issuance after minority transactions, but considers the results solely with summary statistics rather than designing an experiment to explicitly deal with endogeneity, stressing the need for additional evidence.

When considering a "naive" regression model, it is likely that the marginal effect of an independent variable is driven by omitted variables rather than its causal effect. The bias surges due to the fact that there is not an adequate control group, in a way that the differences in the variable of interest may be simply due to the heterogeneity between groups. In other words, the control group is not a valid counterfactual, as his outcomes do not reflect solely the difference in the treatment effect. However, identifying adequate control firms may also impose difficulties for the research, as the higher is the dimensions to be matched, lesser is the sample available for matching.

In this way, Angrist and Pischke (2015) argues that the PSM methodology comes as an alternative when there is no guarantee of a randomized sample, as it deals with the matching problem by analyzing similar firms in just one dimension: the likelihood of being in the treated group. The logic behind the methodology is to look for the counterfactual in order to estimate

the causal effects. In other words, what would be the outcome for a pair observation with similar propensity to be in the treatment group, with the only exception of not having being exposed the treatment effect?

Simply, the methodology seeks to find a valid counterfactual, assuming that the differences between treated and control groups are solely driven by observed characteristics. Although, for a correct application of the methodology, there are two main assumptions that need to be addressed in order to correctly identify causal relations: Conditional Independence and Common Support.

The Conditional Independence Assumption (CIA) states that, conditional on the vector of covariates  $X$ , the attribution to treatment  $Y$  is independent of potential outcomes. That is, after controlling for  $X$ , the selection for the treatment  $Y$  is random:

$$(Y^0, Y^1) \perp D \mid X \quad (14)$$

Where  $Y^0$  and  $Y^1$  denote the outcome for being in the control and treatment group, respectively. Thus, controlling for  $X$ , the attribution of a subject for being in the treated or control group is not driven by any other omitted characteristics:

$$\begin{aligned} E(Y^1 \mid X, D = 1) &= E(Y^1 \mid X, D = 0) = E(Y^1 \mid X) \\ E(Y^0 \mid X, D = 1) &= E(Y^0 \mid X, D = 0) = E(Y^0 \mid X) \end{aligned} \quad (15)$$

In this sense, the main implication of the CIA is that the outcome of a subject on the control group is a good predictor for the outcome of the subject in the treatment group, with similar covariates  $X$ , but in the absence of the treatment. In other words, CIA states that the control group is a good counterfactual for analyzing the treatment group. For the purposes of the study, it refers to the fact that, when analyzing several outcomes of target firms (“treated”) that entered in minority block transactions, firms with similar characteristics, with the only exception of not having entered in a transaction (“control”) are a good predictor of the mentioned outcomes of treated firms if it was the case that they have not entered in such transactions. To understand how the PSM rules out potential biases, start with the “naive” difference on the outcome “ $G$ ” for treated and control groups:

$$G = E[Y^1|D = 1, X] - E[Y^0|D = 0, X] \quad (16)$$

In this, way, the implicit assumption made to justify that this difference is unbiased is that subjects on both groups  $D=1$  and  $D=0$  are comparable. Thus, to understand what is the causal effect due to the outcome, Angrist and Pischke (2015) shows that the Average Treatment Effect on the Treated (ATT) can be addressed as:

$$ATT = E[Y^1|D = 1, X] - E[Y^0|D = 1, X] \quad (17)$$

In other words,  $ATT$  is obtained by comparing the means of two groups: the treated group, which is the group that receives the treatment - in the case of the study, those who participate in minority block transactions - and the control group, who are those who have not engaged, but have observable characteristics similar to their peers. In line with the equations,  $G$  can be expressed in  $ATT$  terms following:

$$G = E[Y^1|D = 1, X] - E[Y^0|D = 0, X] + E[Y^0|D = 1, X] - E[Y^0|D = 1, X] \quad (18)$$

Reorganizing,  $G$  can be expressed as:

$$G = (E[Y^1|D = 1, X] - E[Y^0|D = 1, X]) + (E[Y^0|D = 1, X] - E[Y^0|D = 0, X])$$

$$G = ATT + (E[Y^0|D = 1, X] - E[Y^0|D = 0, X]) \rightarrow ATT + bias$$

(19)

That is, the “naive” difference in outcomes can be expressed as the difference of two subparts: the former refers to the difference in outcomes between those who have received the treatment and its counterfactual, and the latter represents the difference between the counterfactual and the control outcome. It is important to observe that the counterfactual is unobservable, as it is not possible to measure the potential outcome of the treated group if they have not received the treatment beforehand. Thus, this difference in the second term can be

expressed as the bias of the naive estimator. However, if CIA is valid, then it is assumed that the control group is a good counterfactual. Thus:

$$(E[Y^0|D = 1, X] - E[Y^0|D = 0, X]) = (E[Y^0|D = 1, X] - E[Y^0|D = 1, X]) = 0 \quad (20)$$

Therefore, the conclusion is that, with CIA, the bias rules out, and the naive estimator correctly captures the ATT. In this sense, regarding the pair expressions of Equation (19), CIA only assumes that the second is valid. In other words, conditional independence is only needed in potential outcome without treatment.

On the other hand, the second assumption made in PSM is Common Support, that states that for each value contained in the covariates  $X$ , there are subjects in both treated and control groups. Formally, the hypothesis states:

$$0 < P[D = 1|X] < 1 \quad (21)$$

Therefore, conditional on every information contained in  $X$ , the likelihood of being at the treated group or control group is never 100% percent. In other words, based on all information contained in the covariates  $X$ , there is no value that strictly states that given subject belongs to any of the groups. However, if the outcome of interest is the ATT, it is only needed that Equation (21) to be constrained at the upper bound, given that if  $P[D = 1|X] = 0$ , then result is that there is not a potential pair for treatment group subject that poses as a good predictor of the outcome of the treated, which is not the concern of ATT. After all, considering CIA and Common Support together,  $ATT(X)$  can be expressed as:

$$ATT(X) = E[Y^1|D = 1, X] - E[Y^0|D = 1, X] \quad (22)$$

$$\text{But if } E[Y^0|D = 1, X] = E[Y^0|D = 0, X]$$

$$\text{Then } ATT(X) = E[Y^1|D = 1, X] - E[Y^0|D = 0, X]$$

Thus, the essence of the PSM methodology is to verify the ATT when comparing groups that are similar in observables, so that the differences in the variables of interest occur only due to the attribution to the treatment, much as it is the case of simulating a random

sampling procedure. In this case, it is essential to ensure that all or at least a large part of the observed variables used can explain the attribution to treatment.

For the implementation of the PSM, firm and country level data from firms which have not entered into minority transactions between 2000 and 2014 were used along with the preexisting sample. After that, a Random Effects, Panel Logit Model was estimated in order to provide the propensity score for each firm at given year, i.e the likelihood of belonging to the treatment group. Finally, treatment and control firms were matched according to their propensity score estimates. Given that it is plausible to assume that there may be unobservable characteristics that may impose a difference in propensity scores between treatment and control groups and weren't captured by the models, a caliper level of 0.01 was used in order minimize such difference in the propensity scores that have been estimated. Specifically, the difference between propensity scores for matched firms in treatment and control groups (*p-diff*) is almost 0.75%.

