Pontifícia Universidade Católica
do Rio de Janeiro

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How Recent Acquisitions in the Healthcare Market Affect the Price of Procedures

Dissertação de Mestrado

Master's Dissertation presented to the Programa de Pós–graduação em Economia, do Departamento de Economia da PUC-Rio in partial fulfillment of the requirements for the degree of Mestre em Economia.

Advisor : Prof. Leonardo Rezende
Co-advisor: Prof. Letícia Nunes

Rio de Janeiro
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Abstract

Oliveira, Lara de Andrade; Rezende, Leonardo (Advisor); Nunes, Letícia (Co-Advisor). **How Recent Acquisitions in the Healthcare Market Affect the Price of Procedures**. Rio de Janeiro, 2024. 48p. Dissertação de Mestrado – Departamento de Economia, Pontifícia Universidade Católica do Rio de Janeiro.

This study examines the impact of acquisitions in the healthcare market on procedure prices in São Paulo. Our hypothesis is that acquisitions provide health insurance companies with greater bargaining power, enabling them to negotiate lower prices with hospitals. We analyze five acquisition events between June 2018 and December 2020 using a difference-in-differences approach, including a staggered analysis to account for the varying timing of these events. Our findings show a significant reduction in the prices of birth procedures, including vaginal and cesarean deliveries, following the acquisitions, while the impact on ICU procedures and hospital consultations is less clear, with no consistent or significant price changes detected. These results suggest that while acquisitions may drive down prices for certain high-frequency procedures, their effect on more specialized services is more limited. This research contributes to the understanding of how market power dynamics in the healthcare sector influence procedure pricing.

Keywords

Health; Health Insurance; Concentration; Price Setting.

Resumo

Oliveira, Lara de Andrade; Rezende, Leonardo; Nunes, Letícia. **Como Aquisições Recentes no Setor da Saúde Afetam o Preço dos Procedimentos**. Rio de Janeiro, 2024. 48p. Dissertação de Mestrado – Departamento de Economia, Pontifícia Universidade Católica do Rio de Janeiro.

Este estudo examina o impacto das aquisições no mercado de saúde sobre os preços dos procedimentos em São Paulo. Nossa hipótese é que as aquisições proporcionam às operadoras de planos de saúde maior poder de negociação, permitindo que elas negociem preços mais baixos com os hospitais. Analisamos cinco eventos de aquisição entre junho de 2018 e dezembro de 2020 usando a abordagem de diferença em diferenças, incluindo uma análise escalonada para considerar o momento variado desses eventos. Nossos resultados mostram uma redução significativa nos preços dos procedimentos de parto, incluindo partos normais e cesarianas, após as aquisições, enquanto o impacto nos procedimentos de UTI e consultas hospitalares é menos claro, sem mudanças consistentes ou significativas nos preços detectadas. Esses resultados sugerem que, embora as aquisições possam reduzir os preços de certos procedimentos de alta frequência, seu efeito em serviços mais especializados é mais limitado. Esta pesquisa contribui para a compreensão de como as dinâmicas de poder de mercado no setor de saúde influenciam a precificação dos procedimentos.

Palavras-chave

Saúde; Plano de Saúde; Concentração; Definição de Preço.

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CADE - Administrative Council for Economic Defense
ANS - National Supplementary Health Agency
IBGE - Brazilian Institute of Geography and Statistics
TISS - Healthcare Information Exchange System

1
Introduction

In the last few years, more attention has been brought to the supplementary health sector due to substantial mergers and acquisitions happening in the sector. These developments present new challenges, particularly in the areas of competition and price setting within the sector. Recently, the supplementary healthcare market in Brazil has seen a significant surge in mergers and acquisitions. In 2022, the sector accounted for 15% of all mergers and acquisitions in the country. Cruz et al. (2022) documents the growth of large health insurance companies at the expense of smaller ones with a lower concentration of beneficiaries, leading to a more concentrated market.

While previous studies (Ocké-Reis (2006); Pietrobon, Prado & Caetano (2008); Azevedo et al. (2016)) have explored the implications of these mergers, their focus has largely been on the impact on the Brazilian National Health Agency (ANS) and its role in supervising price and plan adjustments. This study, however, shifts the focus to the effects of these recent mergers on the pricing decisions for medical procedures. Specifically, it examines how mergers influence the negotiation of prices paid to hospitals by health insurance companies. We hypothesize that when a company acquires another, it gains a larger market share in a municipality, thereby increasing its bargaining power to negotiate lower prices with hospitals.

We apply a difference-in-differences approach to assess the impact of acquisitions on procedure prices in São Paulo's supplementary health sector. Our primary focus is the acquisition of Mediplan by Intermédica in May 2018, while we also examine four smaller acquisitions between January 2018 and December 2020. We analyze a range of procedures, starting with complex ones like ICU treatments, followed by births, and finally simpler procedures such as hospital consultations.

All of these events involve horizontal interactions, meaning the companies involved are health insurance companies that have merged under a single management, resulting in a larger pool of beneficiaries. However, there are no changes in the companies' production processes, as they operate within the same segment.

For this analysis, we utilize public data from Brazil's National Health Agency (ANS) to calculate the total number of beneficiaries for each company by municipality on a monthly basis. Additionally, we use ANS's hospital procedure pricing data (TISS), which provides detailed information on procedures

performed at hospitals across municipalities. This dataset, spanning from January 2015 to December 2022, offers monthly data; however, it lacks details on the specific health insurance companies making the payments or the hospitals receiving them. As a result, our analysis relies on average pricing data for procedures in each municipality.

We also incorporate data manually gathered from CADE's website on recent acquisitions. Since CADE does not provide a comprehensive list of acquisition events it has analyzed, we conducted a manual search on the website and supplemented it with online searches through newspapers.

The results seem to be in line with our main hypothesis, that the acquisitions lead to a reduction in the price of procedures. In our main analysis, we find a significant decrease in prices for ICU procedures and births, while hospital consultations show a positive price change. We hypothesize that this could be because consultations are possibly often bundled with other procedures in package deals. For the other events, the results are generally noisier. Notably, the second-largest event — Intermédica's acquisition of Green Line — shows no significant effects. We suggest that this could be due to timing, as the merger occurred in the last quarter of 2018, while our main event, which also involves Intermédica, took place in the second quarter of 2019. One possibility is that price negotiations were postponed until both events had concluded.

We also conduct a staggered difference-in-differences analysis to assess all acquisitions and find a significant decline in prices for birth procedures. This result holds when examining all birth procedures together, as well as when separating them into vaginal and cesarean deliveries.

This study is organized into seven sections, in addition to this introduction. The second section reviews the related literature, while the third provides context on the Brazilian healthcare system. The fourth section presents the data, and the fifth focuses on mergers and acquisitions in Brazil, including the events under analysis. The sixth section outlines the empirical strategy, followed by the results in the seventh section, which also includes the staggered difference-in-differences analysis. Lastly, the eighth section presents the conclusions and final discussion.

2
Related Literature

This study examines the impact of acquisitions on procedure prices in the state of São Paulo, Brazil. While research on this topic in Brazil remains limited, extensive studies in the US have explored healthcare market dynamics, particularly within the field of Industrial Organization.

A few studies have focused on the impact of competition on the quality of care. Ho & Hamilton (2000) studies how mergers impact care, they show that the structure of pricing in the hospital sector indicates that the effect of mergers may translate into quality rather than prices. Gaynor, Ho & Town (2015) conducted a literature review on the impact of competition on prices, quality of service and treatment decisions. When looking at acquisitions and hospital cost, Robinson & Luft (1985) found that increased competition would lead to acquisitions of specialized clinics and other non-price-related methods of competition to attract patients and physicians. Complementing these studies, Fulton (2017) analyzed market concentration tendencies in the US private health market between 2010 and 2016 and the effects on costs and quality. Short & Ho (2020) analyze the effect of vertical integration versus market concentration on hospital quality. They find that vertical integration has a limited effect on quality, but the market concentration is negatively related to quality. Handel & Ho (2021) write a review on IO tools that have been developed to analyze competition and regulation in the healthcare market.

While these studies provide extensive insights into how to analyze concentration in the healthcare market, they predominantly focus on the quality of care and cost dynamics. However, few directly address the critical issue of how acquisitions impact procedure price decisions.

