Exogenous Exits, Market Structure, and Equilibrium Contracts in Healthcare

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July 15, 2024

Abstract

This paper quantifies the causal effects of exogenous health insurer and provider exits on contract structure and healthcare market outcomes, proposing market concentration as the main mechanism for these effects. Leveraging the termination of the largest health insurer in Colombia and its hospitals, I find that the use of fee-for-service contracts increased after the termination relative to capitation contracts. Treatment effects are driven by markets with higher provider than insurer concentration at baseline. Results suggest that equilibrium contracts place the financial risk on insurers in markets where providers have higher bargaining leverage.

Keywords: Market structure, Health insurance, Fee-for-service, Capitation.

JEL codes: I10, I11, I13, L10.

*e-mail: nserna@stanford.edu. I am deeply grateful to the Colombian Ministry of Health for providing the data for this research and to Grant Miller and Maria Polyakova for their feedback and advice. The findings of this paper do not represent the views of any institution involved. All errors are my own.

1 Introduction

Provision of high quality healthcare and containing healthcare costs are some of the main policy goals across different health systems. In systems where access to healthcare services is intermediated by private insurance companies, these goals depend on the outcome of negotiations between insurers and providers. Such is the case of high- and middle-income countries like the U.S., Switzerland, Netherlands, Germany, Israel, and Colombia.[1] In these countries, insurers negotiate contracts and terms with providers to deliver healthcare to their enrollees. Factors that affect the outcome of these negotiations can therefore directly impact quality of care and costs.

This paper examines the effect of exogenous insurer and provider exits on the choice of contracts and proposes market structure as the mechanism behind these effects. The focus is on the choice between fee-for-service (FFS) and capitation contracts, and market structure is characterized by insurer and provider market concentration. Market concentration can affect the value of outside options during bilateral negotiations over contracts, which in turn determines healthcare quality, utilization, and spending.[2]

The setting is the Colombian healthcare system. In Colombia, private insurers provide access to a national health insurance plan through a network of providers. Although all aspects of the insurance plan are closely regulated by the government (premiums, cost-sharing, and benefits), insurers and providers bargain over contracts and terms for every health service covered in the national plan. Based on government

[1] See https://www.commonwealthfund.org/international-health-policy-center/countries

[2] Existing literature has focused on prices as the main outcome of bilateral negotiations between insurers and providers (e.g, Liebman, 2022; Ghili, 2022; Ho and Lee, 2019, 2017; Collard-Wexler et al., 2019; Horn and Wolinsky, 1988). By studying the decision to adopt a FFS versus a capitation contract, this paper posits that contract choice and, in particular, payment retrospectiveness is another relevant outcome of these bilateral negotiations. Contract structure affects demand and costs for insurers and providers in ways that future research should investigate.

rules, the contract space is limited to four types of contracts: fee-for-service, capitation, fee-for-package, and fee-for-diagnosis, with the first two representing more than 80% of claims in a year.

To study the determinants of contract choice, I leverage the exogenous termination of the largest health insurer and its hospitals by the end of 2015, called SaludCoop. This insurer covered nearly 20% of enrollees and was vertically integrated with 38 hospitals. The government terminated SaludCoop due to its engagement in illegal activities. My data comprise all the health claims made by individuals enrolled in Colombia's contributory healthcare system from 2013 to 2019, 3 years before and 4 years after the termination. The contributory system covers the half of the population in the country who pay payroll taxes. These data are unprecedented because they report the contract (FFS or capitation) and the terms (prices) that insurers sign with in-network providers for every health service.

Using a dynamic difference-in-differences approach, I compare municipalities where SaludCoop operated against those where it did not operate, before and after the termination. Findings show that the fraction of services covered under FFS for every incumbent insurer-provider pair increased 2 percentage points (p.p) on average after the termination. Treatment effects are larger in markets where providers are more concentrated than insurers, as measured by the pre-period Herfindahl-Hirschman index (HHI). If market concentration determines the value of outside options for insurers and providers during negotiations and hence their bargaining leverage, then equilibrium contracts should be ones that place the financial risk on the insurer –such as FFS contracts– in markets where providers have relatively higher bargaining leverage, in line with my results.

Using the same empirical design I proceed to study changes in healthcare prices, utilization, and spending. Results show a 20% reduction in the number of claims

and healthcare spending per enrollee on average after the termination. This reduction in utilization and spending happens across different service categories, but is less pronounced among complex services such as those provided in an inpatient setting. Reductions in spending are despite substantial increases in average claim prices. Findings indicate that negotiated prices increased around 5% after the termination in treated markets relative to controls. Consistent with the notion that relative market concentration relates to relative bargaining leverage, I find that reductions in healthcare spending are larger in markets where insurers have higher bargaining leverage than providers. While in markets with the opposite pattern in concentration, there is no change in healthcare spending after the termination.

This paper relates to the literature that analyzes the association between contract negotiations and healthcare market outcomes (Cooper et al., 2019; Baker et al., 2019). It contributes causal estimates of the determinants of equilibrium contracts using exogenous variation in market structure, which is rarely observed. The paper also relates to the theoretical (Acquatella, 2022; Choné and Ma, 2011; McGuire, 2000) and empirical (Gupta, 2021; Finkelstein et al., 2018; Ho and Pakes, 2014; Clemens and Gottlieb, 2014; Iizuka, 2012) literatures that study how payment structure impacts insurer and provider behavior. Several papers have focused on the impact of capitation and managed care on health outcomes and risk selection incentives (McWilliams et al., 2020; Kuziemko et al., 2018; Aizer et al., 2007). Others have studied how FFS payments affect healthcare spending and intensity of care (McNamara and Serna, 2024; Somé et al., 2020; Adida et al., 2017; Duggan, 2004; Sørensen and Grytten, 2003; Baker, 1997; Ransom et al., 1996). Finally, recent work has simulated alternative contracts (Gaynor et al., 2023; Einav et al., 2018). Yet, evidence on the question of what determines the choice of contracts between insurers and providers has been limited.

The rest of this paper is structured as follows: section 2 describes my empirical setting and data, section 3 presents the empirical strategy, section 4 quantifies the impacts of exogenous terminations on contract choice, section 5 quantifies the impacts on healthcare market outcomes, and section 6 concludes.

2 Background and data

The Colombian health insurance system has near-universal coverage, providing access to a national health insurance plan through private and public insurers. The half of the population in the country who pay payroll taxes is covered by the contributory system. The other half who have low incomes is covered by the subsidized system. Almost every aspect of the national insurance plan is regulated by the government. For example, insurance premiums are zero, cost-sharing rules are a function of the enrollees' monthly income level but are standardized across insurers and providers, and the list of covered services is determined by the government.[3] Health service coverage is comprehensive, from basic primary care consultations to complex organ transplants. In 2015, the national plan covered over 12,000 health services.[4]

Insurers do not charge premiums but receive per-enrollee transfers from the government at the beginning of every calendar year that are risk-adjusted for sex, age, and municipality of residence. At the end of every calendar year, insurers are also compensated by the government for their enrollees' health based on a coarse list of

[3]For individuals earning less than 2 times the minimum monthly wage (MMW) the coinsurance rate equals 11.5%, the copay equals 2,100 pesos, and the maximum expenditure amount in a year equals 57.5% times the MMW. For those with incomes between 2 and 5 times the MMW, the coinsurance rate is 17.3%, the copay is 8,000 pesos, and the maximum expenditure is 230% times the MMW.Finally, for people with incomes above 5 times the MMW, the coinsurance rate equals 23%, the copay 20,900 pesos, and the maximum expenditure amount is 460% times the MMW.

[4]See Resolution 4678 of 2015.

diagnoses.[5]

2.1 Insurer-provider contracts

To deliver the benefits of the national plan, insurers contract with providers to form their provider networks. Insurers and providers establish contracts for each health service in the national plan. These contracts can involve either capitation payments whereby the insurer pays the provider a fixed amount per enrollee for a set of services, or fee-for-service (FFS) payments whereby the insurer pays the provider every time a service is delivered.[6]

Suppose a patient has 1 consultation with the cardiologist, the unit price of which is \$50; and receives 2 electrocardiograms, the unit price of which is \$100. If the insurer has a FFS contract with the provider for each of these services, then it pays \$250. If the insurer has included these services in a capitation contract and expects that per-patient demand for each service equals 1, then it pays \$150 to the provider.

Under capitation, payments per patient are made for a set of services taking into account negotiated service prices and expected demand per service. These payments are made *once* per patient at the beginning of the year, *before* services are provided, and therefore are prospective. FFS payments are made *after* services are provided and therefore are retrospective. Capitation incentivizes providers to under-provide care or to provide less costly treatments because healthcare costs not covered by the

[5]The ex-post risk adjustment mechanism is known as the High Cost Account, and compensates insurers for the following diseases: cervical cancer, breast cancer, stomach cancer, colon cancer, prostate cancer, lymphoid leukemia, Myeloid leukemia, Hodgkin lymphoma, non-Hodgkin lymphoma, epilepsy, rheumatoid arthritis, and HIV-AIDS (See Resolution 000248 of 2014).