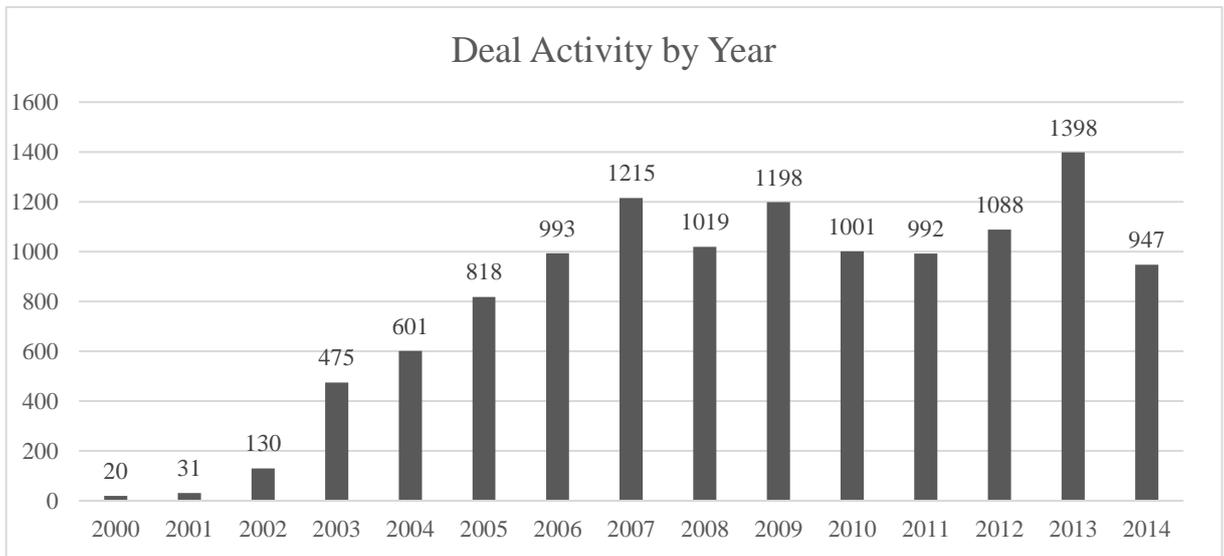
After all, the comparison between financially constrained firms that entered in minority acquisitions with those who did not may shed a light on the differences of post-deal outcomes, seeking to understand if minority transactions are a channel for relieving financial constraints.

## **4 DISCUSSION OF RESULTS**

After all the previously procedures, this chapter organizes and discuss the main preliminary results obtained in order to address the objectives of the study. First, descriptive statistics regarding the main variables of interest will be given. Second, estimations using *panel logit* regressions will be presented, leading to a discussion regarding the determinants of minority block activity. Finally, robustness tests with *propensity score matching* will be given in order to address for the final purpose of the study.

### **4.1 Descriptive Statistics**

After all the completed filters being applied, the final sample consists of 248.402 deal-year observations, with 11.926 unique deals considering a specific target-acquirer pair. Figure 2 presents the number of deals per year.

**Figure 2 - Deal Activity by Year**

Of all the deals, 7,958 were domestic (within the same country), which accounts for 66.72% of the total, and 33.27% consisted of cross-border transactions, which were represented by 72 different target nationalities. Of the latter, the most representative countries were Republic of Korea, with 1,676 deals, China, with 1,198, United Kingdom, with 1,176, Russian, with 757, Norway, with 665, and Australia, with 541 deals, which accounts for approximately 50% of the sample. Additionally, the number of deals shows a downfall over the period between 2008-2010, probably due to the economic recession, but increases on the final years of the sample. Table 2 breaks down by target country of origin.

**Table 2 - Deals by target firms' country of origin**

<b>Country</b>	<b>Deals</b>	<b>%</b>	<b>Cum. %</b>
Republic of Korea	1.676	14.1%	14.1%
China	1.198	10.0%	24.1%
United Kingdom	1.176	9.9%	34.0%
Russian	757	6.3%	40.3%
Norway	665	5.6%	45.9%
Australia	541	4.5%	50.4%
Netherlands	498	4.2%	54.6%
Sweden	496	4.2%	58.8%
Canada	495	4.2%	62.9%
France	428	3.6%	66.5%
United States	384	3.2%	69.7%
Germany	373	3.1%	72.8%
Spain	360	3.0%	75.9%
Poland	331	2.8%	78.6%
Cayman	251	2.1%	80.7%
Singapore	239	2.0%	82.7%
Finland	195	1.6%	84.4%
Malaysia	189	1.6%	86.0%
Turkey	172	1.4%	87.4%
Belgium	137	1.1%	88.6%
Jordan	131	1.1%	89.7%
Rest	1.234	10.3%	100.0%
<b>Total</b>	<b>11.926</b>	<b>100%</b>	<b>100%</b>

Interestingly, in almost every classification of financial constraints, there are more deals with targets being considered financially constrained than those where target firms are considered financially unconstrained: on average, almost 70% of the sample is considered to have difficulties for raising capital. Over the whole period, KZ, WW and SA indexes classified most firms which entered into minority transactions as being financially constrained rather than financially unconstrained.

Likewise, results in terciles also show a substantial difference between financially constrained and unconstrained groups as considering the three indexes. Additionally, correlation between classification measures in quintiles by SA and WW Indexes is 0.56, while the correlation between SA and KZ is -0.03 and the correlation between WW and KZ is 0.10, which is in line with Whited and Wu (2006) and Khatami, Marchica and Mura (2015). Results also do not differ substantially if the classification criteria changes to terciles.

Moreover, there are 2681 deals where the classification results by any of the indexes point to a financially constrained target. Although it appears to be small subsample, the number of target firms classified by any of the three indexes as being financially unconstrained is 230, almost 9% of the former. It is important to point out that such results should not be interpreted in relation to the full sample of deals, as missing values reduces the sample for 7133 transactions with values for all the indexes. Therefore, considering this subsample, the number of target firms classified as financially constrained by any criteria is almost 37%, while unconstrained firms' representation is below 5%.

Furthermore, looking a target firms' financial characteristics, heterogeneity between financially constrained and unconstrained firms' financials is clearly noticeable. For that matter, Table 3 reports que main results comparing financially constrained and unconstrained related to their main financial characteristics.

In general, the expected results can be confirmed by looking at the sample considering WW and SA Indexes for classifying target firms. In general, target firms classified as financially constrained are smaller, less leveraged and generate less cash flows (in relation to *Total Assets*). Such assumptions are valid, as it is expected that firms facing financing restrictions may not have all the access to capital markets as bigger firms do. In this sense, financially constrained firms may depend upon its internal cash flow generation in order not to forego profitable investment opportunities. In fact, financially constrained firms may suffer from difficulties of raising capital, encouraging managers to opt for financial policies that seek to relieve the dependence of external capital (FERREIRA; VILELA, 2004).

Looking a target firms' characteristics, heterogeneity between financially constrained and unconstrained firms' financials is clearly noticeable. Table 3 presents main target firm's characteristics based on the level of financing constraints by each of the indexes. All the results for WW and SA Indexes are statistically significant at 1% level

As already mentioned, financially constrained firms may suffer from difficulties of raising capital, encouraging managers to opt for financial policies that seek to relieve the dependence of external capital (FERREIRA, VILELA, 2004). In this sense, as cash flow generation is relatively lower for financially constrained firms, managers might opt to hold cash as precautionary motive (TIROLE, 2006). Summary statistics shows that, on average, *Cash Holdings* represents almost 13% of *Total Assets* for financially unconstrained targets, while financially constrained firms have almost 25% of its assets represented by *Cash Holdings*. Thus, considering the WW and SA Indexes, the ratio of *Cash Holdings* to *Total Assets* is substantially

higher for financially constrained firms, which may indicate to the precautionary motive. All differences are statistically significant at 1% level.

Moreover, financially unconstrained targets have more investment in *Property, Plant and Equipment (PPE)*, in relation to *Total Assets*, than financially constrained ones. Therefore, *PPE* may point to a facility to raise debt, as firms with high levels of tangible assets may use them as collaterals to facilitate negotiation of better financing conditions for its projects. In fact, not only financially unconstrained firms show higher levels of *PPE* than financially constrained firms but also are more leveraged. All the differences are statistically significant at 1%.

Notwithstanding, classification by KZ Index leads to different relations if compared to WW and SA Indexes. Following its classification, financially constrained targets are more leveraged, have comparable size and hold less cash than financially constrained ones. Although results may lead to a misunderstanding, several studies point to a more reliability of WW and SA Indexes for representing financing constraints (HADLOCK; PIERCE, 2008; HADLOCK; PIERCE, 2010). In fact, Almeida, Campello and Weisbach (2004) argues that KZ measures often yields opposite classifications to that provided by other financing constraint measures. Despite such differences, all the results found in descriptive statistics are in line with the findings of Khatami, Marchica and Mura (2015). Moreover, similar results are found in classification by terciles.