Shifting focus to the Brazilian market, most studies tend to examine the public health system (SUS) or the interaction between SUS and the private sector, particularly in relation to the regulatory role of the National Supplementary Health Agency (ANS). This leaves a gap in understanding how acquisitions within the private healthcare sector influence procedure pricing, which this study aims to address.

When examining market concentration in Brazil, Almeida (2009) demonstrated that, between 2003 and 2006, around 75% of Brazilian municipalities had a high market concentration index. Since then, Brazil has seen a significant increase in mergers and acquisitions, leading to further consolidation in the healthcare sector. Azevedo et al. (2016) highlighted that the market tends

to operate more efficiently when dominated by a smaller number of large, vertically integrated companies.

One of the challenges in analyzing the healthcare market is defining the relevant market. Andrade et al. (2015) addressed this issue by proposing a new methodology for assessing the market in terms of relevant market definitions and concentration levels, which is particularly useful in understanding the effects of consolidation. According to the Supplementary Healthcare Report (CADE (2022)), the Administrative Council for Economic Defense (CADE) has adopted several definitions of the relevant market in supplementary healthcare. Between 2007 and 2010, it used the methodology of the Secretariat for Economic Monitoring (SEAE), which considers travel time and distance. In other cases, it employed the methodology of the National Agency for Supplementary Health (ANS), which grouped municipalities into 89 relevant markets. However, in more recent cases, CADE has used municipal boundaries, generating clusters for those municipalities where the market share exceeds 20%. In this study, we adopt municipal boundaries to define the relevant market.

In a study closely related to our research, Andrade et al. (2024) explore the relationship between ICU procedure prices and the market shares of providers and insurers. They find a positive correlation between ICU procedure prices and provider market share, while insurer market share is negatively correlated with prices. These findings are consistent with our expectations about market dynamics following acquisitions.

3
Background

3.1
Brazilian Healthcare System

Brazil's healthcare system has undergone significant changes throughout its history. It has evolved from a patchwork of private charities to a universal public healthcare system that is the largest of its kind.

Paim et al. (2011)'s work summarized and explained the process of creating Brazil's public health system. The implementation of the Brazilian Unified Health System (SUS) began in 1990 with the approval of a framework healthcare law. The SUS is a comprehensive, universal healthcare system that provides free healthcare services to all Brazilians.

However, the public healthcare system has faced challenges, including significant disparities in healthcare access and outcomes between different regions of the country, funding challenges, and doubts about the quality of care provided. Despite these challenges, Brazil's healthcare system remains one of the most comprehensive in the world, with the SUS providing access to a wide range of services, including primary care, hospital care, and specialized care, as well as many campaigns such as national HIV prevention, vaccination, and tobacco control. Nonetheless, unequal distribution of services persists, with the Southeast receiving better treatment than the rest of the country. Fernandes et al. (2007) revealed a correlation between the coverage rate of the sector and the human development index (HDI), indicating disparities in access to healthcare. Regions with lower HDI scores showed lower coverage rates, highlighting the disproportionate distribution of healthcare resources in the country.

In the present day, the healthcare system is divided into three sub sectors: public (SUS), private and private health insurance. People can use all three of them depending on their ability to pay.

For this study, we will focus on the private sub sectors. The demand for this sectors is mainly composed of employees of public and private companies that offer health insurance plans. As of 2023, 50.8 million people were beneficiaries of a healthcare plan, excluding those enrolled in dental-only plans. Of those, 35.8 million had a collective or corporate health plan and around 9 million had an individual plan.[1]

[1]Information available at ANS tabnet website www.ans.gov.br/anstabnet

To regulate health plan companies, the National Supplementary Health Agency (ANS) was established in 2000. ANS aims to provide legal and administrative regulation of the health insurance market. ANS has established a list of procedures that health plans must offer, which benefits beneficiaries by overcoming the problem of information asymmetry. The agency also establishes how much the price of plans can increase each year. It is important to note that the price regulation only happens for individual plans and is limited to plans signed after 1999 (Pietrobon, Prado & Caetano (2008)). According to Ocké-Reis (2006), in order to meet the requirements imposed by ANS, agencies have been seeking to merge and acquire others, or even go public on the stock exchange, in order to reduce administrative costs associated with economies of scale. Ocké-Reis (2006) argues that these large companies are creating a siege on ANS regulation, pressuring for price adjustments on old individual plans.

The ANS does not regulate the prices that healthcare companies pay to hospitals for procedures; these are negotiated directly between the insurance companies and hospitals. This is particularly interesting because the outcome is heavily influenced by the bargaining power of both parties. Recent acquisitions have altered the bargaining dynamics by increasing the market share of key players. In this study, we examine five different acquisition events in the state of São Paulo to assess whether the prices paid for procedures have changed following these acquisitions.

3.2 Mergers and Acquisitions

In recent years, the healthcare market in Brazil has experienced a notable increase in the number of mergers and acquisitions. In 2022, the healthcare industry accounted for 15% of all mergers and acquisitions. In 2021 alone, there were 32 mergers or acquisitions in the healthcare sector, with Rede D'or being the company with the most acquisitions, totaling R$4.2 billion.

This mergers and acquisitions can be of two types: vertical and horizontal integration. Vertical integration occurs when companies from different stages of the supply chain combine forces, such as when a health insurance company acquires a hospital. This type of integration allows the insurer to control more aspects of healthcare delivery, potentially reducing costs by controlling operations across the supply chain.

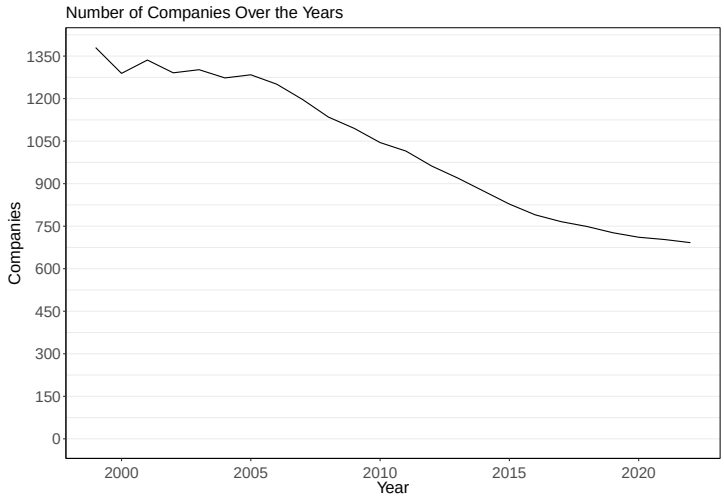
Horizontal integration, on the other hand, involves the merger of companies in the same sector. In the healthcare industry, this would mean, for example, the merger of two health insurance companies. Such interactions can lead to increased market share, reduced competition, and potentially greater

bargaining power with healthcare providers. In this study, we focus specifically on horizontal integration between health insurance companies, analyzing how these mergers impact procedures pricing decisions.

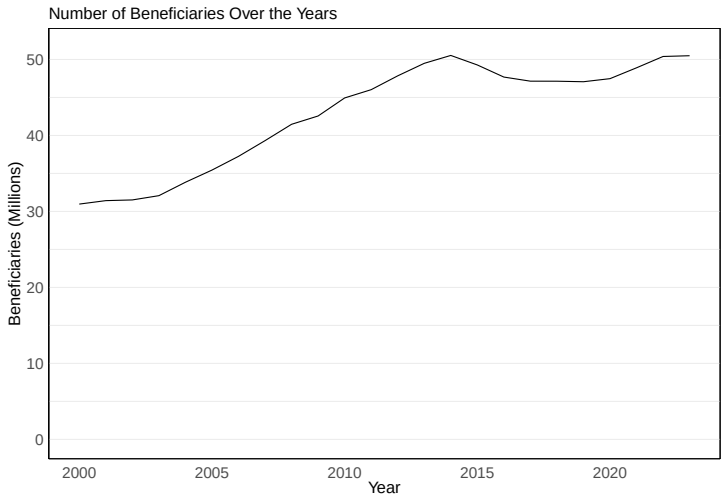
There is evidence that, in the last few years, the supplementary health sector has been concentrating, with many healthcare companies merging and others closing. Figure **??** reflects this scenario, which shows the total number of healthcare plans from 2000 to 2022. There is a clear descent in the number of active plans. At the same time, the number of beneficiaries has been rising consistently. Notably, the number of beneficiaries increased by over 3% in both 2021 and 2022 (figure **??**).

