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Manuel Fernández
Associate Professor, Universidad de los Andes
E-mail: man-fern@uniandes.edu.co

Anghella Rosero
Senior Researcher, PROESA, Universidad Icesi
Ph.D. in Economics, Universidad de los Andes
E-mail: abrosero@icesi.edu.co

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Manuel Fernández & Anghella Rosero

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Centro de Estudios en Protección Social y Economía de la Salud – PROESA

Cali – Colombia
Calle 18 No. 122–135 (Pance), Building B – Floor 2
Phone: +60 (2) 5552334 Ext: 8074
E-mail: contacto@proesa.org.co
www.icesi.edu.co/proesa

The authors are listed in alphabetical order.
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Contenido

Abstract

This study examines the impact of insurer congestion and quality on healthcare service utilization. We exploit the 2015 closure of one of Colombia's largest insurers, which led to the reallocation of its members to various insurers within the same municipalities. Consequently, the receiving entities experienced a sudden and unexpected influx of new affiliates, leading to varying levels of pressure, or "congestion". Using a difference-in-differences empirical strategy, we analyze changes in healthcare utilization among reallocated individuals before and after the liquidation. Our study yields three main findings: (1) individuals transferred to more congested insurers experienced a relative decline in healthcare utilization compared to those assigned to less congested insurers; (2) individuals allocated to higher-quality insurers exhibited increased healthcare utilization relative to those assigned to lower-quality insurers; (3) high-quality insurers mitigated the adverse effects of congestion. These patterns in healthcare utilization are consistent across multiple types of services, including consultations, procedures, emergency care, and hospitalizations. Overall, our findings highlight the negative consequences of insurer closures for healthcare service utilization and underscore the critical role of insurer quality in large-scale reallocations.

JEL Codes: I11; I13; I14; I18

1. Introduction

Insurance coverage is a necessary, but insufficient, condition for guaranteeing effective healthcare access. Despite substantial progress towards universal health coverage (UHC), health systems face significant challenges in ensuring access to quality care. Indeed, the burden of poor quality care is significant, estimated to contribute to 15% of deaths in low-and middle-income countries, with additional adverse outcomes stemming from the underutilization of essential health services (Organización Mundial de la Salud (OMS), 2020). Health insurers are pivotal actors in facilitating access to health care, yet their operations can also introduce systemic barriers and inequities (Agency of Healthcare Research and Quality, 2021). Consequently, when insurers fail to adhere to established quality standards or face financial insolvency, government interventions, including mandatory closures, become unavoidable mechanisms of regulatory oversight (Li et al., 2020).

Liquidation procedures in healthcare are often prolonged and complex, straining already limited resources. For instance, in the United States, several insurers established under the Affordable Care Act (ACA) have undergone liquidation, affecting numerous stakeholders (Marcari and Selby, 2015). Such liquidations can trigger unintended consequences, including disruptions in service utilization and strain on the overall health system. This strain is primarily due to the sudden and unexpected influx of new enrollees at unprepared receiving entities, creating varying levels of pressure, or "congestion". Congestion in healthcare services, whether due to insurer closures or other factors such as administrative hurdles and insufficient provider networks (Dunn et al., 2024), further exacerbates access challenges. Congestion can result in longer waiting times, delayed care, reduced patient satisfaction, and potentially negative health outcomes (Besancenot et al., 2021).

This study analyzes the impact of insurers' congestion and quality on healthcare service utilization in a difference-in-differences design. We exploit the 2015 closure of one of Colombia's largest insurers, Caprecom, which had approximately three million affiliates at the time of liquidation. Individuals were suddenly and unexpectedly reassigned to fourteen health insurance companies through a quasi-random assignment mechanism. Consequently, some insurers experienced a larger influx of new enrollees relative to their existing policyholders base, resulting in varying levels of closure-induced congestion. Receiving entities were of different quality according to a satisfaction ranking defined by the Colombian Ministry of Health. We can then compare health service utilization patterns between transferred individuals assigned to insurers of high vs. low ex-ante quality, and further analyze the interplay between congestion and quality in a triple- differences design.

The study primarily utilizes administrative records of health service utilization. We construct a sample spanning the period from 2014 to 2017, consisting of individuals affiliated with Caprecom in the year of the intervention. The sample has approximately 1.2 million users per quarter. Using these data, we construct measures of healthcare service utilization frequency across four categories—consultations, emergency observation stays, hospitalizations, and medical procedures.

To assess congestion, we calculate the proportion of Caprecom users transferred to each receiving insurer in 2016 within each municipality relative to the total number of affiliated individuals. To assess the quality of insurers, we create a variable representing the performance of insurers based on a satisfaction ranking compiled by the Colombian Ministry of Health. This ranking, released in 2016 but compiled with data from 2015, considers three dimensions: opportunity of care, satisfaction, and access (Escobar et al., 2016). Using the performance scores for each dimension, we calculated a simple average to recreate the ranking for the 25 insurers operating in 2015, including Caprecom and fourteen receiving insurers of Caprecom affiliates. Insurers with scores above the median are classified as high-performing, while those below are considered low-performing.

We have three main findings. First, individuals transferred to insurers experiencing high congestion levels showed significant decreases in healthcare service utilization relative to those transferred to less congested insurers. Specifically, those assigned to insurers with congestion above the median experienced a reduction of 84.59 services per thousand individuals per quarter in overall health service utilization. This represents a 53,1% decrease relative to their pre-intervention baseline of 158.58 services per thousand individuals per quarter. This decrease was observed across various service types, including consultations, procedures, observation room stays, and hospitalizations, with procedures being the most affected. The estimates indicate that this effect is immediate and persistent over time, with no signs of convergence up to two years post-intervention.

Second, individuals transferred to high-performing insurers experienced significantly higher healthcare utilization compared to those assigned to lower-performing insurers. Specifically, the increase averaged 86.15 services per 1,000 individuals per quarter, representing a 54.49% rise over the pre-intervention baseline of 158.11 services per 1,000 individuals. This improvement was observed consistently across all categories of care, again with procedures showing the greatest relative increase. These findings suggest that insurers with stronger performance in access, timeliness, and user satisfaction were more capable of maintaining or improving service delivery and health outcomes in the aftermath of a large-scale reallocation.

Third, quality appears to mitigate the effects of congestion. This result can be divided into two parts, one related to congestion levels and the other to quality. When analyzing congestion, we found that among individuals enrolled in highly congested insurers, those transferred to high-quality insurers exhibited, on average, an increase of 116.6 services per thousand individuals per quarter in healthcare service utilization. This represents a 74.3% increase compared to their pre-intervention baseline of 67.1 services per thousand individuals per quarter, compared to those transferred to low-quality insurers. Conversely, for individuals transferred to low-congestion insurers, we found no significant differences in service utilization between those enrolled in high-quality insurers and those in low-quality insurers. Consequently, quality becomes a more salient factor when insurers experience pressure from a sudden influx of new enrollees.

Upon analyzing the effect of congestion differentiated by quality, we found that among individuals transferred to low-quality insurers, those assigned to high-congestion insurers experienced a significant decrease in health service utilization, averaging 121.1 fewer services per thousand individuals per quarter. This represents a substantial 76.8% decrease compared to their pre-intervention baseline of 157.58 services per thousand individuals per quarter, in comparison to those assigned to low-congestion insurers. Conversely, among high-quality insurers, we found no significant difference in average utilization, regardless of whether individuals were transferred to high-congestion or low-congestion insurers. This suggests that high-quality insurers are better able to manage the challenges associated with a sudden increase in enrollment. These findings underscore the importance of insurer quality in mitigating the adverse effects of congestion, a pattern consistent across various types of health services.

Our paper intersects with four main areas of literature. First, it builds upon studies examining the effects of closures within healthcare systems. This literature primarily focuses on provider (especially hospital) closures, finding increased uncompensated care costs for nearby hospitals and a disproportionate impact on emergency and inpatient service (Garthwaite et al., 2018; Mullens et al., 2023). Some studies also highlight how disrupted health coverage can lead to delayed care-seeking and increased utilization of costly inpatient services (Banerjee et al., 2010). Caprecom liquidation offers a unique opportunity to study insurer closures' effects on healthcare utilization, thereby contributing valuable insights to this body of literature.

Second, we contribute to the literature on congestion within health systems. This research primarily focuses on care providers, linking increased congestion to factors such as free or reduced out-of-pocket expenses (Besancenot et al., 2023), patient behavior, and hospital costs (Lee and Choi, 2020). The difficulty in accurately classifying disease severity, especially in primary care, also contributes to congestion (Besancenot et al., 2018, 2021). Public services often experience higher congestion, potentially due to cost-cutting measures (Matranga and Sapienza, 2015), whereas private services tend to specialize in less severe cases, thereby mitigating congestion (Pardo-Garcia and Sempere- Monerris, 2018). Theoretical models

emphasize the importance of referral systems for equitable service distribution (Vidyarthi and Kuzgunkaya, 2015), and some literature suggests that centralizing capacity in preferred locations may be more effective than decentralization across numerous smaller facilities (Zhang et al., 2009).

Third, we build on studies examining the relationship between insurer quality and healthcare utilization. While insurance can improve care delivery, it does not guarantee better processes or outcomes (Osei Afriyie et al., 2023). In Colombia, insurers with broader provider networks tend to collaborate with higher-quality providers, significantly reducing patient mortality (Vera-hernández et al., 2023). Similarly, research in the United States has linked more limited networks to restricted access (Atwood and Lo Sasso, 2016).

