

# Generosity vs. sustainability: The Case of the Colombian Health System in Bogota\*

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## Abstract

This study examines the impact of offering a more comprehensive range of health services to the insured population on health services utilization and the public expenditure per patient. I leverage a Colombian health system reform that gradually allowed more than half of its affiliates to access a more generous health plan over time. Using a difference-in-differences model, I identify the effect by comparing the patterns of healthcare utilization and associated public expenditure per patient between eligible and ineligible individuals before and after the reform. I obtain three main results. First, individuals exposed to more generous health plans exhibit, on average, higher utilization of health services across outpatient, emergency, and hospitalization settings compared to non-eligible individuals. It is not possible to disentangle whether the increase in utilization is attributed to moral hazard or improved access to care. Second, the availability of more services creates incentives for both patients and healthcare personnel. While the eligible population attends more outpatient consultations, medical personnel perform more intrahospital admissions for eligible individuals compared to non-eligible ones. Additionally, the utilization of procedures, particularly those related to imaging and clinical laboratory tests, increases for the eligible population. Third, I find no significant differences in public expenditure per patient resulting from the performance of procedures and consultations per patient, highlighting the importance of effective fee negotiation among insurers and providers.

**JEL Codes:** I11; H51

**Keywords:** Healthcare, health insurance, service utilization, universal coverage, public expenditure on health.

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# 1 Introduction

Universal health coverage (UHC), one of the sustainable development goals (SDGs), entails providing equitable access to the comprehensive health services that the population requires throughout their lives, free from financial hardship ([Organización Panamericana de la Salud \(OPS\), 2023](#)). It encompasses three dimensions: inclusion of more people, expansion of priority services, and reduction of out-of-pocket expenses ([World Health Organization, 2014](#)). Most countries concentrate on expanding health insurance coverage while ensuring access to a wide and sufficient number of services remains a significant challenge ([Feyisa and Feyisa, 2022](#)). This is due, among other things, to the obstacles they face in achieving broad coverage in social security and controlling financial costs ([Banerjee et al., 2021](#)). One example is the Affordable Care Act (ACA), also known as Obamacare, which aimed to increase coverage and reduce care costs. By improving access to preventive care services, the ACA expected earlier intervention to mitigate chronic diseases' severity ([Manchikanti et al., 2017](#); [Rosenbaum, 2011](#)). However, studies have shown it ultimately increased health insurance costs for the US population ([Haislmaier and Slagle, 2021](#); [Skinner and Chandra, 2016](#); [Butler, 2016](#)).

This scenario highlights the significant tension between efforts to achieve universal coverage and sustaining health systems, considering the three dimensions of UHC. Much of the existing literature focuses on the inclusion of more people in health systems and reducing out-of-pocket expenses; however, the tradeoff has been less explored when the service basket expands. As progress is made towards universal health coverage and access through increased enrollment, both public and private insurance plans expand the service packages available to their members. However, these two processes do not always occur simultaneously ([Báscolo et al., 2018](#)). Following the theory of marginal utility, it is plausible that as healthcare consumption increases, the additional benefit derived from each additional care unit decreases ([Ghorbani and Ghorbani, 2021](#); [Schafermeyer, 2000](#)). This phenomenon could lead to variations in service utilization patterns and potentially increase public health expenditure.

In this study, I analyze the effects of offering a more generous health plan to the insured population on health services utilization and the associated public expenditure per patient. To do this, I leverage a Colombian health system reform that took place between 2009 and 2012, during which the health service basket was gradually expanded for 52.48% of the Colombian health system affiliates.<sup>1</sup> Due to an unanticipated court order, the health plans of the two main health insurance regimes in the country have been unified according to age cohorts. This process has allowed a significant proportion of the population to access more health services, thus improving conditions for users with a less generous health plan. The gradual and progressive implementation of the reform over time provides an opportunity to compare utilization patterns and associated

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<sup>1</sup>Calculation based on data from [Comisión de Regulación en Salud \(2010\)](#)

public expenditure per patient among eligible individuals and those who were not, before and after the reform.

Employing a difference-in-differences design, I undertake two primary analyses. First, I examine the reform’s effect on the frequency of health service utilization, focusing on consultations (outpatient and emergency), procedures (disaggregated by the setting of care: outpatient, emergency, and hospitalization), and inpatient management (hospitalizations and stays in observation emergency rooms). Second, I investigate the reform’s effect on public expenditure per patient, specifically attributable to the utilization of consultations and procedures. Public expenditure per patient is calculated as the frequency of service use multiplied by the reported unit cost of each service.

For this study, I use individualized administrative data from healthcare records provided in Bogota between 2010 and 2014. I focus on individuals aged 57 to 62 in 2011. This age group is of particular interest because individuals aged 60 and over became eligible for a broader range of health services in 2011, while those aged 57 to 59 gained eligibility in 2012. Furthermore, individuals in this age range can make informed decisions regarding their healthcare utilization. Despite the Colombian health system comprising two main health regimes—one based on demand subsidies and the other on contributions by affiliates—I concentrate on individuals enrolled in the subsidized healthcare regime. This selection facilitates the isolation of the reform’s impact and ensures a comparable group, given that the subsidized regime was directly affected by the reform, unlike the contributory regime.

I find three main results. First, extending the health plan to insured individuals increases service utilization among eligible individuals compared to their non-eligible counterparts. The provision of a more comprehensive health plan incentivizes eligible individuals to attend outpatient consultations more frequently, resulting in an average increase of 12.47% (equivalent to 0.0109 additional consultations per patient per month, from a mean of 0.0876 visits). However, there are no significant differences in emergency consultations between the groups. Furthermore, not only does the frequency of healthcare service visits increase, but the performance of healthcare procedures also rises among eligible individuals by an average of 43.81% (0.1016 procedures per patient per month, from a mean of 0.232), with significant increases observed across all care settings.

Second, the expanded health plan appears to influence patient and healthcare personnel behavior. The decision-maker varies depending on the service setting: patients typically decide to seek emergency services and first-level outpatient services, while the decision to refer to hospital services and perform procedures primarily rests with healthcare personnel ([Montero Pérez, 2020](#)). As previously noted, eligible patients increase their utilization of outpatient services when a broader range of services is available. Moreover, medical personnel are more likely to admit eligible patients for inpatient services, such as observation stays in emergency departments and hospitalization, compared to non-

eligible individuals.

Specifically, eligible individuals exhibit an 18.73% increase in observation stays (0.0006 additional stays per patient per month, from a mean of 0.0032) and a 43.60% increase in hospital admissions (0.0006 additional hospitalizations per patient per month, from a mean of 0.0014). This is accompanied by an increase of 29.47% in the use of ambulatory procedures (0.0413 additional procedures per patient per month, from a mean of 0.140), a 55.17% increase in emergency procedures (0.0168 procedures per patient per month, from a mean of 0.0304) and a 70.95% increase in hospitalization procedures (0.0435 procedures per patient per month, from a mean of 0.0613).

In general, the findings suggest a complementary effect between care settings, mainly in outpatient and in-hospital settings. Despite a notable increase in procedures across different care areas, the study’s results and limitations make it difficult to determine the relationship between emergency services and other areas due to the unique considerations in emergency care, such as patient decisions to seek care and medical staff decisions about observation.

Most of these results reveal a strong association between the type of procedure performed and utilization patterns. Overall, the registered increase in procedures among eligible individuals applies to both pre-existing and newly covered services, indicating a potential shift in provider incentives. While imaging and clinical laboratory procedures show a significant differential increase, surgical procedures and collective health promotion and risk management interventions remain relatively unchanged.

Notably, when comparing utilization patterns between eligible and non-eligible patients with chronic and/or high-cost conditions, the former experienced increases in procedure utilization, although these differences were smaller than those observed in patients without such conditions. Conversely, when comparing frequent users of healthcare services, there were no substantial differences in utilization between eligible and non-eligible individuals. This may be attributable to their ability to access services before the reform and establish their consumption patterns.

Third, despite the overall increase in service utilization, I find no significant differences in public health expenditure per patient between eligible and non-eligible individuals. This contrasts with previous literature reporting general increases in public health expenditure following expansions of health insurance schemes ([Tarazi, 2015](#); [Finkelstein, 2007](#)). However, when simulating a scenario without fee negotiation, I observe increases in public expenditure among eligible individuals. This finding suggests that insurers’ commitment to their role as healthcare service purchasers, through effective contracting mechanisms, has successfully mitigated the potential negative impact of increased service utilization on individual public health expenditure for procedures and consultations.