[6]Other types of contracts include fee-for-package whereby the insurer pays the provider a fixed amount per enrollee and group of services associated with a health episode, and fee-for-diagnosis whereby the insurer pays the provider a fixed amount per enrollee and group of services associated with disease management. These alternative contracts represent less than 6% of all health claims in a given year, hence I exclude them from my data.

capitation payment are borne by the provider. Instead, FFS incentivizes providers to over-provide care or to provide the most profitable treatments. Because of these incentives and the timing of payments, the insurer bears the financial risk of moral hazard under FFS, while the provider bears this risk in a capitation contract.

Contracts are typically negotiated at the beginning of every calendar year, but some insurer-provider pairs negotiate mid-year as well. Although these negotiations are unregulated, the government recommends that relatively low-complexity health services such as primary care visits be covered under capitation, while it recommends that relatively high-complexity services such as transplants be covered under FFS. These recommendations are made in an attempt to control the incentives that providers face under each contract. Nevertheless, insurers and providers do not need to abide by the government's recommendations, which results in contract variation within insurer-provider pair and across services.

2.2 Market structure and insurer termination

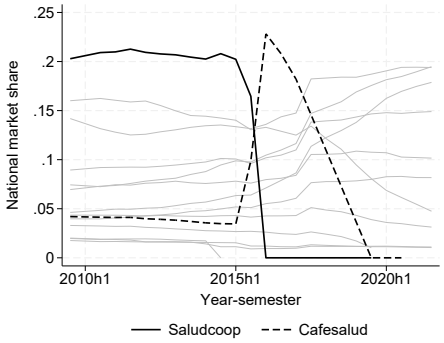
During 2014, there were 19 private insurers in the contributory system, 13 of which covered 98% of enrollees. Insurers compete for enrollees in every municipality in which they operate, and individuals can only enroll with insurers that operate in their municipality of residence.[7] In 2014 there were also around 11 thousand providers in the country, comprising hospitals, clinics, and physician practices.

To study the determinants of contract choice, I leverage the termination of the largest health insurer in the country and its hospitals during December 2015, called SaludCoop. The government terminated this insurer because it diverted nearly $250 billion to investments outside of the healthcare system and because its board of di-

[7] Insurers make entry decisions at the municipality level. There are 1,123 municipalities in the country.

rectors engaged in illegal activities and financial malpractice. As seen in figure 1, SaludCoop covered 20% of enrollees in the country, who were all transferred to an incumbent insurer called Cafesalud during the first three months of 2016. Cafesalud covered on average less than 5% of enrollees prior to the termination. After the first three months of 2016, enrollees were allowed to switch. Cafesalud was itself terminated in 2019.[8] The fact that SaludCoop's market share is stable before 2016 suggests that there were no potential preemptive switches prior to the termination. Of those enrolled with SaludCoop and transferred to Cafesalud, 24% switched out of Cafesalud in 2016, an additional 23% switched out in 2017, and by the end of 2018 most individuals had left this insurer.

FIGURE 1: National market shares by insurer



Note: Figure presents the national market share per insurer. The terminated insurer, SaludCoop, is depicted in the solid black line. The reassignment insurer, Cafesalud, is depicted in the dashed black line. The rest of insurers are depicted in gray.

SaludCoop was vertically integrated with 38 hospitals across the country, which were forced to shut down after December 2015. These were relatively large hospitals representing a total of 2,354 beds. SaludCoop hospitals were forced to sell their assets to other providers, but this did not happen during the sample period. In markets where SaludCoop hospitals operated, other insurers used to cover these hospitals as well. Vertical integration therefore did not imply complete foreclosure of hospital

[8] Buitrago et al. (2024) provide a more detailed description of the termination.

services from rival insurers.

2.3 Data and sample restrictions

The data for this paper are all the health claims made by the half of the population in the country covered by the contributory system from 2013 to 2019, 3 years before and 4 years after SaludCoop's termination. The claims data report patient anonymized identifier, patient's insurer, provider identifier, service code, International Classification of Diseases (ICD-10) code, negotiated service price, date, service contract (capitation of FFS), service setting (hospital care, ambulatory care, urgent care, domiciliary care), and patient characteristics such as sex, age, and municipality of residence. Service codes are 6-digit codes assigned to each service covered in the national insurance plan. Each digit in the code represents specific anatomical areas and procedures.[9] I complement this data with publicly available information on the number of enrollees per insurer, municipality, and month.[10]

For the contract choice analysis, I aggregate the claims data to the insurer, provider, municipality, and semester level.[11] For every observation I calculate the fraction of services covered under FFS, total number of claims, total healthcare spending, and the number of inpatient claims, ambulatory claims, urgent care claims, and consultations. For the healthcare market outcomes analysis, I aggregate the claims data to the insurer, municipality, and year level, calculating the number of claims and healthcare spending per enrollee. Appendix 1 describes the data cleaning pro-

[9] The first 2 digits represent the anatomic area, the third digit represents the type of procedure, and the fourth to sixth digits give more detailed information on the procedure. For example, service 883220 is a simple thoracic spine magnetic resonance imaging and service 883221 is a thoracic spine magnetic resonance imaging with contrasting liquid. In this example, 88 refers to imaging, 3 to magnetic resonance imaging, and 22 to thoracic spine.

[10] The claims data only contains individuals who make claims. To construct appropriate measures of healthcare utilization and spending, this additional enrollment data is needed.

[11] Semesters are half-years from January to June and from July to December.

cess in detail. Throughout my empirical analysis I *exclude* SaludCoop and Cafesalud, focusing on changes in outcomes at the rest of incumbent insurers.

3 Empirical Strategy

The termination of SaludCoop and its hospitals provides a unique setting to study the determinants of contract choice in healthcare. My empirical approach consists of comparing municipalities where SaludCoop operated relative to those where it did not operate, before and after its termination, using the following dynamic difference-in-differences (*did*) design:

$$f_{jhmt} = \sum_{\substack{k=-6 \\ k\neq -1}}^{7} \beta_k \mathbf{1}\{t - t^* = k\} \times T_m + \alpha_m + \gamma_t + \varepsilon_{jhmt} \tag{1}$$

Here f_{jhmt} is the fraction of services covered under FFS between insurer j and provider h in municipality m during semester t, t^* is the semester when SaludCoop is terminated (2016-1), T_m is an indicator for municipalities where SaludCoop operated in 2015, α_m is a municipality fixed effect, and γ_t is a semester fixed effect.

I use De Chaisemartin and d'Haultfoeuille (2020)'s estimator that is robust to heterogeneous treatment effects, and cluster standard errors at the municipality level, which defines the level of treatment. Identification of the causal effect of exogenous exits on contract choice relies on treated and control municipalities being on parallel trends with respect to the fraction of services covered under FFS. Identification can be threatened if SaludCoop chose which municipalities to operate in based on their contract trends.

Table 1 presents summary statistics of my final data sets. In panel A, an observation is a combination of insurer, provider, municipality, and semester. Across all

markets there is a decreasing trend in the fraction of services covered under FFS, but this reduction is larger in control municipalities (7%) than in treated ones (3%) after the termination. The table also shows an increase in average claim prices in the post-period, which is larger in treated municipalities than controls. The smaller reduction in the use of FFS and the larger increase in prices in treated markets is not due to baseline differences between SaludCoop and the rest of insurers along these variables as seen in appendix table 2. On average, treated municipalities saw a 35% increase in insurer HHI with respect to the number of enrollees in the post-period, while control municipalities saw a 7% increase. Provider HHI measured with respect to total healthcare spending in a municipality did not meaningfully change after the termination in treated markets, but decreased 21% in controls.

In panel B of the table, an observation is a combination of insurer, municipality, and year. On average, enrollees made 0.34 and 0.15 fewer health claims after the termination in treated and in control municipalities, respectively. The reduction in utilization in treated markets happens across different service categories, such as inpatient care, urgent care, and doctor consultations. Healthcare spending increased on average 24% after the termination in treated municipalities and 13% in controls. Put together, trends in utilization and spending indicate that claim prices increased after the termination in both sets of markets. In this dataset, insurer and provider HHIs have similar trends as in panel A. That is, treated insurance markets became much more concentrated than controls after the termination. Appendix figures 1 and 2 present additional descriptive evidence of insurer and provider market concentration.