Fourth, we contribute to the less-explored area of congestion and quality interplay within healthcare. Some evidence suggests higher-quality services may experience increased congestion as their reputation grows, potentially impacting performance (Chartock, 2022). Conversely, high-level care protocols, often associated with higher quality, can mitigate the adverse effects of congestion (Yu et al., 2020). This study contributes to this body of literature by examining broader insurer characteristics, such as congestion and quality performance, and most importantly, their interplay and how these factors are associated with healthcare service utilization.

This document consists of six sections, including this introduction. Section 2 provides an overview of the context in which the natural quasi-experiment unfolds. Section 3 offers a description of the dataset used in the analysis. Section 4 outlines the identification strategy. Section 5 presents the results and proposes potential mechanisms to explain the findings. Lastly, Section 6 offers final remarks on the findings and their implications.

2. Institutional background

2.1. The Colombian healthcare system

The Colombian healthcare system operates under a managed competition model of health insurance (Vargas et al., 2010). This model is characterized by a regulated market within a public system, primarily composed of two regimes: The Contributory Regime (CR) covers formal sector employees and self-employed individuals with the capacity to pay, with enrollment mandatory for all formal workers. In contrast, the Subsidized Regime (SR) is designed for the low-income population, and eligibility is means-tested. Historically, close to 50% of affiliations have been part of the Subsidized Regime (Calderón Alberto Agudelo et al., 2011). The high coverage of the system is a marker of success. By 2015, 97.6% of the population was enrolled in the health system.

Health insurers, known as Health Promoting Entities (EPS, in Spanish), play a crucial role in organizing the provision of health services. Participants join the system by registering with an EPS operating in their municipality of residence. These insurers are responsible for ensuring that their members can access necessary healthcare services offered through a network of independently contracted service providers, including hospitals, clinics, and laboratories. Insurers contract with a mix of public and private providers, creating competition in care delivery. Citizens can freely select their health insurer and the providers within that insurer's network.

Insurers face regulatory constraints on three key strategic variables. First, they must guarantee access to the services included in the government-defined mandatory health plan. This entails ensuring comprehensive, efficient, timely, and quality care by health-care service providers (Ministerio de de Salud y Protección Social). Second, rather than setting prices, insurers receive a government-defined, risk-adjusted capitation payment per enrollee, recalibrated periodically. Finally, EPSs cannot discriminate based on health status or risk profile and must allow enrollment for any applicant in the municipality where they operate.

The National Superintendence of Health (Supersalud, in Spanish) is responsible for surveillance, inspection, and control within the healthcare system (Presidencia de la República de Colombia, 2006). Its functions include receiving complaints about service provision and imposing sanctions on all actors in the healthcare system. These sanctions may include liquidating entities, such as insurance companies if they do not meet the minimum requirements to operate correctly.

The extensive regulation of the health system regarding health plans, premiums, and the inability to select affiliates creates a unique opportunity to analyze the insurance liquidation process in Colombia. It allows us to study the effects of congestion and quality while holding key determinants of service utilization fixed.

2.2. Liquidation of health Insurancecompanies

In Colombia, the liquidation of a health insurance company (EPS) is a measure of last resort, implemented only after a series of administrative sanctions have been exhausted. Since 2012, the Supersalud has authorized the implementation of precautionary measures when EPSs fail to meet established performance indicators within the Colombian health system (Asociación Colombiana de Hospitales y Clínicas, 2023). If these measures prove insufficient, Supersalud can intervene administratively, and ultimately, if failures persist and the entity's operation is deemed unsustainable, order liquidation.

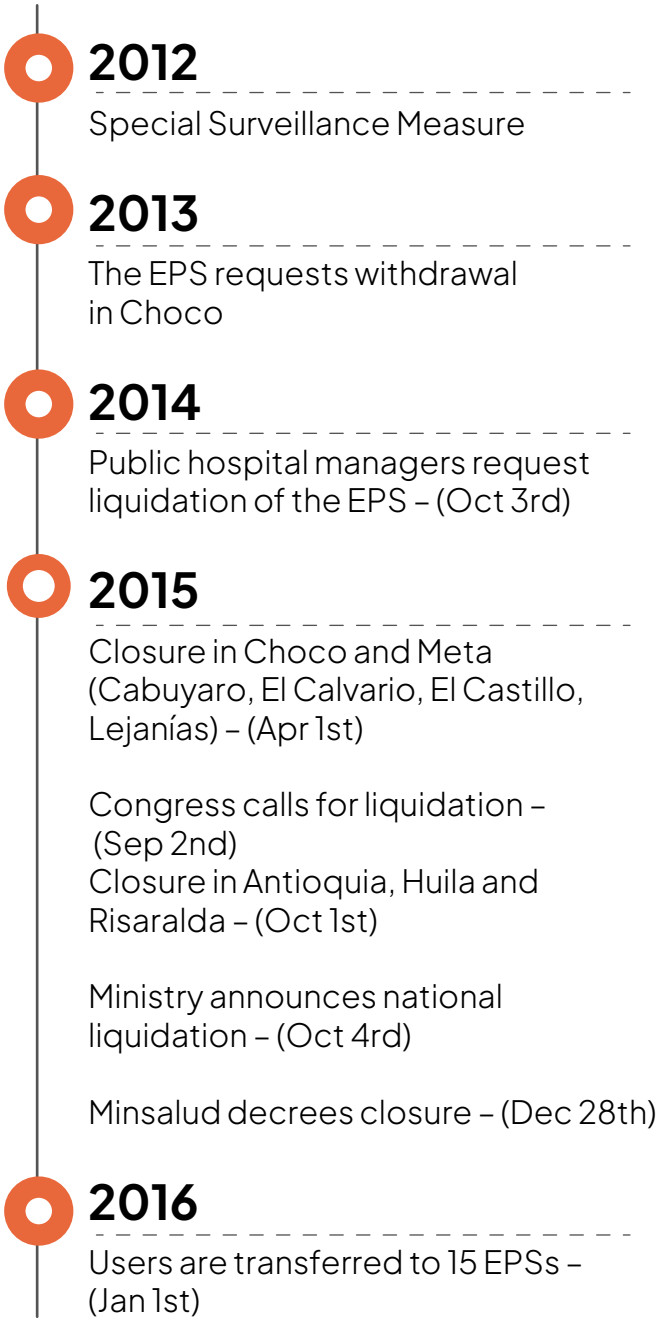
Several large EPSs in Colombia have faced liquidation in recent years, affecting millions of members. In 2015, the two major players in the system were liquidated. One, operating within the contributory regime, was primarily liquidated due to financial insolvency. Its members were transferred to another EPS within the same business group, maintaining similar administrative management (Duran and Jimenez, 2015).

Caprecom, the largest insurer operating within the subsidized regime, also faced liquidation in 2015. As illustrated in Figure 1, Caprecom experienced escalating financial difficulties starting in 2012, prompting Supersalud to initiate three special surveillance measures. These interventions continued in various forms over subsequent years, compounded by concerning health indicators such as elevated maternal mortality rates. By 2014, the situation had become increasingly untenable, leading public hospital managers to call for Caprecom's closure due to substantial outstanding debts owed to suppliers. The liquidation process began gradually in 2015, with services being terminated early in certain municipalities located in the departments of Chocó, Meta, Antioquia, Huila, and Risaralda. By the fourth quarter of 2015, the government announced Caprecom's definitive nationwide liquidation, formally decreed on December 28. On January 1, 2016, over 3 million affiliates of Caprecom were transferred to 15 different EPSs (Viceministerio de Protección Social).

Transferring over 3 million Caprecom members to other EPSs was a complex administrative process. The government established several criteria to organize the reallocation: First, the receiving EPS had to be located in the same municipality as the reallocated affiliates. Second, transfers were designed to maintain stable local market shares of affiliates, with preference given to insurers with higher ex-ante quality, according to the Ministry of Health (MinSalud) quality index. Third, EPSs under government intervention or voluntary withdrawal were excluded. Fourth, at least 60% of enrollees were to be assigned to private insurers. Finally, the distribution aimed to balance the assignment of patients with high-cost diseases across different EPSs.

The assignment of enrollees was randomized based on these criteria, requiring no administrative action from the individuals affected by the transfer (Presidencia de la República de Colombia, 2015).

Figure 1: Timeline of Events Leading to Caprecom's Liquidation



Note: The timeline was constructed using information from nationally disseminated newspapers, magazines, and web documents, as well as resolutions and declarations issued by State Entities such as the Health Superintendence.

3. Data, sample selection, and construction of congestion and quality Measures

Data Sources. We utilize two primary data sources. The first is the Individual Health Service Provision Registries (RIPS, acronym in Spanish). The RIPS serves as the minimum and primary dataset the Colombian health system utilizes for its administration (Ministerio de salud de Colombia, 2000). This information is reported by Health Service Provider Institutions (IPS, acronym in Spanish)[1] validated, and subsequently provided to the Ministry of Health and Social Protection of Colombia, which shared the databases for this research. All individual information is anonymized, with each person assigned the same anonymous identifier across all databases.

The RIPS databases are comprehensive, covering a wide range of health service provision categories. First, the consultations database records consultations across various specialties and health disciplines. Second, the procedures database includes all health interventions, both diagnostic and therapeutic, ranging from low to high complexity. Third, the emergency database contains detailed information on individuals who visited emergency room services and underwent observation. Fourth, the hospitalization database contains records of services provided at different levels of hospitalization, ranging from low-complexity services to intensive care units.