Table 3.1 shows the concentration ratio of the market in 2023 in terms of beneficiaries. The two largest companies account for approximately 15% of all beneficiaries, while 18 companies together cover over 50% of the total beneficiaries nationwide. Although the market appears less concentrated at the national level, significant concentration is observed when examining specific municipalities. One example is Sorocaba, which is illustrated in Figure 5.3 and will be analyzed in greater detail in Section 6, in which, after an acquiring Mediplan, Intermédica reaches nearly 40% market share.

Figure 3.2 illustrated the evolution of the market share of the five largest health insurance companies in Brazil over the years. Recently, Hapvida has surpassed other companies to become the largest in the country, followed by Bradesco and Intermédica. Amil's market share has been dropping significantly. These dynamics are very interesting and highlithgt relevant changes in the market. On one hand, acquisition strategies have boosted Intermédica's and Hapvida's shares in recent years. On the other hand, the market has seen an increasing in group-plans and a decline in individual plans (Albuquerque et al. (2008)), and, as a response to these changes, there have been proposals to introduce cheaper, more accessible health plans for lower-income segments of the population (Marinho (2017)). Although not part of this study, the recent merger of Intermédica and Hapvida, which began in 2022, is expected to further transform this market.



Number of health insurance companies.



Number of healthcare plan beneficiaries.

Figure 3.1: Comparison of trends in the number of health insurance companies and beneficiaries over time.

Source: ANS

Concentration Ratio - beneficiaries (2023)	
Number of Companies	Percentage of Beneficiaries
2	14.7
3	21.5
5	31
9	40.8
18	50.5

Table 3.1: Concentration ratio in terms of beneficiaries. Source: ANS

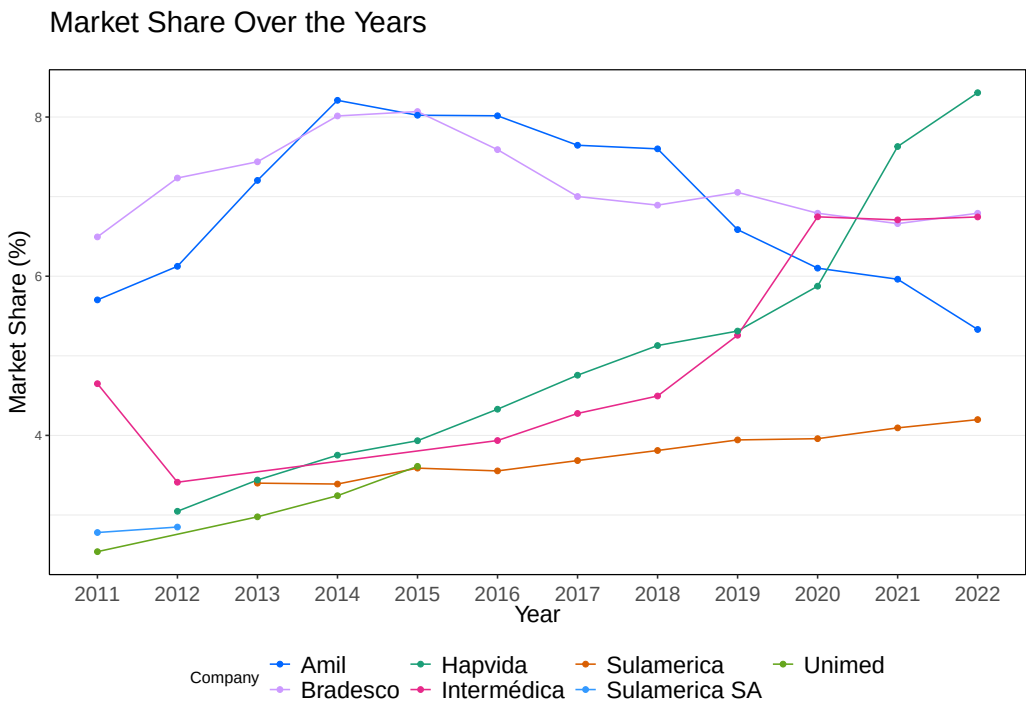


Figure 3.2: Top 5 Health Insurance Companies in Brazil by Market Share.

Source: ANS

Six biggest healthcare companies in the number of beneficiaries, Brazil, June (2023)

Plan	Beneficiaries (millions)
Hapvida	4.210637
Bradesco	3.337679
NotreDame Intermédica	3.325019
Amil	2.669666
SulAmerica	2.149670
Unimed Nacional	2.031835

Table 3.2: Six biggest healthcare plans and the number of beneficiaries.

Source: ANS

4
Data

For this study, we primarily use publicly available data from the ANS website, with a particular focus on the TISS (Exchange of Supplementary Health Information) dataset. This dataset provides detailed records of all procedures performed in each municipality on a monthly basis. For each procedure, we have information on the patient, the price paid by the insurance company, and some details about the diagnosis. However, the dataset does not include identifiers for the specific health insurance company or hospital. Therefore, our analysis is conducted using data aggregated at the municipality level.

Additionally, we use ANS beneficiary data to calculate the market share of each company by year. We also incorporate control variables from the Brazilian Institute of Geography and Statistics (IBGE), such as population and GDP.

To gather information on acquisitions in the supplementary health sector, we rely on publicly available data from CADE. Although this data is accessible, the process of extracting relevant information involves manual effort, including navigating the website, searching for acquisition cases, reading through them, and classifying them to determine their relevance to our analysis.

Using these datasets, we can explore key descriptive statistics related to healthcare procedures and insurance plan coverage across the state. The following figures provide insights into the distribution of health plan coverage and the frequency and cost of selected procedures over time.

Table 4.1 presents the total quantity of the top procedures performed between 2015 and 2022. In this study, we focus on four key procedures: ICU intensivist care, hospital consultations, and cesarean sections from the list, as well as vaginal births, which is not included among the most frequently performed procedures.

Procedures and Quantities	
Procedure	Quantity
Hospital consultation	4,889,384
Complete blood count	1,275,586
Creatinine	1,066,385
Respiratory physiotherapy assistance for clinical inpatients	1,048,467
Urea	905,694
Potassium	708,636
ICU intensivist	590,633
Cesarean	345,349
Newborn care in the delivery room	326,192

Table 4.1: Summary of procedures and their respective quantities.

Source: ANS(TISS)

We also examine the trends in both the number of procedures and the total cost (calculated as quantity x price) of the four primary procedures under analysis. Figure 4.1 illustrates the annual quantity of these procedures in thousands, while Figure 4.2 presents their total costs over the years. Hospital consultations are the most frequently performed; although their unit cost is relatively low, the high volume results in the highest overall expenditure. ICU procedures follow, with Cesarean and Vaginal Births ranking next, respectively.

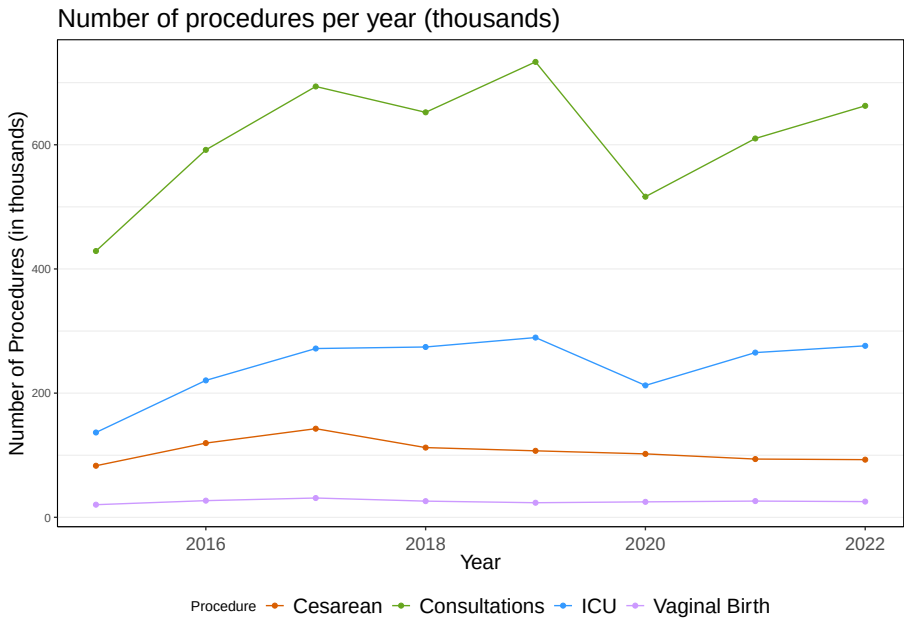


Figure 4.1: Evolution in the quantity of procedures in São Paulo for the procedures we are interested in.