Furthermore, it is also possible to identify that, according to WW and SA Indexes, financially constrained targets are less profitable, presenting lower (and negative) levels of *ROA*, *ROE* and *EBITDA Margin*, but higher investment opportunities than unconstrained ones, proxied by a higher *EV/EBITDA*, which is the ratio of Enterprise Value to Earnings before Interest, Taxes, Depreciation and Amortization, and *Sales Growth*. In this sense, a possibility to explain such behavior is that financially constrained firms are expected to earn higher levels of profits if they could exploit growth opportunities (WHITED; WU, 2006). These findings are in line with those of Khatam, Marchica and Mura (2015), which finds that financially constrained firms have higher Tobins' Q, but lower interest coverage ratios. For the KZ Indexes, interpretation may suffer from the same problems stated for the other variables, following the studies of Hadlock and Pierce (2010) and Almeida, Campello and Weisbach (2004).

**Table 3 - Summary Statistics for Financially Constrained and Unconstrained Firms**

	KZ Index - Quintiles					WW Index					SA Index - Quintiles				
	Unconstrained		Constrained		Difference	Unconstrained		Constrained		Difference	Unconstrained		Constrained		Difference
	Mean	Std. Dev.	Mean	Std. Dev.		Mean	Std. Dev.	Mean	Std. Dev.		Mean	Std. Dev.	Mean	Std. Dev.	
<i>Size</i>	13.1	(1.71)	13.3	(1.171)	-0.12***	14.4	(0.81)	12.5	(1.80)	1.90***	14.7	(0.62)	11.54	(1.27)	3.15***
<i>Cash Holdings</i>	0.22	(0.16)	0.12	(0.13)	0.10***	0.13	(0.11)	0.17	(0.16)	-0.4***	0.13	(0.12)	0.18	(0.17)	-0.05***
<i>PPE/Size</i>	0.14	(0.13)	0.35	(0.21)	-0.21***	0.32	(0.20)	0.27	(0.21)	0.05***	0.32	(0.20)	0.25	(0.21)	0.06***
<i>Cash Flow</i>	0.09	(0.08)	0.06	(0.08)	0.03***	0.09	(0.06)	0.05	(0.09)	0.03***	0.09	(0.07)	0.06	(0.09)	0.04***
<i>Leverage</i>	1.38	(1.26)	1.80	(1.50)	-0.41***	1.85	(1.35)	1.52	(1.44)	0.34***	2.00	(1.41)	1.33	(1.37)	0.67***
<i>ST Debt</i>	0.34	(0.18)	0.35	(0.19)	-0.01***	0.37	(0.18)	0.33	(0.19)	0.03***	0.39	(0.19)	0.30	(0.18)	0.08***
<i>LT Debt</i>	0.11	(0.11)	0.15	(0.12)	-0.04***	0.15	(0.12)	0.13	(0.12)	0.02***	0.16	(0.12)	0.11	(0.12)	0.05***
<i>ROA</i>	0.05	(0.13)	0.01	(0.13)	0.04***	0.05	(0.08)	0.01	(0.16)	0.04***	0.04	(0.08)	-0.004	(0.18)	0.050***
<i>ROE</i>	0.10	(0.41)	-0.01	(0.66)	0.11***	0.11	(0.28)	-0.01	(0.70)	0.12***	0.10	(0.37)	-0.05	(0.75)	0.15***
<i>Sales Growth</i>	0.16	(0.28)	0.13	(0.29)	0.03***	0.13	(0.25)	0.14	(0.30)	-0.01***	0.12	(0.24)	0.15	(0.32)	-0.03***
<i>EV/EBITDA</i>	11.0	(10.3)	12.52	(12.67)	-1.50***	10.6	(9.35)	12.32	(13.0)	-1.70***	10.5	(9.20)	12.0	(13.2)	-1.58***
<i>EBITDA</i>	0.14	(0.17)	0.11	(0.17)	0.03***	0.14	(0.13)	0.11	(0.20)	0.03***	0.13	(0.13)	0.11	(0.21)	0.025***
<i>CBI</i>	0.023	(0.01)	0.025	(0.02)	-0.002***	0.025	(0.016)	0.024	(0.016)	0.001***	0.025	(0.015)	0.024	(0.018)	0.001***
<i>BD</i>	0.61	(0.39)	0.63	(0.45)	-0.02***	0.64	(0.37)	0.61	(0.43)	0.03***	0.65	(0.32)	0.64	(0.53)	0.07***
<i>SPI</i>	6.6	(1.13)	6.5	(1.3)	0.1***	6.63	(1.1)	6.53	(1.27)	0.10***	6.45	(1.27)	6.61	1.20	-0.15***
<i>CPI</i>	6.5	(0.73)	6.2	(0.95)	0.3***	6.33	(0.90)	6.34	(0.87)	-0.01***	6.32	(0.89)	6.42	(0.88)	-0.10***

This table presents the summary statistics by degree of financing constraints, considering the KZ, WW and SA Indexes. Firms considered as being unconstrained belong to the 1st and 2nd lower quintiles of the distribution, while the constrained ones belong to the 4th and 5th upper quintiles. Size is defined as the natural logarithm of Total Assets. Cash Holdings is defined as the ratio of Cash and Short Term Equivalents to Total Assets. PPE/Size is defined as the ratio of Property, Plant and Equipment to Total Assets. Cash Flow is defined as the ratio of firms' Cash Flow to Total Assets. Leverage is defined as the ratio of Assets to Equity. ST Debt refers to Short-Term-Debt and is defined as the ratio of Short-Term Debt to Total Assets. LT Debt refers to Long-Term Debt and is defined as the ratio of Long-Term Debt to Total Assets. ROA is defined as the ratio of Net Operating Profit After Taxes to Total Assets. ROE is defined as the ratio of Net Profit to Total Equity. Sales Growth is defined as the yearly growth in firms' gross-sales. EV/EBITDA is defined as the ratio between Earnings before Interest, Taxes, Depreciation and Amortization to Enterprise Value. EBITDA is defined as the ratio of EBITDA to Net Income. CBI refers to Corporate Bond Issuance and is defined as the ratio of target countries' corporate bond issuance to GDP. BD refers to Bank Deposits and is defined as the ratio of target countries' bank deposits to GDP. SPI and CPI refers to Shareholder Protection Index and Creditor Protection Index, calculated following and Armour et al. (2009) and Siems et al. (2009), respectively. \*, \*\* and \*\*\* denotes statistical significance for the t-test at 10%, 5% and 1%, respectively. Standard errors are presented in parenthesis. Results also hold for the tercile classification criteria and 2-Digit SIC Code industry classification.

Finally, institutional differences may play a role in determining the occurrence of a successful deal, as is it shown, financially constrained firms usually belong to countries with less bond issuance activity, as well as fewer bank deposits than its counterparts and lower GDP. In this way, such information could possibly indicate a lack of possibilities for capital raising in financially constrained firms' countries, which is in line with the literature - see, for example, Rossi and Volpin (2004). Finally, financially constrained targets are more often located in countries with higher levels of creditor and shareholder protection according to the SA Index, which can be thought of as protection for investment decision makers.

In sum, it is seen that minority transactions may play a role as a channel for relieving targets' financing constraints. To shed a light on the problem in a multivariate manner, econometric modeling will be applied in order to formalize the above preliminary findings and propose a basis for discussing the results.

