MSc Thesis

Efficiency and Effectiveness of an Ex-ante Merger Control Regime: Evidence from the Brazilian Antitrust Reform

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Abstract

This study aims to assess the efficiency and effectiveness of a mandatory pre-merger notification regime, by studying the difference-in-differences effect of a reform in Brazilian antitrust. The reform concerns the implementation of an ex-ante enforcement regime, where deals were controlled ex-post before. The difference-in-differences effect induces a reduction in announcement returns of about 4%, which translates into an average value destruction of €143 million per exposed deal. This is robust to different event windows, placebo effects, and truncated samples. This value reduction has several reasons stemming from earlier research. First, the lengthy procedures impair the assets to be bought in the meanwhile, especially when the bidder targets firms in competitive industries where rival bidders emerge. Second, because of managerial entrenchment issues arising when regulatory scrutiny discourages takeovers and hence provides room for agency-motivated deals. Third, the strict notification duties under the new regime force the acquirers to disclose complete and qualitative financial information about the firm. As management tends to overstate its performance, the information accessible to investors is rather realistic than optimistic post-reform. Evidence for the improvement of information symmetry between investors and management is found as well. Investors investing in deals that got exposed to the reform are more accurately informed about long-term performance, compared to the control group. This is measured by the alignment between abnormal merger announcement turns and three-year buy-and-hold returns. The improvement in information symmetry seems lower for deals in competitive environments, indicating acquirers avoid scrutiny by the competition authority. This finding however remains incomplete and requires further research. Lastly, cross-listing seems to have strong and consistent negative explanatory power for short-term announcement returns, while it does not show any effect on the long-term performance of the firm. This is possibly a result of large trading volumes of American Depositary Receipts, making the underlying security in the emerging market itself relatively illiquid. This finding also requires support from subsequent research to be more robust. As information asymmetry levels are emphatically high in Brazil, the reform's improving effect is favorable for its financial markets. However, because this comes with serious costs, it is recommended to rather improve accounting and reporting standards than control the M&A market ex-ante.

Table of Contents

Introduction

Merger control aims to remain markets competitive and prevent monopolistic environments by assessing the nature and intentions of M&A deals. Monopolies can negatively affect social welfare, for example, due to uncompetitive product pricing. M&A deals within the pharmaceutical industry with the sole motive to eliminate potential competitors, so-called Killer Acquisitions, are likely to terminate drug development projects because there are no incentives anymore after the takeover (Cunningham, Ederer & Ma, 2021). Economically speaking, this is clearly an undesirable trend where merger control could justifiably intervene. Most jurisdictions have a mandatory pre-merger notification regime, whereby the merging parties must notify the deal with antitrust authorities[1] before the transaction. The provided information gets investigated extensively to determine whether the combined business could harm competition. Several studies criticize the effectiveness and efficiency of these pre-merger notification regimes. First, it can be difficult to predict the evolution of the merged parties after the transaction (Cabral, 2021), challenging the effectiveness of mitigating anti-competitiveness ex-ante. Second, there is a list of costs for the acquirer to pay in the pre-merger notification (Dissanaike, Drobetz & Momtaz, 2020), challenging efficiency. With a voluntary pre-merger notification regime, or a post-merger notification regime, a lot of these costs and ineffectiveness's can be avoided. To find what effect these pre-merger notification duties exactly have on merging firms, this study aims to answer the following research question:

"What is the effect of a mandatory pre-merger notification regime on the value creation in M&A deals?"

To answer this question, the Brazilin antitrust regulatory reform in May 2012 is used to conduct a difference-in-differences analysis. In this reform, Brazilian merger law converged toward the majority jurisdictions by introducing a pre-merger notification system, which was previously controlling mergers ex-post (OECD, 2019). This provides a way to accurately measure the impact of pre-merger notification duties on merging firms.

So far, the debate about how antitrust regulation regimes should be designed has minor support from financial economics literature that is looking at the cross-section of the merging firms or

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[1] Antitrust regulations encourage competition by limiting market power for particular firms.

other affected parties specifically. This makes it not only a topic that contributes to a debate with highly practical relevance, but it is also a fruitful avenue for new academic research. In addition, the European Commission recently announced a major merger control reform (Modrall, Thiede & Rivas, 2021), making this study relevant to current developments within the M&A industry.

The difference-in-differences (DiD) setup analyzes a treatment group that is subject to the reform in the antitrust law in Brazil and a control group, which is not subject to the new law because of its small size. The DiD effect is investigated on three elements: announcement returns, information asymmetry, and industry competitiveness. The DiD effect is analyzed on the cumulative abnormal returns (CARs) of the acquiring party around the announcement of a takeover. Results show a significant negative effect of the reform on announcement returns, robust to different event windows, placebo effects, and truncated samples. Event windows used are two days, five days, and eleven days. This is in line with the expectations based on earlier research, that managerial entrenchment arises from regulatory scrutiny and increases the chance of agency-motivated deals (Dissanaike et al., 2020). In the second model, the role of information asymmetry in the DiD effect is investigated. Information asymmetries decrease significantly for treated deals, as expected because of the notification duties acquirers have under the new regulation. Information asymmetry is measured by the alignment of CARs and buy-and-hold abnormal returns (BHARs) till three years after the merger. General information asymmetry in Brazil seems to be large compared to another study (Song, Zeng & Zhou, 2021) using the same methods in China. This is also in line with the description of the World Economic Forum (2018) about Brazil's business environment. The third model looks into the difference in the reform's effect on different levels of industry competitiveness. Unexpectedly, the reform seems to have a larger effect within competitive industries, contradicting Masulis, Wang & Xie, (2007), but in accordance with Bonaime, Gulen & Ion, 2018. This is possibly attributable to regulatory arbitrage attempts that are more pronounced in competitive environments (Cabral., 2020; Cunningham et al., 2021). Conclusions about this reasoning however remain weak and require further research. Lastly, there is surprisingly high relevance found of cross-listing in explaining only short-term announcement returns, while long-term firm performance is not affected by the variable. American Depositary Receipts are likely playing a role in this because earlier work (Silva and Chávez, 2008) shows these securities cause liquidity issues in the underlying traded on the domestic stock exchange.

Literature review

The effectiveness and efficiency of mandatory pre-merger notification get criticized in several academic and non-academic articles. In this chapter, the contradicting views on mandatory pre-merger notification will be outlined and compared to each other. As mentioned in the previous chapter, the majority of existing literature on this topic are not from financial economics journals, but from journals in law or policy economics, looking at legal implications and social welfare levels. Since this study tries to find the firms' cross-sectional economic outcomes as a result of different legislations, the findings of these papers are indirectly linked to firm individual outcomes. Lastly, the findings of previous literature will be brought in perspective to the characteristics of Brazilian financial markets since the study has a Brazilian context.

Merger control characteristics

How merger control is exactly designed differs among jurisdictions around the world. Important characteristics are whether the authority undertakes ex-post or ex-ante assessments of the merging parties, or whether pre-merger notification by the merging parties is mandatory or voluntary (OECD, 2021). In 46 out of the 54 different jurisdictions (85%), pre-merger notification is mandatory. 3 jurisdictions (6%) have a voluntary regime and the remaining 5 (9%) have a "mandatory post-merger" or "mandatory and pre- or post-merger" regime, referring to a free choice to notify before the merger and a mandatory notification a certain period after the merger. The 3 jurisdictions with a voluntary regime are Australia, New Zealand, and England. Authorities have claimed they became more stringent in their enforcement, but data does not confirm this since the number of prohibited cases remains a small proportion of all deals investigated, like in previous years, looking at the global aggregate (OECD, 2021).

Collusion theory assumes welfare loss due to uncompetitive product pricing after horizontal mergers. However, this welfare loss can greatly be offset by improvements in product or service qualities (Eckbo, 1983). These non-price variables also affect competition and should be used by antitrust authorities in challenging a merger. In addition, it can be difficult to assess the timing of the impact of the merger on product prices, while merger events are reflected in stock prices immediately. Conflicting with the collusion theory, the rivals of the merging parties in horizontal mergers are experiencing negative abnormal returns as a consequence of news that the merger is challenged by the government (Eckbo, 1983). Collusion theory would predict that rivals earn

positive abnormal returns after the announcement of the merger challenge because it implies a decreased chance of monopoly or cartel formation which plays away rivals. This raises questions about why governments are still challenging mergers since the literature does not support a positive social welfare effect.

Rivals of horizontal merging firms experience positive abnormal returns at the merger announcement, but they do not experience negative abnormal returns at the announcement that the merger is challenged (Fee and Thomas, 2004). The positive abnormal returns for rival firms are consistent with the monopolistic collusion theory. However, the non-negative abnormal returns found for rival firms as a result of a merger challenge announcement are inconsistent with monopolistic collusion theory. Monopolistic collusion theory predicts that rival firms gain positive announcement returns because the merged firms could collude more easily with the rival firms and set monopolistic output and price levels at the expense of consumers. Therefore, announcements of a merger challenge should negatively affect the returns of rival firms. In addition, challenged horizontal mergers do not gain improvements in operational performance, which might be due to the fact that the merging parties must do concessions to get the merger approved by the authorities, and therefore must accept sub-optimal operating performance. Since this reasoning does not specifically hold for horizontal mergers only, this effect can also be expected for vertical mergers, ceteris paribus.

Results of merger control

M&A deals that are controlled by the Directorate-General for Competition (DG COMP)[2], which requires merging parties to notify ex-ante, earn significantly lower returns than deals that are not controlled (Dissanaike et al., 2020). The controlled deals gained on average 0,39% returns, insignificantly different from zero. The uncontrolled segment of the sample generated a significant positive return of 2,18% on average. It is argued that the difference in returns between those two groups is due to regulatory uncertainty and real costs. Regulatory uncertainty emerges because of the time-intensive notification process whereby security is not guaranteed before approval of the deal. This uncertainty is costly and makes it less attractive for a firm to merge or take over another firm. From the perspective of a potential target firm, this

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[2] The European competition agency that has jurisdiction over proposed deals that have European dimensions and meet some other criteria (Dissanaike et al., 2020).

reduces the threat of a corporate takeover and therefore increases managerial entrenchment[3], which leaves room for agency-motivated acquisitions. These acquisitions are not maximizing firm value, because top management has different incentives from shareholders, and generates lower returns accordingly. The European Commission Merger Regulation (ECMR) was reformed in 2004 to reduce this regulatory uncertainty. In line with the managerial entrenchment reasoning, the difference between controlled and uncontrolled M&A returns narrowed significantly. The difference-in-differences effect between the controlled and uncontrolled deals after the reform is -2,26%, and is statistically significant at a 5% level. In other words, the difference in returns between controlled and uncontrolled deals is 2,26% smaller post-reform, compared to this difference pre-reform.

In general, more competitive industries are making better investment decisions because they cannot afford to waste corporate resources (Masulis et al., 2007). It is therefore possible that the entrenchment effect of regulatory scrutiny is less pronounced in deals in highly competitive environments because the firms within that industry do not want to make non-firm value-maximizing decisions. The real costs related to controlled deals are notification costs, litigation costs[4] in the case the deal is challenged, opportunity costs related to merger delays, and costs of disclosing private information which may become accessible to competitors. In the US, bidders complained about the deterioration of the assets to be bought, during the long periods of investigation (Bear and Redcay, 2001), also referring to the costs of merger delaying. Notification costs in Brazil after the reform in May 2012 are around US$17.000 and the merging parties are free to choose how they allocate this filing fee among each other (Canabrava, Spadano, Augustin, Cruz, Prado & Advogados, 2022). With a voluntary or post-merger notification regime, almost all those costs could be avoided. However, in the case law-violating elements are found in the merged firms ex-post, litigation costs could still emerge. The question is whether the forecasts of antitrust authorities are accurate enough to overcome those litigation costs ex-ante. The uncontrolled deals in the control group used by Dissanaike et al. (2020) are not investigated by the European Commission because they fell below the turnover thresholds, and/or thresholds for being characterized as a deal with European dimension[5]. Killer acquisitions appear to do deals just below those thresholds (Cunningham et al., 2021), likely to

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[3] Management entrenchment refers to management behavior that violates value-maximizing principles by making them irreplaceable in a way the company would lose without them.

[4] Costs during a legal process due to law violations, such as costs for lawyers during a lawsuit.

[5] Cross-border deals within the European Union.

avoid notification with the authorities. They defined mergers that are falling just below the threshold as firms that are between -5% and 0% of the threshold. These regulatory arbitrage effects are also found in increased cross-border mergers to avoid antitrust scrutiny.