Our second primary source is the Single Database of Affiliates (BDUA, by its name in Spanish), which contains information on affiliates of insurers under the different regimes of the General Social Security Health System (Ministerio de de Salud y Protección Social, 2016). We use this database to determine each individual's EPS affiliation and municipality of residence during the observation period. By cross-referencing the BDUA with the RIPS data, we link health service utilization with individual characteristics.

While reporting RIPS data is mandatory for all healthcare providers in Colombia, the quality of the information can vary and often does not meet validation standards, especially for services provided to subsidized regime (SR) enrollees. Despite these issues, RIPS data remains the only available source for analyzing service utilization within this population. We performed additional validations to address data quality concerns, removing observations with extreme values, such as implausible birth dates. A notable limitation of this reporting system is the potential for under-reporting, particularly from smaller municipalities where information quality may be suboptimal. Results should be interpreted with this caveat in mind.

1. IPS includes clinics, hospitals, independent professionals, and other health service providers to members of the EPS.

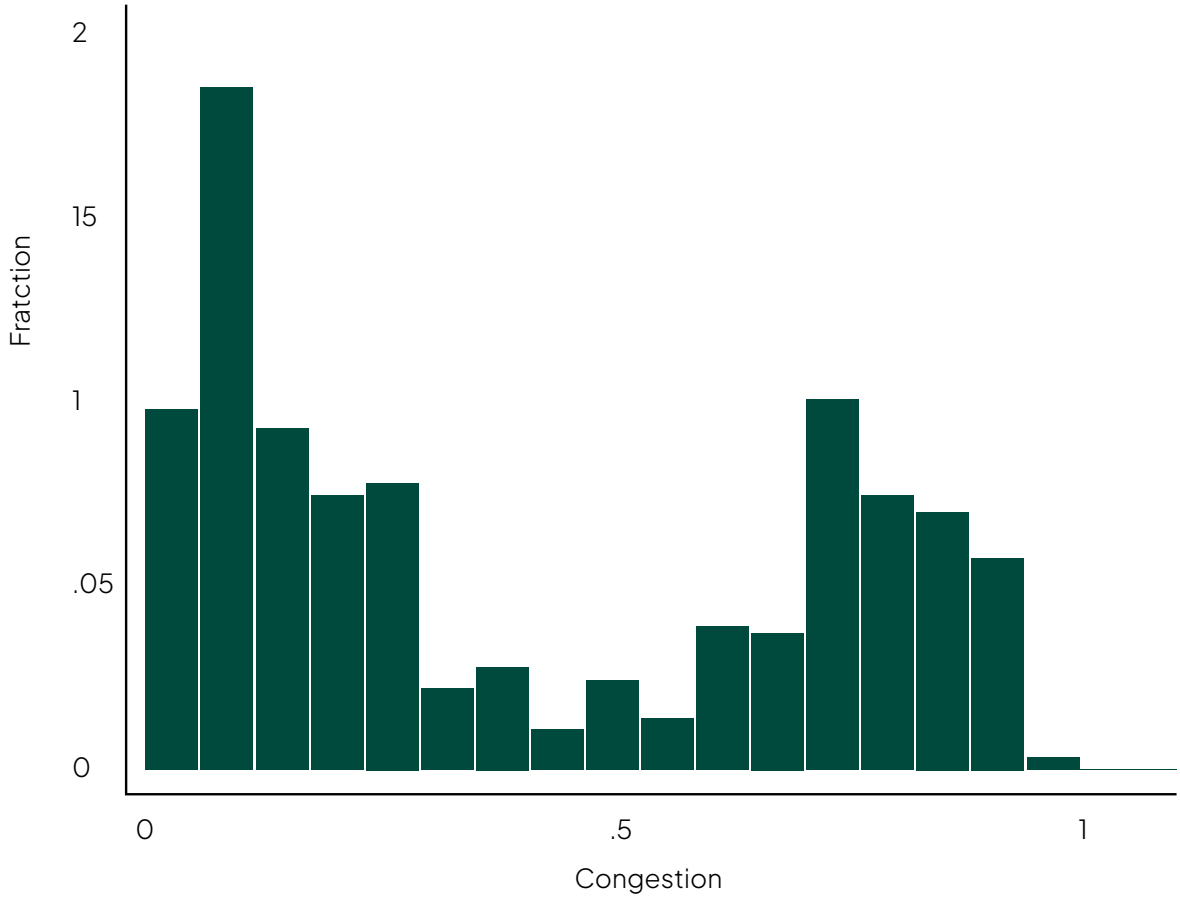
Sample Selection. We construct the sample based on insurer affiliation reported in the BDUA and RIPS data. The sample consists of individuals enrolled in Caprecom in 2015 and excludes those residing in departments that underwent early intervention.[2] Information is aggregated at the quarterly level for the period from January 2014 to December 2017. The sample includes approximately 1.2 million individuals per quarter.

Measuring Congestion. We cross-referenced the RIPS and BDUA databases to identify each individual's insurer affiliation for each year of observation. This allowed us to determine which users were affiliated with Caprecom in 2015 and their subsequent insurer affiliations in 2016. To measure the closure-induced congestion on receiving insurers, we calculated the ratio of Caprecom affiliates transferred to insurer i in municipality m to the total number of non-Caprecom individuals affiliated with that insurer in the same municipality in 2016.

Figure 2 illustrates the distribution of congestion levels. On average, the number of affiliates in a receiving insurer increased by 40% due to the intervention (with a median increase of 28%). In some cases, insurers more than doubled in size locally. Given the sudden and unexpected nature of these transfers, changes of this magnitude likely imposed a significant administrative burden on the receiving entities.

2. These include Chocó, Meta, Antioquia, Huila, and Risaralda (see subsection 2.2).

Figure 2: Distribution of Closure-Induced Congestion Levels by Receiving Insurers



Notes: Congestion is calculated as the ratio of Caprecom affiliates transferred to an insurer in a municipality relative to the total number of non-Caprecom individuals affiliated with that insurer in the same municipality in 2016. The data distribution extends beyond the graphed congestion ratio, but for visual clarity, the graph limits the variable to a maximum of 1.2.

Measuring Quality. In 2016, the Colombian Ministry of Health developed a satisfaction ranking to guide users in selecting their health insurer, focusing on effectiveness and efficiency (Escobar et al., 2016). This ranking was based on 44 indicators from the 2015-pre-intervention-EPS Services Evaluation Survey, categorized into three dimensions: Opportunity (20 indicators), User Satisfaction (16 indicators), and Access (8 indicators). Opportunity is defined as the user's ability to access necessary services without delays that could jeopardize their life or health. User satisfaction refers to the level of contentment experienced by the patient and their family regarding the health- care received, relative to their expectations. Access is defined as the user's capacity to utilize health services (Ministerio de Salud, 2002). The results were standardized, and an aggregate measure was constructed using varying weights for each indicator.

Building upon this, we construct a quality score for our study by calculating the mean across the three dimensions, giving equal weight to each (Opportunity, User Satisfaction, Access). This score is then used to establish a ranking, ordering insurers from highest to lowest, with the top score indicating the highest performer. As might be expected, Caprecom occupied the last position. For ease of interpretation, we create a binary variable classifying insurers scoring above the median as "high quality" and those below as "low quality" (refer to Table A.1 in the appendix).

Figure 3 illustrates the comparative service utilization rates between 2014 and 2017 for individuals transferred to high-quality insurers versus those who remained with low-quality insurers after Caprecom's closure. Utilization rates among Caprecom users nearly halted in the two quarters preceding the closure, as Caprecom ceased operations in several departments, complaints surged, and the insurer's future became uncertain.

Figure 3: Rate of Service Use of Caprecom Users: Pre and Post Transfer

Notes: Figure 3 illustrates data on Caprecom enrollees in 2015 who were subsequently transferred to other insurers due to Caprecom's liquidation. It does not include information on affiliates affected by earlier interventions. The dotted lines correspond to key announcements related to the liquidation process, as detailed in subsection 2.2. Specifically, the black dotted line represents the first quarter of 2015, the blue dotted line indicates the third quarter of 2015, and the red dotted line denotes the first quarter of 2016, following the transfer of Caprecom users.

The data also suggest that users who transferred to high-quality insurers in the first quarter of 2016 showed a stronger service utilization recovery than those who remained with low-quality insurers. A decrease in the service utilization rate in the second half of 2016 is observed, potentially linked to the intervention of a high-quality EPS that received many Caprecom users. This preliminary analysis suggests a potential relationship between insurer quality and health service utilization.

Finally, when analyzing the interaction between congestion and quality, we observe that the distribution of congestion levels varies according to the insurer's quality. High-quality insurers tend to exhibit a greater concentration at low levels of congestion. Conversely, low-quality insurers show a more even distribution of congestion levels, with a slightly higher concentration at high congestion levels (see Figure A.1 in appendix)

As shown in Table 1, the groups were balanced across age groups in 2014, before any formal closure announcements. However, there are significant differences in utilization rates pre-treatment between those transferred to high-quality insurers and those transferred to low-quality insurers, at least in terms of procedure frequencies and hospitalization rates (see the subsection 3 for a detailed discussion of the quality variable).