#### **4.2 Panel Data Estimates**

Given all the preliminary ideas gathered in the summary statistics section, Table 4 presents the results of 6 (six) random effects, panel-logit models representing deal-year pairs, where the dependent variable is assigned "1" if an attempt of minority transaction is made at that year for a specific pair of target and acquirer firms. The Models (1) to (3) include only the firm level variables, as well as the financial constraints indexes measured by quintiles. Models (4) to (6) also includes country-level variables to explain the occurrence of minority transactions. Given the estimates of the AIC (Akaike Information Criteria) and BIC (Bayesian Information Criteria), Model (6) presents the best fit for the case, and therefore will be used to understand the results.

Overall, results show a significant relationship between financial constraints and minority transaction attempts. Related to the financing motive, Cash Holdings shows negative and significant values in all the presented models, showing that a decrease in Cash Holdings can increase the likelihood of a minority transaction, given that lower levels of cash could indicate a lack in the possibilities of investment funding, as it is expected that financially constrained firms maintain higher amounts of cash than compared to its peers as a precautionary motive (FERREIRA; VILELA, 2004). In this sense, precautionary motives are linked to the fact firms' possibilities of raising capital could be restricted, in a way that managers opt to hold cash to avoid losing good investment opportunities.

Additionally, it is possible to see that Cash Flow is negative and significant for all the presented models, indicating that the higher the level of cash-flow generation by target firms, lower is the propensity to enter in minority acquisitions, which is also in line with the financing motive, as firms with higher levels of cash flow or cash holdings may also not need to depend upon external sources of capital, even after controlling for Sales Growth, used as a control for growth opportunities.

Furthermore, Total Debt Ratio shows negative and significant effects for all the presented models. In this way, the lower the level of debt, higher is the propensity of a deal outcome, which is in line with the financing motive, where financially constrained firms tend to have lower levels of debt due to the cost of raising capital and/or its availability. In fact, as target firms increase their overall leverage (ratio between Total Debt and Total Assets), possibly indicating a decrease in internal cash generation dependence as external funding has increased. Therefore, deal propensity also decreases, as firms that can rely on external finance may not opt to sell stakes rather than raising debt in order to fund its investment opportunities.

As the study considers international deals, it is expected that the more underdeveloped is credit development in targets' countries, higher is the likelihood of a minority block attempt, as cross-border effects could emerge in ways to benefit target firms from accessing new financial markets (ROSSI; VOLPIN, 2004). Regarding the institutional framework, it is shown that the difference between creditor protection between target and acquirer firms shows negative and significant for all models presented. In this way, as the difference between creditor protection from targets' and acquirer's firms' countries becomes close to zero, higher is the propensity to a deal outcome, which is in line with the fact that debtholders face the problem of asymmetric information presented by Myers and Majluf (1984).

In other words, acquirer firms wouldn't go for risky projects unless its protection becomes closer than its home country, which has a lower degree of information asymmetry. In fact, as debtholders are contractually designated to receive their earnings by interest and debt amortization regardless of firms' results, outside shareholders may opt to target firms in countries where the difference between acquirer's and target's creditor protection is lower. Alternatively, if creditor protection in target countries is higher than acquirers', then the likelihood of a minority transaction increases as the acquirer firms may see as a less risky investment opportunity, given all other factors constant.

**Table 4 - Random Effects, Panel Logit Estimates based on KZ, WW and SA Indexes considering quintiles.**

Variables	(1)	(2)	(3)	(4)	(5)	(6)
<i>Ln(Size)</i>	-0.03*** (0.001)	-0.01* (0.008)	0.03*** (0.01)	-0.02* (0.01)	0.00 (0.01)	0.07*** (0.02)
<i>Total Debt</i>	-0.54*** (0.06)	-0.55*** (0.06)	-0.51*** (0.06)	-0.48*** (0.11)	-0.58*** (0.11)	-0.46*** (0.11)
<i>CH</i>	-0.17* (0.09)	-0.47*** (0.01)	-0.48*** (0.09)	-0.73*** (0.20)	-0.66*** (0.20)	-0.72*** (0.20)
<i>CF</i>	-1.29*** (0.15)	-1.54*** (0.15)	-1.46*** (0.15)	-1.56*** (0.31)	-1.00*** (0.30)	-0.66** (0.30)
<i>SG</i>	0.20*** (0.04)	0.14*** (0.04)	0.07* (0.04)	0.11 (0.08)	-0.04 (0.08)	-0.11 (0.09)
<i>SR</i>	-	-	-	-0.09*** (0.03)	-0.09*** (0.03)	-0.09*** (0.03)
<i>Vol</i>	-	-	-	0.04 (0.07)	0.08 (0.09)	0.07 (0.06)
<i>CBI</i>	-	-	-	-0.08*** (0.02)	-0.08*** (0.02)	-0.07*** (0.02)
<i>BD</i>	-	-	-	-0.002*** (0.00)	-0.004*** (0.00)	-0.003*** (0.00)
<i>Ln(GDP)</i>	-	-	-	-0.17*** (0.02)	-0.17*** (0.02)	-0.17*** (0.02)
<i>CPI Diff</i>	-	-	-	-0.04 (0.03)	-0.08*** (0.03)	-0.09*** (0.03)
<i>SPI Diff</i>	-	-	-	0.46*** (0.04)	0.46*** (0.04)	0.50*** (0.03)
<i>SPI Diff</i> <sup>2</sup>	-	-	-	-0.11*** (0.02)	-0.10*** (0.02)	-0.12*** (0.02)
<i>KZ Index</i>	0.20*** (0.03)	-	-	-0.04 (0.05)	-	-
<i>CF x KZ Index</i>	-	-	-	-	-	-
<i>WW Index</i>	-	0.074*** (0.10)	-	-	0.14*** (0.05)	-
<i>CF x WW Index</i>	-	-	-	-	-	-
<i>S-A Index</i>	-	-	0.25*** (0.04)	-	-	0.39*** (0.01)
<i>CF x SA Index</i>	-	-	-	-	-	-
AIC	65.146	62.562	59.759	19.928	19.763	19.074
BIC	65.336	62.751	59.947	20.140	19.976	19.285
LR (Wald)	1086	1057	1067	769.24	861.82	953.81
Observations	156.705	154.001	146.768	50.746	52.351	50.537

This table presents the random effects, panel logit regressions, where the dependent variable is Deal Year, which is assigned "1" whether a minority transaction has occurred with some specific pair of target and acquirer firms in a specific year  $t$ . Independent variables are lagged in one year to avoid contemporaneity problem, following Liao (2014). Financial constraint variables were defined based on quintiles the WW, SA and KZ indexes. Robust standard errors are used. Constant term and year dummies were considered. Standard deviations are in parentheses. \*, \*\*, \*\*\* denote statistical significance at 10, 5, and 1 percent, respectively. Results do not differ substantially if terciles a used.

On the other hand, looking at the differences between shareholder protection, all models present positive and statistical significance at 1% for all the models, stating that the higher the difference between target and acquirer countries' shareholder protection, higher is the propensity of a minority transaction. In fact, corporate governance mechanisms such as poison pills can undermine minority shareholder expropriation, which in turn may put the transaction less attractive for acquirer which are seeking for funding risky projects. Therefore, investors which seek for higher returns may opt to enter in transactions where target firm countries' corporate governance mechanisms are weaker than acquirer countries, allowing them to better influence management policies that would benefit them. However, as shareholder protection is measured in a country level, is important to note that the extent of the benefit that could have been expropriated from small shareholders may depend on i) the overall stake of acquirer firm in targets' shareholding; and ii) existence of other minority blockholders and majority holders; and iii) the degree of concentration of target firms' shareholdings.

Finally, it may be the case where there are variables that present non-linear effects on the likelihood of a deal outcome. That said, consider the differences between acquirers' and targets' shareholder protection indexes. As seen in previously results, the larger the difference between acquirer and target, higher is the propensity of a minority transaction between the parts. However, it is plausible to assume that some characteristics that impact the sovereign risk of the target country may impose an additional difficult to the transaction, as target firms' may be unwilling to take a substantially higher risk on the deal. In fact, results show a negative and significant relationship with the quadratic term, indicating that it's plausible to assume that there is an optimum level of difference between targets' and acquirers' shareholder protection in such a way that acquirer firms' may opt not to enter in minority transactions where i) shareholder protection in target country is slightly different from home country, which can undermine several control benefits; or ii) shareholder protection is substantially lower if compared to home country, putting an additional risk that acquirer firms' opt not to undertake.