In European merger regulation, the likelihood of intervention increases when the merger is subject to a foreign acquirer, specifically when the European rival is suffering from the bid (Aktas, Bodt & Roll, 2007). After the well-known General Electric/Honeywell case in 2001, which got approval from all US regulatory agencies and rejection by the European Commission, investors seem to incorporate possible regulatory scrutiny from European regulation (Aktas, Bodt & Roll, 2004). When the bidder is non-European, the market seems to anticipate much higher regulatory costs, reflected in its stock price, suggesting the European Commission (EC) is more stringent with foreign bidders. Specifically, in cases where the EC authorizes the deal subject to conditions, the cumulative average abnormal return (CAAR) is significantly more responsive to this announcement for non-EU bidders compared to EU bidders. For EU bidders this announcement resulted in an insignificant 0.34% CAAR, while non-EU bidders experience a significant 9.40% CAAR. This demonstrates the relief of uncertainty is significantly and substantially higher as a result of the favorable news that the deals get approval for non-EU bidders, compared to EU bidders. The same happens with the announcement of investigation by the EC, where non-EU bidders experience a significant -2,71% CAAR, while results on EU bidders are insignificantly different from zero. This indicates protectionist[6] motives for merger regulation, rather than maximizing social welfare. Dissanaike et al. (2020) stipulate that the European merger control reform in 2004 increased cross-border merger activity, after all the accusations they got for having protectionist motives. The decreased flexibility for managerial entrenchment as a result of this has enlarged the cumulative abnormal returns for M&A deals after the reform.

In terms of general policy uncertainty, economic policy uncertainty measured by the BBD Index from Baker, Bloom & Davis (2016), does significantly decrease the M&A activity for one to two years after the measurement of the index (Bonaime et al., 2018). They define M&A activity as aggregate deal value, number of deals, and the likelihood of a merger wave occurring over the next year. The effect of economic policy uncertainty on decreased M&A activity is stronger for

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[6] Protectionism is referred to a government that is protecting its own economy by intervention.

deals concerning more irreversible investments but weaker for deals involving investments that cannot easily be delayed. This indicates that firms who are doing acquisitions during periods of high economic policy uncertainty are the ones for which investment delaying is relatively costly and/or reversible. For investments for which the cost of delaying is relatively high, the real-option value of waiting for better investment circumstances is low. These high delaying costs are for example a result of the threat that another acquirer takes over the target in the meanwhile. This threat is larger in highly competitive industries (Grenadier, 2002, as cited in Bonaime et al., 2018). The investments with high delaying costs are therefore executed regardless of the unfavorable high economic policy uncertainty. The threat of a competitor taking over the target while you are delaying the investment is larger in highly competitive industries (Grenadier, 2002, as cited in Bonaime et al., 2018). Reversible investments are executed during uncertain circumstances because they can be reversed if it is unsuccessful. Regarding merger notification regimes, a voluntary or post-merger notification policy could refer to more certainty as the list of costs can be avoided on the one hand, but on the other hand, the forecasts made by the antitrust authorities could effectively avoid unforeseen litigation costs post-merger by challenging them. However, making such forecasts is easier in more stable industries with larger predictability, compared to fast-growing unpredictable industries, like technology (Cabral, 2021). By notifying a merger ex-post instead of ex-ante, there is no need for long-term forecasts, preventing ineffective investigations.

In many M&A cases with Latin American innovative startups being targeted by global acquirers, these takeovers result in the termination of local businesses (Pires-Alves, Gonzalo, de Oliveira Lyra, 2019). Those high-growth innovative startups get a lot of support, for example in the form of funding or promotion, from institutions such as governments and universities, because of the economic benefits they provide. Hence, corporates see them as attractive sources of innovation and invest in acquiring them rather than invest in R&D[7] themselves, or, as Cunningham et al. (2021) find, incentivize corporates to eliminate potential competition. Antitrust agencies mostly use competition models, such as Cournot and Bertrand to assess deals, with product prices and output as the main variable to predict the effect of M&As on the competition in the market. These "old" traditional measurements of product prices alone do not comprehend the fast-paced innovating technology sectors (Pires-Alves et al., 2019). Hence, the assessments of M&A deals

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[7] Research and development.

within the technology sector ex-ante might obtain unreliable results due to the irrelevant assessment variables used by the authorities.

Emerging economies and Brazil

Information asymmetry between acquirer's management and stock market investors is more pronounced in emerging economies, due to weaker regulation on financial disclosure, poor accounting practices, and the absence of intermediaries that causes a lack of information intermediaries (Chae, Jung, & Yang, 2014; Khanna and Palepu, 2010; Tao, Liu, Gao & Xia, 2017, as cited in Song et al., 2021). This implies that the misalignment between abnormal returns after merger announcements and post-merger firm performance will be more dominantly present in M&A deals in emerging economies, like Brazil. Brazil's business environment is characterized by an unstable and relative to other OECD's low Global Competitiveness Index (GCI), high corruption, taxes and restrictive labor regulations being the major problematic factors in doing business, and an unpredictable regulatory and legal system with high levels of bureaucracy (World Economic Forum, 2018). Several reforms have been implemented to realize higher fiscal responsibility, stimulate growth and innovation, and to make the economy more efficient, such as the reform in merger law in 2012. The reform in Brazilian merger control in 2012 is expected to have a negative effect on information asymmetry, since the merging parties must notify their deal with antitrust authorities, including financial disclosures. Although OECD (2019) states that "Neither the Competition Law nor any of CADE's bilateral co-operation agreements with other competition agencies allow it to exchange confidential information with other enforcers without the prior consent from the parties, nor do they allow CADE to offer investigative assistance should a foreign agency require it" (p. 14), the information revealed on the announcement date must be more reliable after the intense reporting duties during the pre-merger notification period. In addition, the CADE announces a "Public Notice" of deals under investigation that are likely to be approved. This reporting obligation narrows the information gap between the firms' management and outside investors. Information asymmetry between investors and management results in larger returns since it is likely that management overstates positive information and hides negative information. Large information asymmetries indicate that there is more room for hiding information which makes the stock market over-valuating the stock prices. In this sense, it is expected that returns on M&A deals within Brazil are more in line with post-deal performance after the regulatory reform in 2012. In addition, the tendency of the firms' management to overstate financial performance once there is room to do so, is more

pronounced during the more deregulated environment before the merger control reform. This means that the returns for acquiring parties are in expectation lower after the reform. There is also found more information asymmetry for private firms and for firms in the high-tech sector which are characterized by highly intangible because those firms are opaquer for stock market investors (Song et al., 2021). This indicates that the effect of the reform on information asymmetry might differ among industries, based on their level of tangibility.

Hypotheses

The following hypotheses are formed based on the above-discussed literature. The findings of Dissanaike et al. (2020) suggest an increase in managerial entrenchment due to a lowered threat of corporate takeovers in regulated environments. Therefore, it is expected that there are more agency-motivated deals made after the Brazilian reform, which result in lower returns. Also challenged mergers must do concessions to get the deal approved and hence must accept sub-optimal deal designs leading to lower value creation (Fee et al., 2004). Lastly, the merging firms must disclose private information in the pre-merger notification process to the CADE, closing the information gap between management and investors. Accordingly, the decreased flexibility to overstate financial performance as a result of reporting obligations is also expected to lower the returns post-reform. This expectation is stated in hypothesis 1.

Hypothesis 1: The introduction of an ex-ante merger control regime destroys value of corporate takeovers.

Because of the notification duties as described above, it is expected that the information asymmetry between stock market investors and management, at the time of the deal announcement, is decreased post-reform. The expectation regarding information asymmetry is stated in hypothesis 2.

Hypothesis 2: The ex-ante merger control regime aligns information between stock market investors and the firm's management.

Because more competitive industries are less sensitive to agency conflicts, due to the need to effectively use corporate resources (Masulis et al., 2007), it is expected that the reform has a smaller negative effect on returns within industries where competition is high, looking at the

acquiring party. In addition, according to Grenadier (2002), as cited in Bonaime et al., (2018), delaying investments can be significantly more costly in highly competitive industries, because the threat of another party taking over the target is larger. Hypothesis 3 captures the expected effect of industry competitiveness for the target and acquiring parties.

Hypothesis 3: The expected value-destroying effect of the introduced ex-ante merger control regime will be less pronounced in highly competitive industries.

Methodology & Data

In this chapter, the methodology to test the hypotheses and ultimately to answer the research question are outlined. Data sources, the way of data collection, and the models used in the analyses are presented in this chapter. The first section touch upon the reform in Brazilian antitrust regulation and how it is used as an event study to assess the impact of a mandatory pre-merger notification regime.

The Brazilian reform as quasi-experiment

Under the regulatory reform, Law 12, 529/2011, Brazil converged towards the majority jurisdictions by introducing a pre-merger notification system in 2011 (Pavon-Villamayor, 2017). This came into force on May 30, 2012. Since 1994, under Law 8.884/1994, mergers in Brazil were controlled ex-post (OECD, 2019). Before 1994, there was no merger regulation at all. The introduction of this pre-merger notification regime resulted in longer review procedures, making the path to a completed merger extended. Also, before the reform, the Brazilian Administrative Council for Economic Defense (CADE) had to completely undo consummated mergers violating competition guidelines. This was much more difficult than rejecting a merger ex-ante which might have caused the small number of prohibited cases before the reform. The CADE only investigates cases that have a gross annual turnover or total sales volume, the calendar year prior to the year of the transaction, above or equal to US $370 million in Brazil (R$750 million), by at least one of the parties involved, and a gross annual turnover or total sales volume, the calendar year prior to the year of the transaction, above or equal to US $37 million in Brazil (R$75 million), by at least one other party involved in the transaction. The CADE is also allowed to inspect mergers that do not meet these thresholds, but this right is rarely invoked (Pired-Alves, 2019) and will therefore be ignored. For acquisitions of targets that are not operating in the same industry or vertical industries, the bidder must have a minimum final stake in the target of 20% to be obliged to notify the deal ex-ante (Thomson Reuters, 2022). For horizontal and vertical mergers, the minimum stake is 5%, since the tendency of competition-violating deal characteristics is larger. The deals selected for this study obtain at least a stake of 20% in the target firm, or 5% if the target and acquirer macro industries are the same, to make sure that all deals have potentially (based on the acquirers' turnover) exposure to the reform. The CADE however has a Preparatory Procedure of 30 days where it is assessed whether the deal is under their jurisdiction. Whether a deal undergoes this procedure depends on the level

of information the investigative body of the CADE (General Superintendent) holds regarding potential violations of competition law (OECD, 2019). Therefore, also deals that are formally, based on turnover values, not under CADE's scrutiny can have some exposure to the reformed regulation. The merging parties do not have to wait for CADE's approval of the deal before the announcement and move forward with public bids (Global Legal Group, 2021). This indicates that the announcement dates in the sample can vary in being before or after approval. This makes the sample not biased towards deals that are acceptable according to the CADE's standards. The CADE however issues a Public Notice of deal notification in the early stage of the process when it is assumed to be approved (figure 1). This can lead to early deal information revelation to the market.
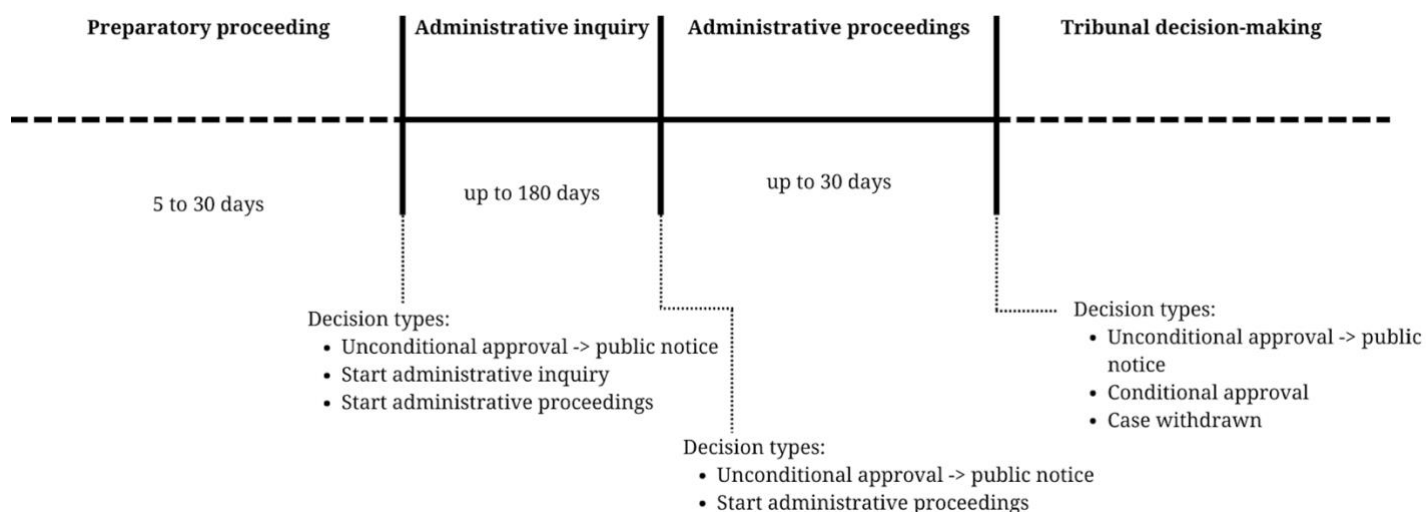
Figure 1. Timetable of the CADE's merger review procedure