This paper intersects with the literature that explores the relationship between in-

creases in health coverage, health service utilization, and public expenditure on health. Several studies have addressed health coverage through the lens of health insurance affiliations. Numerous articles have shown that greater insurance coverage increases the use of preventive medicine, which improves well-being and reduces public expenditure on health, particularly that related to curative actions ([Gustafsson-Wright et al., 2018](#); [Camacho and Ortiz, 2017](#)). Other batches of studies have addressed coverage in terms of out-of-pocket spending. Regarding ex-post moral hazard (e.g., unnecessary emergency room visits or overuse of health services), it has been identified that higher insurance coverage, usually accompanied by a reduction in out-of-pocket spending, not only allows people to access treatments they could not otherwise afford but also, in some cases, incentivizes potential increases in moral hazard behaviors, leading to potential increases in utilization and public expenditure on health ([Finkelstein et al., 2019](#)). A less explored area in the literature is the analysis of coverage related to the increases in the number of services available. In this field, the present study presents a contribution to the literature.

The literature has reported variations in the use of health services and public expenditure on health, depending on the care setting. In general, in contexts where insurance coverage changes, increases have been observed in the use of outpatient services ([Finkelstein et al., 2012](#); [Baicker et al., 2013](#); [Wherry and Miller, 2017](#)). However, no significant changes have been observed in the use of emergency services ([Sommers et al., 2016](#); [Finkelstein et al., 2019](#)) and the evidence on hospitalization is mixed ([Wherry and Miller, 2017](#); [Gutierrez and Pettit, 2020](#); [Finkelstein et al., 2012](#)). Furthermore, this study contributes to the literature by offering a discussion on attendance and the performance of procedures in different care settings.

This document contains six sections, including this introduction. The second section describes the economic, social, and political context in which the quasi-experimental design takes place and presents the conceptual framework on which the study is based. The third section presents an overview of the data used in the analysis. The fourth section describes the identification strategy employed. The fifth section presents the results of the empirical estimates and explores potential mechanisms for the observed findings. Finally, the sixth section concludes with a discussion of the results and their implications.

## 2 Institutional Background

In this section, I first provide general information about the Colombian health system. Second, I explain the unification of health plans, which enables the proposed analysis. Third, I present a conceptual framework containing the initial hypotheses for the analyses to be conducted in this study and its bibliographic support.

## 2.1 The Colombian Healthcare System

The Colombian healthcare system is a public system primarily composed of two regimes: the Contributory Regime, which requires monthly contributions from individuals and their employers (most of whom are employed in the formal sector), and the Subsidized Regime. The Subsidized Regime is based on the free provision of services (total subsidies) or the payment of minimum contributions to access them (partial subsidies). It is available to citizens who are unemployed or considered informal workers. By 2009, 91.04% of the population was affiliated with the Colombian health system, with historically close to 50% of affiliations falling under the Subsidized Regime ([Calderón Alberto Agudelo et al., 2011](#)).

The Colombian healthcare system operates under a managed competition model of health insurance. This model is characterized by a regulated market for health insurance, where insurers, known as Health Promoting Entities (EPSs), play a crucial role in organizing the provision of health services ([Vargas et al., 2010](#)). In this context, the Colombian government defines the services included in the health plan for each specific regime. EPSs must guarantee the population's health insurance coverage in subsidized and contributory regimes. This implies controlling the provision of comprehensive, efficient, timely, and quality care by healthcare service providers ([Ministerio de de Salud y Protección Social, 2023](#)). EPSs must also have minimum financial, technical, and quality capabilities to operate correctly and manage the risk of their affiliates ([Congreso de la República de Colombia, 2011](#)).

Each EPS receives a per-policyholder premium, known as the Capitation Payment Unit (UPC), to ensure coverage of its services. The UPC is determined based on demographic factors and, in some cases, geographical location. This payment unit finances health services and technologies included in the health plan ([Ministerio de Salud y Protección Social, 2010](#)). Regardless of whether private or public, all EPSs receive uniform capitation payments from the government, with the specific amount varying depending on the regime to which the policyholder belongs. When an EPS operates in a municipality, it must allow enrollment to an applicant; therefore, it is unlikely to select insured individuals. The Colombian healthcare system is supported by a quality assurance system.<sup>2</sup> The National Superintendence of Health (known as Supersalud) serves as the entity responsible for surveillance, inspection, and control within the healthcare system ([Ministerio de Protección Social, 2006](#)). Its functions include receiving complaints about the provision of services and imposing sanctions on all actors in the healthcare system. These sanctions may include liquidating entities such as EPSs if they do not meet the minimum requirements to operate correctly.

To ensure service provision for their members, the EPSs contract healthcare services with private sector providers and public hospitals, as stipulated in the health plan

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<sup>2</sup>The Mandatory System for the Guarantee of Quality of Health Care of the General Social Security System in Health (SOGCS, its acronym in Spanish) aims to improve healthcare outcomes.

(Guerrero et al., 2011). While Colombia lacks explicit regulation of health service rates, two manuals have emerged as benchmarks for negotiations between insurers and providers (Bardey and Castaño, 2007). Notably, the Mandatory Traffic Accident Insurance (SOAT, acronym in Spanish) tariff manual<sup>3</sup> is mandatory for Public providers to use when billing. Private providers have the discretion to choose their contracting tariffs. However, in the absence of a contract with insurers, private providers generally bill using the SOAT tariff, with prices adjusted annually based on the minimum wage (Consejo nacional de seguridad social en salud, 1996).

## 2.2 Unification of Healthcare Plans

Until 2008, the Contributory Regime (CR) health plan offered more comprehensive coverage than the Subsidized Regime (SR), with the latter containing only about 43% of the health services available to those in the CR.<sup>4</sup> Meanwhile, the SR provided homogeneous health plan services to all affiliates, with some exceptions for specific age groups. The hospitalization and outpatient care services were based on the regime’s specific plan definitions and contents (Consejo Nacional de Seguridad Social en Salud, 2008). However, both before and after 2009, initial emergency care—referring to the actions necessary to stabilize the patient, make a diagnosis, and define their immediate destination for treatment (Ministerio de Salud y Protección Social, 2013)—usually completed within twelve (12) hours (Hospital Universitario San Ignacio, 2023), included all necessary activities, procedures, and interventions for both CR and SR patients. After this initial period, access to emergency services became similar to that of hospitalization and outpatient consultation, meaning it was restricted. This seemingly unrestricted access during initial care made emergency services attractive to users.

In 2008, a constitutional ruling, not anticipated by citizens, mandated the unification of health plans for both regimes, leading the national government to develop a progressive plan between 2009 and 2012 that gradually increased the number of health services for the SR population. This created a crucial exogenous variation factor for identifying the effects of increasing the available health services for SR-affiliated individuals categorized by age cohorts. The affiliation requirements for the subsidized and contributory regimes remained unchanged after the health reform of 2011, while the benefits package offered by the Subsidized Regime was expanded. The transition occurred in 2011 for people over 60, while the entire population gained access to broader coverage in 2012. Despite these changes, there were no alterations in the attention received during initial emergency care. This continuity in the provision of emergency care services, despite the health plan unification, provides reassurance that emergency services were still expected to be minimally impacted regarding visit frequency and procedures performed.

<sup>3</sup>calculates the cost of health services for victims of traffic accidents, natural disasters, terrorist attacks, initial emergency care, and other catastrophic events

<sup>4</sup>Own calculation based on the definitions of agreement 008 of 2009 and its technical annex number 2, which lists the procedures with the Single Classification of Health Procedures, CUPS, coding included in the RC.

### 2.3 Expected Effects of the Reform

The findings reported in the literature on coverage allow me to formulate hypotheses on the expected results of the present study. First, the wider basket of services offered by health plans may lead to increases in outpatient consultations and procedures. Studies have shown that increased health insurance coverage is associated with increased healthcare utilization, particularly outpatient visits. In the United States, for example, expanding coverage led to more frequent use of outpatient services, (Tarazi, 2015), particularly outpatient visits, mainly preventive ones (Finkelstein et al., 2012; Baicker et al., 2013; Wherry and Miller, 2017). Similar trends were observed in Colombia with the implementation of the subsidized regime, which offers health insurance coverage mainly to poor individuals (Miller et al., 2013), and with free access to health services for pregnant women and children under one year of age (Camacho and Ortiz, 2017).