Table 1: Difference in Means - Baseline Balance (2014) by Quality of

	Receiving Insurers				
	Full Sample	**High Quality**	**Low Quality**	**Diff.**	**P-Val**
Demographics (%)					
Age [0, 24)	0.391	0.396	0.389	0.007	0.446
Age [25, 49)	0.331	0.331	0.331	0.001	0.940
Age [50, 74)	0.231	0.229	0.232	-0.003	0.779
Age ≥ 75	0.047	0.044	0.049	-0.005	0.491
Sex	0.416	0.425	0.411	0.014	0.001
Frequency (×1, 000)					
All Services	183.9	174.7	188.5	-13.9	0.055
Consultations	147.9	141.6	151.2	-9.6	0.108
Procedures	98.1	92.1	101.1	-9.1	0.031
Hospitalizations	5.4	4.8	5.7	-0.9	0.003
Emergencies	7.7	7.4	7.8	-0.4	0.552

Notes: Table 1 presents data from 2014 for Caprecom enrollees who remained with the insurer through- out 2014 and 2015. This data does not encompass information on affiliates affected by interventions before 2015.

4. Empirical Strategy

Our empirical strategy compares health service utilization rates, before and after the closure, for individuals affiliated with Caprecom in 2015 who were transferred to insurers with varying levels of quality and congestion. We analyze the impact of these transfers, leveraging detailed utilization data and the quasi-random assignment.

Econometric Specification. We exploit variation across receiving insurers (i), municipalities (m), and year-quarters (t). The dynamic specification is:

$$Y_{i,m,t} = \sum_{j \neq -1} \tau_j (\mathbf{1}\{j = t - t_0\} \times T_{i,m}) + \alpha_{i,m} + \delta_{m,t} + \varepsilon_{i,m,t}, \quad (1)$$

where $Y_{i,m,t}$ represents either the health service utilization rate—measured as the per capita number of times enrollees of insurer i use health services during period t. All individuals were affiliated with Caprecom during the pre-intervention period and became affiliated with receiving insurers post-closure. The term $j = t - t_0$ denotes the number of quarters since 2016q1, the first post-intervention period, with $1\{\cdot\}$ representing the indicator function. The last quarter of 2015 serves as the reference period.

The treatment variable $T_i \in \{C_{i,m}, Q_i\}$ refers to either congestion or quality. For congestion analysis, $C_{i,m}$ equals 1 for higher-congestion insurers within a municipality (above the national median) and 0 for lower-congestion insurers. For quality analysis, Q_i equals 1 for higher-quality insurers (above the median insurer quality) and 0 for lower-quality insurers. The terms $\alpha_{i,m}$ and $\delta_{m,t}$ are insurer-municipality and municipality- quarter fixed effects, respectively. $\alpha_{i,m}$ captures all time-invariant characteristics of the insurer within the municipality, while $\delta_{m,t}$ captures flexible municipality-specific time trends. Finally, $\varepsilon_{i,m,t}$ represents the error term. Standard errors are clustered by municipality and insurer-quarter levels.

The parameters of interest are the τ_j's. For $j \leq 0$, the estimated values allow us to verify the plausibility of the parallel trends assumption. For $j > 0$, the estimates capture the effect of being transferred to high- versus low-congestion (quality) insurers. In this analysis, all individuals are reallocated simultaneously, with variation arising from the characteristics of the insurers to which they are reassigned.

Triple Difference Specification. To examine the interplay between congestion and quality, we use a triple difference (DiDiD) strategy. The static specification is:

$$Y_{i,m,t} = \tau_1(Post_t \cdot Q_i) + \tau_2(Post_t \cdot C_{i,m}) + \tau_3(Post_t \cdot Q_i \cdot C_{i,m}) + \alpha_{i,m} + \delta_{m,t} + \varepsilon_{i,m,t}, \quad (2)$$

where the variables are defined as above. Here, Postt $\equiv 1\{t \geq 2016q1\}$ is a post- treatment indicator. The parameter $\tau 1$ captures the effect of quality when congestion is low; $\tau 2$ captures the effect of congestion within low-quality insurers; $\tau 1 + \tau 3$ captures the effect of quality when congestion is high; and $\tau 2 + \tau 3$ captures the effect of congestion within high-quality insurers. The parameter $\tau 3$ alone captures the differential effect of congestion between high- and low-quality insurers.[3]

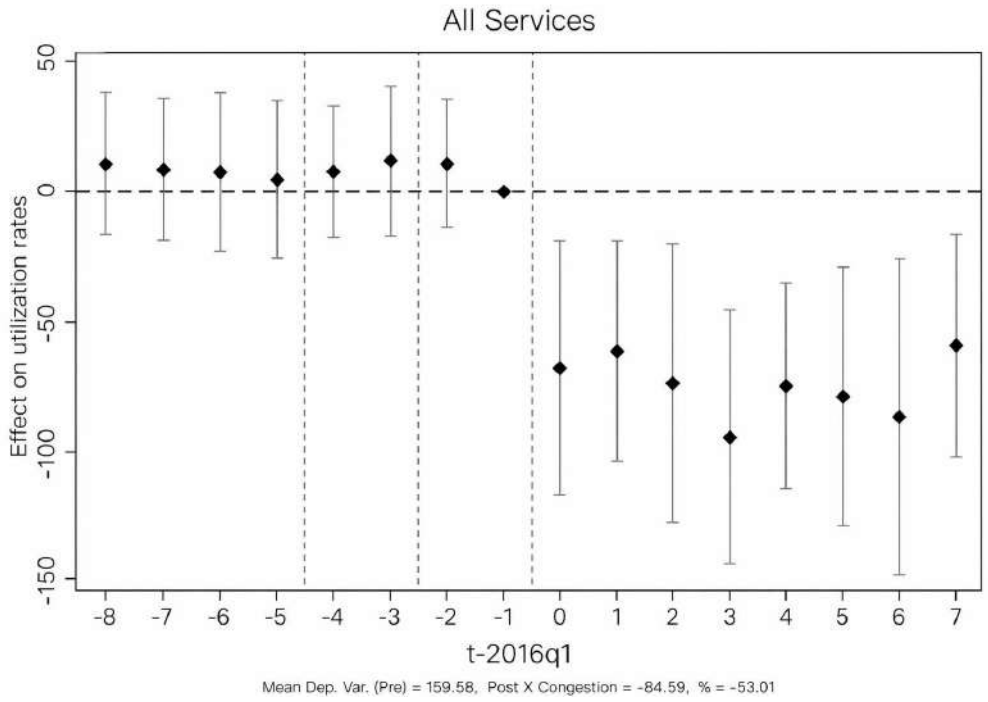
5. Results

5.1. Analysis of Caprecom users

Effects of Congestion on Healthcare Utilization. Figure 4 displays the estimates of the τj coefficients described in equation (1), with the treatment variable being the binary high-congestion indicator. Our findings reveal a significant negative effect on healthcare utilization rates for individuals transferred to insurers experiencing high closure-induced congestion compared to those transferred to low-congestion insurers. The average difference is approximately 84.59 services per thousand individuals per quarter. To provide context, the pre-intervention utilization rate among Caprecom users was 1 services per thousand individuals per quarter, making the estimated effect a decrease of about 53.1% relative to the baseline. The estimates indicate that this effect is immediate and persistent over time, with no signs of convergence up to two years post-intervention. Additionally, we find no evidence of differential pre-trends across the groups, suggesting that the identification assumption holds.

3. Alternatively, it captures the differential effect of quality between insurers experiencing high versus low closure-induced congestion.

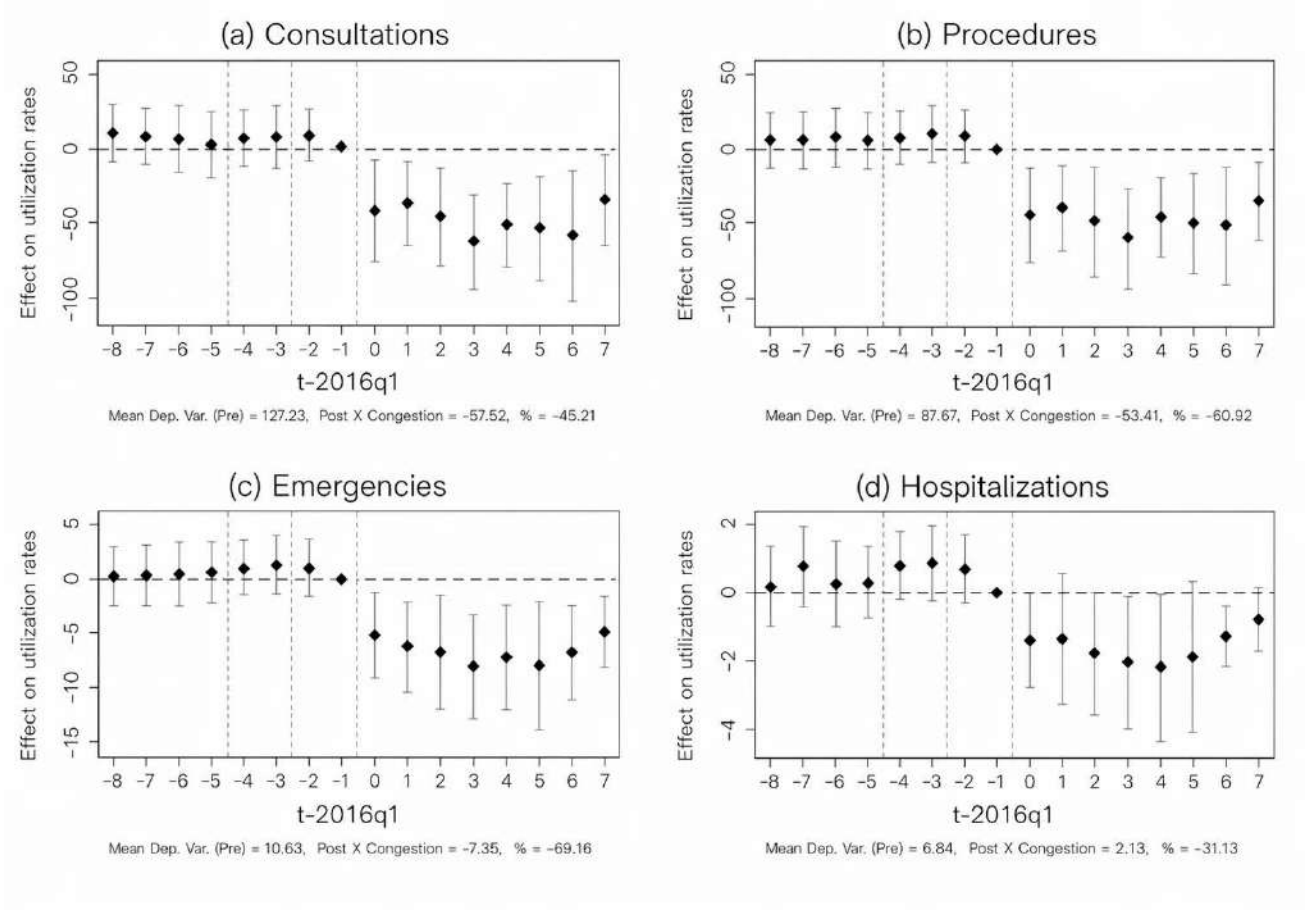
Figure 4: Effect of Congestion in Receiving Insurers on Service Use