The reform will be studied in a quasi-experiment to estimate the difference-in-differences effect of a pre-merger notification regime on announcement returns. The announcement returns are used themselves to test whether the hypothesized negative effect of the reform is present in the sample. The treatment group consists of mergers and acquisitions in Brazil meeting the above-mentioned thresholds, announced over seventeen years before the reform (pre-reform) and nine years after the reform (post-reform). This group is exposed to the intervention on May 30, 2012, which is the Brazilian merger control reform. The control group is formed by the deals that do not meet the thresholds of the CADE and therefore did not get exposed to the reform. The announcements of those deals occur over the same period as the treatment group (1995-2021). The difference between the treatment group and the control group is measured before

the intervention, to see how those groups deviate from each other in the pre-reform setting. Thereafter, the difference between the groups is measured after the intervention. This illustrates if there is a change in the difference between the two groups after the intervention, compared to before the intervention. This method is used to isolate the effect of the reform by overcoming omitted variable bias. For example, if only the difference in pre- and post-reform for the treatment group is measured, other factors could affect the outcomes as well. By using a control group, omitted factors are captured by taking the difference between the treatment and control group, who are assumed to both get exposure to the same omitted factors. Those are for example external factors such as swings in the business cycle, inflation, unemployment rates, or other regulatory changes. The expectation is that the reform reduces the returns of M&A deals, due to the costs paid by the merging parties (Dissanaike et al, 2020). Equation 1 presents the regression model of this quasi-difference-in-differences experiment.

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\begin{aligned}
CAR_{i,t} = \beta_0 &+ \beta_1 Threshold\ dummy_{i,t} + \beta_2 Reform\ dummy_{i,t} + \beta_3 Threshold\ dummy_{i,t} \\
&\cdot Reform\ dummy_{i,t} + Controls_{i,t} + Year\ fixed\ effects_{i,t} \\
&+ Firm\ fixed\ effects_{i,t} + \varepsilon_{i,t}
\end{aligned} \tag{1}
$$

In this model, β_3 represents the difference-in-difference effect. β_1 and β_2 represent the difference between firms above and below the thresholds and mergers before and after the reform respectively. β_0 is the models' intercept and ε_i represents the error term, which is the part of the dependent variable that is not being explained by the regression model. The threshold dummy equals 1 if the observed firm meets the thresholds which the CADE uses as criteria for mandatory merger notification. The threshold dummy equals zero if the firm does not meet the thresholds. The reform dummy equals 1 if the observed merger was consummated after the reform, specifically on May 30, 2012, when the new rules came into force. The reform dummy equals 0 if the merger was consummated before the reform and hence did not get exposed to pre-merger notification obligations. The model is also performed with the reform dummy set at the announcement date of the reform, on November 30th, 2011 (Dilma Rousseff, 2011). On this date the Brazilian President of Republic announced her approval of the new law. After the reform announcement date, the M&A market might incorporate the new law in its valuation before the actual implementation and is therefore also considered as the event date of the reform.

CARs

Following Dissanaike et al. (2020), the announcement returns are calculated as the 11-day market-adjusted cumulative abnormal returns, which take the returns of 5 days prior to the announcement and 5 days after the announcement. The reason for doing this is that some investors might trade with insider knowledge which reflects a merger announcement in the stock price before the actual announcement date. Also, markets might need some time to get information about an announcement absorbed in the stock price. Therefore, the returns up to 5 days after the announcement are considered. The 11-day market-adjusted cumulative abnormal returns are chosen in favor of the 5-day market-adjusted abnormal returns because emerging markets are usually less efficient than developed markets (Song, Zeng & Zhou, 2021; Sehgal, Banerjee, & Deisting, 2012). Therefore, it is expected the information of an announcement will take longer to get absorbed in the firm's stock price, hence the effect of up to 5 days after the announcement instead of 2 days rather is observed. However, Ma, Pagán & Chu (2009) find announcement effects, in terms of positive cumulative abnormal returns, in emerging markets only on event windows (0,1), (-1,1), and (-2,2). Following their results, the event windows (-1,1) and (-2,2) are considered as well, in addition to the (-5,5) window. The normal returns are estimated in an estimation window of 100 days before the event window. Because index prices of Ibovespa Brazil are not supported by Datastream, I make use of the Brazil-DataStream Market Index (TOTMKBR) to calculate the (ab)normal returns. This is the total market index of Brazil provided by DataStream and consists of 100 firms in all industries. The cumulative abnormal returns are calculated based on the individuals' average return, called the mean adjusted CARs, and based on the market model, called the market model adjusted CARs. A return of a security on a specific day is calculated as in equation 2, whereby S stands for the stock price of that specific security.

$$R_{i,t} = \frac{S_t - S_{t-1}}{S_{t-1}} \tag{2}$$

The mean adjusted and market model adjusted CARs are calculated respectively as in the equations 3 and 4.

$$CAR_i^{Mean\ adjusted} = \sum_{t=1}^{T}(R_{i,t} - \bar{R}_i) \tag{3}$$

$$CAR_i^{Mkt\ model\ adjusted} = \sum_{t=1}^{T}(R_{i,t} - \alpha_i - \beta_i \cdot R_t^{index})$$

(4)

Daily returns are denoted with R and average daily returns with $\bar{R}$. i stand for an individual security with N = 1715. t is the respective day within the evaluation window, with T=2, 3, 5 or 11, depending on the event window. R_t^{index} is the daily return of the index used as market benchmark on evaluation day t.

Control variables and fixed effects

Following Dissanaike et al. (2020), the firm specific control variables used in de difference-in-difference model are Tobin's q, assets (Ln), leverage, cross-listing and momentum. Tobin's q is defined as the market value of equity over the book value of equity. Leverage is total debt over total assets times 100. The deal specific control variable used by Dissanaike et al (2020) are not used in this study, because it dramatically reduces the sample size due to missing values. In addition, firm- and year fixed effects are incorporated in the model to control for firm specific time-invariant characteristics. Industries are classified based on the Industrial Classification Benchmark (ICB)[8]. Some firms undergo multiple acquisitions and therefore have overlap in their estimation window.

BHARs

Following Song et al. (2021), the level of information asymmetry is measured by the alignment between abnormal returns at merger announcements and their true operating performance 3 years after the merger. This can illustrate whether the reform has effectively made stock markets more efficient by introducing mandatory financial disclosure in a pre-merger notification regime. The alignment between announcement returns and post-acquisition performance is

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[8] The Industry Classification Benchmark contains separates different industries. Those industries are Basic materials, Consumer discretionary, Consumer staples, Energy, Financials, Industrials, Health care, Technology, Real estate, Communication services and Utilities. Consumer staples are consumer goods and consumer discretionary are consumer goods that are not necessities. Those are therefore hit more severely in economic downturns.

estimated by the alignment between CARs and buy-and-hold abnormal returns (BHARs). The BHARs are calculated according to equation 5.

$$BHAR_{i,t} = \prod_{t=1}^{T}(1 + R_{i,t}) - \prod_{t=1}^{T}(1 + R_t^{index})$$

(5)

$R_{i,t}$ and R_t^{index} are again the daily returns for the individual security and benchmark index respectively. T is 1096 (3 years). The alignment between the CARs and BHARs is measured with a regression model, presented in equation 6.

$$BHAR_{i,t} = \gamma_0 + \gamma_1 CAR_{i,t} + \gamma_2 Threshold\ dummy_{i,t} + \gamma_3 Reform\ dummy_{i,t} + \gamma_4 CAR_{i,t}$$
$$\cdot Threshold\ dummy_{i,t} \cdot Reform\ dummy_{i,t} + \gamma_5 Controls_{i,t}$$
$$+ \gamma_6 Fixed\ effects_{i,t} + \epsilon_{i,t}$$

(6)

The estimator γ_1 gives the alignment between BHARs and CARs. γ_4 represents the interaction between the alignment between BHAR's and CAR's and whether the deals was exposed to the reform, and hence had notification duties to the CADE. In other words, it shows how much the alignment between announcement returns and the post-acquisition performance differ after the regulation reform, compared to before the reform. A schematic overview of the periods is shown in figure 2.
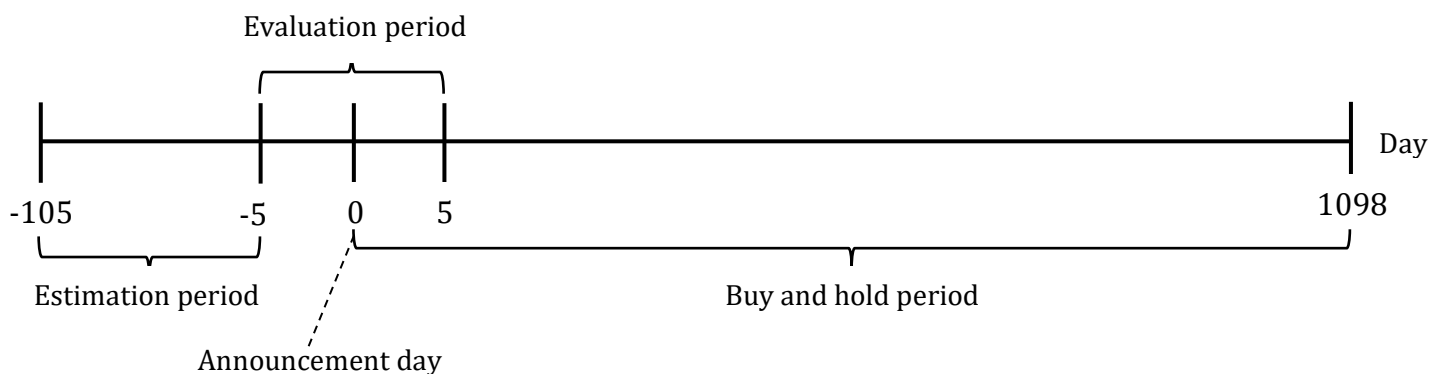

Figure 2. Timeframe of the different periods

Industry competitiveness

Following Masulis et al., (2007) and Bonaime et al., (2018), I use the Herfindahl-Hirschman Index (HHI) to evaluate the competitiveness of the different industries. This index measures the market concentration by firm-individual market shares. The more concentrated the market, the lower the level of competition within that particular industry. The HHI is calculated with equation 7.

$$HHI_{m,j} = \sum_{j=1}^{27} (Annual\ revenue_j)^2 \Big|_m$$

(7)

The HHI is calculated for a specific market m for a given year j. Data on the annual revenues are obtained from all Brazilian listed firms in the DataStream database. With the 11 different ICB industries and a sample period of 27 years, I got 290 different HHI's[9]. These values are allocated to the acquiring firms in the sample, based on the macro industry and calendar year of announcement. The HHI variable will be included in the original model to see whether a stronger market concentration will lead to a weaker negative effect of the reform on announcement returns. Following Dissanaike et al., (2020), there is also a dummy variable created which equals 1 if the HHI of a given industry in a given year is above the mean HHI for all industries in that year (equation 8).

$$HHI\ dummy = \begin{cases} 1, if\ HHI_{m,j} > \overline{HHI}_j \\ \\ 0, if\ otherwise \end{cases}$$

(8)

The regression model with the HHI incorporated is defined in equation 9.

$$CAR_{i,t} = \delta_0 + \delta_1 HHI_{i,t} + \delta_2 Threshold\ dummy_{i,t} + \delta_3 Reform\ dummy_{i,t}$$
$$+ \delta_4 Threshold\ dummy_{i,t} \cdot Reform\ dummy_{i,t} \cdot HHI_{i,t} + \delta_5 Controls_{i,t}$$
$$+ \delta_6 Firm\ fixed\ effects_{i,t} + \varepsilon_{i,t}$$

(9)

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[9] During the years before 2003, there were no listed firms in some of the 11 industries. Therefore, there are only 290 HHI's instead of 297 (11*27).