However, as these indexes are based on differences between target and acquirer firms, it is uncertain which part of the index makes the difference higher or lower. To shed some light on the problem, cross-tabulation were made in order to identify which countries are involved in cross-border transactions. In fact, it is seen that United States and Great Britain act as acquirers at almost 45% of all cross-border transactions, while is representability as targets is below 15%. Moreover, the average level of difference between acquirer and target *CPI's* and

*SPI*'s, considering only the subsample of cross-border transactions, is 0.20 and 0.07, respectively.

However, looking only at the differences target firms from United States are acting as acquirers, differences in *CPI* increase substantially to 0.61, while differences in *SPI* decrease substantially to -0.24. Thus, results indicate that, in fact, cross-border transactions are mostly represented as having acquirers seeking for investment opportunities in countries with less shareholder protection and higher creditor protection, which is in line with the panel-data estimations previously presented.

Also related to the institutional environment, Credit Bond Issuance and Bank Deposits show negative and significant values, stating that the lower is the development of the domestic, higher is the propensity of a given firm to enter in a minority acquisition deal. In other words, target firms are mainly hosted in countries with lower financial development, which can undermine their possibilities of raising capital – or, at least, making it more difficult if compared to other countries – and therefore indicant that cross border deals are a possible path to access better developed financial markets.

Finally, Stock Return presented negative and significant values for all the models, which in in line with the fact that financially constrained firms tend to have lower levels of return due to its impossibility of exploit all the positive NPV opportunities. However, for all the models presented, Volatility shows insignificant relationship with the occurrence of minority acquisitions.

After all, it is worth noting that even after controlling for several channels of influence for a deal outcome, such as Size, Sales Growth and GDP, financing constraints measures remains statistically significant and considerably stable among the models regardless of its classification criteria. Furthermore, for robustness tests, separate regressions were estimated using groups of financially constrained and unconstrained firms based on for each index. Table 5 shows the results of the estimations.

It is shown that most of the coefficients have maintained its significance and signal for the two subsamples. However, Cash Holdings mainly hold its significance only for the financially constrained subsamples, which can indicate that liquidity policies of financially constrained firms may be linked to its capacity to exploit growth opportunities, while there is no such effect for the financially unconstrained ones. Additionally, Cash Flow maintains negative and statistically significant in almost all specifications. However, it is seen that its magnitude is higher for unconstrained samples, while in constrained samples the effect is lower.

**Table 5 - Random Effects, Panel logit estimates by groups of financially constrained and unconstrained firms**

Random Effects, Panel logit estimates by groups of financially constrained and unconstrained firms						
Variables	KZ Index		WW Index		S-A Index	
	(7)	(8)	(9)	(10)	(11)	(12)
	Unconstrained	Constrained	Unconstrained	Constrained	Unconstrained	Constrained
<i>Ln(Size)</i>	0.01 (0.02)	-0.06*** (0.02)	-0.16*** (0.04)	-0.003 (0.01)	-0.08*** (0.05)	0.05*** (0.02)
<i>Total Debt</i>	-0.65*** (0.18)	-0.34** (0.14)	-0.06 (0.20)	-0.81*** (0.12)	-0.26 (0.19)	-0.66*** (0.15)
<i>CH</i>	-0.40 (0.26)	-0.6** (0.03)	0.30 (0.34)	-1.05*** (0.21)	0.43 (0.31)	-0.90*** (0.24)
<i>CF</i>	-1.3*** (0.46)	-0.77** (0.40)	-2.05*** (0.06)	-0.92*** (0.34)	-2.17*** (0.60)	0.19 (0.39)
<i>SG</i>	0.07 (0.14)	0.07 (0.10)	-0.30* (0.18)	0.07 (0.10)	-0.52*** (0.17)	0.18 (0.11)
<i>SR</i>	-0.30*** (0.06)	-0.03 (0.04)	-0.17** (0.07)	-0.09*** (0.03)	-0.07 (0.05)	-0.07** (0.04)
<i>Vol</i>	1.99*** (0.60)	-0.07 (0.16)	-0.005 (0.08)	0.30 (0.20)	-0.21 (0.24)	0.41 (0.18)
<i>CBI</i>	-0.12*** (0.04)	-0.10*** (0.02)	-0.10*** (0.03)	-0.10*** (0.02)	-0.08** (0.03)	-0.09*** (0.02)
<i>BD</i>	-0.006*** (0.00)	-0.001*** (0.00)	-0.003*** (0.001)	-0.003*** (0.001)	-0.005*** (0.001)	-0.002*** (0.001)
<i>Ln(GDP)</i>	-0.36*** (0.04)	-0.08*** (0.02)	-0.26*** (0.04)	-0.12*** (0.02)	-0.28*** (0.03)	-0.10*** (0.03)
<i>CPI Diff</i>	-0.035 (0.04)	-0.04 (0.04)	0.10** (0.04)	-0.04 (0.03)	-0.07*** (0.04)	-0.03 (0.04)
<i>SPI Diff</i>	0.35*** (0.06)	0.45*** (0.05)	0.62*** (0.06)	0.31*** (0.04)	0.60*** (0.05)	0.23*** (0.06)
<i>SPI Diff<sup>2</sup></i>	-0.20*** (0.04)	-0.06*** (0.02)	-0.14*** (0.03)	0.31*** (0.05)	-0.10*** (0.02)	-0.13*** (0.03)
Observations	23.812	27.108	22.297	30.251	29.994	21.300

This table presents the random effects, panel logit regressions, where the dependent variable is Deal Year, which is assigned “1” whether a minority transaction attempt has occurred with some specific pair of target and acquirer firms at determined year. Independent variables are lagged in one year to avoid contemporaneity problem, following Liao (2014). Financing constraint variables were defined as classifying groups based on quintiles and terciles of the WW, SA and KZ indexes. Standard deviations are in parentheses. \*, \*\*, \*\*\* denote statistical significance at 10, 5, and 1 percent, respectively.

A possible explanation for such difference is that, while considering constrained firms, even with higher levels of cash flow generation, there is still a higher need of capital raising to fund investment projects, as compared to unconstrained firms.

Even though results may point to a positive influence regarding target firms’ financing constraints variables and the occurrence of minority transactions, one may concern that results are biased estimates of the desired relationship since there may have been unobservable firms’ specific characteristics correlated with the explanatory variables, in such a

way that their effects haven't been controlled during the analysis, leading to a misunderstanding in addressing the determinants of minority transactions.

To rule out this possibility, the study performs another robustness test considering the SA Index as the financial constraint measure adopting firm fixed effects. Given all the problems regarding the adoption of the fixed effects with mostly time-invariant explanatory variables, the financial constraint measures were considered as a continuous measure, rather than a discrete variable that assigns 0 (zero) or 1 (one). Specifically regarding fixed effects, which can drop a substantially higher number of observations for time-invariant variables, using quintiles or terciles imposes that only observations that have changed its status from one degree of financial constraints to another will be used, excluding any other characteristics that may persist over time. To address this problem, financial constraints measures were constructed using the continuous measure of the *SA Index* and were computed only for firms that belong to the two lower and higher quintiles, as well as for the lower and higher terciles. Results are presented in Table 6.

Analyzing the results, it is possible to verify that, considering models (11) and (13), most of the variables used still hold positive and significant values. More specifically, financial constraint variables remain positive and statistically significant even after controlling for unobservable firm, fixed effects. Results also hold if classification criteria changes from quintiles to terciles.

Above all, results from several specifications stress the fact that financial constraints impact the occurrence of minority transactions. Therefore, it is plausible to assume that financial constraints are a key determinant of minority acquisitions. Results are in line with the most recent findings in M&A, such as Liao (2014) and Khatami, Marchica and Mura (2015), which found similar evidences regarding the relationship between financial constraints and takeover attempts.