Note: Standard errors are clustered at the municipality and quarter-insurer levels. The sample consists of Caprecom enrollees from 2015 who were later transferred to other insurers following Caprecom's liquidation. The variable 'all services' denotes whether a user received at least one service during the observation period, irrespective of its type. Service utilization rates are computed per thousand individuals per quarter.

Figure 5 presents the results for a similar specification but distinguishes service utilization by type: consultations, procedures, emergencies, and hospitalizations. The results remain qualitatively unchanged. Notably, procedures experienced the most substantial decline, with a 79.7% reduction compared to the pre-intervention baseline. Emergency services utilization fell by 68.2%, and consultations decreased by 60.6%. Hospitalizations were the least affected, with a 33.0% reduction, suggesting that individuals with acute healthcare needs continued receiving necessary hospital care despite potential administrative barriers. This finding is consistent with previous research on hospital congestion, which indicates that congestion does not significantly affect diagnostic practices (Balakrishnan and Soderstrom, 2000). Again, we find these effects persisted throughout the second year after Caprecom's closure, potentially indicating that insurers with high congestion were not able to adapt over time.

Figure 5: Effect of Congestion in Receiving Insurers on Service Use by Type



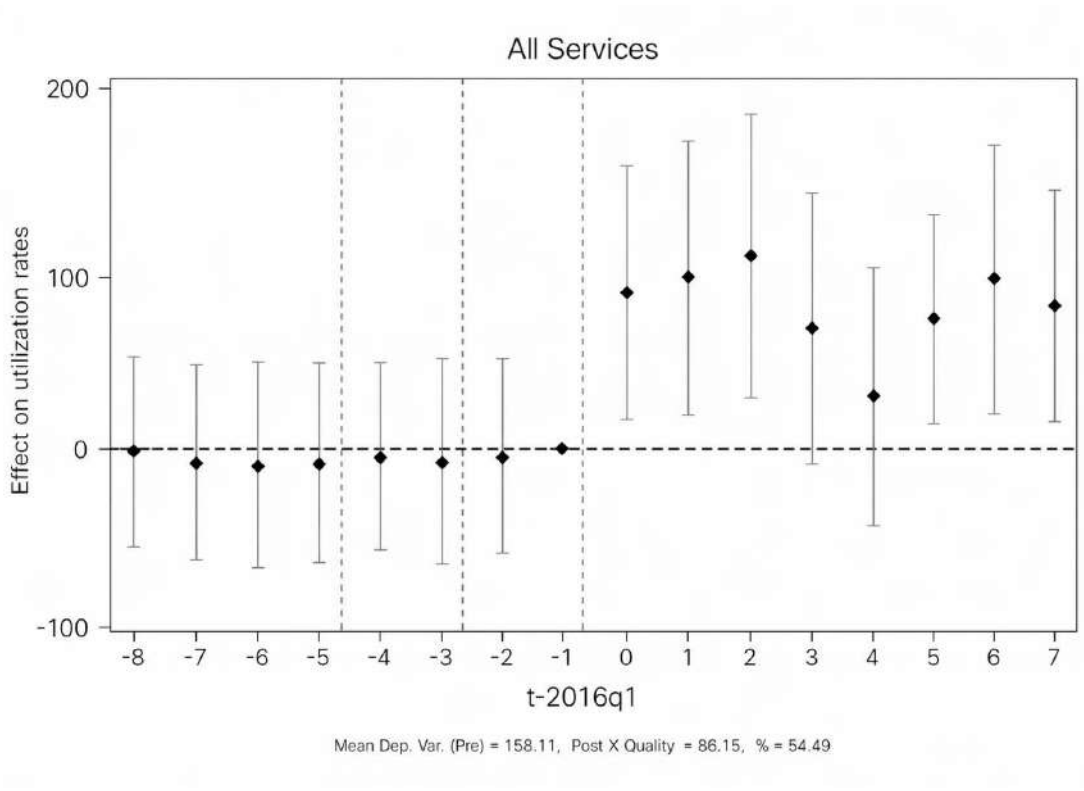
Note: Standard errors are clustered at the municipality and quarter-insurer levels. The sample comprises Caprecom enrollees from 2015 who were subsequently transferred to other insurers following Caprecom's liquidation. Service utilization rates are calculated per thousand individuals per quarter, stratified by type of health service.

We find that healthcare utilization increased significantly among individuals who, following the closure of Caprecom, continued to receive services from providers that had previously delivered a higher concentration of care to Caprecom affiliates. Specifically, when post-intervention care was delivered by providers with strong pre-existing ties to Caprecom—measured as those with a high share of Caprecom-related service volume prior to the closure—service use increased by approximately 139.16% relative to the pre-intervention period (see A.4). This result suggests that continuity in the provider network plays a critical role in mitigating disruptions to care following large- scale insurer exits. The findings point to the potential value of maintaining established provider-patient relationships during administrative reallocations, especially in fragmented health systems where information and coordination costs are high.

Effects of Quality on Healthcare Utilization. Our findings reveal a significant positive effect on healthcare service utilization for individuals transferred to higher-quality insurers compared to those transferred to lower-quality insurers. As shown in Figure 6, individuals who moved to better ex-ante performing insurers have utilization rates that are, on average, 86.15 services per thousand individuals higher, representing a 54.5% increase relative to baseline rates.

Although persistent, the results suggest that utilization rates began converging in the third and fourth quarters after the intervention but diverged again afterward. A detailed inspection of the data shows that this pattern is primarily explained by a single high-quality insurer that received a large number of Caprecom users. Further investigation reveals that this insurer was temporarily intervened by Supersalud during the quarters where utilization rates converged. While we cannot definitively attribute the temporary convergence to this intervention, the pattern is consistent with interventions having an adverse impact on utilization.

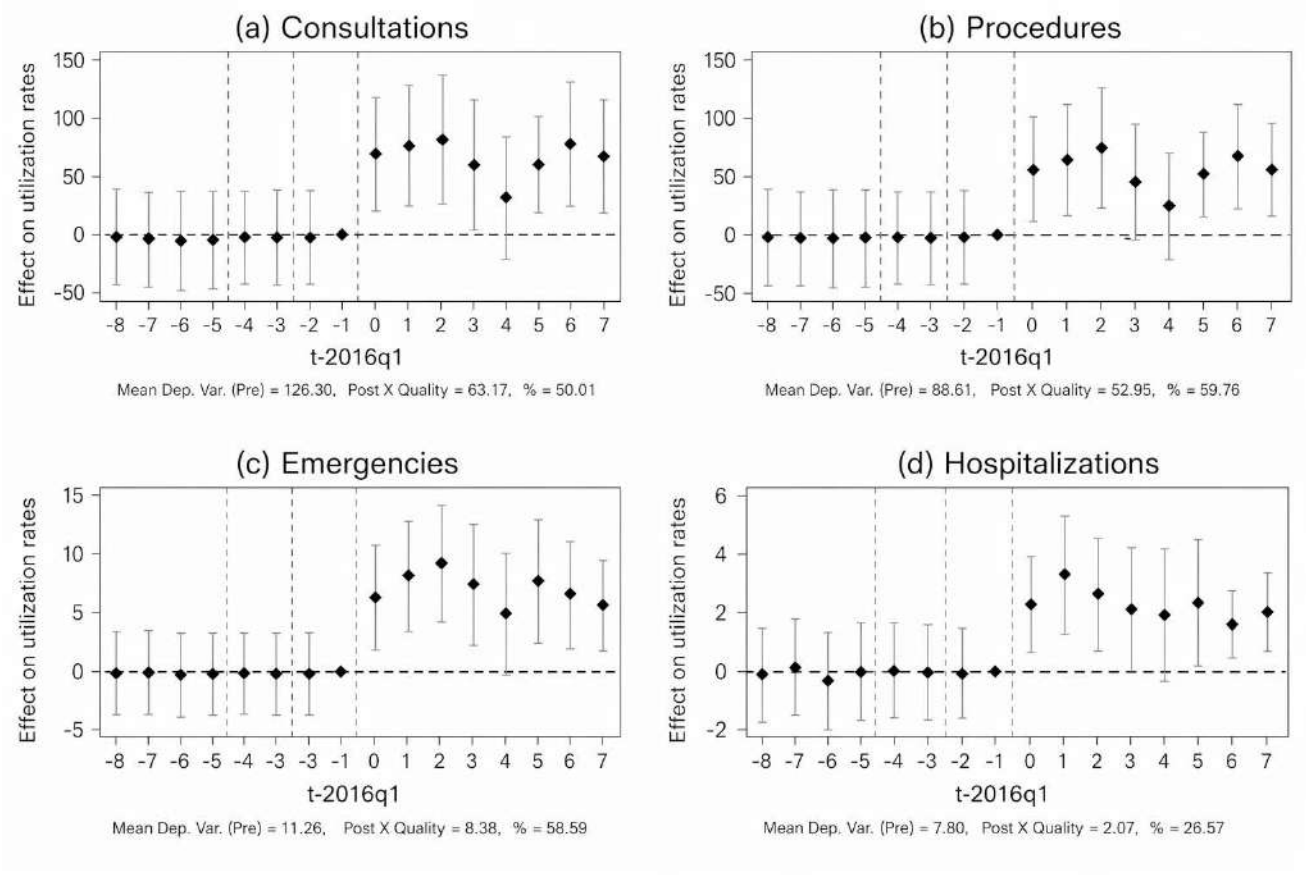
Figure 6: Effect of Quality of Receiving Insurers on Service Use