TABLE 1: Summary statistics of datasets

	A. Contract choice analysis data			
	Treated		Control	
	Pre	Post	Pre	Post
Fraction services under FFS	0.91 (0.27)	0.88 (0.31)	0.87 (0.32)	0.81 (0.36)
Average claim price	0.41 (0.96)	0.63 (1.69)	0.11 (0.14)	0.16 (0.22)
Insurer HHI	1500 (515)	2019 (890)	4953 (1632)	5291 (1940)
Provider HHI	377 (469)	390 (471)	6402 (2594)	5064 (3141)
Observations				
$jhmt$	72,152	114,422	13,654	21,896
jh	11,007	12,539	1,931	2,182
m	459	473	410	473
	B. Healthcare outcomes analysis data			
	Treated		Control	
	Pre	Post	Pre	Post
Claims per enrollee	9.07 (9.82)	8.73 (59.6)	5.19 (60.4)	5.04 (15.3)
Spending per enrollee†	0.37 (0.30)	0.46 (1.36)	0.15 (4.11)	0.17 (1.43)
Claim price†	0.40 (0.51)	0.49 (0.59)	0.06 (0.07)	0.07 (0.10)
Inpatient claims per enrollee	0.81 (0.98)	0.51 (0.83)	0.39 (53.0)	0.25 (1.35)
Urgent care claims per enrollee	0.80 (1.20)	0.58 (1.70)	1.16 (7.43)	0.96 (5.71)
Consultations per enrollee	3.51 (3.79)	3.48 (22.1)	2.25 (7.40)	2.38 (10.2)
Insurer HHI	2007 (969)	2530 (1327)	4964 (1780)	5712 (2291)
Provider HHI	1375 (1953)	1399 (1933)	7206 (2629)	6801 (2986)
Observations				
jmt	4,767	6,933	2,932	3,474
jm	2,259	2,384	1,337	1,263
m	441	444	318	318

Note: Table presents mean and standard deviations in parenthesis of the contract choice analysis data in panel A and the healthcare outcomes analysis data in panel B. Each panel presents summary statistics separately for treated and control groups, pre and post SaludCoop's termination. Treated units are municipalities where SaludCoop operated in 2015. Control units are municipalities where SaludCoop did not operate. In panel A an observation is a combination of insurer j, provider h, municipality m, and semester t. In panel B an observation is a combination of insurer j, municipality m, and year t. Summary statistics are weighted by the number of enrollees per insurer, municipality, and year. The average claim price in panel A is averaged across services for every observation. Insurer HHI is calculated based on market shares on the number of enrollees. Provider HHI is calculated based on market shares in total healthcare costs. (†) measured in millions of pesos. The average exchange rate in 2014 was 2,000 COP/USD.

4 Effects of Exogenous Exits on Contract Choice

Panel A of figure 2 presents estimates of the dynamic treatment effects on contract choice. Prior to the termination, treated and control municipalities have parallel FFS trends. After the termination, the fraction of services covered under FFS increased between 1 and 4 p.p. The impact on the use of FFS is not a result of SaludCoop hospitals closing. Even in markets where these hospitals had less than 1% market share in total healthcare spending, presented in panel B, I estimate similar treatment effects. The impact is also not constrained by government regulation recommending low-complexity services to be covered under capitation. Appendix figure 3 shows significant increases in the use of FFS particularly among these services.

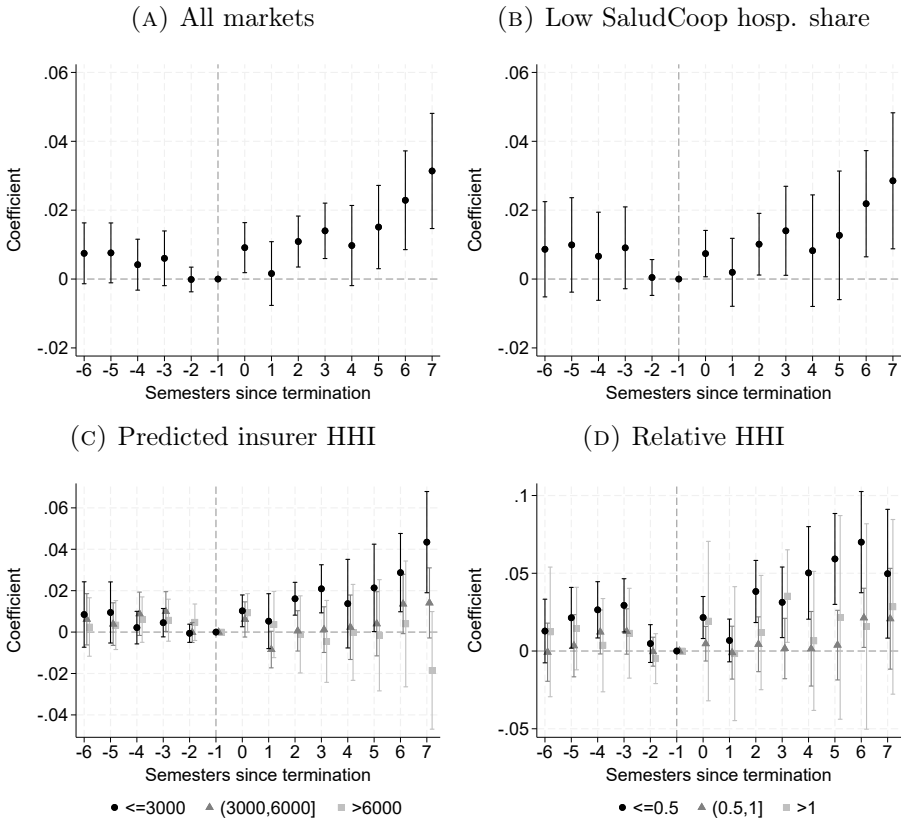
Panels C and D explore market concentration as a potential mechanism for the choice of contracts. Panel C presents treatment effects conditional on insurer HHI during 2014. This HHI is calculated using predicted insurer market shares in the number of enrollees assuming that SaludCoop's enrollees were reassigned to incumbent insurers in proportion to their observed market shares.[12] Results show that the effect on FFS take-up is driven by markets with relatively low levels of insurer concentration depicted in black. Instead, highly concentrated insurance markets saw either no changes or decreases in the use of FFS as seen by the point estimates in light gray. These results are robust to alternative market definitions as seen in appendix figure 7, which defines markets as services and constructs market shares based on total healthcare spending in each service. Appendix 3 presents all the associated coefficients and standard errors.

[12] Suppose there are 100 enrollees and three insurers in a municipality: EPS010 (SURA) with market share equal to 0.3, EPS016 (Coomeva) with market share equal to 0.2, and EPS013 (SaludCoop) with market share equal to 0.5. Predicted insurer HHI after EPS013 is terminated is calculated from market shares for EPS010 and EPS016 equal to 0.6 ($= 100^{-1}(30 + 50 \times \frac{0.3}{0.5})$) and 0.4 ($= 100^{-1}(20 + 50 \times \frac{0.2}{0.5})$)

Panel D presents treatment effects conditional on the ratio between insurer and provider HHI during 2014. Provider HHI is calculated using provider market shares in total healthcare spending in a municipality. Although there is evidence of pre-trends in the estimates in black, findings suggest that the fraction of services covered under FFS increased between 1 and 8 p.p after the termination in markets where provider concentration was more than twice the measure of insurer concentration. This result goes in line with providers having higher bargaining leverage than insurers in those markets, and therefore with equilibrium contracts being ones that place the financial risk on insurers. Appendix table 3 corroborates these findings by presenting pooled *did* results including time-varying insurer and provider HHIs as separate regressors, and controlling for market, semester, and insurer-by-provider fixed effects.

Another plausible explanation for the increased use of FFS, besides market concentration, is that FFS is the preferred contract when uncertainty over payments rises, something we would expect after the termination of a large insurer. If this kind of uncertainty resolves over time, the increasing treatment effects even after four years since the termination would be inconsistent with this explanation. Appendix figure 4 explores other possible mechanisms for the increase in FFS such as provider size measured by the number of beds in 2014 and the fraction of claims associated with chronic diseases in 2014. For example, we might expect the use of FFS –a contract that places the financial risk on the insurer– to be higher in markets with relatively larger providers because it is more difficult for the insurer to replace them in their networks. We might also expect the use FFS to be higher in markets with relatively sicker population as their healthcare treatments are more complex and costlier for providers. Taken together the different exercises show that the main source of heterogeneity in treatment effects is relative market concentration as presented in this section.

FIGURE 2: Impact of insurer exit on contract choice



Note: Figure presents coefficients and 95% confidence intervals of a dynamic *did* design. The outcome variable is the fraction of services covered under FFS. Treated units are municipalities where SaludCoop operated in 2015. Control units are municipalities where SaludCoop did not operate. Relative time indicators are constructed relative to the first semester of 2016 and are set to -1 for control units. Panel A uses the full sample of markets and panel B uses the subsample of treated markets where SaludCoop's hospitals had less than 1% market share in total healthcare costs during 2014. Panel C explores the heterogeneity of treatment effects by insurer HHI in 2014. Insurer HHI is calculated using predicted insurer market shares on the number of enrollees assuming that SaludCoop's enrollees are reassigned to incumbent insurers in proportion to their observed market shares. 11% of markets and 78% of enrollees fall in the group with insurer HHI ≤ 3000, 51% of markets and 18% of enrollees in the group with HHI$\in (3000, 6000]$, and 37% of markets and 3% of enrollees in the group with HHI> 6000. Panel D explores the heterogeneity of treatment effects by relative insurer to provider HHI in 2014. Provider HHI is calculated based on provider market shares in total healthcare spending. 27% of markets and 8% of enrollees fall in the group with relative HHI≤ 0.5, 58% of markets and 16% of enrollees in the group with relative HHI$\in (0.5, 1]$, and 14% of markets and 77% of enrollees in the group with relative HHI> 1. Standard errors are clustered at the municipality level.