However, none of the analysis address the fact that minority acquisitions indeed relieve financial constraints in post-deal periods. Given that there are several other motives that could influence firms to opt for a minority transaction, such as real options, undervaluation and the governance motive, it is expected that, if the financing is a truly determinant of minority acquisitions, target firms' financial variables such as size, investment and leverage will demonstrate higher increases than its counterparts during post-deal period.

In this sense, a propensity score procedure will be applied to analyze post-deal outcomes for financially constrained target firms that entered in minority transactions.

**Table 6 - Fixed Effects, Panel Logit Estimates based on the SA Index**

Fixed Effects, Panel Logit Estimates based on the SA Index				
Variables	(13)	(14)	(15)	(16)
<i>Ln(Size)</i>	-0.47*** (0.18)	-0.28*** (0.12)	0.32 (0.36)	1.009*** (0.22)
<i>Total Debt</i>	-0.05 (0.29)	-0.10 (0.18)	0.15 (0.27)	-0.041 (0.17)
<i>CH</i>	-0.34 (0.36)	-0.33 (0.23)	-0.11 (0.34)	-0.13 (0.22)
<i>CF</i>	-1.06** (0.5)	-0.89*** (0.34)	-0.52 (0.48)	-0.62* (0.33)
<i>SG</i>	0.09 (0.10)	-0.05 (0.06)	0.06 (0.09)	-0.5 (0.06)
<i>SR</i>	-0.03 (0.04)	-	-0.07** (0.03)	-
<i>Vol</i>	-0.38 (0.37)	-	0.05 (0.23)	-
<i>CBI</i>	-0.03 (0.4)	0.008 (0.03)	-0.04 (0.03)	0.003 (0.03)
<i>BD</i>	0.004 (0.001)	0.006*** (0.001)	0.003** (0.001)	0.006*** (0.001)
<i>Ln(GDP)</i>	-0.47*** (0.18)	-0.28*** (0.12)	-0.51*** (0.16)	-0.35*** (0.11)
<i>CPI Diff</i>	-0.77*** (0.12)	-0.58*** (0.09)	-0.75*** (0.11)	-0.58*** (0.08)
<i>SPI Diff</i>	-0.008 (0.14)	-0.13* (0.08)	0.15 (0.13)	-0.05 (0.07)
<i>SPI Diff<sup>2</sup></i>	-0.09* (0.05)	-0.07*** (0.02)	-0.08 (0.04)	-0.06*** (0.02)
<i>S-A Index</i>	0.67 (0.52)	1.41*** (0.33)	0.43 (0.49)	1.15*** (0.31)
Classification Criteria	Quintiles	Quintiles	Terciles	Terciles
AIC	6.958	13.621	8.032	15.346
BIC	7.130	13.820	8.207	15.548
LR (Wald)	160.50	474.87	188.27	547.16
Observations	13.143	29.221	15.256	33.142

This table presents the fixed effects, panel logit regressions, where the dependent variable is Deal Year, which is assigned “1” whether a minority transaction attempt has occurred with some specific pair of target and acquirer firms at determined year. Independent variables are lagged in one year to avoid contemporaneity problem, following Liao (2014). Financing constraint variables were defined following the measure of the SA Index. Constant term and year dummies were considered. Standard deviations are in parentheses. \*, \*\*, \*\*\* denote statistical significance at 10, 5, and 1 percent, respectively.

### 4.3 Propensity Score Matching

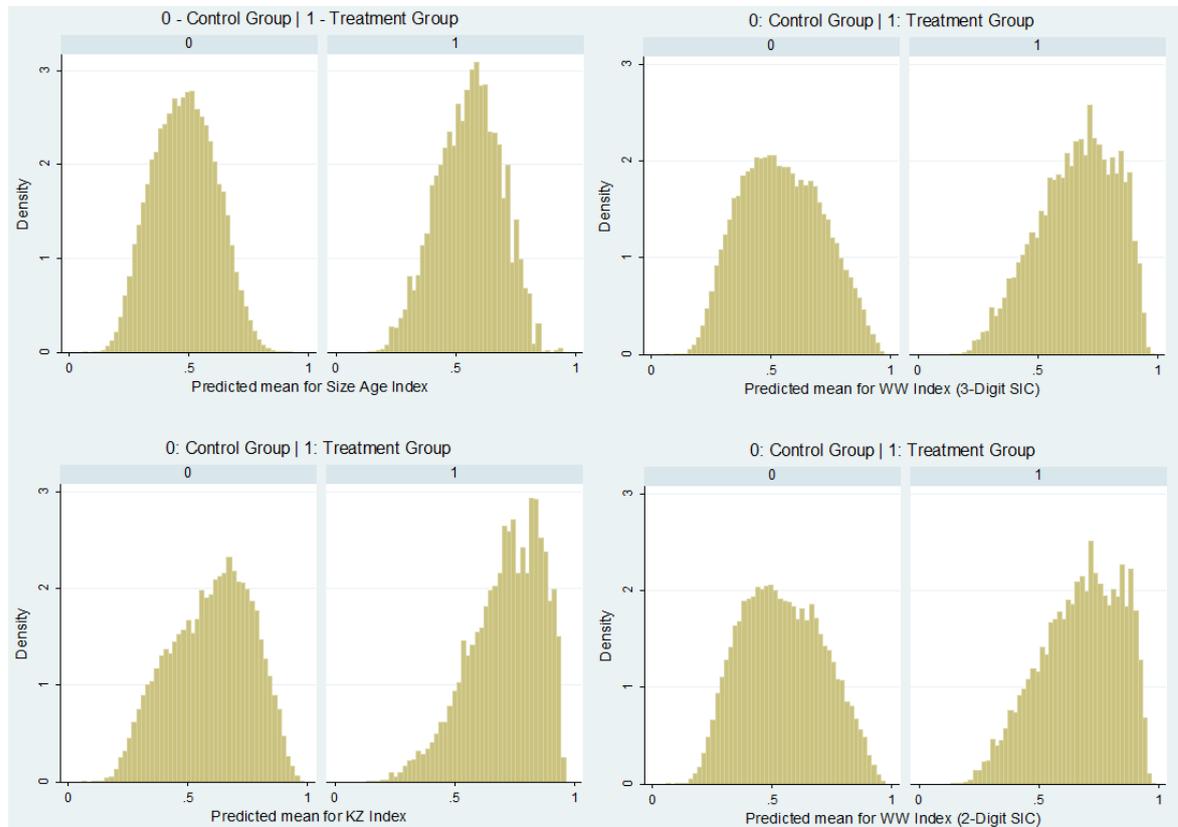
The results from *panel logit* regressions demonstrate that targets' financial constraints do affect minority transaction attempts, even after controlling for several factors that may affect firms' decisions. However, to promote a robustness test to the previously findings, while investigating if such channel truly eases financial constraints, the study applied a PSM methodology.

As there may be firm characteristics that could possibly drive the propensity to enter in minority transactions, companies' financial and country-year data were also gathered for similar firms that were not classified as having participated of deals in the studied period in order to avoid a possible identification bias, forming another dataset for robustness tests. At the end of the merging process, this second database contained a panel data for the 2000-2014 of deals, with 1.034.000 firm-year observations. The same filters regarding SIC codes, negative values and variable adjustments were also applied, as well as the winsorizing procedures and construction of the financial constraints variables.

After that, a *panel logit* estimation was used to calculate the propensity to engage in minority transactions using the target firms' observable variables. Figure 3 shows the distribution of the propensity score matching for treatment (firms that entered in minority transactions as targets) and control (firms that did not entered), considering only financially constrained firms based on the groups created using quintiles of the KZ, WW and SA Indexes. Results do not differ using terciles.