Source: ANS

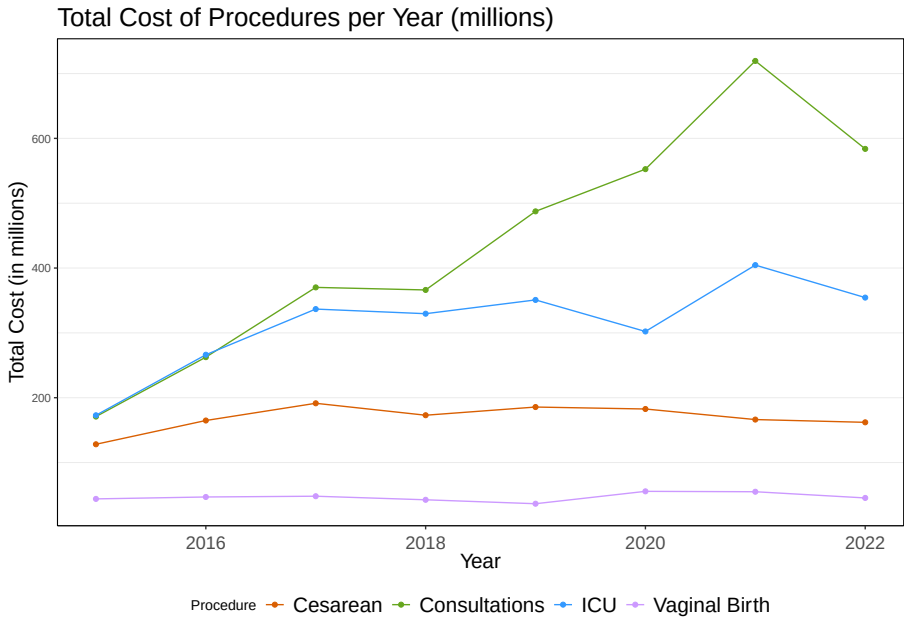


Figure 4.2: Evolution in the total cost of procedures (quantity x price) in São Paulo for the procedures we are interested in.

Source: ANS

Using ANS data on healthcare plan beneficiaries, we can analyze the coverage rate across cities in the state of São Paulo. Figure 4.3 displays the

coverage rate for 2015, where higher coverage is concentrated in municipalities near the metropolitan area of São Paulo and in parts of the eastern side of the state. The map for 2022, included in the appendix, shows a similar distribution, indicating minimal change in coverage patterns over the years (Figure A.1).

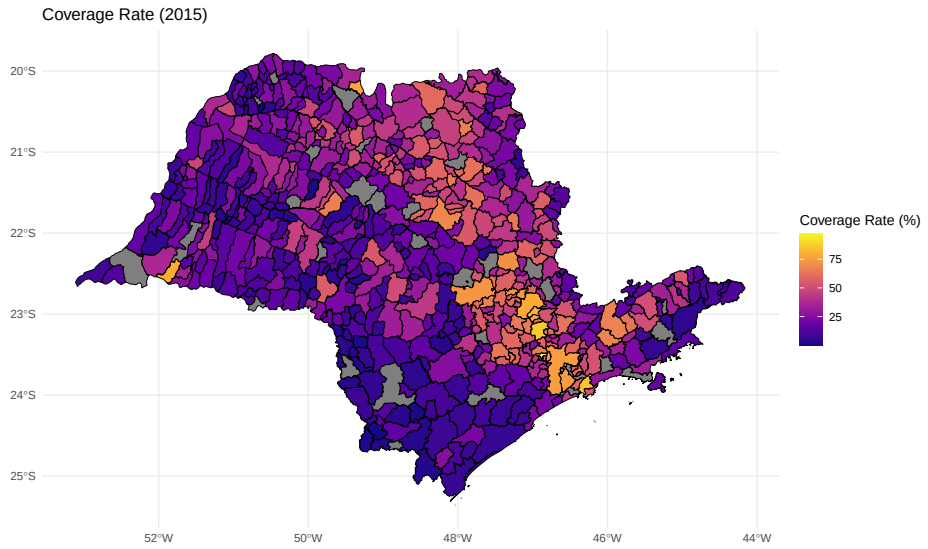


Figure 4.3: Coverage Rate in the State of São Paulo in 2015.

Source: ANS, IBGE

4.1 How is procedure price set

Procedure prices in the Brazilian healthcare market are determined through negotiations between healthcare providers and health insurance companies. This process is regulated by the National Supplementary Health Agency (ANS), as stipulated in Resolution No. 503 of March 2022. The ANS mandates that all prices must be agreed upon and documented in a written contract between the insurance company and the hospital or healthcare provider. While the ANS does not set the actual prices for procedures, it ensures that the negotiation process is standardized and transparent, promoting fairness and accountability in the market.

Prices can be defined by specific procedures (fee-for-service) or by package (global fee), where a single amount covers all necessary services to treat a specific medical condition.

The negotiated contracts cover a wide range of medical procedures and services, and the terms are subject to periodic reviews and renegotiations to reflect changes in costs, technology, and market conditions. Although prices

are typically adjusted annually to account for inflation, the resolution states that both parties are able to negotiate adjustment dates, allowing for more frequent revisions if needed. This contractual obligation helps to ensure that both parties, the insurers and the provider, have clearly defined expectations and responsibilities. The requirement for written contracts aims to reduce disputes and enhance the stability of service provision in the healthcare sector.

4.2 Events analyzed

In this work, we will analyze how recent acquisitions impact the market power of companies and, in turn, affect their decisions regarding procedure pricing. Our main hypothesis is that horizontal integration among insurers will lead to increased bargaining power. This enhanced leverage enables them to negotiate lower prices for medical procedures with hospitals.

We are examining acquisition events that occurred in São Paulo between January 2018 and December 2020. Out of all the integration events documented in the country, we will focus on five specific events in São Paulo, they are: São Francisco x São Lucas (September 2018), Intermédica x Greenline (November 2018), Unimed São Paulo x Unimed Nacional (January 2019), Intermédica x Mediplan (May 2019), and Hapvida x Medical (March 2020). While all of these are primarily horizontal integration events, some health insurance companies also own hospitals, making these integrations partially vertical as well. Therefore, we are unable to separate the horizontal and vertical effects. The impact on prices may arise either from the increased bargaining power of the merged firms or from the lower operational costs typically associated with vertical integration.

Considering these five events, we can rank them by their significance based on the average ΔHHI of the acquisitions (table 4.2). The average ΔHHI was calculated by weighting the ΔHHI of each municipality affected by the acquisition by its population. The most important acquisition event in the period was the acquisition of Mediplan by Intermédica.

Event	Average Delta HHI
Intermédica x Mediplan	991.49
Intermédica x Greenline	730.53
São Francisco x São Lucas	454.57
Hapvida x Medical	< 200
Unimed S. Paulo x Unimed Nacional	< 200

Table 4.2: Average Delta HHI for the different acquisition events.

Source: ANS, CADE

4.2.1 Intermédica and Mediplan

The acquisition of Mediplan by Intermédica is a significant example of consolidation in Brazil's supplementary health sector. Announced in 2019, Intermédica, one of the largest health insurance and medical service providers in the country with national operations, acquired Mediplan, a regional health plan company, to expand its market presence and increase its customer base. According to CADE's report, competitive concerns were identified primarily in cities in the countryside of São Paulo state, particularly in Sorocaba and nearby municipalities.