More generally, the effects of exogenous exits on contract choice would likely spill over to premiums in settings where insurers compete along this dimension. Increased provider bargaining leverage after the termination would raise negotiated prices, and insurers would pass-through these cost increases to consumers in the form of higher

premiums.[13]

Variation in healthcare prices. To the extent that market concentration changes the value of the outside option for contract negotiations between insurers and providers, market concentration may also explain variation in healthcare prices. To see how much of the price variation can be explained by insurer and provider HHIs, I estimate a linear regression of the logarithm of prices per insurer, provider, municipality, service, and semester on insurer and provider HHIs. The R^2 of this regression is 0.08. Including municipality-service-semester fixed effects increases the R^2 to 0.80, and additionally including insurer-by-provider fixed effects increases the R^2 to 0.84.[14] Market concentration can therefore explain 8% of the variation in healthcare prices within insurer-provider pair, but there is still 16% of unexplained variation after including all the fixed effects that is perhaps due to measurement error or contract renegotiations within a year that are not observed in the data.

5 Effects of Exogenous Exits on Healthcare Outcomes

In this section I quantify the impact of exogenous exits on healthcare utilization and spending per enrollee. I estimate equation (1) on data at the insurer, municipality, and year level. Panels A to C of figure 3 present event study results for the log of the number of claims per enrollee, the log of healthcare spending per enrollee, and

[13] Equation (5) in Ho and Lee (2017) shows that premiums in a bargaining environment are large relative to Nash-Bertrand premiums whenever the provider's gains from trade with insurers are large. Dafny et al. (2015) also show that insurer competition lowers premiums. And, for the converse, Cabral et al. (2018) show that the pass-through of subsidies to premiums is low the more concentrated is the insurance market.

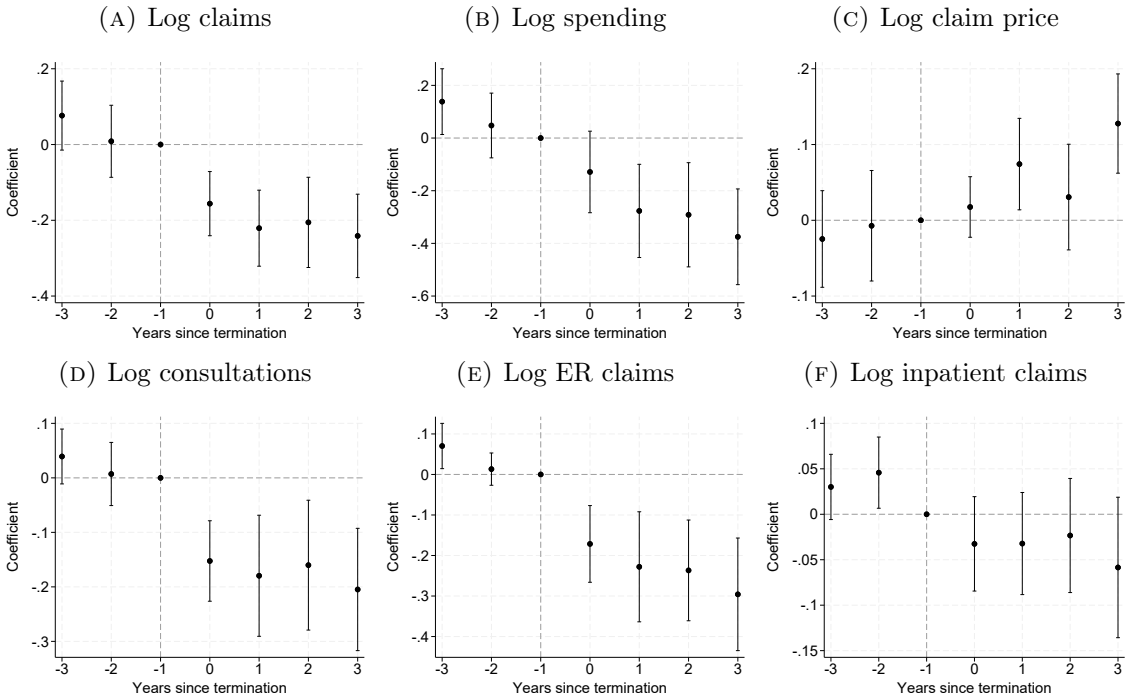
[14] In the specifications that include municipality-service-semester fixed effects and insurer-by-provider fixed effects, insurer and provider HHIs are perfectly collinear with the fixed effects and therefore are excluded.

the log of claim prices, respectively. The main takeaway is that healthcare utilization and spending both decreased substantially after the termination. The figure indicates that, prior to the termination, treated and control municipalities had parallel outcome trends. After the termination, panel A shows a 20% decline in the number of claims per enrollee and panel B shows similar reductions in healthcare spending. For the average enrollee, the number claims decreased by a greater magnitude than their healthcare spending, suggesting that claim prices increased significantly as seen in panel C. Higher claim prices are consistent with providers' bargaining leverage increasing relative to insurers in treated markets after the termination.

Panels D to F of figure 3 examine trends in utilization for specific services such as the log of doctor consultations, log of the number of urgent care claims, and log of the number of inpatient claims per enrollee, respectively. Results show significant reductions in utilization for mostly discretionary services such as doctor consultations, but show no changes in utilization of complex services related to inpatient care. Appendix figure 5 reports event study results for healthcare spending per enrollee associated with these services.

Given that market concentration affects the choice of contracts as seen in the previous section, which may in turn impact the type of care that patients receive, figure 4 explores the heterogeneity of treatment effects on utilization and spending by HHI. The figure presents results by insurer HHI during 2014 in the top panel and by relative insurer to provider HHI during 2014 in the bottom panel. Insurer and relative HHIs are calculated as in figure 2. Panels A and B show that reductions in the number of claims and healthcare spending per enrollee after the termination are larger in markets where predicted insurer HHI is relatively low. For example, in markets where the HHI is less than or equal to 3,000, there is a 40% decline in the number of claims on average in the post-period. This is in contrast to the 10% decline

FIGURE 3: Impact of insurer exit on intensity of care, utilization, and spending per enrollee



Note: Figure presents coefficients and 95% confidence intervals of the dynamic *did* design using as outcomes the log of total claims per enrollee in panel A, the log of total spending per enrollee in panel B, the log of claim price in panel C, the log of the number of consultations per enrollee in panel D, the log of urgent care claims per enrollee in panel E, and the log of inpatient claims per enrollee in panel F. Treated units are municipalities where SaludCoop operated in 2015. Control units are municipalities where SaludCoop did not operate. Relative time indicators are constructed relative to 2016 and are set to -1 for control units. Standard errors are clustered at the municipality level.

in markets with insurer HHI above 6,000.

When compared to provider HHI, panels C and D show that markets with higher insurer than provider concentration saw larger reductions in the number of claims and healthcare spending per enrollee after the termination. If relative HHI determines the bargaining leverage, then panel D shows that healthcare costs per enrollee decreased 25% the year of the termination in markets where insurers have higher bargaining leverage. However, there was no change in this outcome in markets where providers have higher bargaining leverage.

6 Conclusions

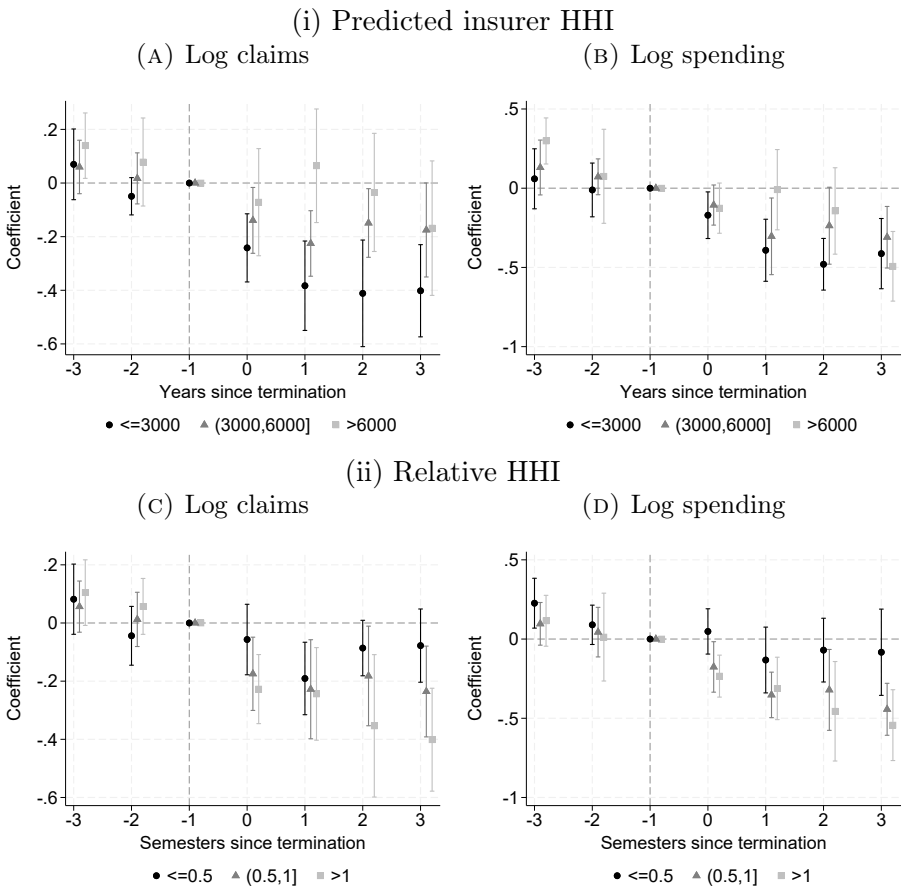
This paper examines health insurer and healthcare provider market structure as determinants of contract choice in healthcare. Market structure is characterized by insurer and provider market concentration, and the focus is on the choice between fee-for-service (FFS) and capitation contracts. The paper uses a unique dataset from the Colombian health care system that reports the type of contract and the terms that insurers sign with providers for every health service. I leverage the exogenous termination of the largest health insurer in the country and its hospitals to quantify how contract choice and healthcare market outcomes change after the termination. Then, I explore market concentration as the mechanism behind these effects.