Second, in hospitals' emergency departments, the expansion of insurance coverage generally does not result in reported changes in consultation rates. Studies conducted in the United States found no significant effects on emergency room visits when health insurance coverage increased (Finkelstein et al., 2012; Baicker et al., 2013; Wherry and Miller, 2017; Sommers et al., 2016; Finkelstein et al., 2019). In contrast, in Colombia, the removal of restrictions on accessing healthcare services for pregnant women and children under one year of age led to a reduction in the use of these services (Camacho and Ortiz, 2017). This suggests that the subsidized regime's health plan expansion may decrease emergency consultations due to the increased availability of outpatient services and the opportunity cost associated with emergency department visits. Patients with non-critical conditions might be directed to outpatient services if their clinical condition is not deemed severe citePines2011, Jiang2020. Regarding the performance of procedures in the emergency room, the prevailing hypothesis is that no significant effects are expected, as all procedures required by the patient in initial emergency care were already included before the reform (see subsection 2.2).

The evidence on the effect of increasing health coverage on hospitalizations is mixed. Studies in the United States like Wherry and Miller (2017) and Gutierrez and Pettit (2020) report significant increases in hospitalizations as health insurance enrollment increases with the expansion of Medicaid coverage, whereas Finkelstein et al. (2012) and Baicker et al. (2013) find no significant effects related to the Oregon Health Insurance Experiment. This aligns with findings in Colombia after implementing the subsidized regime (Miller et al., 2013). In contrast, Camacho and Ortiz (2017) find reductions in hospitalizations when free services are included for pregnant women and children under one year of age. Therefore, the absence of changes or fewer emergency room visits in increased health services might lead to fewer hospital admissions (Kolstad and Kowalski, 2012). However, increased outpatient visits could also lead to unchanged or even increased hospital admissions (Ansari et al., 2006; Jiang et al., 2006; Mahmoudi et al., 2020). This ambiguity makes formulating a precise hypothesis difficult, especially

considering the physician’s discretion in hospitalization decisions ([Milne et al., 2015](#); [Mahmoudi et al., 2020](#)).

Finally, the literature suggests a positive association between increased health insurance coverage and higher public expenditure on health. This is particularly true for the spending generated by the use of hospitalization services, as evidenced by research in the United States ([Tarazi, 2015](#); [Finkelstein, 2007](#)). Similarly, studies in Colombia examining the inclusion of more services in the public health plan of the contributory regime estimated an increase in public expenditure ([Riascos and Camelo, 2015](#)). Therefore, expanding available health services for members of the subsidized regime is likely to generate higher public expenditure on health.

### 3 Data and Sample Selection

Four databases of the Individual Health Service Provision Records (RIPS, acronym in Spanish) are used for this study. The RIPS constitute the minimum and basic data set the Colombian health system uses for its administration ([Ministerio de salud de Colombia, 2000](#)). This information is reported by the Health Service Provider Institutions (IPS, acronym in Spanish).<sup>5</sup> The information is validated on a platform and presented to the Ministry of Health and Social Protection of Colombia, which shared the databases for this study. This is individual information; each person has the same anonymous identifier in all databases.

The databases are classified into four service provision categories. First, the consultations database encompasses records of consultations by different specialties and health disciplines. For this analysis, consultations are disaggregated into outpatient and emergency visits. Second, the emergency database contains information about individuals who visited emergency room services and were placed under observation. Third, the hospitalization database contains records of services provided at different levels of hospitalization, ranging from low-complexity services to intensive care units. Fourth, the procedures database includes all health interventions, both diagnostic and therapeutic, with records of low to high complexity. This database covers interventions in all three settings: outpatient, emergency, and inpatient care, but the procedures are disaggregated accordingly.<sup>6</sup> Importantly, the consultation and procedure databases also provide the reported fees for service provision. This variable is multiplied by the frequency of use to calculate public health expenditure per patient.

For this study, I focus on healthcare provided in Bogota, the Colombian capital, which offers more reliable healthcare information than other regions. While health-

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<sup>5</sup>IPS include clinics, hospitals, independent professionals, and other entities that provide health services to affiliates of the EPS

<sup>6</sup>Outpatient procedures refer to services provided without requiring an overnight hospital stay. Emergency procedures are those performed when a patient seeks emergency care and is either discharged or kept under observation in the emergency department. Inpatient procedures encompass all those performed once a patient is admitted to any hospitalization service, regardless of the level of complexity.

care providers are required to report data to the RIPS, the quality of this information often falls short of validation standards, particularly regarding health services provided to Subsidized Regime (SR) affiliates. Despite these limitations, the RIPS data remains the only source for analyzing health service utilization within the subsidized regime.

The study’s scope is further delimited to the subsidized regime (SR) as these affiliates were exposed to a broader range of services following a significant healthcare reform. This targeted focus allows for a more precise comparison of individuals with similar socioeconomic characteristics, thereby highlighting the distinct impact of the reform on healthcare service utilization and its associated public expenditure on health. Additionally, by using the same anonymous individual identifier, I cross-reference the dataset with the Single Database of Affiliates (BDUA, by its name in Spanish) to obtain users’ birth years, a crucial variable for generating age cohorts.

Implementing the reform generated an exogenous variation, so the cohort facilitating the effect analysis was those aged 60 and over in 2011. Eligibility for unification was defined by four age groups across four distinct periods. However, given that some individuals under 60 were children or adolescents, not all could independently make healthcare decisions. Those under 60, these individuals were incorporated in 2012, when the unification process was completed, and the entire population had access to the same service plans. For this reason, I used data from people aged between 57 and 62 in 2011, born between 1949 and 1954. Those 60 years old or over were eligible for the reform, while those under 60 initially were not, becoming eligible only in July 2012. Due to the substantial influence of age on healthcare utilization, a three-year gap between cohort groups was chosen to minimize potential age-related disparities in the analysis.

I construct a panel dataset that contains information from January 2010 to December 2014. Data from earlier periods are excluded due to quality limitations. For the ‘frequency of use’ variable, I calculate the number of times each individual accessed a health service, categorized by database and care setting. Given that the reported information is conditional on actual service utilization, missing values are imputed as zero for periods without a record of the individual using health services. This imputation also implies zero public expenditure in those periods.

The panel dataset comprises a total of 1,890,900 observations for 31,515 individuals. Of these, 693,330 observations correspond to the “pre-phase” period before November 2011. This analysis focuses exclusively on observations with reported sex, recognizing that men and women may exhibit different healthcare utilization patterns due to physiological and pathological variations. Table 1 presents summary statistics of individuals who utilized healthcare services, categorized by each RIPS database. Overall, the observable characteristics—such as sex, frequency of use, and public expenditure on consultations and procedures per patient—appear similar in the pre-intervention period between individuals included in the 2011 unification program and those not eligible.

For individuals born before 1951 and those born after, procedures exhibit the highest frequency of utilization, with a difference of 0.026 procedures per individual per month between the two groups. This is followed by outpatient consultations, where the difference is 0.011 consultations per individual per month. No significant differences are found in the average frequencies of utilization for emergency consultations, stays in observation rooms, or hospitalizations.

Several data gaps limit the analysis’s scope and the results’ generalizability. Notably, the need for more information on medication use, medical supplies, and health technologies helps the understanding of overall public expenditure. Additionally, the absence of data on the types of contracts between insurers and providers restricts my ability to analyze how this relationship influences public expenditure on health. Finally, as this study relies on administrative data from Bogotá, the capital city, it is essential to acknowledge that Bogotá’s healthcare system dynamics may differ from those in other regions, particularly those with predominantly rural populations. Bogotá often has a more significant number of insurers and providers, potentially leading to higher service utilization frequencies than areas with fewer options. Therefore, the results may not be fully generalizable to cities or regions with different healthcare landscapes.