Note: Standard errors are clustered at the municipality and quarter-insurer levels. The sample consists of Caprecom enrollees from 2015 who were later transferred to other insurers following Caprecom's liquidation. The variable 'all services' denotes whether a user received at least one service during the observation period, irrespective of its type. Service utilization rates are computed per thousand individuals per quarter.

The effect of quality is consistent across various types of health services. Procedures were most affected, experiencing a 59.76% increase, indicating that this service type is particularly sensitive to changes in insurance status. Emergency room observation stays also increased significantly, by 56.6%. Consultations followed with a 50.0% increase. Hospitalizations were least affected, showing a 26.6% increase, with the difference becoming non-significant after the first half of 2016.

Figure 7: Effect of Quality of Receiving Insurers on Service Use by Type



Note: Standard errors are clustered at the municipality and quarter-insurer levels. The sample comprises Caprecom enrollees from 2015 who were subsequently transferred to other insurers following Caprecom's liquidation. Service utilization rates are calculated per thousand individuals per quarter, stratified by type of health service.

Interaction Between Congestion and Quality. One of the most striking findings of our study is the relationship between congestion and quality. When analyzing the effect of quality conditional on the congestion level of the receiving insurer, we found no significant differences in health service utilization between those transferred to high-quality versus low-quality insurers within the low-congestion group (see Table 2). However, among individuals transferred to high-congestion insurers, those assigned to high-quality insurers exhibited a substantial 74.0% increase in healthcare service utilization (116.6 services per thousand individuals per quarter, compared to a pre- intervention baseline of 67.1) relative to those assigned to low-quality insurers. This suggests that the importance of quality is magnified in high-congestion scenarios.

This pattern persists across various health service types. While we observed no significant effect of quality on any service type among individuals transferred to low- congestion insurers, those transferred to high-congestion, high-quality insurers experi enced significant increases in procedures (81.09%), consultations (69.57%), and emergency room stays (48.19%) compared to those transferred to high-congestion, low- quality insurers. Notably, hospitalizations showed no significant differences, indicating that it is the least sensitive service type to the quality-congestion interaction.

Examining the effect of congestion conditional on insurer quality revealed that congestion is particularly detrimental when quality is low. While high congestion within high-quality insurers did not lead to significant changes in utilization, high congestion within low-quality insurers was associated with a substantial 76.8% decrease in health services utilization (121.07 services per thousand individuals per quarter, compared to a pre-intervention baseline of 157.58). The negative effect of congestion within low- quality insurers persisted across all service types.

Table 2: Triple Difference: Effect of Congestion and Quality on Service Use

	Dep. Var.: Utilization Rates				
	All Services	**Procedures**	**Consultations**	**Hospitalizations**	**Emergencies**
Post × Quality (τ_1)	-1.224	-3.205	2.790	0.733	1.955
	(28.384)	(20.589)	(19.827)	(0.980)	(1.785)
Post × Congestion (τ_2)	-121.068***	-77.821***	-82.791***	-2.109***	-6.758***
	(17.054)	(12.352)	(12.202)	(0.466)	(1.041)
Post × Quality × Congestion (τ_3)	117.873**	74.586**	84.890**	0.891	3.363
	(51.491)	(35.719)	(33.827)	(1.574)	(2.707)
Derived Effects					
$\tau\_1 + \tau\_3$	116.65***	71.38***	87.68***	1.62	5.32***
	(42.94)	(28.69)	(27.91)	(1.21)	(2.04)
$\tau\_2 + \tau\_3$	-3.20	-3.24	2.10	-1.22	-3.39
	(44.66)	(30.17)	(29.13)	(1.40)	(2.47)
Observations	58,012	58,012	58,012	58,012	58,012
Mean Dep. var.	157.58	88.03	126.04	7.79	11.04
Fixed Effecs					
Municipality-Quarter FE	Yes	Yes	Yes	Yes	Yes
Municipality-Insurer FE	Yes	Yes	Yes	Yes	Yes

Note: Standard errors are clustered at the municipality and quarter-insurer levels. The sample consists of Caprecom enrollees from 2015 who were later transferred to other insurers following Caprecom's liquidation. Service utilization rates are computed per thousand individuals per quarter, discriminating by type of health service. Note 2 : (1) $\tau 1$: Effect of quality when congestion is low. (2) $\tau 2$: Effect of congestion within low- quality insurers. (3) $\tau 1 + \tau 3$: Effect of quality when congestion is high. (4) $\tau 2 + \tau 3$: Effect of congestion within high-quality insurers.

Overall, our findings suggest that quality mitigates the adverse effects of congestion on healthcare service utilization, aligning with research on hospital settings that demonstrate a similar impact on health outcomes (Yu et al., 2020). This mitigating effect of quality is particularly pronounced in high-congestion environments, indicating that higher-quality insurers may possess the capacity to effectively manage congestion, thereby preventing negative impacts on their members' utilization of healthcare services. Moreover, the effects are more pronounced for services typically requiring insurer authorization, such as procedures and consultations, while the impact on hospitalizations is less pronounced. Notably, the significant and unexpected results observed for observation room stays warrant further investigation.

5.2. Robustness analysis

To explore the robustness of our findings, we conducted additional analyses within the sample of Caprecom users. Specifically, we reran the proposed econometric specifications using a continuous measure of congestion as the variable of interest. The results of these analyses corroborate the findings presented in the previous subsections. We observed a consistent 69.69% decrease in service utilization among users transferred to insurers with higher levels of congestion compared to those with lower levels (see Figure A.2 in the appendix). Furthermore, disaggregating the analysis by service type revealed a general decline in utilization across all types of services for those transferred to insurers with higher levels of congestion (see Figure A.3 in the appendix).

6. Final remarks

Government interventions in the health insurance sector, particularly liquidations, require careful consideration and execution. Although the liquidation of low-quality insurers may be well-intentioned, the complexities of such processes can negatively impact members. Our analysis demonstrates that the resulting congestion within the health system plays a detrimental role. Paradoxically, efforts to protect members' rights and improve access can inadvertently harm them, as congestion leads to reduced service utilization.

Insurer quality is crucial for both the continuity of patient care and effective congestion management. While access and utilization are distinct concepts (Liu et al., 2006), our results suggest that high-performing insurers foster greater access, evidenced by higher utilization rates among transferred Caprecom members. Consequently, resources should be prioritized toward these high-performing entities. As efficiency in healthcare becomes increasingly critical, directing resources towards quality improvement at all levels of health systems is imperative to achieve desired health outcomes while meeting user needs and expectations. This emphasis

on quality is particularly crucial in high- congestion scenarios, where it emerges as a primary management tool.

The closure of insurers ultimately leads to declines in health service utilization. Our findings indicate that users directly affected by the Caprecom liquidation and subse- quently transferred to other insurers experienced significant and persistent decreases in service utilization, even two years post-liquidation. This suggests that despite efforts by receiving insurers and the government, these users continued to face barriers to accessing care, potentially impacting their health outcomes.

Strategies are needed to encourage individuals to choose high-performing insurers while ensuring the continuity of high-quality practices. Although the Caprecom liquidation was conducted randomly, without users being able to choose their receiving insurer, our results demonstrate the positive effects of affiliating with high-performing insurers. Consistent with other studies, providing public information promoting affiliation with these insurers while encouraging their good performance is crucial (Stolper et al., 2019). While some research suggests that publicizing the quality of institutions like hospitals could lead to increased congestion and deterioration of quality (Lin et al., 2023), our findings indicate this may not always hold for insurers. High-quality insurers can effectively manage the potential adverse effects of congestion.