Analyzing the results, it is seen that the propensity scores estimated for treatment and control groups show similar distributions. In this sense, PSM methodology was applied to compare in treatment and control groups several variables that could indicate an increase in investment activity and/or capital raisings. Given that it is plausible to assume that there may be unobservable characteristics that may impose a difference in propensity scores between treatment and control groups and weren't captured by the models, a *caliper* level of 0.01 was used in order minimize such difference in the propensity scores that have been estimated. Specifically, difference between propensity scores for matched firms in treatment and control groups (*p-diff*) is almost 0.75%.

**Figure 3 - Propensity Score Estimates for Financial Constraint Indexes**



In this way, growth percentages were calculated for a window of  $[-2, +2]$  years around the minority acquisitions for variables that may have suffer from an effect whether financial constraints are relieved, such as Total Assets, Total-Debt Ratio, Long-Term Debt Ratio and Short-Term Debt Ratio, where Total-Debt Ratio, Long-Term Debt Ratio and Short-Term Debt Ratio are the ratios of Total Debt, Long-Term Debt and Short-Term Debt to Total Assets, respectively. Thus, it is expected that firms in the treatment group show higher growth in investments and capital raisings at the post-deal period, while suffer from a lower growth in the previous periods. Table 6 presents the results of PSM estimates for outcome variables.

Results show that financially constrained firms that engaged in minority transactions as targets, regardless of the measure of financial constraints used, show higher investment growth ratios forward to the transaction, as well as higher growth in leverage ratios. More specifically, changes in Total Assets are 11% and 19% higher in the treatment group, on average, than the control group for the T+1 and T+2 periods, respectively, while there is a lower growth (-5% and -4% for T-1 and T-2, respectively), on average, in the years prior to the occurrence of the transactions. Likewise, changes in Total Debt Ratio for the treatment group are 13% higher, on average, than the control group for the T+1 and T-2 periods, respectively,

while prior to the transaction the difference is lower (-8% and -6%, respectively, for the T-1 and T-2 periods). Regarding long term funding, treatment group shows a 20% higher growth in Long Term Debt Ratio, on average, than the treatment group, while prior to the transaction the difference is -5%, on average.

Considering only the KZ and WW Indexes, there are statistically and significant increases in Total Assets in an order of 17% and 23% higher, on average, than its peers for the T+1 and T+2 periods, respectively, which that can indicate the effectiveness of minority transactions to foster investment growth, while presented a close to zero difference in growth in the periods T-1 and T-2. Paralleling these results, the same behavior is found looking specifically at firms' capacity to raise external capital to fund investment opportunities. It is seen that treatment firms show levels of growth in Total Debt Ratios 19% and 25% higher for the T+1 and T+2 periods, respectively, if compared to firms in the control group, while the lagged results point to lower statistically significant growth (-3% and -1% for the T-1 and T-2, respectively), on average, than those which didn't enter in minority transactions, which could indicate more facility forward to the transaction for the treatment group to access external funding in feasible conditions that could be used to exploit growth opportunities. Results do not differ significantly if 2-Digit SIC growth rates are used.

Additionally, breaking down debt ratios in short and long-term shows that, prior to the transaction, firms demonstrate almost the same growth rates of Short-Term Debt Ratios than its counterparts. However, looking at long-term capital raising, growth rates for Long-Term Debt Ratios are almost 30% and 20% higher than firms in the control groups, on average, for the periods T+1 and T+2. Almost all estimates are statistically significant at the 1% level. Additionally, in the previous periods, growth in debt ratios, regardless of their type, appears to be lower and statistically significant for the control groups, indicating that on previous periods, it could be the case where financial constraints were more present.

Regarding the SA Index, it is seen that the differences between treatment and control groups are not statistically significant for the T+1 and T+2 periods. However, looking prior to the transaction, firms that belong to the treatment group show lower and statistically significant growth in Size and Debt Ratios. Despite of such difference, results show to be consistent between the three financial constraints measures.

Moreover, it could be the case where the results would be independent from the fact that treatment and control groups are represented only by financially constrained firms. In other

words, difference between treatment and control groups using only financially unconstrained firms would deliver the same results.

**Table 7 - Propensity Score Matching Estimates for Financially Constrained Firms**

Propensity Score Matching Estimates for Financially Constrained Firms													
KZ Index (Quintiles)					WW Index (Quintiles)				SA Index (Quintiles)				
<i>Size</i>													
<i>Lead</i>	<i>TG</i>	<i>CG</i>	<i>Dif.</i>	<i>t-stat</i>	<i>TG</i>	<i>CG</i>	<i>Dif.</i>	<i>t-stat</i>	<i>TG</i>	<i>CG</i>	<i>Dif.</i>	<i>t-stat</i>	
T+1	0.10	0.079	0.02	4.59***	0.095	0.088	0.007	1.71*	0.096	0.097	-0.001	-0.25	
T+2	0.08	0.06	0.015	4.65***	0.084	0.074	0.010	2.85**	0.087	0.080	0.007	1.58*	
<i>Lag</i>	<i>TG</i>	<i>CG</i>	<i>Dif.</i>	<i>t-stat</i>	<i>TG</i>	<i>CG</i>	<i>Dif.</i>	<i>t-stat</i>	<i>TG</i>	<i>CG</i>	<i>Dif.</i>	<i>t-stat</i>	
T-1	0.103	0.099	0.003	0.93	0.101	0.105	-0.004	-1.00	0.087	0.103	-0.015	-3.32***	
T-2	0.122	0.112	0.01	2.30**	0.113	0.127	-0.008	-2.03**	0.105	0.118	-0.012	-2.50**	
<i>TD</i>													
<i>Lead</i>	<i>TG</i>	<i>CG</i>	<i>Dif.</i>	<i>t-stat</i>	<i>TG</i>	<i>CG</i>	<i>Dif.</i>	<i>t-stat</i>	<i>TG</i>	<i>CG</i>	<i>Dif.</i>	<i>t-stat</i>	
T+1	0.116	0.094	0.022	4.41***	0.136	0.118	0.017	3.02***	0.131	0.129	0.002	0.31	
T+2	0.096	0.079	0.016	3.42***	0.106	0.098	0.007	1.40	0.113	0.103	0.010	1.41	
<i>Lag</i>	<i>TG</i>	<i>CG</i>	<i>Dif.</i>	<i>t-stat</i>	<i>TG</i>	<i>CG</i>	<i>Dif.</i>	<i>t-stat</i>	<i>TG</i>	<i>CG</i>	<i>Dif.</i>	<i>t-stat</i>	
T-1	0.137	0.135	0.002	0.44	0.124	0.135	-0.010	-1.75*	0.107	0.131	-0.023	-3.41***	
T-2	0.161	0.150	0.011	1.97**	0.140	0.156	-0.161	-2.63**	0.123	0.145	-0.021	-3.05***	
<i>STD</i>													
<i>Lead</i>	<i>TG</i>	<i>CG</i>	<i>Dif.</i>	<i>t-stat</i>	<i>TG</i>	<i>CG</i>	<i>Dif.</i>	<i>t-stat</i>	<i>TG</i>	<i>CG</i>	<i>Dif.</i>	<i>t-stat</i>	
T+1	0.127	0.126	0.001	0.12	0.146	0.144	0.002	0.29	0.146	0.153	-0.006	-0.79	
T+2	0.124	0.118	0.006	1.03	0.126	0.134	-0.007	-1.24	0.131	0.139	-0.008	-1.07	
<i>Lag</i>	<i>TG</i>	<i>CG</i>	<i>Dif.</i>	<i>t-stat</i>	<i>TG</i>	<i>CG</i>	<i>Dif.</i>	<i>t-stat</i>	<i>TG</i>	<i>CG</i>	<i>Dif.</i>	<i>t-stat</i>	
T-1	0.157	0.161	-0.004	-0.70	0.145	0.164	-0.019	-2.87**	0.127	0.158	-0.031	-4.01***	
T-2	0.182	0.175	0.007	1.14	0.159	0.180	-0.020	-2.98***	0.146	0.174	-0.027	-3.41***	
<i>LTD</i>													
<i>Lead</i>	<i>TG</i>	<i>CG</i>	<i>Dif.</i>	<i>t-stat</i>	<i>TG</i>	<i>CG</i>	<i>Dif.</i>	<i>t-stat</i>	<i>TG</i>	<i>CG</i>	<i>Dif.</i>	<i>t-stat</i>	
T+1	0.44	0.31	0.13	6.36***	0.439	0.396	0.042	1.88*	0.422	0.408	0.013	0.52	
T+2	0.307	0.268	0.038	1.98**	0.362	0.293	0.069	3.24***	0.349	0.301	0.047	1.88*	
<i>Lag</i>	<i>TG</i>	<i>CG</i>	<i>Dif.</i>	<i>t-stat</i>	<i>TG</i>	<i>CG</i>	<i>Dif.</i>	<i>t-stat</i>	<i>TG</i>	<i>CG</i>	<i>Dif.</i>	<i>t-stat</i>	
T-1	0.419	0.418	0.00	0.00	0.409	0.418	-0.008	-0.39	0.353	0.418	-0.064	-2.48**	
T-2	0.504	0.468	0.035	1.63*	0.459	0.479	-0.019	-0.83	0.405	0.472	-0.066	-2.52**	