In terms of collective health plans, CADE's report indicates that Intermédica and Mediplan are the closest competitors in this market, offering plans at significantly lower costs compared to other competitors. This consolidation contributed to a more concentrated supplementary health market, potentially leading to greater bargaining power with healthcare providers and economies of scale. This acquisition is part of a broader trend of consolidation in the Brazilian health sector.

We will focus on this event because it was the largest and most significant during the period under consideration. It was the only acquisition approved with restrictions, as it resulted in some regions having a market share exceeding 40% post-acquisition. To address potential anticompetitive risks, CADE imposed specific remedies aimed to ensure the availability of affordable health plans. One of the key measures was the introduction of a new health plan product,“Smart 150," in the Sorocaba region, to be offered at a lower price than the existing “Smart 200" plan for a minimum period of three years.

4.2.2 Other acquisition events

We will look at four more acquisition events that happened in the state of São Paulo in the time period we are interested. They are all smaller in size and in magnitude when compared to Intermedica x Mediplan, with Hapvida x Medical and Unimed Nacional x Unimed São Paulo being the ones with the least variation in the HHI.

The second event in terms of magnitude is Intermédica x Green Line, approved in November of 2018, it consisted in Interméditca acquiring 100% of Green Line's shares. The acquisition led to a market share of over 20% and variation in the HHI of over 200 points in the municipalities of Barueri, Carapicuíba, Itapevi, Jandira and Osasco.

Next, São Francisco x São Lucas was approved in September of 2018. It led to a market share of over 20% and a variation in HHI of over 200 points in Avanhandava, Getulina, Guaiçara, Guarantã, Lins and Promissão.

Hapvida acquired Medical in November 2020. Given that their combined market share remained below 40% and the ΔHHI did not exceed 200 points, the acquisition was deemed free of competitive concerns. Similarly, the merger between Unimed Nacional and Unimed São Paulo, approved in March 2020, raised no competitive issues in the cities of interest due to the low combined market share and minimal impact on the ΔHHI.

5
Empirical Strategy

We will analyse this event with a difference in differences approach (equation 5-1). We will follow an approach similar to Guanziroli (2022) and define the control group as cities in the state of São Paulo that had only one insurance company operating (but not both) and the treatment group as the cities that had both companies with beneficiaries in the city at the same time (figure 5.1). With this we expect to get the effect of the acquisition on the cities where both companies have clients, due to the greater market share of Intermédica after the acquisition. This should lead to a greater market power of the company, and therefore they will be able to negotiate lower prices with hospitals. We are using municipality as unity of analysis for the relevant market, following CADE (2022).

Due to limitations in the data, we will only be examining the aggregate effect at the municipality level. This means that a lower price negotiated between the company of interest and the hospitals it operates may result in a lower overall price across the municipality. Alternatively, if other prices remain constant, we will be getting solely the effect of this specific price change.

Our main equation of analysis is

$$\begin{aligned}\log Price_{it} = \alpha + \beta_1 Treated_i + \beta_2 PostAcquisition_t \\ + \delta(Treated_i \times PostAcquisition_t) + \gamma_i + \lambda_t + X_{it} + \epsilon_{it}\end{aligned} \tag{5-1}$$

In this specification, δ is our main coefficient of interest, capturing the interaction between treated municipalities and the post-acquisition period. A negative value of δ would indicate that prices in the treated municipalities fell further after the acquisition than in the control group. The terms γ_i and λ_t represent city and quarter fixed effects, respectively, while X_{it} includes a set of municipality-level control variables.

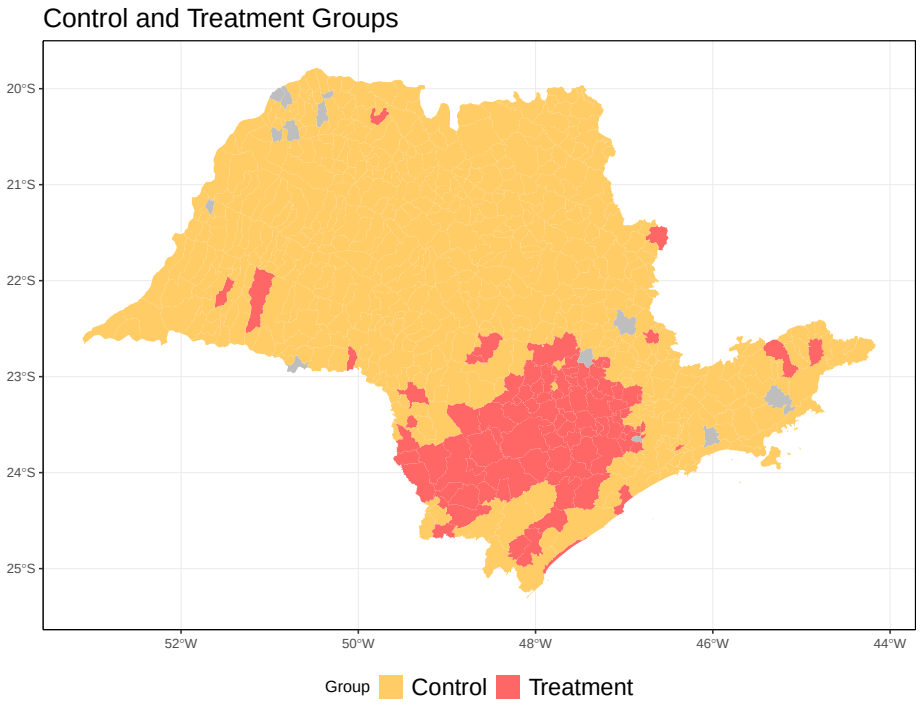


Figure 5.1: Control and Treatment groups.

Source: ANS

We will examine birth procedures, including both natural and cesarean births as well as Intensive Care Unit (ICU) procedures and another simpler medical services. This will help us determine whether the effect is specific to certain types of procedures or if it extends across various layers of medical services.

Birth procedures are particularly interesting for analysis due to their frequency and the general familiarity of their processes. Additionally, cesarean deliveries, which are among the most common surgical procedures, also tend to be quite costly for hospitals. This makes them a significant focus in the negotiation of procedure prices.

Following the approach of d (n), we analyze Intensive Care Unit (ICU) procedures because they are clean measures, primarily consisting of the daily rate for ICU medical care, without interference from the cost of medications. This allows us to more accurately capture the pure effect on procedure prices.

5.1 Descriptive statistics

Looking further into the Intermédica x Mediplan event, we can observe significant changes in market dynamics. As depicted in figures 5.2 and 5.3, Intermédica has been steadily gaining a substantial number of beneficiaries

since 2019, resulting in a notable increase in market share. The acquisition not only increased Intermédica's beneficiary base but also enhanced its negotiating power with hospitals and other healthcare providers, potentially leading to more favorable pricing arrangements.

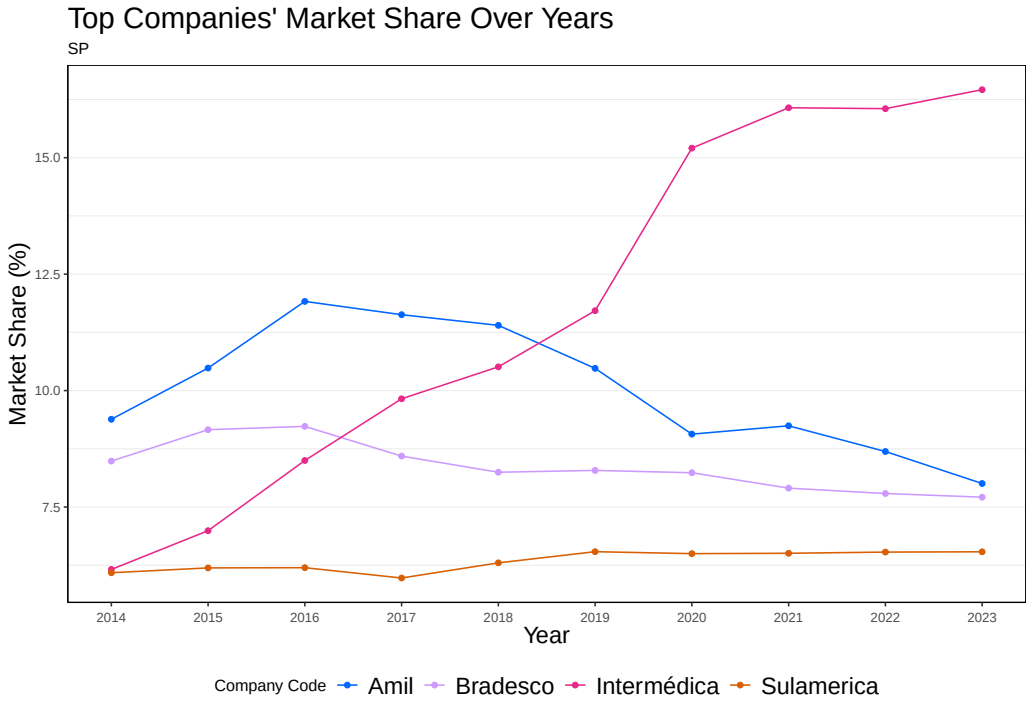


Figure 5.2: Top health insurance companies in the state of São Paulo over the years.