*

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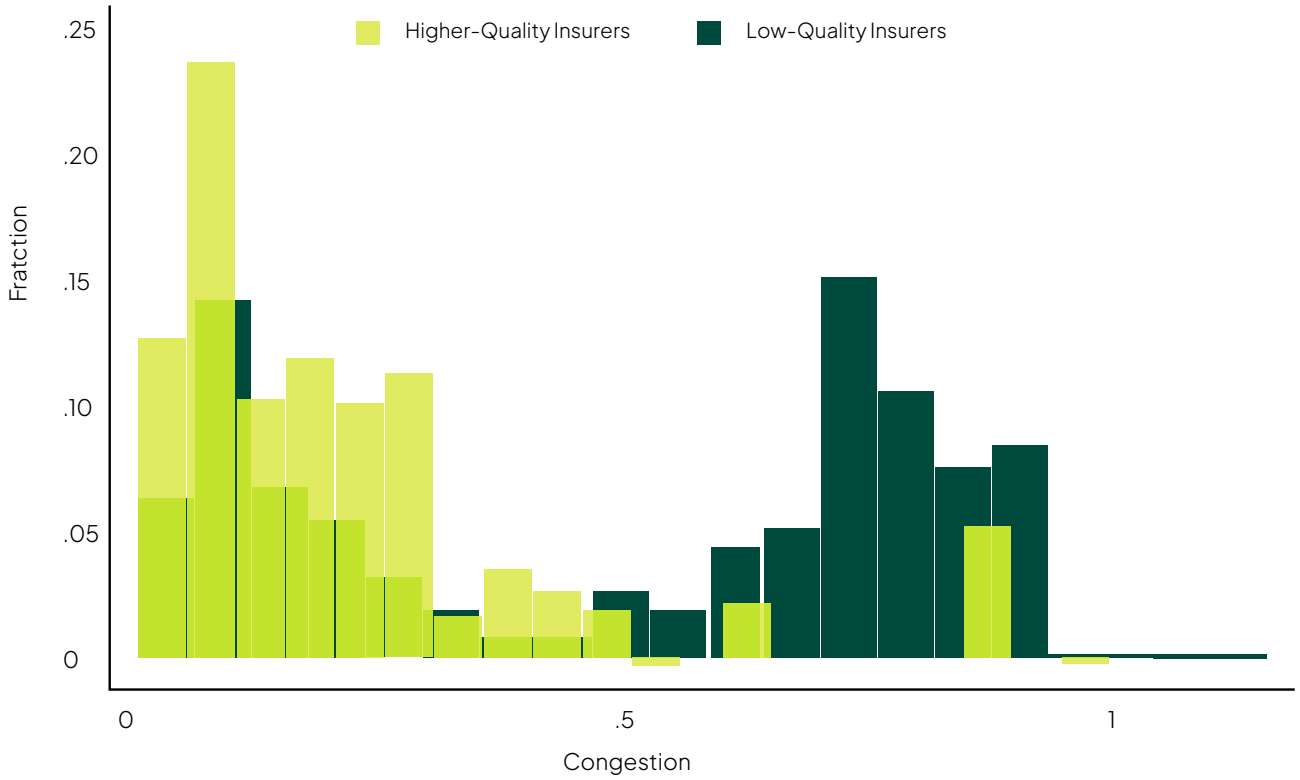
Appendix

Table A.1: Performance Ranking

Insurer	Affiliates	Caprecom affiliates	Relative to affiliates	Category receiver	Access	Opportunity	Satisfaction	Total	Ranking	Quaity
Eps 6	1,939,193.6	151,595	7.82	1	72.90	76.90	75.70	75.17	1	1
Eps 22	1,091,876.6	913	0.84		73.90	58.90	68.80	67.20	5	1
Eps 9	1,405,041.6	63,243	4.50	1	70.80	67.80	76.90	71.83	2	1
Eps 19	1,486,920.8	9,407	6.33		60.00	70.20	54.80	61.67	9	1
Eps 10	993,722	51,659	5.20	1	74.50	59.40	74.00	69.30	4	1
Eps 13	631,197.06	45,435	7.20	1	65.70	67.90	75.90	69.83	3	1
Eps 8	1,775,314.4	87,721	4.94	1	57.10	65.00	66.10	62.73	7	1
Eps 3	1,812,471.8	28,65	15.65		56.80	63.40	69.00	63.07	6	1
Eps 17	3,720,039.5	187,28	5.03		54.60	62.80	70.40	62.60	8	1
Eps 18	1,550,169.5	10,895	0.70		58.20	52.90	66.70	59.27	11	1
Eps 20	19,047.5	6,176	3.14		63.00	46.00	62.90	57.30	13	1
Eps 23	118,224.59	643	0.54		66.80	37.80	76.20	60.27	10	1
Eps 12	550,723.56	45,782	8.31	1	63.50	50.90	62.70	59.03	12	1
Eps 7	1,147,371.9	141,548	12.34	1	56.90	54.00	57.00	55.97	16	0
Eps 16	1,716,062.58	19,634	11.44		55.50	57.80	54.70	56.00	15	0
Eps 21	635,553.5	1,447	0.23		56.40	56.70	56.20	56.43	14	0
Eps 2	355,772.88	625,406	17.58	1	45.50	55.10	56.80	52.47	18	0
Eps 11	2,856,416.3	48,396	1.69	1	44.90	44.30	46.40	45.20	23	0
Eps 4	1,918,982.9	198,012	10.32	1	54.20	50.30	57.80	54.10	17	0
Eps 15	106,607.25	21,335	20.01	1	46.40	39.00	57.90	47.70	19	0
Eps 5	185,660.29	17,573	9.47	1	50.70	45.70	37.70	44.70	24	0
Eps 25	264,440.75	181	0.07		52.80	50.30	36.90	46.67	21	0
Eps 24	151,504.25	216	0.14		61.40	43.60	31.50	45.50	22	0
Eps 14	490,120.25	22,433	4.58	1	43.40	41.30	56.90	47.20	20	0
Eps 1	326,758.15				32.90	54.90	24.70	37.50	25	0

Notes: The table presents the information used to calculate the ranking and performance of the insurers analyzed.

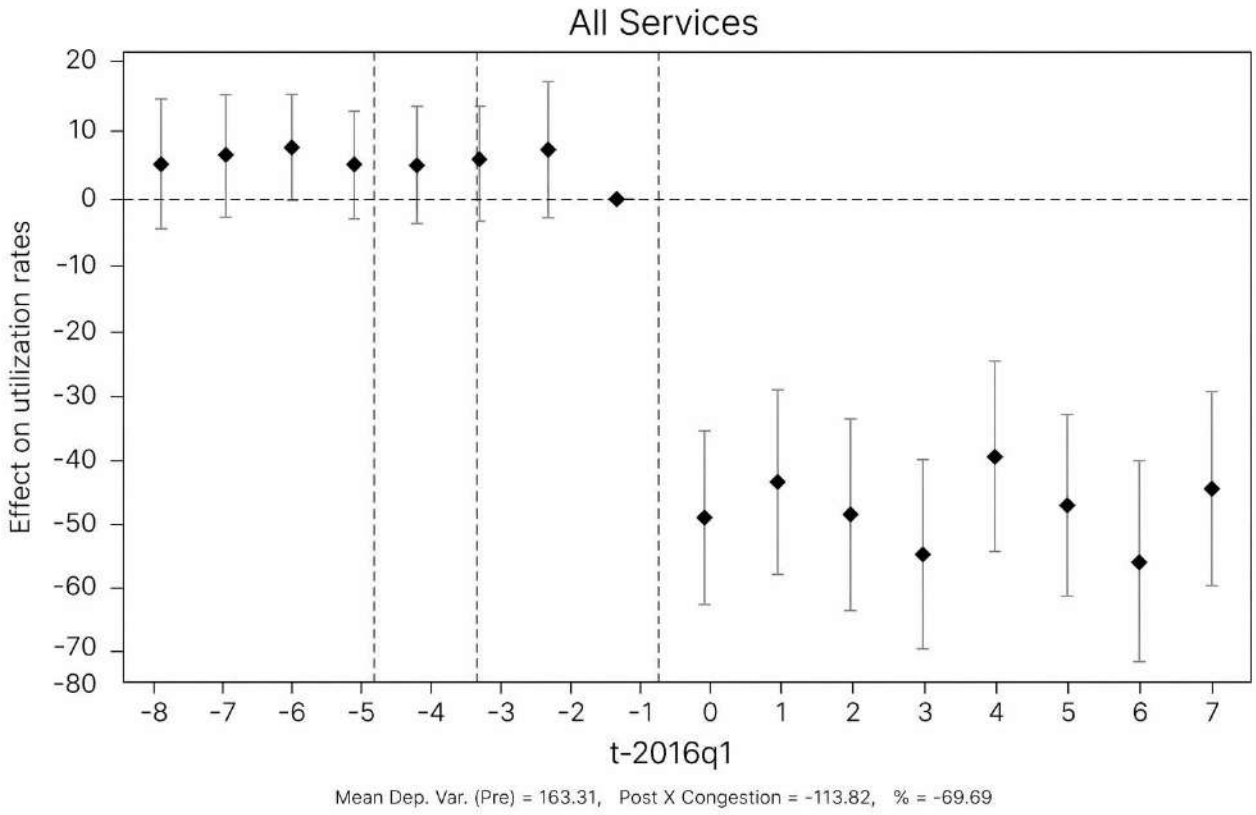
Figure A.1: Distribution of Closure-Induced Congestion Levels among Receiving Insurers, Stratified by Quality



Note: Congestion is calculated as the ratio of Caprecom affiliates transferred to an insurer in a municipality relative to the total number of non-Caprecom individuals affiliated with that insurer in the same municipality in 2016. The distribution is further analyzed by stratifying according to the quality classification of the receiving insurer. While the actual data distribution extends beyond the displayed congestion ratio, the graph is capped at a maximum of 1.2 for enhanced visual clarity.