Table 1: Descriptive statistics

| Baseline characteristics (Phase-pre: Before November 2011) |                              |           |                              |           |
|------------------------------------------------------------|------------------------------|-----------|------------------------------|-----------|
|                                                            | Year of birth = 1949 to 1951 |           | Year of birth = 1952 to 1954 |           |
|                                                            | Mean                         | SD        | Mean                         | SD        |
|                                                            | (1)                          | (2)       | (3)                          | (4)       |
| <i>Individual-level Variables</i>                          |                              |           |                              |           |
| Observations (N)                                           | 312,576                      |           | 380,754                      |           |
| Sex (Men)                                                  | 44.57%                       |           | 44.59%                       |           |
| Frequency use of outpatient consultations                  | 0.094                        | 0.497     | 0.083                        | 0.494     |
| Frequency use of emergency consultations                   | 0.010                        | 0.149     | 0.010                        | 0.146     |
| Frequency stays in emergency                               | 0.003                        | 0.073     | 0.003                        | 0.070     |
| Frequency stays in hospitalization                         | 0.001                        | 0.049     | 0.001                        | 0.046     |
| Frequency use of procedures                                | 0.246                        | 3.815     | 0.220                        | 3.391     |
| Frequency use of procedures (Laboratories)                 | 0.113                        | 1.843     | 0.100                        | 1.716     |
| Frequency use of procedures (Imaging)                      | 0.013                        | 0.227     | 0.012                        | 0.215     |
| Frequency use of procedures (Quirurgical)                  | 0.011                        | 0.207     | 0.010                        | 0.209     |
| Frequency use of procedures (Other non-quirurgical)        | 0.030                        | 0.565     | 0.027                        | 0.486     |
| Frequency use of procedures (community health)             | 0.001                        | 0.016     | 0.001                        | 0.017     |
| Expenditure on consultations                               | 2,535.57                     | 104,242.7 | 1,977.44                     | 50,045.71 |
| Expenditure on procedures (Ambulatory)                     | 8,805.85                     | 793,882.8 | 5,657.091                    | 501,014.5 |
| Expenditure on procedures (Emergency)                      | 1,941.503                    | 343,269.3 | 1,505.385                    | 110,235.9 |
| Expenditure on procedures (Hospitalization)                | 4,066.967                    | 478,758.8 | 2,341.99                     | 255,771.4 |

Table 1 presents the descriptive statistics. Public expenditures per patient, derived from the utilization of consultations and procedures, are presented in current Colombian pesos. The sample used in the first and second columns includes all patients aged 60 to 62 years in 2011. The sample used in columns three and four includes patients aged 57 to 59 years in 2011.

## 4 Empirical Strategy

The empirical strategy that allows me to identify the effect of increasing the availability of health services on health utilization and expenditure is to compare patterns of eligible and ineligible individuals before and after the reform. Given the richness of the data and the exogenous variation derived from the gradual implementation of the unification of health plans, it is possible to compare the patterns of service utilization and individual public expenditure on the health of people between 60 and 62 years old in 2011, with those who were not exposed initially, that is, people between 57 and 59 years old in 2011.

For this analysis, I employ a difference-in-differences (DID) approach to estimate how increasing the number of health services affects healthcare utilization frequencies and public expenditure per patient. The model for this analysis is presented below:

$$Y_{it} = \beta_1(EligibilityXPost_{it}) + \alpha_i + \gamma_t + \varepsilon_{it}. \quad (1)$$

The variable  $Y_{it}$  represents the utilization of health services, measured as the number of times individual  $i$  receives healthcare during the month  $t$ . In some cases, it may also represent the public expenditure per patient derived from consultations and procedures by individual  $i$  in period  $t$ . Eligibility for the new reform depends on the individual's date of birth and the observation period. Then, the variable  $EligibilityXPost_{it}$  takes a value of 1 if individual  $i$  was born between 1949 and 1951 (i.e., was 60 years or older in 2011) and received healthcare between November 2011 and December 2014; or if individual  $i$ , regardless of their date of birth (i.e., was between 57 and 62 years old in 2011), received healthcare between July 2012 and December 2014. Individuals who do not meet these criteria receive 0 in the variable. The terms  $\alpha_i$  and  $\gamma_t$  capture the individual and time-fixed effects, respectively, and  $\varepsilon_{it}$  is the error term.

The parameter of interest,  $\beta_1$ , allows me to identify the change in service utilization patterns and individual public expenditure after the unification of health plans. While the study data only includes information from healthcare users, a treatment-on-the-treated (ToT) analysis is still appropriate. Although the reform affected the entire population, including non-users of health services, it is reasonable to assume that the effect on this group is null. Even if non-users were included in the analysis, the results would stay the same because their observed values would be zero. In this specific case, the intention-to-treat (ITT) estimate is equivalent to the ToT estimate, and the effect can be directly derived from  $\beta_1$ .

The evidence strongly supports the assumption of parallel trends, bolstering the application of difference-in-differences methodology. Given the similarity in characteristics between individuals eligible for the health plan unification in 2011 and those who were not, it is reasonable to assume that frequencies of use followed similar trends in the

absence of the reform. Figure 1 (see appendix) illustrates the trend of frequencies of use across three phases: pre-phase (encompassing all periods until October 2011), intra-phase (spanning from November 2011 to June 2012; eligibility for additional services for those aged 60 and over), and post-phase (following July 2012). During the pre-phase, average use frequencies followed similar trends for eligible and non-eligible individuals. However, a change in trend occurred once individuals aged 60 and over became eligible for unification in the intra-phase. In the post-phase, when all individuals are eligible, the trends again show similarities between both groups.

The event study analysis further strengthens the confirmation of parallel trends. Figure 2 (see appendix) presents the results of implementing an event study. The figure shows no significant effect on service use in the pre-phase. However, during the intra-phase, when only those aged 60 and over were eligible, service use increased compared to the ineligible group. This effect diminishes over time as the entire population becomes eligible in 2012. These results provide a robust confirmation of the parallel trends, reinforcing the validity of my findings.

An event study analysis further strengthens the evidence for parallel trends (Figure 2) (see appendix). The figure shows no significant effect on service utilization in the pre-phase. However, during the intra-phase, when only those aged 60 and over were eligible, service use increased compared to the ineligible group. This effect diminishes over time as the entire population becomes eligible in 2012. Therefore, it is plausible that in the absence of the reform, there would not have been significant variations in healthcare utilization trends for both eligible and ineligible groups.

## 5 Results

In this section, I present the study’s results. First, I examine the impact of increasing the availability of health services on their utilization in different care settings: emergency, outpatient, and hospitalization. Second, I explore the results related to the different types of procedures and types of users. Third, I analyze the results related to public expenditure derived from using procedures and consultations.

### 5.1 Impact on Service Utilization

Overall, attendance at health services increased both in outpatient and inpatient settings. Similarly, the number of procedures performed increased across all three care settings: Outpatient, emergency, and hospitalization.

### 5.1.1 Variations in Healthcare Attendance

The analysis of healthcare service utilization demonstrates a notable increase in the frequency of patient visits. Table 2 presents the main results of consultations. I find that ambulatory consultations increased by 12.47% among individuals eligible for the unification program compared to those who were not eligible (0.0109 additional consultations per patient per month, from a mean of 0.0876). While statistically significant differences are observed among women, no such differences are found among men. These findings are consistent with the literature on the impact of increased insurance enrollment on healthcare utilization (Finkelstein et al., 2012; Baicker et al., 2013; Sommers et al., 2016; Wherry and Miller, 2017; Finkelstein et al., 2019). Furthermore, implementing the reform by increasing the availability of different types of outpatient consultations, particularly specialized ones, generated incentives for the population to access more outpatient services, as expected.

I do not find significant differences in the use of emergency consultations for the general population. With the unification of health plans, the initial emergency care underwent no substantial changes (see subsection 2.2). Therefore, no changes are expected in its utilization, as reported.

Table 2: Variations in attendance at consultations

| (a) Ambulatory consultations                                            |                       |                       |                    | (b) Emergency Room Consultations                                        |                    |                     |                    |
|-------------------------------------------------------------------------|-----------------------|-----------------------|--------------------|-------------------------------------------------------------------------|--------------------|---------------------|--------------------|
| VARIABLES                                                               | (1)<br>All            | (2)<br>Female         | (3)<br>Male        | VARIABLES                                                               | (1)<br>All         | (2)<br>Female       | (3)<br>Male        |
| eligibilityxpost                                                        | 0.0109***<br>(0.0031) | 0.0149***<br>(0.0045) | 0.0060<br>(0.0040) | eligibilityxpost                                                        | 0.0009<br>(0.0009) | -0.0000<br>(0.0011) | 0.0020<br>(0.0013) |
| Observations                                                            | 1,890,900             | 1,047,960             | 842,880            | Observations                                                            | 1,890,900          | 1,047,960           | 842,880            |
| Number of individuals                                                   | 31,515                | 17,466                | 14,048             | Number of individuals                                                   | 31,515             | 17,466              | 14,048             |
| Individual FE                                                           | Yes                   | Yes                   | Yes                | Individual FE                                                           | Yes                | Yes                 | Yes                |
| Year-Month FE                                                           | Yes                   | Yes                   | Yes                | Year-Month FE                                                           | Yes                | Yes                 | Yes                |
| Frequency of use mean                                                   | 0.0876                | 0.105                 | 0.0666             | Frequency of use mean                                                   | 0.0101             | 0.0100              | 0.0103             |
| % of mean                                                               | 12.47                 | 14.21                 | 9.034              | % of mean                                                               | 8.584              | -0.0353             | 19.05              |
| Robust standard errors in parentheses<br>*** p<0.01, ** p<0.05, * p<0.1 |                       |                       |                    | Robust standard errors in parentheses<br>*** p<0.01, ** p<0.05, * p<0.1 |                    |                     |                    |

Table 2 presents the estimates obtained using the DID technique of the effect of increasing the number of available services on outpatient visits and emergency services (see the corresponding tables 2a and 2b). The sample used in the first column includes all patients between 57 and 62 years of age in 2011. Moreover, the sample in columns two and three corresponds to women and men, respectively. The frequency of use mean is calculated in the pre-intervention phase.