Source: ANS

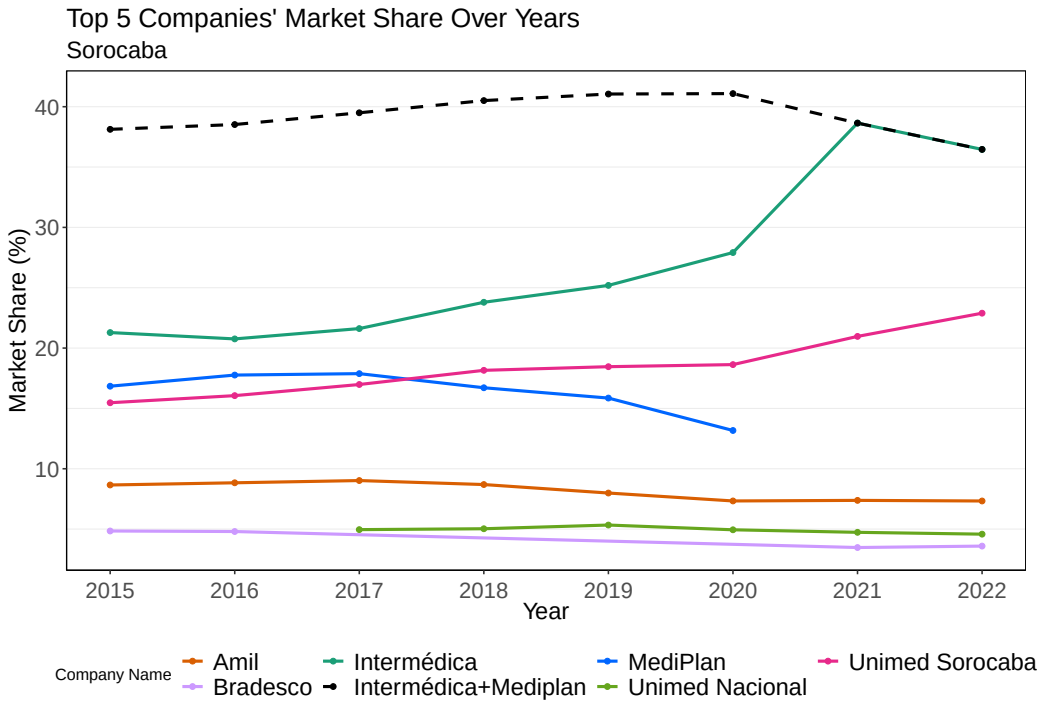


Figure 5.3: Top 5 insurance companies in Sorocaba over the years.

Source: ANS

In Figure 5.3, the dashed line represents the combined market share of MediPlan and Intermédica. Notably, while Intermédica's market share increases post-acquisition, it falls short of the expected combined total, suggesting that some beneficiaries may be switching to other health insurance companies. Although we cannot directly measure this with the available data, there is a concurrent rise in Unimed Sorocaba's market share, implying that it may be absorbing the beneficiaries who are leaving the newly merged company.

Table 5.1 shows the market share of both companies for the most affected cities before the acquisition, in 2018, and an estimation of the joint market share. The last column shows that the ΔHHI for each of the most affect cities is over 200. Tables for the remaining events can be found in the Appendix (Tables A.1 to A.4).

Municipality	**Intermedica's Market Share (%)**	**Mediplan's Market Share (%)**	**Joint Market Share (%)**	**Δ HHI**
Araçoiaba da Serra	25.7	19.7	45.4	1013
Boituva	24.6	17.6	42.2	865
Capela do Alto	25.6	18.6	44.2	953
Pilar do Sul	26.4	19.5	46.0	1032
Salto de Pirapora	26.7	19.1	45.5	1020
Votorantim	26.5	18.8	45.3	998
Sorocaba	26.6	18.7	45.1	998

Table 5.1: Participation in collective hospital medical plan markets.

Source: ANS, CADE

5.2 Procedures

For this study we are analyzing different procedures to see if the difference in price is specific to a single procedure or type of procedure, or if we are able to see prices changing in procedures with different degrees of complexity and prices.

We are considering two ICU procedures: ICU intensivist and ICU consultant ward. The first refers to a 12-hour shift while the second is a daily ongoing care by an intensivist. These procedures are interesting to be analyzed because they are clean measures, without interference from cost of medication, and will allow us to capture the pure effect on prices (Andrade et al. (2024)).

For the analysis of birth procedures, we are not limiting our scope to the birth procedure itself. Instead, we are including every procedure that typically occurs when a person is admitted to the hospital to give birth. This comprehensive approach is based on the belief that it is more appropriate to consider the entire suite of procedures associated with a birth event, as prices may be negotiated collectively for all procedures that commonly occur during childbirth. The most common procedures included in this analysis are: newborn care in the delivery room, newborn care in the nursery, syphilis testing, basic heel prick test, complete blood count with platelet count or fractions, and red reflex test in newborns. We separate birth procedures into three separate groups, the first accounts for all birth procedures (Total births), the second considers only vaginal births (single or multiple) and the third for cesarean births.

We are also examining a simpler procedure: medical consultations. This procedure primarily involves the physician's service without the use of complex equipment. It typically applies to less critical patients who are admitted to the hospital but are not in ICU beds. The focus is on routine care for patients who require medical attention but do not need intensive monitoring or specialized equipment. The challenge when analyzing this procedure is that its pricing may be part of a pre-negotiated package deal, rather than being billed as an individual service.

6
Results

We expect that an acquisition will lead to a higher market share for the buying company, which will in turn lead to the company being able to negotiate lower prices with providers.

6.1
Staggered

We employ a staggered difference-in-differences approach. This method allows for acquisitions to occur at different times across different companies, rather than applying a single treatment time for each acquisition. It is particularly useful in this context, as the acquisitions happened at different times across various regions in the state of São Paulo.

In this analysis, we examine the effects of the five acquisition events, with staggered treatment times based on when the acquisitions occurred.

Table 6.1 presents the results, with the dependent variable being the log of prices. The first column reports the results considering only the fixed effects, while the second column includes additional controls.

We find no significant effect for ICU procedures or hospital consultations. However, the results show negative and significant effects for all disaggregations of birth procedures, indicating a clear reduction in prices following the acquisitions.

Overall, the staggered analysis aligns with our hypothesis. Significant reductions in prices for birth and cesarean procedures are observed, while the prices for ICU procedures and hospital consultations remain largely unaffected by the acquisitions.

For this part of the analysis, we use a simple Two-Way Fixed Effects model to provide a preliminary summary and check initial results. In the next steps, we aim to implement a more robust approach using the Callaway & Sant'Anna method, which accounts for heterogeneous treatment effects and better handles the complexities of staggered adoption.

	Dependent variable:	
	log(price)	
	(1)	(2)
ICU	0.016	0.015
	(0.012)	(0.012)
Birth	-0.031^{***}	-0.031^{***}
	(0.010)	(0.010)
Vaginal	-0.039^{***}	-0.045^{***}
	(0.013)	(0.013)
Cesarean	-0.034^{***}	-0.033^{***}
	(0.010)	(0.010)
Consultations	0.009	0.006
	(0.009)	(0.009)
Note:	*p<0.1; **p<0.05; ***p<0.01	

Table 6.1: Staggered analysis results

6.2 Main event

We will now look at the events separately to see if results hold from the staggered analysis.