Findings show that the fraction of services covered under FFS for every insurer-provider pair increased significantly after the termination, and that this change is larger in markets where providers are more concentrated than insurers. If relative market concentration relates to relative bargaining leverage, then results suggest that equilibrium contracts place the financial risk on insurers –such as FFS contracts– in markets where providers have higher bargaining leverage. I also find that healthcare utilization and spending decreased significantly after the termination, despite substantial increases in average claim prices. In line with the previous intuition, reductions in utilization and spending happen only in markets where insurers are more concentrated than providers.

My findings indicate that factors that affect the value of negotiations between health insurers and healthcare providers can directly impact quality of care, intensity of care, and spending, which are relevant outcomes for policymakers. This paper focuses on market concentration, but other factors may include network adequacy standards, antitrust policies in health insurance and hospital markets, and risk ad-

justment. Evidence on these factors is important for informing policies in health systems where access to health services is intermediated by private insurers.

FIGURE 4: Impact of insurer exit on utilization and spending per enrollee by HHI



Note: Figure presents coefficients and 95% confidence intervals of the dynamic *did* design using at outcomes the log total claims per enrollee and the log of total spending per enrollee. Panels A and B explore the heterogeneity of treatment effects by insurer HHI in 2014. Insurer HHI is calculated using predicted insurer market shares on the number of enrollees assuming that SaludCoop's enrollees are reassigned to incumbent insurers in proportion to their observed market shares. 9% of markets and 75% of enrollees fall in the group with insurer HHI $\leq$ 3000, 54% of markets and 21% of enrollees in the group with HHI$\in$ $(3000, 6000]$, and 37% of markets and 3% of enrollees in the group with HHI$>$ 6000. Panels C and D explore the heterogeneity of treatment effects by relative insurer to provider HHI in 2014. Provider HHI is calculated based on provider market shares in total healthcare costs. 28% of markets and 7% of enrollees fall in the group with relative HHI$\leq$ 0.5, 56% of markets and 16% of enrollees in the group with relative HHI$\in$ $(0.5, 1]$, and 15% of markets and 77% of enrollees in the group with relative HHI$>$ 1. Treated units are municipalities where SaludCoop operated in 2015. Control units are municipalities where SaludCoop did not operate. Relative time indicators are constructed relative to 2016 and are set to -1 for control units. Standard errors are clustered at the municipality level.

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Appendix 1 Data cleaning

At the end of every year insurers in the contributory healthcare system report to the government all the health claims that they reimbursed providers for. The data for this paper are these claims reports to the government. The government uses the claims data to calculate and update the risk-adjusted transfers that it makes to insurers. To do so, it imposes several data quality filters. The filters make it so that not every insurer that reports claims ends up in the final data set. Of the 19 insurers that participate in the contributory system, 13 are observed in the claims data. Excluding insurers that are terminated by the government during the sample period (SaludCoop in 2015 and Cafesalud in 2019), of the 11 remaining insurers, I observe 6 of them during all 7 years, and 10 of them for at least 4 years. I use the subsample of claims associated with these 10 insurers, which exclude SaludCoop (EPS013), Cafesalud (EPS003), and Cruz Blanca (EPS023). Appendix table 1 shows the total number of enrollees in the contributory system, the fraction represented by insurers that pass the government's data quality filters, and the fraction represented by insurers in the data set for my empirical analysis.

Appendix Table 1: Number of enrollees after sample restrictions

Year	Total enrollees (1)	Fraction in claims (2)	Fraction in sample (3)
2013	20,437,523	0.959	0.697
2014	21,675,193	0.967	0.705
2015	25,464,728	0.995	0.609
2016	22,402,988	0.993	0.750
2017	26,312,759	0.857	0.681
2018	22,274,235	0.852	0.832
2019	23,422,474	0.881	0.866

Note: Table reports the total number of enrollees in the contributory system per year in column (1), the fraction of enrollees represented by insurers that pass the Ministry of Health's data quality filters in column (2), and the fraction of enrollees represented by insurers in my final data set in column (3). Insurers with less that 0.005% market share in a municipality are dropped for calculating the total number of enrollees.

To organize the data for the contract choice analysis I proceed in following steps:

1. Aggregate the claims data to the insurer, provider, 4-digit service code, municipality, and semester level. Contracts are negotiated at this level of aggregation for 96.16% of observations, that is, conditional on an insurer-provider-service-semester there is no variation in FFS. For the remaining 3.84% of observations, I assume the contract is FFS if the total FFS cost is greater than the total capitation cost.

2. To avoid making inference off of services that very few providers can deliver, drop service categories with less than 50 insurer-provider pairs during the sample period and keep insurer-provider-services that are observed for more than 4 semesters. All my results are robust to more stringent or lenient sample restrictions as seen in appendix 4.

3. Fill in missing semesters conditional on each insurer-provider-service tuple. For example, if I observe the tuple in 2017-2 and in 2019-1, I fill in observations for 2018-1 and 2018-2 replacing measures of utilization and costs by zero and carrying forward the last observed contract. In the final data set, 11.39% of observations correspond to these filled-in values.

4. Aggregate the data to the insurer, provider, municipality, and semester level, calculating the fraction of (4-digit) services covered under FFS, total number of claims, total healthcare cost, and number of inpatient claims, ambulatory claims, urgent care claims, and consultations.

5. Exclude SaludCoop, Cafesalud, and Cruz Blanca.

To organize the data for the healthcare outcomes analysis I process in the following steps:

1. Aggregate the claims data to the insurer, municipality, and year level, calculating total healthcare cost, total number of claims, and number of claims in specific service categories.

2. Merge number of enrollees per insurer, municipality, and year, to calculate measures of healthcare utilization and spending per enrollee.

3. Exclude SaludCoop, Cafesalud, and Cruz Blanca.

Appendix 2 Descriptive evidence

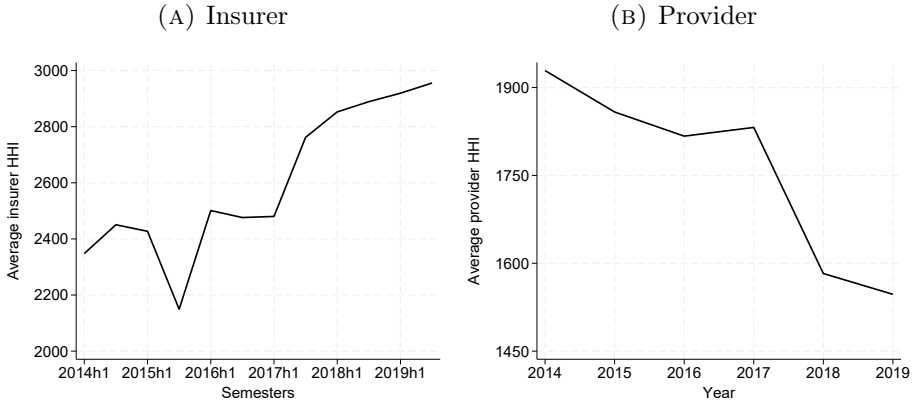
This appendix presents additional descriptive evidence. Appendix table 2 presents the mean and standard deviation in parenthesis of the fraction of services covered under FFS in column (1) and claim prices in column (2) for every insurer in the pre-termination period. Appendix figure 1 presents a time series of insurer and provider HHI in panels A and B, respectively. Insurer HHI is calculated based on market shares in the number of enrollees per municipality. Provider HHI is calculated based on market shares in total healthcare spending per municipality. In each panel the HHIs are averaged across municipalities weighting by number of enrollees and total healthcare spending, respectively. Appendix figure 2 presents the distribution of insurer HHI based on number of enrollees conditional on treated municipalities in the left panel and control municipalities in the right panel. The distribution for the pre-period is presented in gray and the distribution for the post-period is presented in black. Appendix table 3 presents pooled *did* results including municipality, semester, and insurer-by-provider fixed effects, as well as time-varying insurer HHI in the number of enrollee and provider HHI in total healthcare spending.