The unification of health plans influenced healthcare service visits and led to a substantial increase in the number of procedures performed among eligible individuals compared to their non-eligible counterparts. Table 3 details the variation in procedures. I find that the use of procedures increased on average by 43.81% in eligible individuals compared to those who were not (0.1016 additional procedures per patient per month, from a mean of 0.232). This is an expected result since the reform expanded the number of services included in the health plan for individuals affiliated with the subsidized regime. This finding potentially reflects pent-up demand for services previously unavailable, as discussed in the following subsections.

Table 3: Variations in procedures

| VARIABLES             | (1)<br>All            | (2)<br>Female         | (3)<br>Male           |
|-----------------------|-----------------------|-----------------------|-----------------------|
| eligibilityxpost      | 0.1016***<br>(0.0252) | 0.0829***<br>(0.0266) | 0.1248***<br>(0.0459) |
| Observations          | 1,890,900             | 1,047,960             | 842,880               |
| Number of individuals | 31,515                | 17,466                | 14,048                |
| Individual FE         | Yes                   | Yes                   | Yes                   |
| Year-Month FE         | Yes                   | Yes                   | Yes                   |
| Frequency of use mean | 0.232                 | 0.231                 | 0.233                 |
| % of mean             | 43.81                 | 35.88                 | 53.55                 |

Robust standard errors in parentheses  
 \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 3 presents the estimates obtained using the DID technique of the effect of increasing the number of available services on the number of procedures performed. The sample used in the first column includes all patients between 57 and 62 years of age in 2011. Moreover, the sample in columns two and three corresponds to women and men, respectively. The frequency of use mean is calculated in the pre-intervention phase.

### 5.1.2 Changes in incentives

The introduction of a more comprehensive health plan, resulting from the unification of health plans, appears to incentivize both patients to seek care and healthcare personnel to provide it. Notably, the utilization of procedures increased across all care settings among eligible individuals compared to non-eligible individuals, with the most pronounced increase observed in inpatient services ( i.e., all services provided in emergencies and hospitalization), where physicians play a significant role in determining the course of treatment. This collaborative dynamic between patients and physicians likely contributes to the observed increase in procedures.

Eligible patients exhibit increased utilization of outpatient services, particularly for procedures, compared to non-eligible individuals. The observed 29.47% increase (equivalent to 0.0413 additional procedures per patient per month, from a baseline of 0.140) in outpatient procedures may be attributable to the documented increase in outpatient consultations with referrals for procedures and the expanded range of available services.

Similarly, eligible individuals experienced a substantial 55.17% increase (0.0168 additional procedures per patient per month, from a baseline of 0.0304) in procedures performed in emergency rooms. This finding, while potentially counterintuitive, could be explained by patients remaining in emergency departments beyond the initial assessment, allowing for additional procedures to be conducted. The overall increase in procedures was also observed in hospitalizations among eligible individuals, with a notable rise of 70.95% (0.0435 additional procedures per patient per month, from a baseline of 0.0613).

Table 4: Performance of Procedures by Healthcare Setting

| Care setting          | Ambulatory            |                       |                    | Emergency           |                    |                    | Hospitalization      |                    |                      |
|-----------------------|-----------------------|-----------------------|--------------------|---------------------|--------------------|--------------------|----------------------|--------------------|----------------------|
| VARIABLES             | (1)<br>All            | (2)<br>Female         | (3)<br>Male        | (4)<br>All          | (5)<br>Female      | (6)<br>Male        | (7)<br>All           | (8)<br>Female      | (9)<br>Male          |
| eligibilityxpost      | 0.0413***<br>(0.0097) | 0.0562***<br>(0.0136) | 0.0227<br>(0.0138) | 0.0168*<br>(0.0101) | 0.0067<br>(0.0093) | 0.0293<br>(0.0195) | 0.0435**<br>(0.0172) | 0.0199<br>(0.0175) | 0.0728**<br>(0.0317) |
| Observations          | 1,890,900             | 1,047,960             | 842,880            | 1,890,900           | 1,047,960          | 842,880            | 1,890,900            | 1,047,960          | 842,880              |
| Number of individuals | 31,515                | 17,466                | 14,048             | 31,515              | 17,466             | 14,048             | 31,515               | 17,466             | 14,048               |
| Individual FE         | Yes                   | Yes                   | Yes                | Yes                 | Yes                | Yes                | Yes                  | Yes                | Yes                  |
| Year-Month FE         | Yes                   | Yes                   | Yes                | Yes                 | Yes                | Yes                | Yes                  | Yes                | Yes                  |
| Frequency of use mean | 0.140                 | 0.157                 | 0.120              | 0.0304              | 0.0288             | 0.0324             | 0.0613               | 0.0454             | 0.0810               |
| % of mean             | 29.47                 | 35.87                 | 19.01              | 55.17               | 23.38              | 90.26              | 70.95                | 43.85              | 89.85                |

Robust standard errors in parentheses

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

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able 4 showcases the estimates, a product using the DID technique. This technique allows us to accurately measure the effect of increasing the number of available services on the frequency of procedures performed, with a specific focus on the setting of care. The sample used in columns 1, 4, and 7 includes all patients aged 57 to 62 in 2011. Columns 2, 5, and 8 present the results for women. Columns 3, 6, and 9 present the results for men. Columns 1 to 3 present the results of procedures performed in the outpatient setting. Columns 4 to 6 present the results for the emergency room setting. Columns 7 to 9 present the results for the hospital setting. The frequency of use mean is calculated in the pre-intervention phase.

Interconsultations,<sup>7</sup> which are decided by healthcare professionals, increased by 89.92% (0.0058 additional interconsultations per patient per month, from a mean of 0.00642). This suggests that the unification caused health professionals to refer patients to other specialized professionals more frequently.<sup>8</sup>

Table 5: Variations in interconsultations

| VARIABLES             | (1)<br>All            | (2)<br>Female      | (3)<br>Male          |
|-----------------------|-----------------------|--------------------|----------------------|
| eligibilityxpost      | 0.0058***<br>(0.0007) | 0.0036<br>(0.0025) | 0.0075**<br>(0.0036) |
| Observations          | 1,890,900             | 1,047,960          | 842,880              |
| Number of individuals | 31,515                | 17,466             | 14,048               |
| Individual FE         | Yes                   | Yes                | Yes                  |
| Year-Month FE         | Yes                   | Yes                | Yes                  |
| Frequency of use mean | 0.00642               | 0.00528            | 0.00783              |
| % of mean             | 89.92                 | 68.95              | 96.15                |

Robust standard errors in parentheses

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

Table 5 presents the estimates obtained using the DID technique of the effect of increasing the number of available services on interconsultations. The sample used in the first column includes all patients between 57 and 62 years of age in 2011. Moreover, the sample in columns two and three corresponds to women and men, respectively. Interconsultations were excluded from the outpatient visit data sample, as these can also be performed in hospital settings. The frequency of use mean is calculated in the pre-intervention phase.

Implementing the health plan unification program, resulting in a more comprehensive health plan for SR affiliates, led to an increase in the utilization of inpatient services among the eligible population. Table 6 presents the impact of the unification on stays in emergency observation rooms and hospitalization services. On average, stays in observation rooms increased by 18.73% for eligible individuals visiting the emergency room (0.0006 additional stays per patient per month, from a mean of 0.00320), compared to non-eligible individuals.

<sup>7</sup>Interconsultation is a process where a healthcare professional caring for a patient seeks advice or expertise from another professional on the diagnosis or treatment plan, without transferring full responsibility for the patient's care ([Ministerio de salud y protección social, 1994](#); [Montero Ruiz, 2016](#)).