Table 6.2 shows the regression results examining the effect of treatment and post-acquisition on the log price of different procedures. The dependent variable in all three models is the log of the price of procedures, and each row represents the interaction term for a different procedure. Column (1) includes only city and quarter fixed effects. Column (2) incorporates additional controls for municipality GDP and private hospital beds. Column (3) further includes a linear trend control.

The first line shows the regression results for the log of ICU procedure prices. The results align with our hypothesis, showing consistently negative and significant effects across all specifications. The same thing happens when

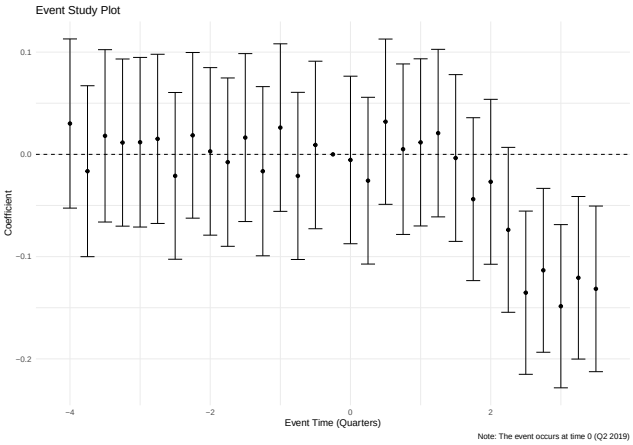
examining birth procedures as a whole, as well as when disaggregating into vaginal and cesarean deliveries.

To complete the analysis, we add a simpler procedure, hospital consultations, and find significant and positive results. While this contrasts with our main hypothesis, we suggest this could occur because hospital consultations are relatively generic procedures. Given their simplicity, they may often be included alongside other procedures in a package bundle when a patient is admitted, which might explain the differing outcome.

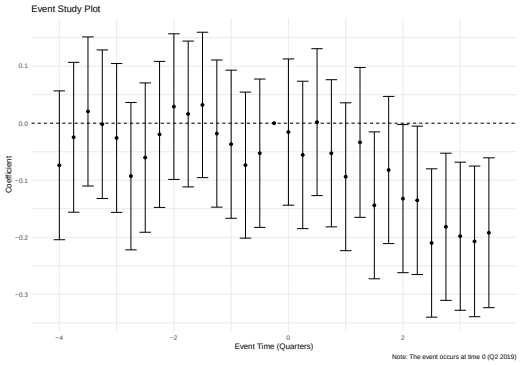
Figure 6.1 shows the event study graphs for all of the procedures in our main analysis. ICU, all birth, and cesarean procedures show a clear downward trend in prices following the acquisition, with a significant decline. Vaginal birth procedures also exhibit a negative trend in prices, although the coefficients fluctuate considerably, and the confidence intervals are relatively wide, indicating some imprecision in the estimates. In contrast, hospital consultations display a more volatile pattern, with coefficients fluctuating without a clear trend. Prices for hospital consultations increase after the acquisition, but the wide confidence intervals suggest a high degree of uncertainty in these estimates.

	Dependent variable:		
	log(price)		
	(1)	(2)	(3)
ICU	-0.186^{***}	-0.191^{***}	-0.185^{***}
	(0.036)	(0.036)	(0.036)
Total births	-0.119^{***}	-0.103^{***}	-0.102^{***}
	(0.009)	(0.016)	(0.011)
Vaginal	-0.066	-0.068^{*}	-0.068^{*}
	(0.041)	(0.041)	(0.041)
Cesarean	-0.122^{***}	-0.122^{***}	-0.034^{*}
	(0.030)	(0.030)	(0.020)
Consultations	0.095^{***}	0.104^{***}	0.101^{***}
	(0.025)	(0.025)	(0.025)
Controls	No	Yes	Yes
Linear trend	No	No	Yes
Note:			*p<0.1; **p<0.05; ***p<0.01

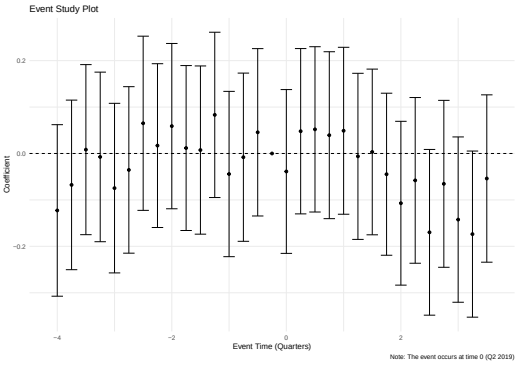
Table 6.2: Intermédica x Mediplan



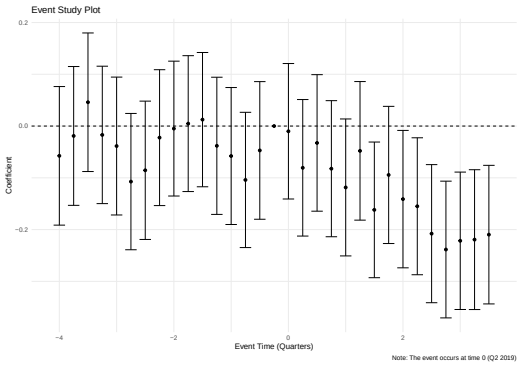
ICU procedures



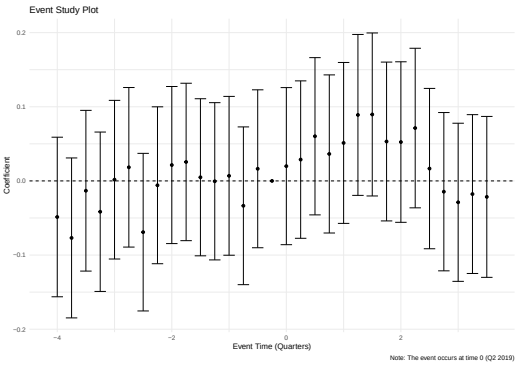
All birth procedures



Vaginal birth procedures



Cesarean procedures



Hospital Consultations

Figure 6.1: Event study analysis for various procedures for the Intermédica x Mediplan acquisition event

6.3 Other events

We now turn to the smaller acquisition events to complement our analysis. These results tend to be more granular and less reliable due to the smaller scale of the acquisitions.

Tables 6.3 to 6.6 present the results for each event, ordered by their size. For ICU procedures, only the Hapvida x Medical event shows negative and significant results across all specifications. The lack of significant interaction terms for the other events suggests that these acquisitions did not have a substantial differential impact on ICU procedure prices in the treated cities compared to the control group.

For all disaggregated birth procedures, the results are negative for the São Francisco x São Lucas and Unimed Nacional x Unimed São Paulo acquisitions. Interestingly, consultations, which showed positive results in our main event, exhibit negative results for all acquisitions except for Intermédica x Green Line.

Our second largest event, Intermédica x Green Line, shows no significant coefficients. We hypothesize that the timing of these events may explain this outcome. Since both involve Intermédica, and the acquisition of Green Line occurred in the last quarter of 2018 while the acquisition of Mediplan took place in the second quarter of 2019, it is possible that price negotiations were postponed until after the second acquisition.

Overall, the staggered analysis aligns with the findings from the individual event analyses, capturing broader trends across all events.