This table presents the propensity score estimates based on a logit regression where the dependent variable is Merge Activity, which is assigned "1" whether a minority transaction attempt has occurred with the firm, and "0" otherwise. Financing constraint variables were defined as classifying groups based on quintiles and terciles of the WW, SA and KZ indexes. TG, CG, Dif. and t-stat refers to Treatment Group, Control Group, Difference in Means and Students' t test, respectively. \*, \*\*, \*\*\* denote statistical significance at 10, 5, and 1 percent, respectively.

In this sense, it could be the case that the difference in growth and fund raising outcomes isn't related to the financing motive, as financially constrained and unconstrained

subsamples present the same behavior. Therefore, robustness tests, the same procedures of PSM methodology were made in unreported tables only unconstrained firms. Interestingly, when comparing difference between treatment and control groups for the two subsamples, it is seen that the magnitude of the difference is substantially higher for the subsample of financially constrained firms. In this way, it is seen that such differences may indicate easing of financial constraints – the financing motive – rather than other explanations for the completion of minority block transactions.

Overall, these findings may indicate that firms that engage in minority transactions as targets ease financing constraints in a way that they i) show higher investment ratios than its peers, as demonstrated by the growth Total Assets; and ii) benefit from having access to better sources of external finance, as illustrated by higher growth rates in Total-Debt Ratio and Long-Term Debt Ratio, if compared to control group. In this sense, such results do not act only a robustness test indicate the importance of finance constraints in target firms' decision to engage in minority transactions but also plays a role in demonstrating that this channel effectively relieves financial constraints and foster corporate investment, which is in line with the findings of Erel, Jang and Weisbach (2015) for majority acquisitions.

Finally, using the above mentioned estimations for the average treatment effect, it is also possible to compare the difference between periods T+1 and T-1 by treatment and control group. In this sense, results show a positive difference for all of the outcomes, regardless of the financial constraint measure used. That is, firms that belong in the treatment group – those which have entered in minority transactions as targets – have shown higher growth ratios than its counterparts for studied period forward to the acquisition, if compared to the two years prior to the transaction. Table 8 shows the mentioned results.

**Table 8- Differences between time for Size and Debt outcomes in periods T-1 and T+1**

<b>Difference between time periods for Size and Debt Outcomes</b>			
<i>Size</i>	<i>KZ Index</i>	<i>WW Index</i>	<i>SA Index</i>
T+1	0.02	0.007	-0.001
T-1	0.003	-0.004	-0.015
<i>Diff</i>	0.017	0.011	0.014
<i>Size</i>	<i>KZ Index</i>	<i>WW Index</i>	<i>SA Index</i>
T+1	0.022	0.017	0.002
T-1	0.002	-0.010	-0.023
<i>Diff</i>	0.02	0.027	0.025
<i>Size</i>	<i>KZ Index</i>	<i>WW Index</i>	<i>SA Index</i>
T+1	0.001	0.002	-0.006
T-1	-0.004	-0.019	-0.031
<i>Diff</i>	0.005	0.021	0.025
<i>Size</i>	<i>KZ Index</i>	<i>WW Index</i>	<i>SA Index</i>
T+1	0.13	0.042	0.013
T-1	0.00	-0.008	-0.064
<i>Diff</i>	0.13	0.05	0.077

## 5 CONCLUSIONS AND DIRECTIONS FOR FUTURE RESEARCH

According to Ouimet (2013), minority acquisitions represent a totally distinct form of firm reorganization with specific characteristics that may differ from complete integrations, such as majority buyouts. Considering a financial constraints scheme, several authors point that minority transactions may serve as a channel for relieving targets' financial constraints as they certify investment opportunities and facilitate access to large, integrated capital markets with better debt conditions for fostering corporate investment.

In this sense, this study proposed to study the determinants of minority transaction attempts by analyzing target firms' characteristics. In special, the role of target financial constraints is addressed in order to verify not only if targets' financial constraints impact the likelihood of a deal attempt, but especially if minority transactions truly relieve financing constraints and positively impact investment growth and debt raising.

The findings suggest that financially constrained firms are smaller, have higher growth in gross sales, but are less leveraged and generate less cash flows, which can indicate unexploited growth opportunities. In fact, considering several classifications for financially constrained firms, it seems that such group represents the majority of target firms which engage in minority transactions over the period 2000-2014. Results of the econometric modelling point to a positive relationship between minority transaction attempts and targets' financing constraints for the WW and SA Indexes, even after controlling for several variables that could represent firms' financial decisions.

Consistent with the previous findings, propensity score estimates show that financially constrained firms that entered into minority transactions as targets present higher growth ratios in Total Assets in almost 15% on average, if compared to a control group with similar characteristics after deal completion, while demonstrate a -5% lower growth prior to the transaction. Moreover, these firms present almost a 3% lower growth in Short-Term Debt ratios, but a 18% higher growth in Long Term Debt ratios, indicating better access to feasible debt options. After all, the results stress the importance of minority transactions as a form to relieve target firms' financial constraints.

This study contributes to the growing literature on minority acquisitions as it extends the findings of Liao (2014), finding evidence for minority deal activity for the financing and the governance motive. Additionally, the study also contribute as considers the role of endogeneity not only as a robustness test, but also to access if financial constraints are indeed relieved after deal completion. To the best of the knowledge of the author, this advance has never been done in the minority acquisitions literature before. Likewise, the study extends the findings of Erel, Jang and Weisback (2015), which founds similar results regarding majority acquisitions in the presence of financial constraints in target firms.

While the results contribute in a way to better understand minority transactions specific characteristics and motivations, there is still important questions to be answered. In this sense, further directions for future research can be exploited in order to provide a more detailed discussion of the problem, as well as to shed more light on some important, but not discussed issues.

First, studying the role of equity stake size in minority acquisitions may help better understand minority block activity. Therefore, there is a need for better understanding in the definition of an optimum size of minority stake large enough to compensate the cost of monitoring and provide enough power to influence managerial action, while at the same time equilibrates the exposure of acquirer firms to risk, as discussed in Dhillon and Rossetto (2015). Additionally, not only a dynamic outside block formation is important to better understand minority acquisitions, but also relevant, the inside block formation on target firms. Finally, as the matching procedure is relying on the CIA hypothesis, identification strategy of the causal effect is dependent of such assumptions to produce comparable results across treated and control groups. In this sense, the use of other identification strategies which rely on exogenous variation, such as the Differences in Differences (D-D), can be used.

Above all, it is clear that the results point to interesting insights regarding minority acquisitions as a channel for relieving financial constraints. In this sense, research should be expanded in order to better understand how firms' decisions in corporate restructuring may be affected by firms, industry, governance and country characteristics.

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