<sup>8</sup>Although it is not possible to determine the setting of care in which the interconsultations were carried out due to limitations in the available data, they are generally billed as hospital services.

Greater availability of services leads to increases in hospitalizations. Although the expected effect on intrahospital stays is unclear, hospitalizations in eligible patients increased by 43.60% (0.0006 additional monthly hospitalizations per patient, from a mean of 0.00140). These findings are consistent with those reported in studies on increased health insurance coverage (Finkelstein et al., 2012; Gutierrez and Pettit, 2020). Additionally, the evidence suggests that an increase in health coverage, whether through the number of people insured or the availability of procedures, generates similar effects on the frequency of hospitalizations.

Table 6: Variations in the stay at inpatient services

| (a) Observation stay                                                    |                     |                    |                    | (b) Hospitalization stays                                               |                     |                    |                    |
|-------------------------------------------------------------------------|---------------------|--------------------|--------------------|-------------------------------------------------------------------------|---------------------|--------------------|--------------------|
| VARIABLES                                                               | (1)<br>All          | (2)<br>Female      | (3)<br>Male        | VARIABLES                                                               | (1)<br>All          | (2)<br>Female      | (3)<br>Male        |
| eligibilityxpost                                                        | 0.0006*<br>(0.0004) | 0.0005<br>(0.0005) | 0.0007<br>(0.0006) | eligibilityxpost                                                        | 0.0006*<br>(0.0004) | 0.0007<br>(0.0004) | 0.0005<br>(0.0006) |
| Observations                                                            | 1,890,900           | 1,047,960          | 842,880            | Observations                                                            | 1,890,900           | 1,047,960          | 842,880            |
| Number of individuals                                                   | 31,515              | 17,466             | 14,048             | Number of individuals                                                   | 31,515              | 17,466             | 14,048             |
| Individual FE                                                           | Yes                 | Yes                | Yes                | Individual FE                                                           | Yes                 | Yes                | Yes                |
| Year-Month FE                                                           | Yes                 | Yes                | Yes                | Year-Month FE                                                           | Yes                 | Yes                | Yes                |
| Frequency of use mean                                                   | 0.00320             | 0.00295            | 0.00352            | Frequency of use mean                                                   | 0.00140             | 0.00116            | 0.00169            |
| % of mean                                                               | 18.73               | 16.51              | 21.05              | % of mean                                                               | 43.60               | 60.99              | 28.67              |
| Robust standard errors in parentheses<br>*** p<0.01, ** p<0.05, * p<0.1 |                     |                    |                    | Robust standard errors in parentheses<br>*** p<0.01, ** p<0.05, * p<0.1 |                     |                    |                    |

Table 6 presents the estimates, obtained using the DID technique, of the effect of increasing the number of available services on emergency room admissions in which patients are left in observation and hospital admissions (see corresponding tables 6a and 6b). The sample used in the first columns includes all patients between 57 and 62 years of age in 2011. The sample in columns two and three corresponds to women and men, respectively. The frequency of use mean is calculated in the pre-intervention phase.

### 5.1.3 Substitution versus Complementariness Effect between Areas of Care

My findings motivate an analysis of the interplay between complementary and substitutable services across different healthcare settings. When considered alongside studies examining the effects of expanded insurance coverage (Finkelstein et al., 2012; Baicker et al., 2013; Sommers et al., 2016; Wherry and Miller, 2017; Finkelstein et al., 2019; Gutierrez and Pettit, 2020), these results suggest the presence of a complementary effect. These prior studies consistently report increases in healthcare utilization, mainly hospital services.

Table 7 summarizes the main results related to changes in the patterns of health service consumption, both in the use of services and in the performance of procedures, which were presented above:

Table 7: Summary of Results

| Setting         | Procedures | Consultations | Inpatient stays | Total    |
|-----------------|------------|---------------|-----------------|----------|
| Outpatient      | Increase   | Increase      | N/A             | Increase |
| Hospitalization | Increase   | Increase      | Increase        | Increase |
| Emergency       | Increase   | No change     | Increase        | Increase |

The setting of healthcare service is presented in each row. The first column shows results related to the utilization of procedures. The second column presents the results related to consultations (including interconsultations in the hospitalization setting). The third column presents the results of in-hospital stays. The fourth and last columns present the total effect, which is the sum of the previous columns.

Evidence suggests the presence of a complementary effect between outpatient and inpatient settings. While hospital stays increase, outpatient visits also increase. Similarly, procedures in both settings increase. This suggests that, once discharged from the hospital service, patients are referred to a greater extent to the outpatient setting, both for consultations and procedures. As people consulted outpatient services more frequently, with the possibility of accessing a more comprehensive range of services, more extensive intrahospital treatment was facilitated and deemed necessary. This is because, after the reform, medical staff had access to more diagnostic procedures, such as imaging and clinical laboratory tests, which ultimately saw the most significant increases.

The relationship between the emergency department, outpatient visits, and hospitalization is not as straightforward. The emergency department is usually the primary gatekeeper to health systems. However, outpatient services would ideally replace this type of service since many emergency department visits are non-urgent and could be handled in outpatient services (Rodríguez-Páez et al., 2018). Therefore, a substitution effect is expected, and the absence of changes in emergency department visits and the increase in outpatient visits support this hypothesis.

The analysis suggests a complementary, rather than substitutive, relationship between outpatient and hospital services, potentially indicating limited access before the reform. These relationships become highly relevant when formulating policies that affect service availability in any setting. Here, it is crucial to consider potential gains for the population and potential burdens on the healthcare system.

## 5.2 Differentiation by Type of Procedures and User Groups

The reform generated incentives for patients and healthcare personnel, promoting greater use of services. It is well known that medical personnel routinely make decisions about interconsultations and prescribe health procedures. This, together with the observed increase in inpatient stays, suggests that healthcare personnel, specifically physicians, modified their behavior regarding treatment decisions. It is possible that these professionals perceived the reform as an opportunity to provide more health services that would facilitate the diagnosis and treatment of patients and also somehow induce de-

mand. I carry out some additional exercises to better understand these results.

### **5.2.1 Differences between Procedures Previously Included in the Health Plan and Those Included with the Reform**

The healthcare reform affected both the procedures newly included in the health plan and those previously covered (see Table 10 in the appendix). By distinguishing between procedures already included in the health plan before the unification<sup>9</sup>, I find that procedures performed in ambulatory and emergency settings increased in eligible individuals compared to non-eligible individuals for both samples. However, in hospitalization settings, significant differences were only found among the procedures previously included. The increases in emergency procedures may be associated with the possibility of patients staying in the emergency department longer than for initial care.

### **5.2.2 Differentiation According to Procedure Classification**

Health procedures can be classified depending on their objective and care context. In practice, some procedures are costlier and used more frequently than others. This warrants an analysis of the effect of increasing the scope of available services, categorized according to the type of procedure and the subclassification within the Single Classification of Health Procedures (CUPS, acronym in Spanish).<sup>10</sup> The analyzed categories included surgical, imaging, laboratory, other non-surgical, and community health intervention and procedures (includes public health procedures).<sup>11</sup> The results are presented in the appendix section (see table 11 in the appendix section). The most notable findings of my analysis are the significant differences showing increases in eligible individuals compared to non-eligible ones in the performance of imaging, clinical laboratory, and other non-quirurgical procedures across care settings. In contrast, surgical procedures and those related to community health interventions show no significant changes overall.

### **5.2.3 Differences Between Patients with or Without Chronic and High-Cost Diagnoses**

It is common for patients with chronic diseases to use health services more frequently (Wu et al., 2015; Naoum et al., 2020). Thus, in the presence of expanding health plans, health services for this population may increase and significantly influence the results described above. To identify this, I utilize diagnoses reported in the procedure databases according to the ICD-10 code, separating patients with chronic and high-cost

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<sup>9</sup>This distinction is based on a comparison of the list of procedures in agreement 08 of 2009 with the list of procedures in agreement 029 of 2011.

<sup>10</sup>CUPS is a logical ordering of procedures and interventions performed in Colombia, identified by a code (Ministerio de salud y protección social, 2001)

<sup>11</sup>This category includes those procedures and interventions related to health promotion or enhancement, disease prevention and control, environmental health, and public health management.

disease diagnoses from those with other diagnoses. <sup>12</sup>

I find significant differences in procedure utilization between patients eligible and non-eligible individuals identified as having chronic and/or high-cost conditions and those who were not (see Table 12 in the appendix). Interestingly, the reform led to an increase in procedure utilization among men in this particular group across all settings. This result is counterintuitive, given that the literature has shown that women typically use more health services (Redondo-Sendino et al., 2006; Roy and Chaudhuri, 2012). For the group of patients not identified with chronic and/or high-cost conditions, significant differences are found across all settings and subgroups by sex.