The CADE also uses the HHI to assess the market competitiveness of industries (OECD, 2021). This could mean that industries with higher HHI's are under higher scrutiny of the CADE, and are therefore, in contradiction to the hypothesized effect, losing more on their announcement returns post-reform. The newly introduced law does not state that firms within different industries have alternative notification duties. There is however a fast-track procedure that the CADE uses for mergers that are not raising concerns about violation of competition (OECD, 2021). One of the metrics used to assess whether a merger is eligible for the fast-track procedure is an HHI variation below 200. The HHI variation is the difference in HHI as a result of the merger in question.

Data

Data on deals are obtained from Zephyr and DealScreener. Deals data is collected based on the restriction that both, the acquirer, and target, are Brazilian, and that the acquirer is listed or delisted, such that the stock prices are available around the deal announcement date. Deals with unknown crucial variables are deleted from the dataset. These are for example the announcement date, turnover amount, the acquired stake, and control variables. For stakes below 20%, the deals where the acquirer and target do not operate in the same macro industry are deleted from the dataset as well, such that only the deals are considered that have notification duties to the CADE (Thomson Reuters, 2022).

Abnormal returns are obtained from DataStream with the Event Study Tool. The output from the Event Study Tool also contains the average daily return, beta, and alpha of each security based on the estimation days. Those mean-adjusted and market model-adjusted returns are merged with the deals dataset. The threshold dummy is created by allocating a 1 to deals with a turnover value in the calendar end-year before the calendar year of the announcement day of over R$750 million, and a 0 otherwise. To assess whether the deal meets the CADE's thresholds, the last calendar year's turnover of the acquirer only is considered. This has two reasons. First, I am interested in the cumulative abnormal returns of the acquirer and if the acquirer meets the thresholds, it is restricted in looking for a target firm. If the target firm also meets the thresholds, the acquirer must commit notification to the CADE. In the case the lengthy process will be too expensive for the acquirer, for example, if the firm has a high cost for merger delay (Bonaime, Gulen & Ion, 2018), it might choose a sub-optimal firm to merge with in order to avoid notification duties with the CADE. Second, the target firms are usually smaller and are therefore

unlisted. This causes a large fraction of target firms in the sample with missing information on their financials. This dramatically decreases the sample size. The reform dummy is created by recognizing a 1 if the announcement date of the deal was after the reform and 0 otherwise. The firm-specific control variables Tobin's q, log total assets, and leverage are obtained from DataStream. The obtained values are based on the values on the first day of the month of the announcement day. Data on cross-listing is also obtained from DataStream, and data on stakes are obtained together with extracting the deals in Zephyr and Dealscreener. The cross-listing dummy is created by giving the observation a 1 if the acquirer is listed on more than one stock exchange. With the static request of QTEALL all the exchanges the security is traded on are given. For all deals with the acquirer listed on more than 1 exchange, a dummy value of 1 is recognized, and a 0 otherwise. After deleting all deals with crucial missing variables and illogical values, such as market-to-book equal to zero, and deleting all deals with acquirers' turnover value below R$1 million, the dataset contains 1689 observations with 378 different acquiring firms. Those firms acquire 1 up to 55 targets over the sample period. The 3 firms with the largest number of takeovers, 37, 54, and 55, are classified in the real estate, health care, and utilities industry respectively. Figure 3 presents the number of takeovers performed by the 10% most frequent acquirers.
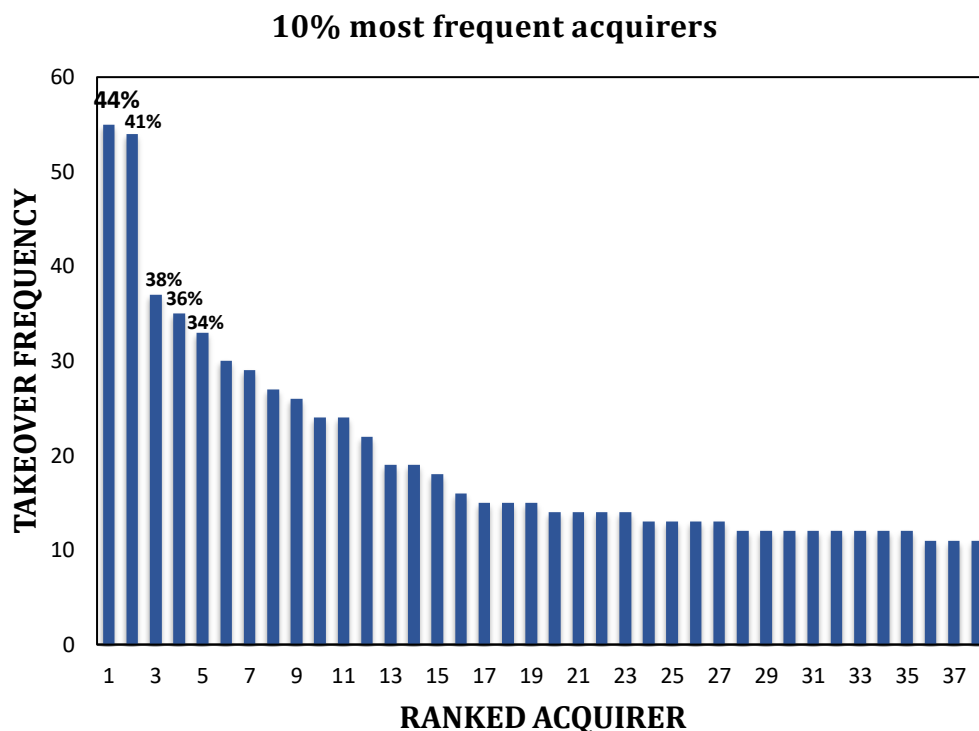
Figure 3. Takeovers by top 10% acquirers

The horizontal axis represents the acquirer ranked based on the number of acquisitions it performs during the sample period from 1995 to 2021. For the 5 largest acquirers, the cumulative percentage of acquisitions is shown, calculated as the number of acquisitions performed by that 10% as a fraction of the total sample of 1689 acquisitions. Accordingly, 44% of the acquisitions, being 746 out of 1689, are performed by the 10% largest acquirers. Figure 4 further elaborates on how the panel is balanced. The red 45 degrees line demonstrates a perfectly balanced panel, where all acquirers evenly contribute to the total sample size of takeovers. The blue curve presents how the sample is balanced. The steep line at the high end of cumulative % takeovers shows that a large part of the takeovers is concentrated in a small percentage of acquirers. However, 209 out of the 378 acquirers in the sample are multiple acquirers, which do at least two takeovers. This is 55% of the sample.

Balanced panel

Figure 4. Percentage of takeovers by percentage of acquirers

Results

This chapter presents the results of the analyses described in the Methods and Data chapter. The first section presents descriptive statistics and describes correlations among the different variables used. The results are also discussed and linked to the findings of other papers. The second section contains the results of the difference-in-differences analyses, starting with a basic univariate analysis of the different CARs, without taking into account any other variables such as controls or fixed effects.
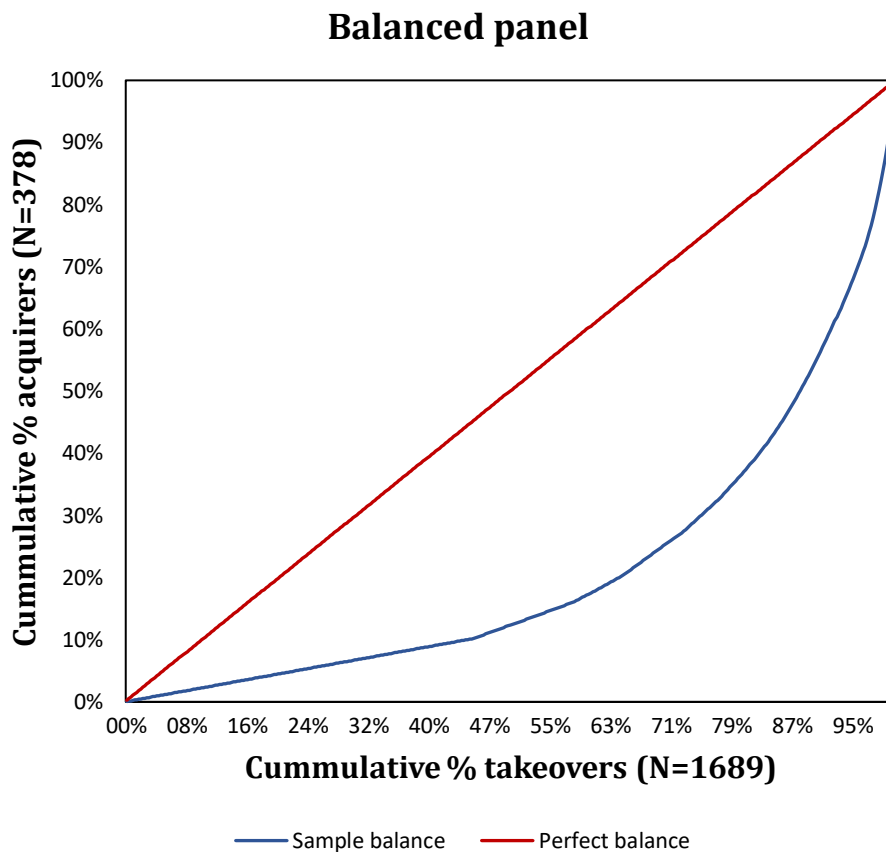
Descriptive statistics

Table 1 presents the descriptive statistics of the return variables and firm- and deal characteristics. On average, the average daily return calculated over the 100 days estimation period is 0,0009 or 0,09%. The alpha is, as expected by the CAPM market model close to zero. Beta is somewhat left-skewed with some outliers in the minimum and maximum, but still around one. This is also as expected since all the firms in the sample together must represent the whole market benchmark. The CARs, both calculated with the mean and the market model, are nicely standard normal distributed around 0. Stakes are 5% at a minimum because of the selection restriction described in the previous chapter. 1016 of the 1689 deals concern a stake of 100%, and 1271 deals concern a majority stake of 50,1% or more. The cross-listing mean indicates that 15% of the deals concern an acquirer which is listed on multiple stock exchanges. This low percentage is not surprising since the sample contains deals only with Brazilian acquirers and targets, making the nature of the sample very national. The mean leverage of 29% is consistent with the 30,1% leverage found by Barros, Cardenas & Mendes-da-silva (2021) in a sample of Brazilian acquirers from 2000 to 2015. Buy-and-hold abnormal returns are calculated based on a three-year holding period, starting from the announcement day. Hence, the last three sample years are not covered by the BHARs. Only 1282 observations remain, with announcement years ranging from 1995 to 2018. On average, returns from holding the acquirer for three years is 7,56%. The largest observation realized a return of 1.449%, and the three largest ones following are raging from 1.206% to 1.285%. Three of those largest capital gains are from the same acquirer. Takeover frequency per acquirer (N = 378) is the number of deals done by one acquirer, as described in the previous chapter. The takeover frequency with N = 1689 is the number of takeovers per deal.