Appendix Table 2: FFS and prices across insurers in the pre-period

Insurer	FFS (1)	Claim price (2)
EPS002	0.705 (0.456)	0.248 (0.478)
EPS003	0.847 (0.360)	0.422 (0.930)
EPS005	0.955 (0.208)	0.175 (0.344)
EPS008	0.132 (0.339)	0.379 (0.926)
EPS010	0.234 (0.424)	0.212 (0.315)
EPS012	0.003 (0.051)	0.105 (0.083)
EPS013	0.750 (0.433)	0.278 (0.485)
EPS016	0.464 (0.499)	0.252 (0.713)
EPS017	0.442 (0.497)	0.260 (0.425)
EPS018	0.277 (0.447)	0.467 (1.737)
EPS037	0.470 (0.499)	0.315 (0.589)

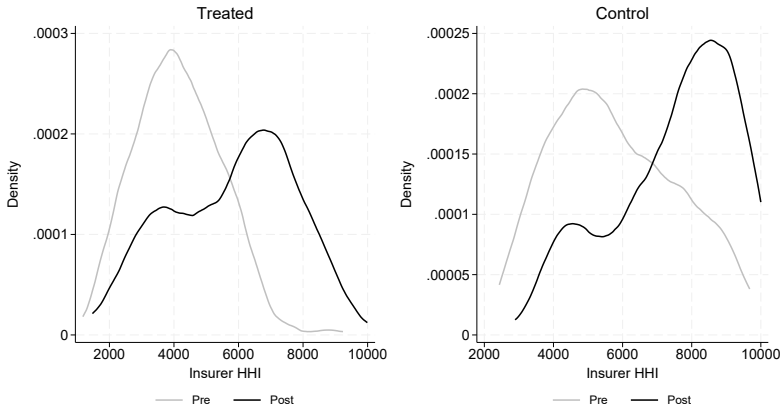
Note: Table uses the contract choice analysis data to report the average number of provider-services covered under FFS in column (1) and average claim prices in column (2) with their standard deviations in parenthesis for every insurer in the pre-termination period (2013-2015). Averages and standard deviations are weighted by the number of claims at the provider-service level. Claim prices are measured in millions of pesos. The average exchange rate in 2014 was 2,000 COP/USD.

Appendix Figure 1: Average municipal HHI



Note: Panel A presents average insurer HHI across municipalities weighted by the number of enrollees in the municipality, from the first half of 2014 to the second half of 2019. Insurer HHI is calculated based on market share in the number of enrollees. Insurers with less than 0.005% market share in a municipality are excluded. Panel B presents average provider HHI across municipalities weighted by total healthcare costs in the municipality, from 2014 to 2019. Provider HHI is calculated based on market shares in total healthcare costs.

Appendix Figure 2: Distribution of insurer HHI



Note: Panel A presents the distribution of insurer HHI across (treated) municipalities where SaludCoop operated, separately for the pre-termination period (2013-2015) in gray and the post-termination period (2016-2019) in black. Panel B presents the distribution of insurer HHI across (control) municipalities where SaludCoop did not operate, separately for the pre-termination period (2013-2015) in gray and the post-termination period (2016-2019) in black. Insurer HHI is calculated based on market shares on the number of enrollees in each municipality.

Appendix Table 3: Treatment effect conditional on insurer and provider HHI

	Fraction FFS	
	(1)	(2)
Treated×Post	0.0039	0.0135
	(0.0046)	(0.0054)
Insurer HHI	-0.0274	-0.0348
	(0.0109)	(0.0114)
Provider HHI	0.0434	0.0065
	(0.0096)	(0.0075)
Fixed effects		
Municipality	Y	Y
Semester	Y	Y
Insurer-provider	—	Y
N	221,922	221,922

Note: Table presents an OLS regression of the fraction of services covered under FFS on the interaction between the treatment indicator and the post-period indicator, time-varying insurer HHI on the number of enrollees, and time-varying provider HHI on total healthcare costs. In column (1) the specification includes market and semester fixed effects. In column (2) insurer-by-provider fixed effects are added. Treated units are municipalities where SaludCoop operated in 2015. Control units are municipalities where SaludCoop did not operate. Standard errors reported in parenthesis are clustered at the municipality level.

Appendix 3 Event study coefficients

This appendix presents coefficients and standard errors associated with each dynamic *did* result in the main text. It also reports coefficient plots for additional outcomes.

Appendix Table 4: Event study coefficients for contract choice

	(1) Main		(2) SaludCoop hosp share	
Relative time	coef	se	coef	se
-6	0.0075	(0.0044)	0.0086	(0.0071)
-5	0.0076	(0.0038)	0.0099	(0.0070)
-4	0.0042	(0.0037)	0.0066	(0.0065)
-3	0.0060	(0.0041)	0.0091	(0.0061)
-2	-0.0001	(0.0018)	0.0005	(0.0027)
-1	—	—	—	—
0	0.0091	(0.0030)	0.0074	(0.0034)
1	0.0016	(0.0034)	0.0020	(0.0050)
2	0.0109	(0.0043)	0.0101	(0.0046)
3	0.0140	(0.0041)	0.0140	(0.0066)
4	0.0097	(0.0065)	0.0082	(0.0083)
5	0.0151	(0.0063)	0.0127	(0.0095)
6	0.0229	(0.0071)	0.0219	(0.0079)
7	0.0314	(0.0089)	0.0285	(0.0101)

Note: Table presents coefficients and standard errors in parenthesis of the event study specification following equation (1) using as outcome variable the fraction of services covered under fee-for-service for every insurer-provider pair. Column (1) presents the main specification and column (2) presents the specification that drops markets where SaludCoop hospitals had more than 1% market share in total healthcare spending. Treated units are municipalities where SaludCoop operated in 2015. Control units are municipalities where SaludCoop did not operate. Relative time indicators are constructed relative to the first semester of 2016 and are set to -1 for control units. Standard errors are clustered at the municipality level.

Appendix Table 5: Event study coefficients for contract choice by predicted insurer HHI

	(1) HHI<=3000		(2) HHI (3000,6000]		(3) HHI>6000	
Relative time	coef	se	coef	se	coef	se
-6	0.0074	(0.0084)	0.0102	(0.0051)	-0.0037	(0.0083)
-5	0.0067	(0.0077)	0.0119	(0.0050)	-0.0037	(0.0086)
-4	0.0000	(0.0056)	0.0126	(0.0039)	0.0023	(0.0071)
-3	0.0023	(0.0049)	0.0134	(0.0043)	0.0044	(0.0064)
-2	-0.0009	(0.0021)	0.0007	(0.0027)	0.0025	(0.0032)
-1	—	—	—	—	—	—
0	0.0108	(0.0037)	0.0077	(0.0052)	0.0016	(0.0056)
1	0.0055	(0.0057)	-0.0037	(0.0056)	-0.0074	(0.0083)
2	0.0155	(0.0035)	0.0079	(0.0057)	-0.0134	(0.0089)
3	0.0210	(0.0051)	0.0081	(0.0068)	-0.0170	(0.0079)
4	0.0157	(0.0084)	0.0041	(0.0098)	-0.0136	(0.0118)
5	0.0233	(0.0080)	0.0095	(0.0092)	-0.0242	(0.0139)
6	0.0282	(0.0090)	0.0205	(0.0079)	-0.0078	(0.0110)
7	0.0454	(0.0096)	0.0216	(0.0087)	-0.0363	(0.0166)

Note: Table presents coefficients and standard errors in parenthesis of the event study specification following equation (1) using as outcome variable the fraction of services covered under fee-for-service for every insurer-provider pair. Treated units are municipalities where SaludCoop operated in 2015. Control units are municipalities where SaludCoop did not operate. Relative time indicators are constructed relative to the first semester of 2016 and are set to -1 for control units. Column (1) uses the subsample of treated markets with insurer HHI less than or equal to 3,000, column (2) with insurer HHI between 3,000 and 6,000, and column (3) with insurer HHI above 6,000. Insurer HHI is calculated using predicted insurer market shares on the number of enrollees assuming that SaludCoop's enrollees are reassigned to incumbent insurers in proportion to their observed market shares. 11% of markets and 78% of enrollees fall in column (1), 51% of markets and 18% of enrollees in column (2), and 37% of markets and 3% of enrollees in column (3). Standard errors are clustered at the municipality level.