#### 5.2.4 Procedures Performed on Frequent and non-frequent Users

The knowledge derived from frequent use of health services influences the effectiveness of the healthcare reform in increasing service utilization. I divide the sample into frequent and non-frequent users based on their procedure performance frequencies before the reform (i.e., October 2011 for those born before 1952 and July 2012 for those born in 1952 or after), considering frequent users as those who exhibit frequencies above the 90th percentile, conditional on having at least one procedure utilization. It is important to note that frequent users may only sometimes coincide with high-cost and chronic patients. Frequent users may also possess a higher level of health system knowledge, leading them to access services more readily. This allows me to analyze if more significant experience and knowledge of service access make frequent users potentially more sensitive to increased service availability.

Frequent users do not exhibit significant differences in procedure utilization between eligible and non-eligible individuals (see table 14 in the appendix section). This contrasts with non-frequent users, who show increases in utilization across all areas of care. Non-frequent users, who may not have previously accessed procedures excluded from the health plan, increased their use, while frequent users, presumably already having access through legal means, do not.

### 5.3 Impact on public expenditure on health per patient

Increasing the availability of health services to insured individuals leads to a generalized increase in service utilization but not necessarily in per-patient health expenditure. When analyzing public expenditure on health per patient per month, calculated by multiplying reported rates by the utilization of procedures and consultations, this study

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<sup>12</sup>Chronic diseases and high-cost treatments were taken from the following ICD-10 subcategories: Human immunodeficiency virus disease [HIV] (B20 -B24), Malignant neoplasms (C00-C97), Diabetes mellitus (E10-E14), Extraparalytic and movement disorders (G20-G26), Cerebral palsy and other paralytic syndromes (G80-G83), Chronic rheumatic heart diseases (I05-I09), Hypertensive diseases (I10-I15), Ischemic heart diseases (I20-I25), Pulmonary heart diseases and diseases of the pulmonary circulation (I26-I28), Other forms of heart diseases (I30-I52), Cerebrovascular diseases (I60-I69), Chronic lower respiratory diseases (J40-J47), Arthropathies (M00-M25), and Kidney failure (N17-N19). The creation of these subcategories was based on existing Colombian regulations (Ministerio de salud y protección social, 2009; Observatorio Nacional de Salud, 2015).

finds no significant differences between eligible and non-eligible individuals in any setting of care (see Table 8 and Table 9). These results diverge from those reported in the literature on insurance coverage expansions, where increased utilization is often associated with higher public spending (Tarazi, 2015; Finkelstein, 2007). These results also suggest that negotiating rates between insurers and providers in Colombia may have played a role in mitigating the potential increase in public health expenditure.

Table 8: Variation in individual public expenditure on health procedures per patient, according to reported fees

| Care setting                                                            | Ambulatory                  |                          |                              | Emergency                      |                                |                           | Hospitalization           |                           |                             |
|-------------------------------------------------------------------------|-----------------------------|--------------------------|------------------------------|--------------------------------|--------------------------------|---------------------------|---------------------------|---------------------------|-----------------------------|
|                                                                         | (1)                         | (2)                      | (3)                          | (4)                            | (5)                            | (6)                       | (7)                       | (8)                       | (9)                         |
| VARIABLES                                                               | All                         | Female                   | Male                         | All                            | Female                         | Male                      | All                       | Female                    | Male                        |
| eligibilityxpost                                                        | -1,786.8767<br>(1,281.9972) | -11.7949<br>(1,492.2231) | -3,994.2097*<br>(2,197.5735) | 319,428.0335<br>(319,094.5888) | 576,783.1713<br>(575,868.0634) | -390.5000<br>(1,185.3925) | -957.8279<br>(1,413.9453) | -313.4472<br>(1,020.9038) | -1,758.5967<br>(2,907.4579) |
| Observations                                                            | 1,890,900                   | 1,047,960                | 842,880                      | 1,890,900                      | 1,047,960                      | 842,880                   | 1,890,900                 | 1,047,960                 | 842,880                     |
| Number of individuals                                                   | 31,515                      | 17,466                   | 14,048                       | 31,515                         | 17,466                         | 14,048                    | 31,515                    | 17,466                    | 14,048                      |
| Individual FE                                                           | Yes                         | Yes                      | Yes                          | Yes                            | Yes                            | Yes                       | Yes                       | Yes                       | Yes                         |
| Year-Month FE                                                           | Yes                         | Yes                      | Yes                          | Yes                            | Yes                            | Yes                       | Yes                       | Yes                       | Yes                         |
| Frequency of use mean                                                   | 7077                        | 6982                     | 7195                         | 1702                           | 1132                           | 2410                      | 3120                      | 2459                      | 3942                        |
| % of mean                                                               | -25.25                      | -0.169                   | -55.51                       | 18768                          | 50938                          | -16.20                    | -30.70                    | -12.75                    | -44.62                      |
| Robust standard errors in parentheses<br>*** p<0.01, ** p<0.05, * p<0.1 |                             |                          |                              |                                |                                |                           |                           |                           |                             |

Table 8 presents the estimates, made using the DID technique, of the effect of increasing the number of available services on public expenditure caused by the number of procedures performed according to the reported individual values. The sample used in columns 1, 4, and 7 includes all patients aged 57 to 62 in 2011. Columns 2, 5, and 8 present the results for women. Columns 3, 6, and 9 present the results for men. Columns 1 to 3 present the results of procedures performed in the outpatient setting. Columns 4 to 6 present the results for the emergency room setting. Columns 7 to 9 present the results for the hospital setting.

Table 9: Variation in individual public expenditure on consultations per patient, according to reported fees

| VARIABLES                                                               | (1)<br>All          | (2)<br>Female       | (3)<br>Male          |
|-------------------------------------------------------------------------|---------------------|---------------------|----------------------|
| eligibilityxpost                                                        | -221.36<br>(153.81) | -100.36<br>(211.60) | -371.89*<br>(223.24) |
| Observations                                                            | 1,890,900           | 1,047,960           | 842,880              |
| Number of individuals                                                   | 31,515              | 17,466              | 14,048               |
| Individual FE                                                           | Yes                 | Yes                 | Yes                  |
| Year-Month FE                                                           | Yes                 | Yes                 | Yes                  |
| Mean consultation fee                                                   | 1591                | 1794                | 1338                 |
| Robust standard errors in parentheses<br>*** p<0.01, ** p<0.05, * p<0.1 |                     |                     |                      |

Table 9 presents the estimates, made using the DID technique, of the effect of increasing the number of available services on public expenditure caused by the number of procedures performed according to the reported individual values. The sample used in the first columns includes all patients between 57 and 62 years of age in 2011. Moreover, the sample in columns two and three corresponds to women and men, respectively. Interconsultations were excluded from the outpatient visit data sample, as these can also be performed in hospital settings.

Interestingly, even though I observe increases in consultation use and the number of procedures performed, these findings are not accompanied by a rise in public expenditure per patient. To delve deeper, I standardized procedure fees using the SOAT rate manual.<sup>13</sup> Standardizing fees by this method simulates a context without negotiation. This approach significantly increased estimated public expenditure on health

<sup>13</sup>This manual, established by decree, calculates the cost of health services for victims of traffic accidents, natural disasters, terrorist attacks, initial emergency care, and other catastrophic events. Public IPS bills under this tariff, while private IPS can choose their contracting tariff. However, when there is no contract with insurers, private IPS typically bill using the SOAT tariff, whose prices increase annually according to the minimum wage (Consejo nacional de seguridad social en salud, 1996)

procedures per patient in both outpatient and emergency settings. This finding and the observed rise in service utilization reinforce the notion that tariff negotiation is critical in containing public health expenditure growth.

The debate between welfare and sustainability in health systems is of great importance. While one of the main objectives of these systems worldwide is to improve the health and well-being of the population, it is widely recognized that achieving this requires financial balance. Hence, the constant concern to guarantee financial sustainability while implementing processes to expand health coverage ([Dahuabe and Marinho, 2022](#)). In this context, public expenditure becomes a fundamental variable within health systems, which is why it is crucial to know the variables that can affect its efficiency.