Table 1

Descriptive statistics of the acquiring parties in the sample deals

N = 1689	Min	Q1	Median	Mean	Q3	Max	StDev
Average daily return	-0,0136	-0,0009	0,0007	0,0009	0,0024	0,1173	0,0044
Alpha	-0,0120	-0,0009	0,0004	0,0006	0,0018	0,1133	0,0039
Beta	-0,6220	0,4160	0,7094	0,7419	1,0281	3,8881	0,4786
CAR market model (-5,5)	-1,3159	-0,0428	0,0014	0,0097	0,0526	1,4100	0,1065
CAR mean (-5,5)	-1,2899	-0,0488	0,0033	0,0106	0,0615	1,3994	0,1181
Turnover (1000 R$'s)	1267	585.005	2.025.272	13.401.946	9.161.712	569.595.832	33.628.745
Stake	5,0%	50,1%	100,0%	77,6%	100,0%	100,0%	32,8%
Tobin's q	0,01	1,08	1,89	4,59	3,14	1327,71	44,00
Ln total assets (1000 R$'s)	9,85	14,27	15,62	15,72	16,80	21,42	1,89
Leverage	0,00	15,96	29,93	29,14	41,18	87,91	17,04
Cross-listing dummy	0,00	0,00	0,00	0,15	0,00	1,00	0,36
BHAR (N= 1282)	-2,6345	-0,4943	-0,0816	0,0756	0,4374	14,4865	1,1817
Takeover Freq. (N= 378)	1	1	2	4,47	5	55	6,63
Takeover Freq. (N = 1689)	1	4	10	14,28	19	55	14,21

Descriptive statistics of the acquiring parties in the sample deals with N=1689, over a period of 1995 till 2022. $CAR^{Mkt\ model\ adjusted}$ and $CAR^{Mean\ adjusted}$ are the cumulative abnormal returns accumulated over the 11 days in the evaluation period, adjusted on the security's co-movement with the market and its own average return based on the estimation period of 100 days respectively. Alpha and Beta are the intercept-and slope coefficient respectively of the capital asset pricing model, with estimation windows of 105 days before the announcement date, so 100 days before the first evaluation period. Turnover values are the annual net sales or revenue of the acquiring party in the calendar year before the calendar year of the takeover. This value is expressed in 1000 Brazilian Real's. Stock price data is obtained from DataStream (code: S#T) via the event study tool request table. The BHARs are the buy-and-hold returns from holding the security for 3 years, starting on the announcement day. The returns are calculated as the product of daily returns minus the product of the daily returns of the benchmark.

Table 2 presents the correlation matrix of the variables described above. Only the BHARs are excluded because of the difference in the number of observations. The correlations among the variables are overall quite low. Turnover is not surprisingly positively correlated with total assets, cross-listing, and takeover frequency, as larger firms have typically larger revenues, have therefore more resources to fund takeovers and larger firms are more likely to be listed on multiple stock exchanges. Leverage has a negative effect on the takeover frequency, which is however small. This contradicts Barros et al., (2021) indicating a significant positive correlation between leverage and being a multiple-acquirer in the sample. A lower debt-assets ratio might indicate more financially healthy firms that can consistently do takeovers with rather internal funds or equity financing. The negative correlations between market model-adjusted CARs and average daily returns, alphas and betas are because the cumulative abnormal returns are calculated by correcting for their average and market co-movements. Hence, a high beta or average means that the abnormal return to be positive must be even higher.

Table 2

Correlation matrix of acquiring parties' firm characteristics and return variables

N=1689	Turnover	Average	Alpha	Beta	CAR mkt	Stake	Tobins q	Log assets	Leverage	Cross-listing	Takeover freq.
Turnover	1,00										
Average	-0,03	1,00									
Alpha	-0,03	0,94	1,00								
Beta	0,21	0,10	0,05	1,00							
CAR mkt	-0,04	-0,42	-0,43	-0,10	1,00						
Stake	-0,02	0,02	0,01	-0,10	-0,03	1,00					
Tobins q	-0,02	0,00	0,00	-0,02	0,00	-0,03	1,00				
Log assets	0,63	0,01	0,00	0,38	-0,06	-0,07	-0,07	1,00			
Leverage	0,06	-0,03	-0,02	0,08	0,01	-0,06	-0,06	0,28	1,00		
Cross-listing	0,40	0,00	-0,02	0,14	-0,05	0,00	-0,02	0,43	0,04	1,00	
Takeover Freq.	0,171	-0,002	-0,010	0,125	-0,032	-0,020	0,060	0,218	-0,025	0,259	1,00

Correlation matrix of all the variables in the main dataset.

Table 3 shows the deviation of the deals in the sample among the treatment- and control groups. Deals that have a year-end turnover value in the calendar year before the calendar year of the announcement date above R$750.000.000 (turnover threshold), are systematically investigated by the CADE. Deals below that value are not. Therefore, the "Above Threshold"-segment is exposed to the new antitrust laws and is in the treatment group. Deals below the threshold are in the control group. The control group and the treatment group consist of 496 and 1193 deals respectively. The groups are analyzed before and after the reform. The analyzed period pre-reform spans from January 20th, 1995, to May 30th, 2012. During this period there were 1073 deals in the sample. The period post-reform spans from May 31st, 2012, till May 10th, 2022. The number of deals in the sample during this period is 616.

Table 3

Number of observations per segment

N = 1689	Pre-Reform	Post-Reform	Total
Below Threshold	354 (21%)	142 (8,4%)	496 (29,4%)
Above Threshold	719 (42,6%)	474 (28,0%)	1193 (70,6%)
Total	1073 (63,6%)	616 (36,4%)	1689 (100%)

Deviation of the total of 1689 deals among the 4 classifications. The threshold values of the sample deals are based on the revenue or net sales (turnover) of the acquiring parties, obtained from DataStream (DataStream code: WC01001). The threshold value used by the CADE is R$750.000.000. The Pre-Reform period spans from the 20th of January 1995 till the 30th of May 2012. The Post-Reform period spans from the 30th of January 2012 till the last observation on the 10th of May in 2022.

Remarkable is that the majority of the deals fall in the treatment group because the revenues exceed the threshold value most of the time. This is a result of the fact that the sample consists of only listed acquirers. Mostly, listed firms are larger than private firms and have larger revenues accordingly. Post-reform, the share of firms below the threshold in the sample total becomes even smaller (from 33% to 23%)[10]. This might be due to the general economic growth in Brazil.

Univariate analysis of CARs

In this section, solely the CARs for the four different classifications (pre-reform, post-reform, above the threshold, and below threshold) are investigated. The differences in CARs are compared between the different classifications without considering other factors, such as control variables or fixed effects.

Table 4
Univariate analysis of CARs

Panel A: Average CARs				
	# observations	CAR (-1,1)	CAR (-2,2)	CAR (-5,5)
Total	1695	1,11%***	1,06%***	0,95%***
<Threshold	502	1,84%***	1,84%***	1,65%***
>Threshold	1193	0,83%***	0,77%***	0,68%**
Pre-reform	1079	0,91%***	0,68%***	0,42%
Post-reform	616	1,50%***	1,78%***	1,92%***

Panel B: Difference in CARs (-5,5)		
	Treatment group	Control group
# observations	1193	502
Pre-reform (t=0)	0,23%	0,80%
Post-reform (t=1)	1,36%***	3,78%***
Differences (t=1 - t=0)	1,13%**	2,98%**
Difference-in-differences	-1,85%	

*p<0,1; **p<0,05; ***p<0,01. The CARs are tested on being statistically different from zero with two-sided t-tests. The differences and difference-in-difference average CARs are tested on significance using two-sampled two-sided t-tests, with the null hypothesis stating that the average is equal to zero.

Table 4 presents the results of the univariate analysis of the CARs for different event windows. Typically, acquirer abnormal returns are negative or close to zero, for example, because the firm

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[10] Pre- or post-Reform Below threshold / Pre- or Post-Reform Total: 354 / 1073 = 32,99%. 142 / 616 = 23,05%.

pays a premium over the target value, but it is found that taking over domestic targets experience positive returns because of lower difficulties with culture clashes (Moeller and Schilngemann, 2005).

Their sample of US firms obtains an insignificant 0,307% CAR (-1,1) for cross-border targets and, more consistent with the results in table 4, an 1,173% CAR (-1,1) for domestic deals on a 1% significance level. Therefore, the national-focused deals dataset in this study might explain the significant positive abnormal returns presented in panel A in table 4. Their findings can also explain the negatively correlated cross-listing dummy and CARs presented in table 2. Cross-listed firms are likely more internationally oriented, and although the relevant takeover is domestic, the market might consider the international orientation of the acquirer and hence yield lower returns. The remarkably larger CARs for deals in the control group, which have a turnover below the CADEs used threshold, compared to the treatment group which has large turnover values is consistent with Moeller, Schlingemann and Stulz (2003). They find a size effect of acquirer announcement returns with 2,24% smaller CARs (-1,1) for large acquirers compared to small acquirers, due to the larger acquisition premiums large firms pay over their targets. This is also presented in the steeper accumulation of abnormal returns of graph "<Threshold" compared to the ">Threshold" graph in figure 4. Figure 4 presents the cumulative average abnormal returns (CAAR) for all four specifications individually over the 11-day event window, estimated with the market model. The number of CARs per classification is according to table 3.

As stated in hypothesis 1, it is expected that the CARs are larger pre-reform compared to post-reform. This is however not supported by the findings in panel A of table 4. Post-reform, the CARs on all three alternative evaluation windows are substantially larger than those pre-reform. This is also observable in the much stronger abnormal return accumulation in the graph "Post-reform" compared to the graph "Pre-reform" (figure 4). Yet, here the control group, which is excluded from the increased regulatory exposure in 2012, is ignored as well as control variables that control for example the size effect found by Moeller et al., (2003).

In panel B the differences in CARs within and between groups are presented. The effect of the reform on the CARs (-5,5) within groups (treatment and control) is still positive. This could be due to time trends, such as the fast-growing economy in Brazil. When looking at the difference between groups in those CAR increases from t=0 to t=1, it is indeed observable that other factors

than the reform play a role in this positive change in CARs. The CARs in the control group increased substantially more, with 2,98% than the CARs in the treatment group, with only 1,13%. This is as expected since the control group did not get exposure to the increased regulatory scrutiny in t=1, whereas the treatment group did. The treatment group was more restricted by rules and could therefore benefit relatively less easily from for example the economic expansion than the control group, causing the divergence in CARs.
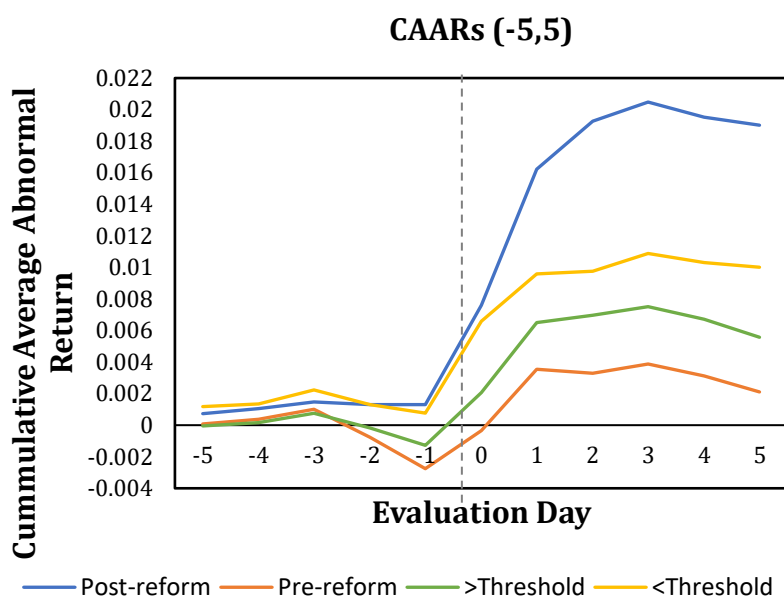