Appendix Table 6: Event study coefficients for contract choice by relative insurer-provider HHI

	(1) Rel. HHI<=0.5		(2) Rel. HHI (0.5,1]		(3) Rel. HHI>1	
Relative time	coef	se	coef	se	coef	se
-6	0.0129	(0.0104)	-0.0008	(0.0095)	0.0123	(0.0213)
-5	0.0214	(0.0100)	0.0034	(0.0102)	0.0144	(0.0135)
-4	0.0265	(0.0092)	0.0122	(0.0072)	0.0038	(0.0153)
-3	0.0294	(0.0087)	0.0126	(0.0074)	0.0114	(0.0147)
-2	0.0048	(0.0062)	-0.0004	(0.0047)	-0.0049	(0.0082)
-1	—	—	—	—	—	—
0	0.0215	(0.0069)	0.0047	(0.0057)	0.0193	(0.0262)
1	0.0068	(0.0070)	-0.0011	(0.0087)	-0.0017	(0.0220)
2	0.0383	(0.0102)	0.0043	(0.0090)	0.0119	(0.0187)
3	0.0313	(0.0116)	0.0016	(0.0099)	0.0353	(0.0152)
4	0.0502	(0.0152)	0.0014	(0.0122)	0.0065	(0.0228)
5	0.0592	(0.0149)	0.0038	(0.0114)	0.0216	(0.0334)
6	0.0700	(0.0166)	0.0213	(0.0097)	0.0158	(0.0337)
7	0.0497	(0.0211)	0.0208	(0.0165)	0.0284	(0.0287)

Note: Table presents coefficients and standard errors in parenthesis of the event study specification following equation (1) using as outcome variable the fraction of services covered under fee-for-service for every insurer-provider pair. Treated units are municipalities where SaludCoop operated in 2015. Control units are municipalities where SaludCoop did not operate. Relative time indicators are constructed relative to the first semester of 2016 and are set to -1 for control units. Column (1) uses the subsample of treated markets with relative insurer to provider HHI less than or equal to 0.5, column (2) with relative HHI between 0.5 and 1, and column (3) with relative HHI above 1. Insurer HHI is calculated using predicted insurer market shares on the number of enrollees assuming that SaludCoop's enrollees are reassigned to incumbent insurers in proportion to their observed market shares. Provider HHI is calculated based on provider market shares in total healthcare spending. 27% of markets and 8% of enrollees fall in column (1), 58% of markets and 16% of enrollees in column (2), and 14% of markets and 77% of enrollees in column (3). Standard errors are clustered at the municipality level.

Appendix Table 7: Event study coefficients for utilization and spending per enrollee

	Log claims		Log spending		Log claim price	
Relative time	coef	se	coef	se	coef	se
-3	0.0764	(0.0465)	0.1383	(0.0637)	-0.0247	(0.0325)
-2	0.0086	(0.0485)	0.0477	(0.0627)	-0.0072	(0.0372)
-1	—	—	—	—	—	—
0	-0.1561	(0.0432)	-0.1288	(0.0790)	0.0175	(0.0204)
1	-0.2208	(0.0512)	-0.2767	(0.0903)	0.0742	(0.0308)
2	-0.2055	(0.0608)	-0.2914	(0.1009)	0.0306	(0.0356)
3	-0.2412	(0.0562)	-0.3750	(0.0927)	0.1277	(0.0334)

Note: Table presents coefficients and standard errors in parenthesis of the event study specification following equation (1) using as outcome variable the log of number of claims per enrollee in column (1), the log of healthcare spending per enrollee in column (2), and the log of average claim price in column (3). Treated units are municipalities where SaludCoop operated in 2015. Control units are municipalities where SaludCoop did not operate. Relative time indicators are constructed relative to 2016 and are set to -1 for control units. Standard errors are clustered at the municipality level.

Appendix Table 8: Event study coefficients for utilization and spending per enrollee per service

	Log consultations		Log ER claims		Log inpatient claims	
Relative time	coef	se	coef	se	coef	se
-3	0.0392	(0.0257)	0.0702	(0.0285)	0.0301	(0.0183)
-2	0.0071	(0.0296)	0.0132	(0.0203)	0.0458	(0.0200)
-1	—	—	—	—	—	—
0	-0.1525	(0.0377)	-0.1714	(0.0483)	-0.0325	(0.0265)
1	-0.1796	(0.0567)	-0.2279	(0.0693)	-0.0322	(0.0287)
2	-0.1602	(0.0608)	-0.2368	(0.0634)	-0.0233	(0.0320)
3	-0.2048	(0.0573)	-0.2958	(0.0709)	-0.0585	(0.0394)

Note: Table presents coefficients and standard errors in parenthesis of the event study specification following equation (1) using as outcome variable the log of number of consultation per enrollee in column (1), the log of ER claims per enrollee in column (2), and the log of inpatient claims per enrollee in column (3). Treated units are municipalities where SaludCoop operated in 2015. Control units are municipalities where SaludCoop did not operate. Relative time indicators are constructed relative to 2016 and are set to -1 for control units. Standard errors are clustered at the municipality level.

Appendix Table 9: Event study coefficients for log number of claims per enrollee by HHI

Relative time	coef	se	coef	se	coef	se
Panel A	(1) HHI<=3000		(2) HHI (3000,6000]		(3) HHI>6000	
-3	0.0353	(0.0671)	0.0876	(0.0424)	0.0957	(0.0628)
-2	-0.0748	(0.0454)	0.0249	(0.0415)	0.0546	(0.0649)
-1	—	—	—	—	—	—
0	-0.3651	(0.0487)	-0.0840	(0.0546)	-0.1362	(0.1241)
1	-0.4643	(0.0665)	-0.1652	(0.0601)	-0.0922	(0.1011)
2	-0.4503	(0.0984)	-0.1157	(0.0708)	-0.1813	(0.0917)
3	-0.3942	(0.0834)	-0.2042	(0.0791)	-0.1711	(0.1105)
Panel B	(1) Relative HHI<=0.5		(2) Relative HHI (0.5,1]		(3) Relative HHI>1	
-3	0.0818	(0.0616)	0.0563	(0.0449)	0.1044	(0.0575)
-2	-0.0440	(0.0516)	0.0124	(0.0476)	0.0570	(0.0490)
-1	—	—	—	—	—	—
0	-0.0568	(0.0618)	-0.1747	(0.0642)	-0.2273	(0.0606)
1	-0.1908	(0.0636)	-0.2278	(0.0869)	-0.2438	(0.0812)
2	-0.0861	(0.0487)	-0.1821	(0.0874)	-0.3536	(0.1249)
3	-0.0778	(0.0642)	-0.2356	(0.0796)	-0.4013	(0.0903)

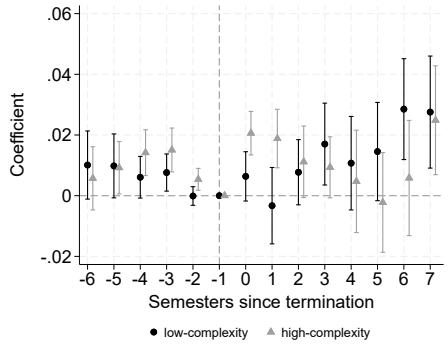
Note: Table presents coefficients and standard errors in parenthesis of the event study specification following equation (1) using as outcome variable the log of number of claims per enrollee. In panel A, column (1) uses the subsample of treated markets with insurer HHI less than or equal to 3,000, column (2) with insurer HHI between 3,000 and 6,000, and column (3) with insurer HHI above 6,000. Insurer HHI is calculated using predicted insurer market shares on the number of enrollees assuming that SaludCoop's enrollees are reassigned to incumbent insurers in proportion to their observed market shares. 9% of markets and 75% of enrollees fall in column (1), 54% of markets and 21% of enrollees in column (2), and 37% of markets and 3% of enrollees in column (3). In panel B, column (1) uses the subsample of treated markets with relative insurer to provider HHI less than or equal to 0.5, column (2) with relative HHI between 0.5 and 1, and column (3) with relative HHI above 1. Provider HHI is calculated based on provider market shares in total healthcare costs. 28% of markets and 7% of enrollees fall in column (1), 56% of markets and 16% of enrollees in column (2), and 15% of markets and 77% of enrollees in column (3). Treated units are municipalities where SaludCoop operated in 2015. Control units are municipalities where SaludCoop did not operate. Relative time indicators are constructed relative to 2016 and are set to -1 for control units. Standard errors are clustered at the municipality level.

Appendix Table 10: Event study coefficients for log healthcare spending per enrollee by HHI

Relative time	coef	se	coef	se	coef	se
Panel A	(1) HHI<=3000		(2) HHI (3000,6000]		(3) HHI>6000	
-3	0.0218	(0.1163)	0.1436	(0.0884)	0.2654	(0.0776)
-2	-0.0127	(0.0967)	0.0780	(0.0690)	0.0278	(0.1526)
-1	—	—	—	—	—	—
0	-0.2548	(0.1137)	-0.0566	(0.0758)	-0.1971	(0.1280)
1	-0.4496	(0.1045)	-0.2212	(0.0631)	-0.2325	(0.1355)
2	-0.4785	(0.1027)	-0.2053	(0.1347)	-0.3236	(0.1403)
3	-0.3745	(0.1205)	-0.3637	(0.1156)	-0.4090	(0.1131)
Panel B	(1) Relative HHI<=0.5		(2) Relative HHI (0.5,1]		(3) Relative HHI>1	
-3	0.2263	(0.0803)	0.0961	(0.0687)	0.1153	(0.0819)
-2	0.0899	(0.0634)	0.0437	(0.0798)	0.0124	(0.1415)
-1	—	—	—	—	—	—
0	0.0481	(0.0729)	-0.1760	(0.0813)	-0.2340	(0.0676)
1	-0.1323	(0.1059)	-0.3525	(0.0732)	-0.3116	(0.1005)
2	-0.0698	(0.1026)	-0.3209	(0.1303)	-0.4558	(0.1602)
3	-0.0832	(0.1389)	-0.4433	(0.0837)	-0.5434	(0.1141)

Note: Table presents coefficients and standard errors in parenthesis of the event study specification following equation (1) using as outcome variable the log of healthcare spending per enrollee. In panel A, column (1) uses the subsample of treated markets with insurer HHI less than or equal to 3,000, column (2) with insurer HHI between 3,000 and 6,000, and column (3) with insurer HHI above 6,000. Insurer HHI is calculated using predicted insurer market shares on the number of enrollees assuming that SaludCoop's enrollees are reassigned to incumbent insurers in proportion to their observed market shares. 9% of markets and 75% of enrollees fall in column (1), 54% of markets and 21% of enrollees in column (2), and 37% of markets and 3% of enrollees in column (3). In panel B, column (1) uses the subsample of treated markets with relative insurer to provider HHI less than or equal to 0.5, column (2) with relative HHI between 0.5 and 1, and column (3) with relative HHI above 1. Provider HHI is calculated based on provider market shares in total healthcare costs. 28% of markets and 7% of enrollees fall in column (1), 56% of markets and 16% of enrollees in column (2), and 15% of markets and 77% of enrollees in column (3). Treated units are municipalities where SaludCoop operated in 2015. Control units are municipalities where SaludCoop did not operate. Relative time indicators are constructed relative to 2016 and are set to -1 for control units. Standard errors are clustered at the municipality level.