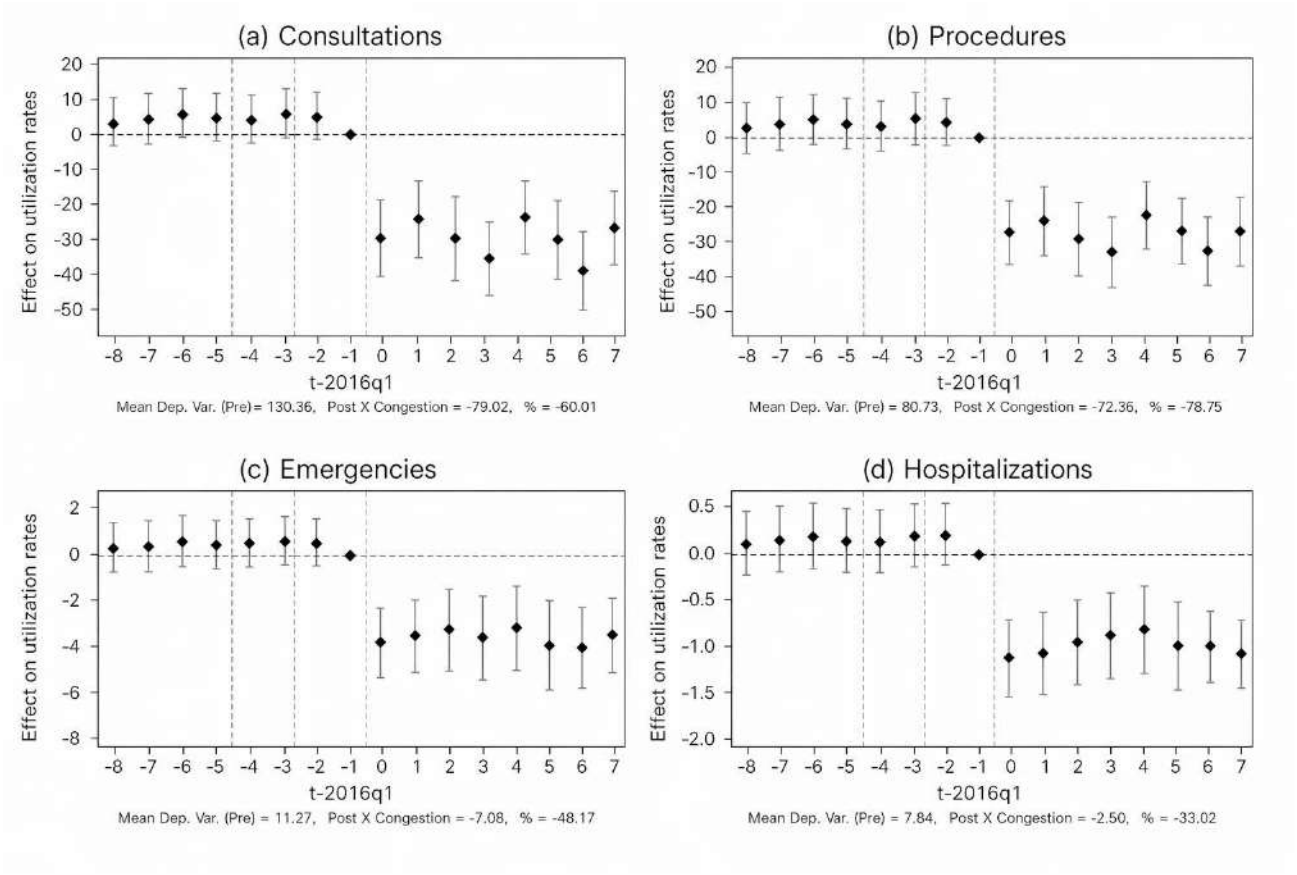
Figure A.2: Effect of Congestion in Receiving Insurers on Service Use, Continuous Measure

Note: Standard errors are clustered at the municipality and quarter-insurer levels. The sample consists of Caprecom enrollees from



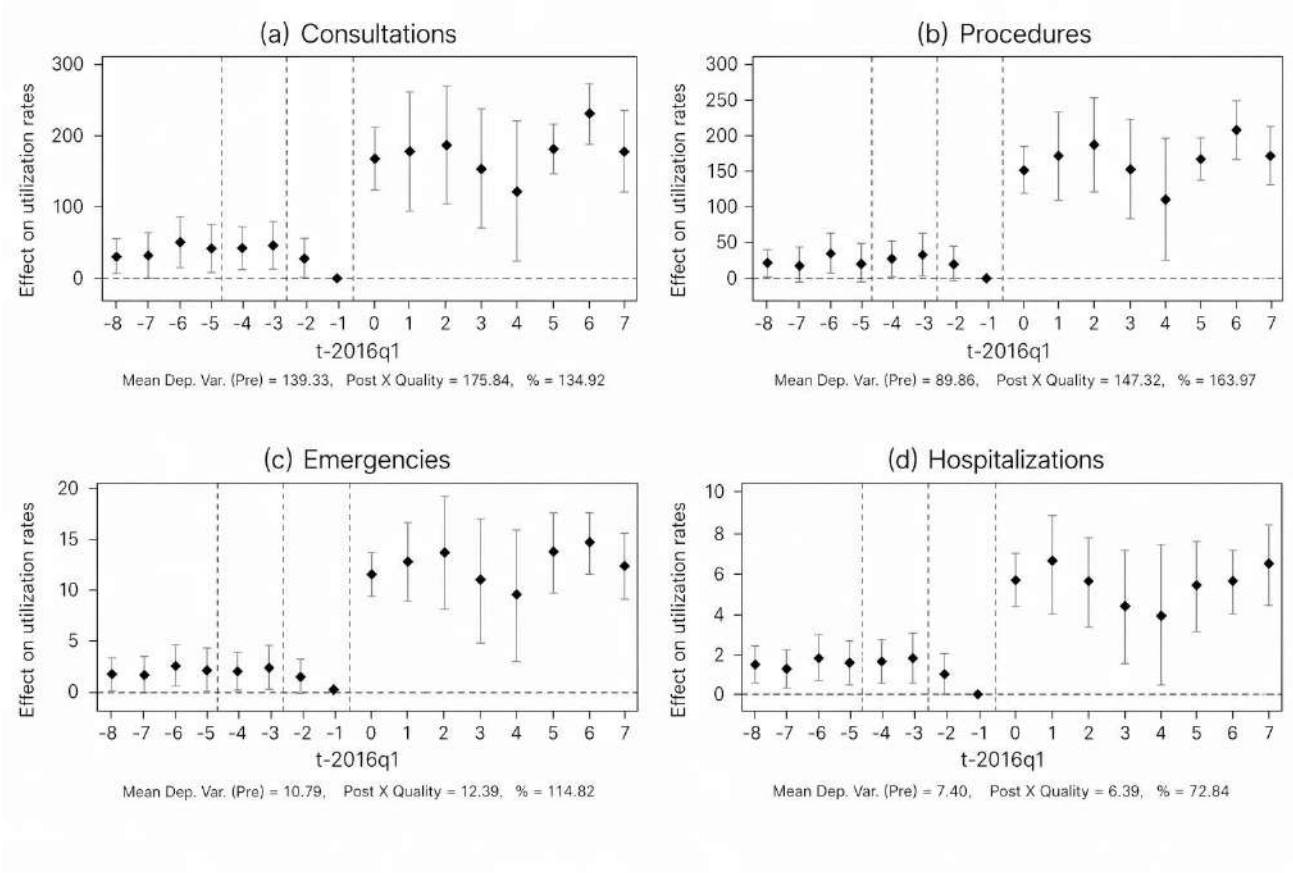
2015 who were later transferred to other insurers following Caprecom's liquidation. The variable 'all services' denotes whether a user received at least one service during the observation period, irrespective of its type. Service utilization rates are computed per thousand individuals per quarter.

Figure A.3: Effect of Congestion in Receiving Insurers on Service Use by Type, Continuous Measure



Note: Standard errors are clustered at the municipality and quarter-insurer levels. The sample comprises Caprecom enrollees from 2015 who were subsequently transferred to other insurers following Caprecom's liquidation. Service utilization rates are calculated per thousand individuals per quarter, stratified by type of health service.

Figure A.4: Effect of Continuous Prior Network Engagement in Receiving Insurers on Service Use by Type, Continuous Measure



Note: Standard errors are clustered at the municipality and quarter-insurer levels. The sample comprises Caprecom enrollees from 2015 who were subsequently transferred to other insurers following Caprecom's liquidation. Service utilization rates are calculated per thousand individuals per quarter, stratified by type of health service.

Universidad Icesi | PROESA Centro de Estudios en Protección Social y Economía de la Salud

Universidad Icesi - Building B, 2nd Floor
Calle 18 # 122 - 135, Cali - Colombia
Phone: +60 (2) 555 2334 EXT: 8074
Email: contacto@proesa.org.co
www.icesi.edu.co/proesa