Figure 4. Cumulative average abnormal returns per classification

This difference between the CAR between groups increases from t=0 to t=1 is -1,85%. Hence the difference-in-differences effect is as expected negative, however insignificant. Remarkable in figure 5 is that only panel C immediately experiences declining abnormal returns after the announcement. The increase in abnormal returns the day just before the announcement is likely a result of insider trading. The other panels show an additional peak in abnormal returns after insider trading, after the announcement. This indicates that not all information was revealed by investors with insider knowledge, since they would have traded the stock such that the abnormal returns right after the announcement go back to normal. This is however also the case in panel C since on day one the abnormal returns are still positive, but it has decreased substantially, where it increases for all the other panels. Deals post-reform sustain abnormal returns after announcements for the longest period. This is also observable in table 4, where the CARs from short to long event windows are descending pre-reform and ascending post-reform This might indicate improved market efficiencies and corporate governance systems in Brazil over time. In

this later stage of the sample period (after May 2012), there are large gains to be made for investors without private information, since abnormal returns remain positive after the announcement.
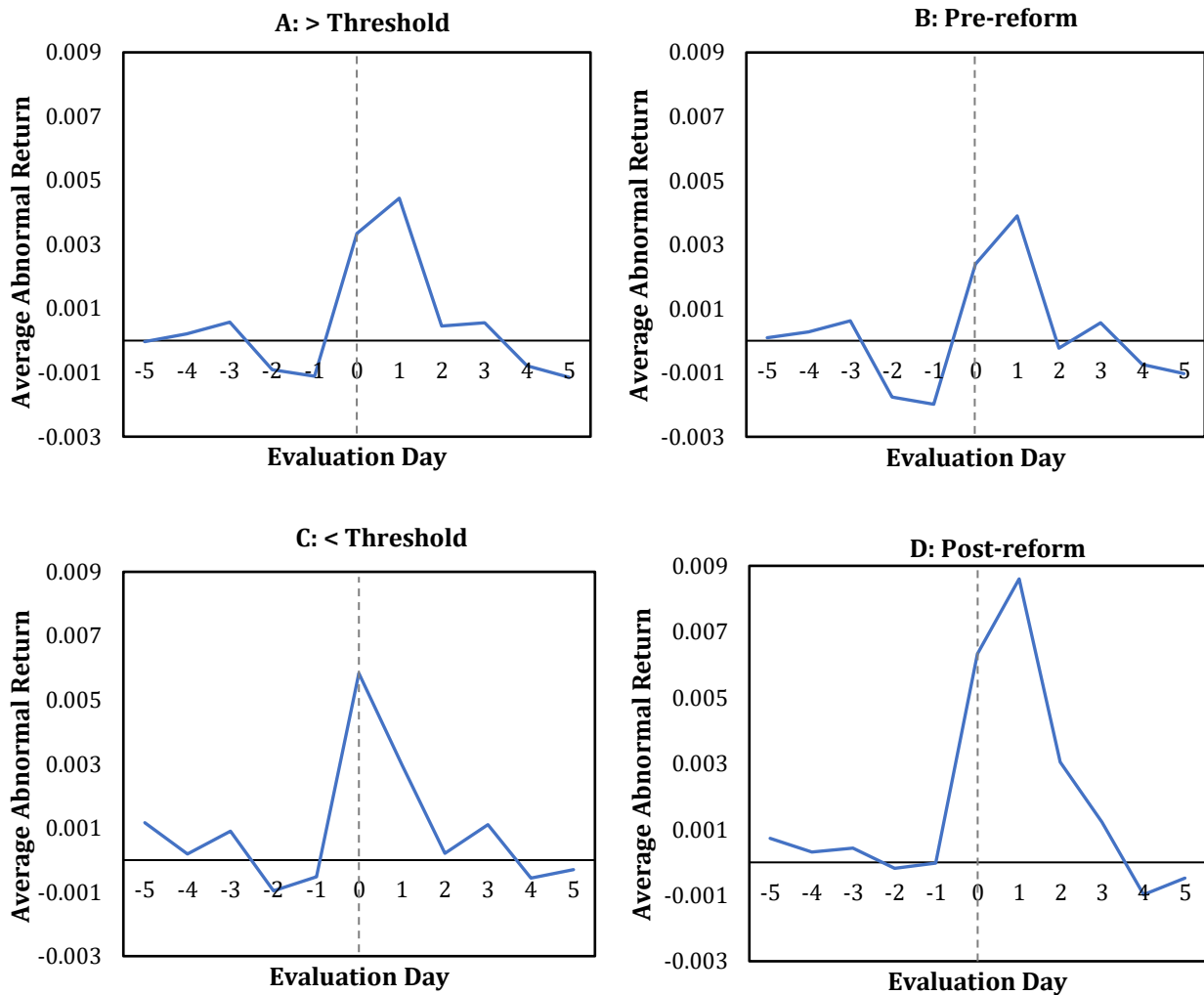
Figure 5. Average abnormal returns 11 days around the announcement day per classification

This section presented the univariate analysis of the cumulative abnormal returns around merger announcement days and compared those among the four different classifications. CARs are for all classification samples, including the total sample, positive and the majority also statistically significant. Secondary patterns found in the analysis of CARs can be explained by previous literature (Moeller et al., 2003; Moeller et al., 2005). Most importantly, CARs seem to have increased after the reform for the total sample and for the control- and treatment groups separately, contradicting the hypothesized effect. However, the increase in CARs around

announcement days is much more pronounced in the control group, which did not get exposure to the new merger enforcement regime. Hence there is a negative difference-in-differences effect found, consistent with the hypothesis emerging from the literature review. This negative 1,85% difference is however not significantly different from zero. The next section further investigates the effect in a multivariate analysis, where control variables and fixed effects are considered as well to isolate the effect of the merger control reform.

Multivariate analysis of CARs

This section presents the results of the regression models on the difference-in-differences effect of the Brazilian merger control reform, on the cumulative abnormal returns around the merger announcement dates of the acquiring parties.

Table 6 presents the results of this baseline regression. Following Dissanaike et al., (2020), the first model is run excluding all the control variables, such that it can be assured that any effect between the merger control reform and acquirer announcement returns is not driven by the presence of the control variables. For simplicity, this is only done for the 11-day event windows. For all four specifications, the reform dummy is insignificant but positive. It indicates that post-reform, cumulative abnormal returns over 11 days around the announcement date are between 0,8% and 2,4% larger, comparable with the univariate analysis in the previous section. In addition, the negative signs for the threshold dummies are consistent with the size effect discussed by Moeller et al., (2003). Acquirers with annual turnover values above the CADE's used threshold, considered as larger firms, earn about 0,2% to 0,4% lower deal announcement returns than firms below the threshold.

For all four specifications, there is a significant negative difference-in-differences effect on announcement returns found. For the statistically significant estimators, this range from 3,0% to 4,4% and are significant on a 5% level for the 2- and 5-day event windows. On the 11-day event window specifications, both with and without controls, the estimators are significant on a 1% level. The small range in which the difference-in-differences estimators fall for the models including- and excluding controls (0,044 – 0,042) is a sign that the control variables have a negligible impact on the treatment effect (Roberts and Whited, 2013, as cited in Dissanaike et al., 2020). This indication of small endogeneity concerns also holds for the treatment effects

found in the model comparison with and without controls on the different evaluation windows (those models are not presented in table 6 for simplicity).

Table 6
Baseline regression of difference-in-differences effect on cumulative abnormal announcement returns

	CAR (-5,5)	CAR (-1,1)	CAR (-2,2)	CAR (-5,5)
Difference-indifferences variables				
Reform	0,010	0,024	0,020	0,008
	(0,024)	(0,017)	(0,019)	(0,024)
Threshold	-0,003	-0,003	-0,004	-0,002
	(0,011)	(0,008)	(0,009)	(0,012)
Reform*Threshold	-0,044***	-0,029**	-0,030**	-0,042***
	(0,016)	(0,012)	(0,013)	(0,016)
Acquirer & deal characteristics				
Tobins q		0,00001	-0,00002	0,00002
		(0,00004)	(0,00004)	(0,0001)
Leverage		-0,0002	-0,0001	-0,0001
		(0,0002)	(0,0002)	(0,0003)
Ln total assets		0,009	-0,001	-0,005
		(0,005)	(0,006)	(0,007)
Cross-listing		-0,149***	-0,572***	-0,451***
		(0,090)	(0,099)	(0,126)
Stake		-0,00002	-0,0001**	-0,0001
		(0,0001)	(0,0001)	(0,0001)
(Intercept)	0,014	-0,258***	0,573***	0,542***
	(0,100)	(0,097)	(0,107)	(0,135)
Year fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Robust standard errors	No	No	No	No
# observations	1689	1689	1689	1689
R^2	0,485	0,510	0,524	0,486
F-statistic	2,975***	3,251***	3,428***	2,947***
	(df = 1282)	(df = 1278)	(df = 1278)	(df = 1278)
Residual standard error	0,088	0,063	0,069	0,088

*$p<0,1$; **$p<0,05$; ***$p<0,01$. Including robust standard errors does not change the results significantly. Hence, the data is already homoscedastic itself and does not require transformations of models with robust standard errors. Estimators are predicted with OLS estimation.

Consistent with hypothesis 1, this indicates that as a result of the reform, acquirers earn about 4% lower announcement returns (about 2,7 times CAR's standard deviation), which is substantial and economically relevant. With an average market capitalization of R$18,8 billion

in revenue in the treatment group, the estimators induce a R$752 million value destruction per deal. This is equal to US $143 million and is of economic significance for acquirers. The 2-day evaluation window CARs seem least affected by the reform. This could be due to the widespread accumulation of abnormal returns, as illustrated in Figures 4 and 5 in the previous section. Therefore, CARs might be just very small and hence have a smaller difference-in-differences effect. Findings of Dissanaike et al., (2020), who use a highly similar research design to investigate the difference-in-differences effect of a merger control reform, find a difference in CARs (-5,5) of around 3,1%. Despite their study being a reversed version of this study, where a loosening of regulation increased the returns on corporate acquisitions and has a European context, the absolute differences in acquirer returns are comparable.

For all 4 specifications, year and firm fixed effects are included. Firm fixed effects are included because the sample contains single firms that do a large number of acquisitions, up to 55, over the sample period. Because of these frequent acquirers, the data is treated as panel data, and accordingly includes firm-fixed effects rather than industry-fixed effects. Otherwise, there would be a lot of different observations biased by the common characteristics they share. Although treating M&A data as panel data is not common because panels are highly unbalanced due to the large difference between the numbers of observations per period, Barros et al., (2021) include firm fixed effects to overcome endogeneity issues and Bodt, Cousin & Roll (2019) find evidence for the presence of fixed effects in M&A datasets with multiple acquirers.

Except for all other controls, the cross-listing estimator is highly significant on all three specifications. Acquirers that are cross-listed earn about 50% lower deal announcement returns. This is consistent with the negative sign found in the correlation between cross-listing and CARs in table 2, however very inconsistent with the insignificant estimator of 0,0095 found by Dissanaike et al., (2020) on cross-listing. The size effect (Moeller et al., 2003) could explain those remarkable results, with the reasoning that larger firms are more likely to be cross-listed, which is supported by the correlation of 0,43 between log assets and cross-listing (table 2). It is also found that cross-listings decrease liquidity costs of trading the securities in emerging markets (Silva et al., 2008). Brazil is found to be the country with the largest trading costs of the four Latin-American countries (Argentina, Mexico, Chile, and Brazil) investigated. In the U.S., often foreign companies are traded as American Depositary Receipts (ADRs). ADRs allow American investors to easily invest in foreign companies. Silva et al., (2008) also stipulate a lower trading

cost for ADRs compared to their underlying local security. Hence, cross-listed acquirers might experience much more trading volumes in their ADR-equivalents rather than on the local securities themselves in the short run, causing the lower announcement effects found for cross-listings. Also, the larger levels of insider trading and information asymmetry in ADRs compared to the local Latin-American securities provide an advantage of trading on merger announcements as an American investor. Those findings are however particularly pronounced in small firms.

Overall, the results support hypothesis 1 and prove that the introduction of an ex-ante merger control regime destroys value of corporate takeovers because of emerging agency problems increasing value-destroying acquisitions, and because of the decreased flexibility to overstate financial performance. As mergers pre-reform were controlled ex-post, the decreased acquirer returns could however also be a result of a lower probability of merger approval rather than information asymmetry or management entrenchment reasons. The next sections further analyze information asymmetry as a source of the found difference-indifferences effect.

Information asymmetry

A resulting effect of the tighter merger control in Brazil is expected to be a clearer financial market with lower levels of information asymmetry. Because merging parties are obliged to notify their deal at the authorities under the new regime, there is less flexibility to overstate their financial performance. The reporting duties must make the "reviewed" information of better quality and accuracy because the CADE had to approve the deal and requires information as complete as possible. At the deal announcement, this information will be publicly available for stock market investors. Hence, stock market investors' expectations at the merger announcement should be more in line with the expectations of the firm's management on the post-acquisition performance. This section presents the results of differences in expectations alignment pre- and post-reform.

Table 7 presents the results of the regression analysis of the difference-in-differences effect of the alignment between stock market investors and management, measured by the explaining power of CARs on three-year BHARs. The model is specified for all three CAR event windows, and again for the 11-day event window, the model is also specified without control variables to do the endogeneity check. The size effect in CARs found in the previous analyses is found as well

for the 3-year buy-and-hold returns. Acquirers considered as large based on their revenue earn statistically significant 30% to 40% lower BHARs over a 3-year holding period, compared to small acquirers. This size effect is also observable in the significant negative estimators for log of total assets, similar in magnitude. The explanatory power of announcement returns on the long-term stock price performance over the whole sample range from 73% to 131% for the different event windows and are all moderate or highly statistically significant. Song et al., (2021) conducted this analysis for Chinese acquirers and find a remarkably larger effect of about 220% with moderate significance. Although both China and Brazil are developing economies, this difference indicates that there are substantially more severe information asymmetries in Brazilian financial markets. Given the high corruption concerns in Brazilian business environments, also relative to other OECD's (World Economic Forum, 2018), this is not a surprising insight. Of all four Latin-American Countries (Chile, Argentina, Mexico, and Brazil) investigated by Silva et al., (2008), Brazil has the weakest corporate governance systems, also indicating a larger vulnerability for information asymmetry issues between management and shareholders. Leverage seems to have a significant negative effect on three-year buy-and-hold returns, but this is negligibly small.