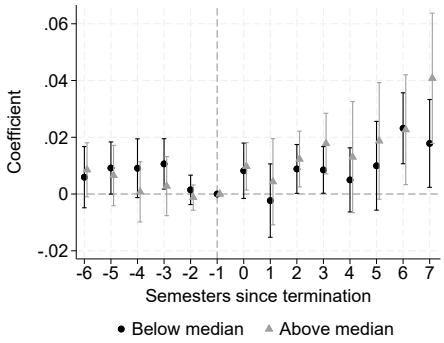
Appendix Figure 3: Impact of exogenous exits on contract choice by type of service



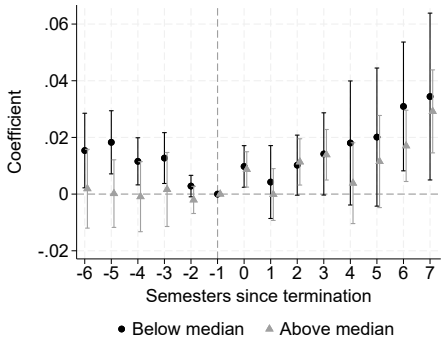
Note: Figure presents coefficients and 95% confidence intervals of a dynamic *did* design. The outcome variable is the fraction of services covered under FFS. Treated units are municipalities where SaludCoop operated in 2015. Control units are municipalities where SaludCoop did not operate. Relative time indicators are constructed relative to the first semester of 2016 and are set to -1 for control units. Estimates in black use the subsample of consultation, laboratory, imaging, and nuclear medicine services (low-complexity). Estimates in gray use the rest of services (high-complexity). Standard errors are clustered at the municipality level.

Appendix Figure 4: Impact of exogenous exits on contract choice by fraction sick and provider size

(A) Average number of beds per provider



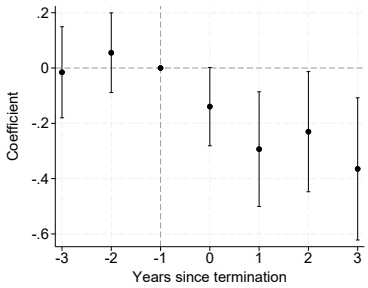
(B) Fraction of claims associated with chronic conditions



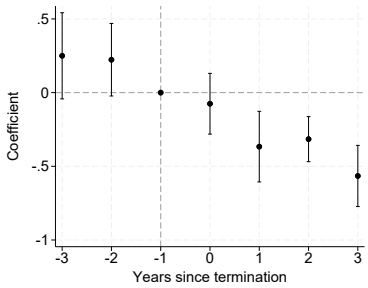
Note: Figure presents coefficients and 95% confidence intervals of a dynamic *did* design. The outcome variable is the fraction of services covered under FFS. Treated units are municipalities where SaludCoop operated in 2015. Control units are municipalities where SaludCoop did not operate. Relative time indicators are constructed relative to the first semester of 2016 and are set to -1 for control units. Standard errors are clustered at the municipality level. Panel A explores the heterogeneity of treatment effects by average number of beds per provider during 2014. Estimates in black use the subsample of markets where the average provider has less than 50 beds (below median). Estimates in gray use the subsample of markets where the average provider has 50 or more beds (above median). Panel B explores the heterogeneity of treatment effects by fraction of claims associated with chronic conditions in 2014. Estimates in black use the subsample of markets where less than 5% of claims correspond to chronic conditions (below median). Estimates in gray use the subsample of markets where 5% or more claims correspond to chronic conditions (above median).

Appendix Figure 5: Impact of insurer exit on spending per service per enrollee

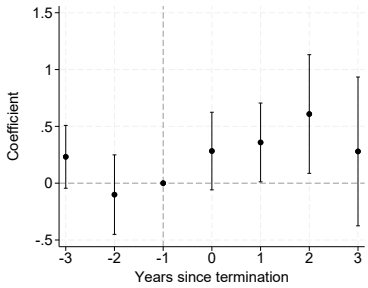
(A) Log consultation cost



(B) Log ER cost



(C) Log inpatient cost



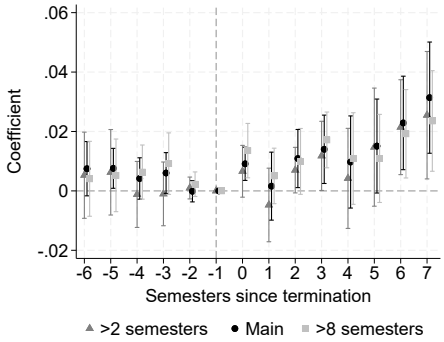
Note: Figure presents coefficients and 95% confidence intervals of the dynamic *did* design using as outcomes the log of spending in consultations per enrollee in panel A, the log of spending in ER in panel B, and the log of spending in inpatient services in panel C. Treated units are municipalities where SaludCoop operated in 2015. Control units are municipalities where SaludCoop did not operate. Relative time indicators are constructed relative to 2016 and are set to -1 for control units. Standard errors are clustered at the municipality level.

Appendix 4 Robustness checks

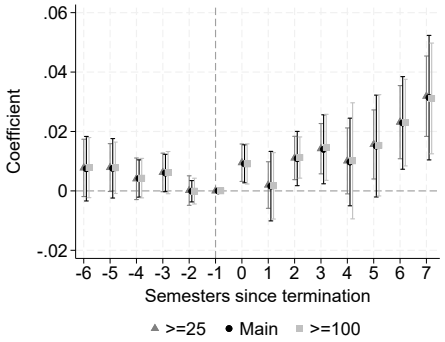
This appendix presents robustness checks on sample construction for the event study using as outcome the fraction of services covered under FFS.

Appendix Figure 6: Robustness on sample construction

(A) Minimum number of semesters

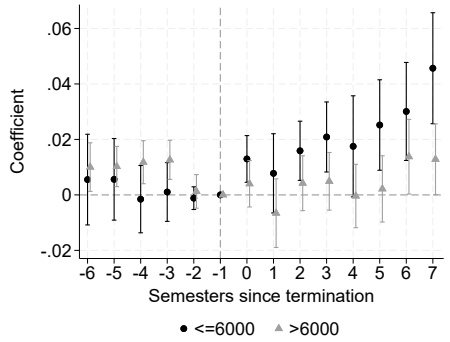


(B) Minimum number of insurer-provider pairs



Note: Figure presents coefficients and 95% confidence intervals of a dynamic *did* design. The outcome variable is the fraction of services covered under FFS. Treated units are municipalities where SaludCoop operated in 2015. Control units are municipalities where SaludCoop did not operate. Relative time indicators are constructed relative to the first semester of 2016 and are set to -1 for control units. Standard errors are clustered at the municipality level. Panel A presents robustness checks on the minimum number of semesters for including an insurer-provider-service tuple in the final data. Estimates in black are the main specification that conditions on observing insurer-provider-service tuples for more than 4 semesters. Estimates in dark gray condition on observing them for more than 2 semesters. Estimates in light gray condition on observing them for more than 8 semesters. Panel B presents robustness checks on the minimum number of insurer-provider pairs observed for each service for inclusion in the final data. Estimates in black are the main specification that conditions on observing 50 or more insurer-provider pairs for every service. Estimates in dark gray condition on observing 25 or more insurer-provider pairs for every service. Estimates in light gray condition on observing 100 or more insurer-provider pairs for every service.

Appendix Figure 7: Robustness on market definition for calculating insurer HHI



Note: Figure presents coefficients and 95% confidence intervals of a dynamic *did* design. The outcome variable is the fraction of services covered under FFS. Treated units are municipalities where SaludCoop operated in 2015. Control units are municipalities where SaludCoop did not operate. Relative time indicators are constructed relative to the first semester of 2016 and are set to -1 for control units. Standard errors are clustered at the municipality level. Estimates in black use the subsample of treated markets with average insurer HHI less than or equal to 6,000. Estimates in gray use the subsample of treated markets with average insurer HHI greater than 6,000. Average insurer HHI is calculated based on insurer market shares in total healthcare spending per service-municipality in 2014. This HHI is then averaged across services within each municipality weighting by number of claims per service.