	Dependent variable:		
	log(price)		
	(1)	(2)	(3)
ICU	0.006	0.010	0.015
	(0.030)	(0.030)	(0.029)
Total births	0.020	0.023	0.027
	(0.024)	(0.024)	(0.024)
Vaginal	0.033	0.037	0.029
	(0.035)	(0.035)	(0.035)
Cesarean	0.005	0.009	0.014
	(0.024)	(0.024)	(0.024)
Consultations	−0.046	−0.037	−0.037
	(0.029)	(0.028)	(0.028)
Controls	No	Yes	Yes
Linear trend	No	No	Yes
Note:	*p<0.1; **p<0.05; ***p<0.01		

Table 6.3: Intermédica x Green Line

	Dependent variable:		
	log(price)		
	(1)	(2)	(3)
ICU	0.035	0.035	0.027
	(0.037)	(0.037)	(0.037)
Total births	-0.124^{***}	-0.123^{***}	-0.112^{***}
	(0.033)	(0.033)	(0.033)
Vaginal	-0.137^{***}	-0.138^{***}	-0.130^{***}
	(0.043)	(0.043)	(0.044)
Cesarean	-0.119^{***}	-0.118^{***}	-0.107^{***}
	(0.033)	(0.033)	(0.033)
Consultations	-0.099^{***}	-0.095^{***}	-0.095^{***}
	(0.020)	(0.020)	(0.020)
Controls	No	Yes	Yes
Linear trend	No	No	Yes
Note:			*p<0.1; **p<0.05; ***p<0.01

Table 6.4: São Francisco x São Lucas

	Dependent variable:		
	log(price)		
	(1)	(2)	(3)
ICU	−0.078**	−0.078**	−0.079**
	(0.036)	(0.036)	(0.036)
Total births	−0.026	−0.025	−0.022
	(0.033)	(0.033)	(0.033)
Vaginal	−0.039	−0.039	−0.043
	(0.042)	(0.042)	(0.042)
Cesarean	−0.043	−0.042	−0.039
	(0.034)	(0.034)	(0.034)
Consultations	−0.182***	−0.183***	−0.183***
	(0.030)	(0.030)	(0.030)
Controls	No	Yes	Yes
Linear trend	No	No	Yes
Note:			*p<0.1; **p<0.05; ***p<0.01

Table 6.5: Hapvida x Medical

	Dependent variable:		
	log(price)		
	(1)	(2)	(3)
ICU	0.020	0.015	0.004
	(0.033)	(0.033)	(0.033)
Total births	-0.063^{**}	-0.066^{**}	-0.062^{**}
	(0.027)	(0.027)	(0.027)
Vaginal	-0.130^{***}	-0.138^{***}	-0.138^{***}
	(0.039)	(0.039)	(0.039)
Cesarean	-0.048^{*}	-0.052^{*}	-0.047^{*}
	(0.028)	(0.028)	(0.028)
Consultations	-0.083^{***}	-0.078^{***}	-0.078^{***}
	(0.022)	(0.022)	(0.022)
Controls	No	Yes	Yes
Linear trend	No	No	Yes
Note:			*p<0.1; **p<0.05; ***p<0.01

Table 6.6: Unimed Nacional x Unimed São Paulo

7
Conclusion

This study aimed to investigate the effects of acquisitions in the healthcare market on procedure prices across various regions in the state of São Paulo. Given the increasing concentration of health insurance companies due to mergers and acquisitions, understanding how these events impact the cost of procedures such as ICU care, birth deliveries, and hospital consultations is crucial. By using both individual event analyses and a staggered difference-in-differences approach, we were able to assess the short-term effects of five different acquisitions, each occurring at different times and involving major players in the healthcare market.

The results of our analysis reveal a clear pattern: acquisitions lead to significant reductions in the prices of birth procedures, including vaginal and cesarean deliveries. These results were consistent across most specifications and approaches, whether analyzed individually or through a staggered model. However, for ICU procedures and hospital consultations, the results were less conclusive, with no significant changes detected in most cases. The findings suggest that while acquisitions may enhance bargaining power and reduce prices for some high-frequency procedures like births, the same effects do not consistently apply to more specialized procedures such as ICU care or generic hospital consultations.

Potential limitations in our analysis include the complexity of hospital procedure pricing, which may be influenced by factors beyond the acquisition events themselves, such as regulatory changes or shifts in demand. Additionally, the timing of acquisitions could have led to confounding effects, particularly for events that occurred in close succession. It is possible that price negotiations were postponed or adjusted after subsequent acquisitions, blurring the effect of individual events.

A
Appendix

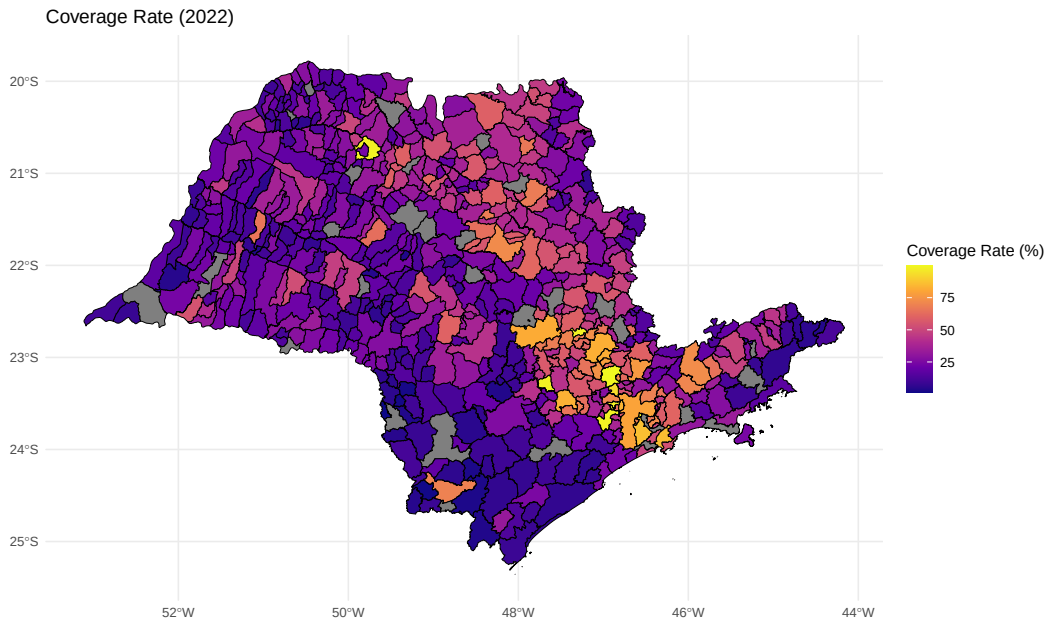


Figure A.1: Coverage Rate in the State of São Paulo in 2022.

Source: ANS, IBGE

Municipality	**Intermedica's Market Share (%)**	**Greenline Market Share (%)**	**Joint Market Share (%)**	**Δ HHI**
Barueri	13.5	11.1	24.6	301
Carapicuíba	18.7	33.6	52.3	1258
Itapevi	34.9	14.9	49.8	1038
Jandira	17.4	25.0	42.4	872
Osasco	24.3	10.6	34.9	516

Table A.1: Intermédica x Greenline.

Source: ANS, CADE

Municipality	**S.Francisco's Market Share (%)**	**S.Lucas's Market Share (%)**	**Joint Market Share (%)**	**Δ HHI**
Avanhandava	9.26	28.21	37.47	522.4492
Getulina	3.78	35	38.78	264.6
Guaicara	13.38	32.94	46.32	881.4744
Guarantã	3.31	35.85	39.16	237.327
Lins	3.2	35.7	38.9	228.48
Promissão	13	33.59	46.59	873.34

Table A.2: São Francisco x São Lucas.

Source: ANS, CADE

Municipality	**Hapvida's Market Share (%)**	**Medical's Market Share (%)**	**Joint Market Share (%)**	**Δ HHI**
Iracemapolis	1.7	56.9	58.6	196
Limeira	0.6	55.2	55.8	68.9
Araras	16.4	0.5	16.9	16.1
Conchal	3.5	6.3	9.8	44.3
Piracicaba	8.3	0.3	8.6	4.7
Rio Claro	4.6	0.4	5.0	3.4
Santa Barbara D'Oeste	3.1	0.8	3.9	5.2

Table A.3: Hapvida x Medical.

Source: ANS, CADE

Municipality	**Unimed Nacional's Market Share (%)**	**Unimed SP's Market Share (%)**	**Joint Market Share (%)**	**Δ HHI**
Santa Isabel	7.96	1.42	9.38	22.6
Guararema	3.29	0.89	4.18	5.9
Cajamar	1.2	0.41	1.61	1
Cotia	2.35	0.69	3.04	3.2
Embu Guaçu	1.04	0.49	1.53	1
Itaquaquecetuba	2.15	0.72	2.87	3.1
Pirapora do Bom Jesus	2.01	0.68	2.69	2.7

Table A.4: Unimed Nacional x Unimed São Paulo.

Source: ANS, CADE

B
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