All specifications indicate that BHARs are lower after the reform, but without significance. This contradicts larger CARs post-reform found in the previous section. The difference-indifferences variable (Reform*Threshold) does not seem to explain any variance in BHARs. This is likely due to the long holding period of three years. This means that for a lot of observations, the stock price had exposure to periods with and without the new regulation. Hence, the returns cannot be easily attributed to the reform in 2012. The interaction between the difference-in-differences term and the CARs are significant only on the CAR (-5,5) event window. This does not raise too many concerns since this event window also best demonstrates the effect of the reform on announcement returns. However, there is a remarkably large spread between the different CAR event windows in these models, with estimators ranging from positive 2,6 to -1,2. Still, those values are not significantly different from zero, except for the 11-day event window specification. The significant estimator in the second specification with control variables indicates that when the acquirer is exposed to the reform, CARs on an 11-day event window have better explanatory power on the three-year BHARs of almost 260%. This means that a CAR (-5,5) increase by 1%, leads to a 2,6% larger BHAR if the deal is exposed to the reform, compared

Table 7

Regression analysis of difference-in-differences effect on BHAR-CAR alignment

	3-year BHAR	3-year BHAR	3-year BHAR	3-year BHAR
Difference-in-differences variables				
Reform	-0,009	-0,062	-0,062	-0,070
	(0,208)	(0,244)	(0,245)	(0,245)
Threshold	-0,401***	-0,320***	-0,299**	-0,317***
	(0,123)	(0,121)	(0,122)	(0,122)
CAR mkt (-5,5)	0,807**	0,726**		
	(0,342)	(0,337)		
CAR mkt (-1,1)			1,308**	
			(0,508)	
CAR mkt (-2,2)				0,810*
				(0,413)
Reform*Threshold	-0,103	0,010	-0,010	-0,011
	(0,192)	(0,191)	(0,192)	(0,192)
Reform*Threshold*CAR (-5,5)	2,227**	2,585***		
	(1,012)	(0,997)		
Reform*Threshold*CAR (-1,1)			-1,234	
			(1,748)	
Reform*Threshold*CAR (-2,2)				1,577
				(1,559)
Acquirer & deal characteristics				
Tobin's q		-0,0002	-0,0002	-0,0002
		(0,0005)	(0,0005)	(0,0005)
Leverage		-0,007**	-0,006*	-0,006*
		(0,003)	(0,003)	(0,003)
Log total assets		-0,494***	-0,489***	-0,490***
		(0,091)	(0,091)	(0,091)
Stake		-0,002*	-0,002*	-0,002*
		(0,001)	(0,001)	(0,001)
Cross-listing		-0,493	-0,532	-0,537
		(1,237)	(1,242)	(1,243)
(Intercept)	2,199**	7,667***	7,560***	7,574***
	(0,971)	(1,528)	(1,536)	(1,536)
Year fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Robust standard errors	No	No	No	No
# observations	1282	1282	1282	1282
R^2	0,615	0,629	0,625	0,625
F-statistic	4,654***	4,875***	4,790***	4,789***
	(df = 327; 954)	(df = 331; 950)	(df = 331; 950)	(df = 331; 950)

*p<0,1; **p<0,05; ***p<0,01. The robust standard errors somewhat improve the significance of the variables of interest. Still, without robust standard errors, the majority of the significance remains significant.   Estimators are predicted with OLS estimation.

to deals that were not exposed. This is consistent with hypothesis 2, stating that the regulatory scrutiny around Brazilian M&A deals decreases information asymmetry because of the notification duties with the CADE. Because of the clearer sharing of information, it is easier for stock market investors to interpret the long-term value of takeovers a few days after the announcement. Hence, the long-term returns are more consistent with the returns just around the merger announcement. This also strengthens the reasoning that overstatement of financial performance drives the negative effect of the reform on announcement returns, found in the previous section.

Cross-listing seems not to be of any significance in explaining three-year buy-and-hold returns. As argued in the previous section, the negative effect of cross-listings on CARs might be a result of liquidity preferences in the case of ADRs in the short run. Hence, those effects are observed for announcement returns of only a few days around merger announcements rather than that those ADR existence influence the long-term performance of the companies. It could also be that U.S.-based hedge funds are perusing arbitrage strategies with ADRs, where acquirers are typically shorted (Officer, 2007), causing stock price declines. In contradiction, Song et al., (2021) do find significant and positive cross-listing dummies on three-year BHARs for Hong Kong-listed acquirers. Given the alternative findings on cross-listing in studies on different geographies (Song et al., 2021; Dissanaike et al., 2020), these results are not generalizable across countries and might be attributable to the case of Brazilian deals specifically.

Industry concentration

In this section, the variation in the impact of the reform among different levels of industry competition is investigated. It tests the theory that in competitive industries, measured as industry concentration, the need to effectively utilize corporate resources creates less room for overinvestment problems (Masulis et al., 2007) destroying firm value (hypothesis 3). Hence, the expected agency conflicts arising from the reform will have a weaker effect in highly fragmented industries. The highest concentrations are found in energy, health care, and technology and the highest fragmented industries are customer discretionary, utilities, and industrials.

Table 8 presents the results of the model defined in equation 9. In this regression model, there are no year-fixed effects included since the yearly measured HHI values already incorporate year-fixed effects. For the two-day event window, there is an extra specification included

without controls to check for omitted variable bias in the interaction terms. The results on the reform dummy are similar to the results in table 6, close to zero and insignificant. The five- and eleven-day CARs are significantly larger post-reform. The threshold dummy again shows a size effect. There is however a large dispersion between those estimators for the specification with and without controls. The HHI dummy varies substantially among the different event windows. Solely on the 11-day event window with controls, there is a weak significant estimator found, which is negative 3,4%, indicating that CARs are lower in concentrated industries, and higher in competitive industries. The basic difference-in-differences variable shows, as expected, similar numbers as in table 6. Only for the two-day event window, it lost significance. The treatment effect among industry concentrations shows somewhat more consistency in the different specifications and is moderately statistically significant on the two- and five-day event windows. Again, the similar results in the two-day estimation period with and without controls indicate the effect is truly attributable to the difference-in-differences effect, and not by the controls. This sign is positive, indicating that the negative effect of the reform on announcement returns found in table 6, is less negative with 2,1% to 2,3% when acquirers are operating in highly concentrated industries. This contradicts Masulis et al., (2007) and hypothesis 3, stating that highly fragmented industries should experience less value-destroying effects of the reform. A reason for this effect could be that in concentrated industries, the pressure to make investments now is lower than in fragmented industries because the threat of a competitor taking the first mover advantage in the meanwhile is smaller (Grenadier, 2002, as cited in Bonaime et al., 2018). Because the reform has increased regulatory uncertainty, firms in more competitive industries have more difficulties with delaying their investments and hence do takeovers rather quickly than at the perfect moment. Therefore, the deals with acquirers operating in less competitive industries suffered less from the increased regulatory uncertainty followed from the reform, and still have some opportunity to optimally time their investments. The weakening effect of industry concentration could also be argued by attempts to avoid regulatory scrutiny. In more competitive industries, firms do takeovers solely to eliminate potential future competition and hence avoid being caught violating the antitrust law by taking over targets just below the notification thresholds (Cunningham et al., 2021). This might make the takeover market for deals subject to the CADE's notification duty less attractive and hence less profitable.

Table 8

Regression analysis of industry concentration on the difference-in-differences effect

	CAR (-1,1)	CAR (-1,1)	CAR (-2,2)	CAR (-5,5)
Difference-in-differences variables				
Reform	0,003	0,004	0,025**	0,034**
	(0,009)	(0,009)	(0,011)	(0,014)
Threshold	-0,011	-0,010	-0,005	-0,005
	(0,007)	(0,007)	(0,009)	(0,011)
Reform*Threshold	-0,009	-0,008	-0,033***	-0,041***
	(0,010)	(0,010)	(0,013)	(0,016)
> mean HHI	-0,005	-0,007	0,002	-0,034*
	(0,012)	(0,013)	(0,015)	(0,019)
Reform*Threshold*>mean HHI	0,021*	0,022**	0,023**	0,014
	(0,011)	(0,011)	(0,013)	(0,017)
Acquirer & deal characteristics				
Tobins q		0,00000	-0,00001	0,00004
		(0,00003)	(0,00004)	(0,0001)
Leverage		-0,0002	-0,0001	-0,0001
		(0,0002)	(0,0002)	(0,0003)
Log total assets		-0,0004	0,001	0,003
		(0,003)	(0,004)	(0,005)
Cross-listing		-0,129	-0,559***	-0,436***
		(0,082)	(0,099)	(0,125)
Stake		-0,0001	-0,0001**	-0,0001
		(0,0001)	(0,0001)	(0,0001)
(Intercept)	0,080	0,223***	0,639***	0,532***
	(0,058)	(0,073)	(0,089)	(0,112)
Year fixed effects	No	No	No	No
Firm fixed effects	Yes	Yes	Yes	Yes
Robust standard errors	Yes	Yes	Yes	Yes
# observations	1689	1689	1689	1689
R^2	0,525	0,526	0,514	0,474
F-statistic (df = 389; 1305)	3,781***	3,742***	3,562***	3,046***
Residual standard error	0,057	0,057	0,069	0,088

*p<0,1; **p<0,05; ***p<0,01. Estimators are predicted with OLS estimation.

This regulatory arbitrage might therefore result in stronger negative effects of the reform in competitive industries. This effect is tested for the reform's positive effect on information asymmetry. Table 9 indeed confirms that the difference in BHAR-CAR alignment between high and low-competitive industries becomes larger post-reform, with a larger alignment for uncompetitive industries. This indicates that management shared less complete or accurate information with investors in competitive industries, possibly because they avoided the CADE's scrutiny because they have competition law violating incentives.

Table 9

Industry competition and BHAR-CAR alignment regression

N = 1282	BHAR
CAR (-5,5)	0,892*
Reform	0,245**
CAR (-5,5)*Reform	-0,393
Low competition industry	-0,004
CAR (-5,5)*Reform*Low competition industry	2,643*
(Intercept)	0,015
# observations	1282

*p<0,1; **p<0,05; ***p<0,01. Low competition industry is a dummy variable that equals 1 if the HHI of the industry in the year prior to announcement is larger than the average HHI in that year. Estimators are predicted with OLS estimation.

Robustness checks

In this section, several robustness checks are performed to check whether the results are robust to certain changes in measures. First, following Dissanaike et al., (2020), the baseline regression is performed with a "placebo" difference-in-differences variable, confirming that the results are not driven by violations of the parallel trends assumption made in difference-in-differences research set-ups. Second, hypothesis 1 is tested with two truncated samples to rule out the size effect playing a role in the results.

Difference-in-difference research set-ups make the unstable assumption that both groups, the control and treatment group, are following parallel trends, except for the treatment of interest (Dissanaike et al., 2020). Hence, the results found in the baseline regression presented in table 6 could also be a result of other trends that are specific to one of the two classified groups. To test whether this is the case, the reform dummy is transformed into a placebo reform dummy, where the reform date of May 30th, 2012, is changed to a randomly chosen date of February 1st, 2010. The baseline regression is repeated exactly as in table 6, with the only difference being the placebo reform date. The results of this placebo regression are presented in table 9. The controls show similar results as in table 6 and are excluded from the table for simplicity. The reform dummies are still insignificant, but smaller, which is as expected. Threshold dummies still induce a size effect, but most importantly, the placebo diff-in-diffs effect is insignificantly different from zero. This confirms that the results are not driven by the parallel trends assumption being violated but are indeed a result of the new merger control regime implemented on May 30th, 2012.

Table 9

Baseline regression with placebo Difference-in-Difference-variable

	CAR (-5,5)	CAR (-1,1)	CAR (-2,2)	CAR (-5,5)
Difference-indifferences variables				
Placebo reform	0,019	0,003	0,003	0,019
	(0,034)	(0,022)	(0,027)	(0,034)
Threshold	-0,011	-0,016*	-0,011	-0,008
	(0,012)	(0,008)	(0,010)	(0,012)
Placebo reform*Threshold	-0,009	-0,013	0,003	-0,008
	(0,015)	(0,010)	(0,012)	(0,016)
Controls	No	Yes	Yes	Yes
(Intercept)	0,014	0,133	0,609***	0,590***
	(0,100)	(0,087)	(0,106)	(0,134)
Year fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
# observations	1689	1689	1689	1689
R^2	0,482	0,537	0,522	0,483
F-statistic	2,937***	3,617***	3,401***	2,914***
	(df = 1282)	(df = 1278)	(df = 1278)	(df = 1278)
Residual standard error	0,088	0,057	0,070	0,088

*p<0,1; **p<0,05; ***p<0,01.

Table 10 shows of the other two regressions (from table 7 and 8) with the placebo difference-in-differences variable. The first 2 specifications, without and with controls, confirm that the significant effect of BHAR-CAR alignment found in table 7 are not driven by the violated parallel trend assumption. Again, the controls show similar numbers and are excluded for simplicity and there is a significant size effect and significant predicting power of CARs on BHARs in general. The interactions with the difference-in-differences variables are for both, with and without controls, insignificantly different from zero, indicating that the randomly assigned date does not have any effect. Specifications three and four present the interaction of HHI and the difference-in-differences effect for the two-day event window, for which the only significance was found in table 8. Also there is no effect found, confirming that the contradicting finding on industry concentration has something to do with the regulatory reform in 2012.

Table 10

Regressions of BHAR-CAR alignment and HHI with placebo Difference-in-Difference-variable

	3-year BHAR	3-year BHAR	CAR (-1,1)	CAR (-1,1)
Difference-indifferences variables				
Placebo reform	-0,170	-0,193	0,001	0,001
	(0,340)	(0,335)	(0,022)	(0,022)
Threshold	-0,408***	-0,329**	-0,019**	-0,019**
	(0,129)	(0,128)	(0,008)	(0,008)
CAR (-5,5)	1,072***	0,983***		
	(0,361)	(0,356)		
Placebo reform*Threshold	0,006	0,067	0,011	0,012
	(0,165)	(0,165)	(0,010)	(0,010)
> mean HHI			-0,015	-0,036*
			(0,013)	(0,021)
Placebo reform*Threshold*CAR (-5,5)	0,053	0,232		
	(0,808)	(0,795)		
Placebo reform*Threshold*>mean HHI			0,017	0,017
			(0,011)	(0,011)
Controls	No	Yes	No	Yes
(Intercept)	2,262**	7,584***	0,024	0,132
	(0,974)	(1,523)	(0,065)	(0,088)
Year fixed effects	Yes	Yes	No	No
Firm fixed effects	Yes	Yes	Yes	Yes
# observations	1282	1282	1689	1689
R^2	0,613	0,627	0,538	0,538
F-statistic	4,614***		3,648***	3,612***
	(df = 327; 954)	4,824***	(df = 408;	(df = 412;
		(df = 331; 950)	1280)	1276)
Residual standard error	0,852	0,838	0,057	0,057

*p<0,1; **p<0,05; ***p<0,01.

Another intermediating factor of concern that might drive the significant negative results on the reform exposure on CARs is firm size. All models so far have been indicating a strong significant negative size effect, on both long- and short-term returns. Since the treatment group is larger by definition than the control group, the negative difference-in-differences effect might be driven by the firm sizes of the acquirers in those groups. Therefore, following Dissanaike et al., (2020), the baseline regression is repeated with a truncated sample. The sample is truncated on a 10% and 20% level. In the 10% truncation, the 10% largest acquirers in the treatment group are deleted from the sample, with size based on total assets. In the control group, the 10% smallest acquirers are deleted. The same is done for the 20% truncation but deleting 20% of the largest

and smallest acquirers. This narrows the size gap between the two groups and creates the opportunity to verify whether the results were driven by this size gap. The results of the baseline regression with the truncated samples are presented in table 11. The results are in both the 10% and 20% truncation, and for the 11-days and 5-days event windows highly similar to the original baseline regression from table 6. This proves that narrowing the size gap between the treated and control group does not affect the results, and hence that the results are not driven by the size effect.

Table 11
Baseline regression with truncated samples

	10% truncation		20% truncation	
	CAR (-5,5)	CAR (-2,2)	CAR (-5,5)	CAR (-2,2)
Difference-indifferences variables				
Reform	0,014	0,021	0,008	0,021
	(0,025)	(0,020)	(0,026)	(0,021)
Threshold	-0,0001	-0,003	-0,006	-0,006
	(0,012)	(0,010)	(0,010)	(0,010)
Reform*Threshold	-0,048***	-0,030**	-0,044**	-0,034**
	(0,017)	(0,014)	(0,018)	(0,016)
Controls	Yes	Yes	Yes	Yes
(Intercept)	0,484***	0,497***	0,445***	0,417***
	(0,148)	(0,116)	(0,171)	(0,133)
Year fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
# observations	1520	1520	1351	1351
R^2	0,442	0,400	0,436	0,400
F-statistic	2,296***	1,932***	2,229***	1,920***
	(df = 1129)	(df = 1129)	(df = 1002)	(df = 1002)
Residual standard error	0,090	0,071	0,089	0,070

*p<0,1; **p<0,05; ***p<0,01.

Conclusion & Discussion

This study aims to assess the effect of an ex-ante merger control regime on the outcomes of the acquiring parties. This is done by setting up a difference-in-differences experiment for the implementation of an ex-ante regime in Brazil in 2012, where a treatment- and control group is observed pre- and post-reform. In this last chapter, the results are brought together forming a concise conclusion about all the findings. Those findings are discussed and brought into the perspective of earlier research. These discussions lead thereafter to practical implications for both, management, and regulators. Finally, the limitations of the study are outlined, concluding with suggestions for further research on mergers & acquisitions and their regulation.

Conclusion & Discussion

The findings presented in the previous chapter can conclude on three main things: value destruction, reduction of information asymmetry, and an unexpected role of industry competitiveness.

First, the implementation of a merger control regime where merging parties must notify their deal ex-ante with the CADE, significantly reduce value creation in the accumulation of daily returns around the day of the merger announcement. This translates into a R\$752 million, or €143 million value reduction per deal that is exposed to the new stringent ex-ante merger control. It is such as expected because of the lengthy procedures and information-sharing duties the merging parties must go through. This should reduce the incentive for management to make acquisitions, leaving more room for managerial entrenchment in the takeover market (Dissanaike et al., 2020) or accepting sub-optimal deal structures to let the deal get approved (Fee et al., 2004). The €143 million value reduction per deal is of high economic significance for shareholders of acquiring firms and might therefore make them more reluctant in doing takeovers. Bringing this into perspective, with an average 11-day cumulative abnormal return of 1% and average revenue of R\$13,4 billion, the average deal creates about R\$134 million, or €24,8 million in merger announcements. This means that the new regulation caused a decrease in value creation of almost six times the average value created in deal announcements. This must raise concerns about the efficiency of the enforcement, as the benefits of such a regime should outweigh these huge costs.

Second, the results support the hypothesis that the value destruction is partly driven by the information-sharing duties the treated acquirers have had since the reform. Information asymmetry between investors and the acquirers' management is much less observed in the group that is exposed to the reform and hence has notification duties pre-merger. The obligation to provide clear and complete information to the CADE, which is also published in a "Public Notice" when a deal is likely to go through, closes the information gap between investors that invest in the merging acquirer and the management of the firm. Since management tends to overstate financial performance leading to larger returns, the reduced information asymmetry is likely a driving force for the value reduction of treated deals. The increased quality of shared information by management to shareholders is a favorable development in Brazilian financial markets, especially because of its poor performance on corporate governance and high corruption levels (Silva et al., 2008; World Economic Forum, 2018). Despite this sign of effectiveness of the new merger enforcement, the question remains whether this outweighs the large value destruction found.

Third, the value-destroying effect of the reform is unexpectedly, slightly more pronounced in competitive industries. This contradicts the argument that firms operating in competitive industries cannot afford inefficient utilization of corporate resources (Masulis et al., 2007) and rather supports Bonaime et al., (2018) stating that the cost of investment delaying is higher in competitive industries. This makes the lengthy procedures more costly. Following the argumentation of Cunningham et al., (2021), this finding can also be attributed to regulatory arbitrage attempts in competitive environments, because doing deals that are under the CADE's scrutiny is not attractive anymore. In competitive industries, firms seem to have reported less information to the authorities, because it did not become accessible to outside investors, based on the findings that merger announcement effects are less representative of long-term performance. This stipulates the weak effectiveness of controlling mergers ex-ante because firms that are aware they are violating the competition standards acquire their assets in a way that notification with the CADE is avoided. Strong evidence on this reasoning for the difference between high- and low-competitive industries however still lags and is beyond the scope of this study.

Lastly, as a side-finding, cross-listing turns out to be a highly relevant negative predictor for short-term merger announcement returns, while it is not for long-term returns. Since cross-

listing does not do anything for long-term returns, this is possibly a result of ADRs making the underlying less attractive due to relative liquidity issues. The geographical robustness of this finding remains weak because of highly divergent results found in other studies (Dissanaike et al., 2020; Song et al., 2021), in Europe and China respectively.

Practical implications

Bidding firms are complaining about the lengthy procedures in the US that deteriorate their assets to be bought (Bear et a., 2001). This issue is confirmed to be similar in the Brazilian M&A market. The value impairment is of even larger magnitude in competitive industries since others might make a bid in the meanwhile. Hence, especially in highly fragmented industries, it is worth it to try to quantify the fast-track procedure provided by the CADE under specific requirements. This will reduce the costs of delaying investments. It is not to be recommended to violate the competition standards, but from the perspective of shareholder value-maximizing operators, it might even be more lucrative to choose a sub-optimal target if it avoids notification duties with the CADE. The CADE has fined a total of about €3 billion since the implementation of the new notification rules in 2012 (OECD, 2019). The sample contains 474 treated deals after the implementation. With an average value destruction of €143 million, this gives a total damage of €67,8 billion, which is much larger than the total fines issued. Bidders might be aware of this tradeoff and are better off avoiding notification duties and risking a fine post-merger. This is also what the findings of industry competition induce. To incentivize bidders to not take the risk, fines could be increased. However, ineffectiveness will remain as the majority of the deals are not raising anti-competitive concerns, and the cost-effectiveness will decrease even further. It is hence recommended to control mergers ex-post, and rather improve accounting and quarterly reporting standards in order to overcome information asymmetry issues since the results clearly show an improvement of information symmetry by forcing parties to report. Lastly, the findings on cross-listings and ADRs warn investors perusing short-term strategies for liquidity issues in the underlying security of the ADR.

Limitations & Further research

A standard issue in a difference-in-differences quasi-experiment is that the event of interest is not the only event over the sample period. Next to the introduction of a pre-merger notification regime, several other changes are affecting the M&A market. For example, the jurisdictional thresholds (for post-merger inspections) have been raised as well (anonymous, 2012). By

considering a control group next to the treatment group that is specific to the event of interest, the noise arising from this issue is minimized.

This study only looks at acquiring firms and ignores the target firms' characteristics. This might negatively affect the accuracy of the allocation of the deals in the treatment and control groups. For example, it could be that a particular deal is unjustified allocated to the treatment group, because the acquirers' turnover was large enough, while the target turnover was below the threshold used by the CADE. Combining research on acquirers and their targets at the same time will be difficult because of a lag of observations. It will however be relevant to investigate the outcomes of the reform for target firms. Especially, to see whether bidders indeed avoid CADE's scrutiny by targeting firms that earn slightly below the threshold. Also, inspecting the target firms might be of more relevance in investigating the role of industry competitiveness, as the competitiveness of the industry of the target firm determines the number of bids it receives, not the industry of the acquirer. This is hence a more accurate indicator of the costs of delaying investments.

The dataset is limited to deals that are completed and hence approved by the authorities. The results are therefore biased towards deals that are characterized by meeting the standards of the CADE. Repeating the analyses with a sample that also contains deals that are not completed might be valuable for subsequent research. This can give more clarity on the additional value of the CADE being able to withdraw deals ex-ante to overcome competition issues in the industry. In addition, other authorities involved in the M&A process in Brazil are ignored. Considering the role of other parties, such as the CVM (the Brazilian SEC), the Brazilian Stock Exchange, or the Banco Central do Brasil (the Brazilian central bank) will be a valuable contribution to this study. To further investigate the remarkable role of cross-listings in deal announcement returns of Brazilian acquirers, it would be interesting to see whether different interaction effects between cross-listing and CARs can be found for different firm sized, as size matters (Silva and Cháves, 2008).

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