## 5.4 Robustness Analysis

To validate the consistency of my findings, I replicated the general exercises related to service attendance and procedure utilization in a subset where I limited the observation period to June 2012, before the entire population (particularly those under 60 years old) became eligible while maintaining age groups. Overall, I found that the results remained similar in magnitude to those including the post-intervention phase. The main difference is that, concerning the use of emergency observation rooms, I do not find significant changes between the eligible and non-eligible groups. Additionally, for hospitalization, the significance increased (see results in subsection [7.2.1](#) in the appendix).

## 6 Final Remarks

While increased service availability generally benefits the population's well-being, it can also strain health systems financially. As found by [Departamento Nacional de Planeación \(2016\)](#), people perceived improvements in their health status after the unification of health plans in Colombia. Furthermore, the reform not only changed health service utilization but also significantly increased the performance of medical procedures. Additionally, the reform has facilitated the expansion of all healthcare interventions, not just those included in the reform itself. Diagnostic procedures, particularly imaging and clinical laboratory tests, showed the most significant increases, potentially facilitating the early diagnosis of pathologies.

Inpatient management reports increase, highlighting the creation of incentives for medical personnel. This rise, reflected in longer stays in emergency observation rooms and hospitalization, is likely related to the more significant health complications the population encounters due to their prior lack of access to many health services. The reform provides doctors with greater diagnostic and treatment tools in this case. However, it requires special attention since, as evidenced in the literature, moral hazard problems

(such as unnecessary hospital admissions or procedures) may arise on the part of health personnel ([Ochoa-Rodríguez et al., 2022](#)). These issues cannot be analyzed with the data from this study but should be further investigated.

The lack of a clear substitution relationship between emergency services and outpatient visits, as revealed by this study, has significant implications for healthcare policy and management. While preventive health should be the main objective of health systems, the complementary relationship between the hospital and outpatient settings can generate opportunities. Strengthening health policies to facilitate access to outpatient services not only for diagnosis but also for disease prevention and management of complications could be a viable strategy. Therefore, studies that facilitate a greater understanding of the relationship between these settings of care, such as this one, could be of great help in the construction of such policies.

”Pre-existing conditions such as chronic and/or high-cost pathologies influence the increase in service use, while knowledge of the system seems to be important in establishing consumption patterns. Patients with high-cost and chronic pathologies regularly have higher service utilization than the rest of the population ([Lopera-Medina, 2017](#)) and are benefited by the reform. In Colombia, attempts have been made to provide access to the services they require through different mechanisms, even before the reform. As people familiar with these mechanisms may know how to navigate the system, they can easily access health services. This explains the absence of significant changes in service utilization among frequent users.

The negotiation of specific health services tariffs, such as for hospital stays or diagnostic procedures, is related to the containment of individual public expenditure on health procedures. Typically, when more significant amounts of health services are offered, this leads to increases in public healthcare budgets. However, this is different from the reform. Consequently, a plausible explanation is that specific service prices had to be adjusted to keep reported public expenditure constant. This finding highlights the importance of effective management in negotiating health service tariffs, where considering observed changes in service utilization is crucial.

The Colombian case shows that expanding service coverage through broader plans can increase utilization without necessarily straining the healthcare system’s sustainability, as evidenced by the lack of significant expenditure increase. At the same time, increased service availability can improve population health while not eliminating all access barriers. Even with a wider range of services, unnecessary procedures or limitations on access may still exist. However, it could lead to improvements in the population’s health status, potentially even reducing complications and enhancing quality of life, which is ultimately desirable. Further investigation is needed to assess the potential for inappropriate utilization due to increased procedure availability, as an analysis of health outcomes is beyond the scope of this study.

While this study’s results provide valuable insights, it’s important to note their limi-

tations. Due to the unique characteristics of the CR population and its accompanying structure, the findings may not be directly applicable to other types of populations, such as those under the Contributory Regime (CR). However, many of the findings align with those observed in research from various countries, suggesting broader relevance. Additionally, higher-quality data is crucial for conducting accurate country-level analyses, which should be considered in future research.

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## 7 Appendix

### 7.1 Parallel trends

Figure 1: Parallel trends

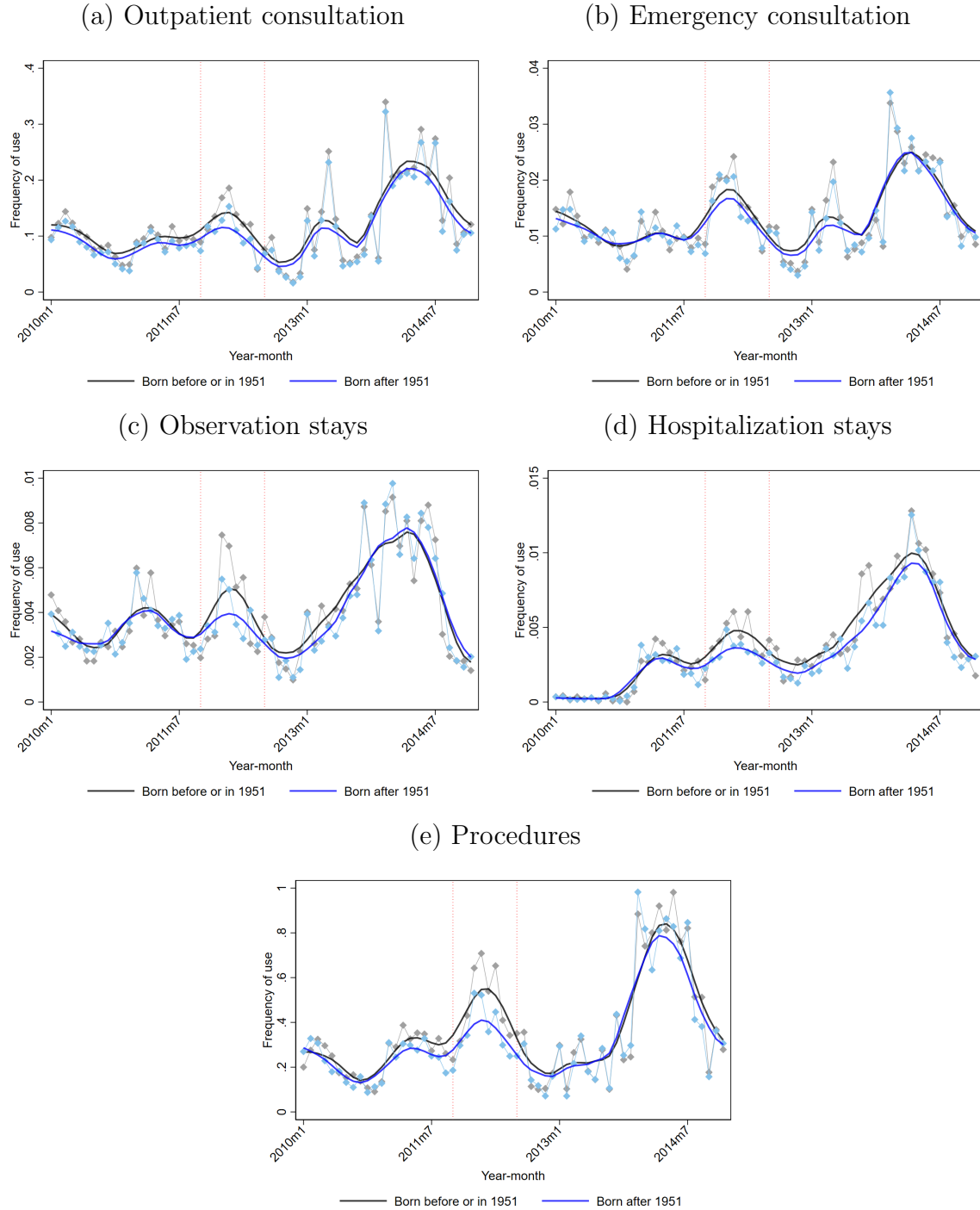


Figure (1) presents the estimated average frequencies of use for the different databases: consultations (divided into outpatient, inpatient, and emergency department consultations), emergency room with observation, hospitalizations, and procedures. In all cases, the blue line presents the estimates for the cohort of individuals born in 1951 or earlier, and the black line presents the estimates for those born after 1951. The red dotted lines indicate the start and end of the "intra" phase, the period where one cohort received treatment while the other did not.

Figure 2: Event study - frequency of use



Figure (2) presents the results of an event study analysis for all healthcare services provided in Bogota between 2010 and 2014 for subsidized regime affiliates.

Figure 3: Event study - public expenditure on procedures and consultations

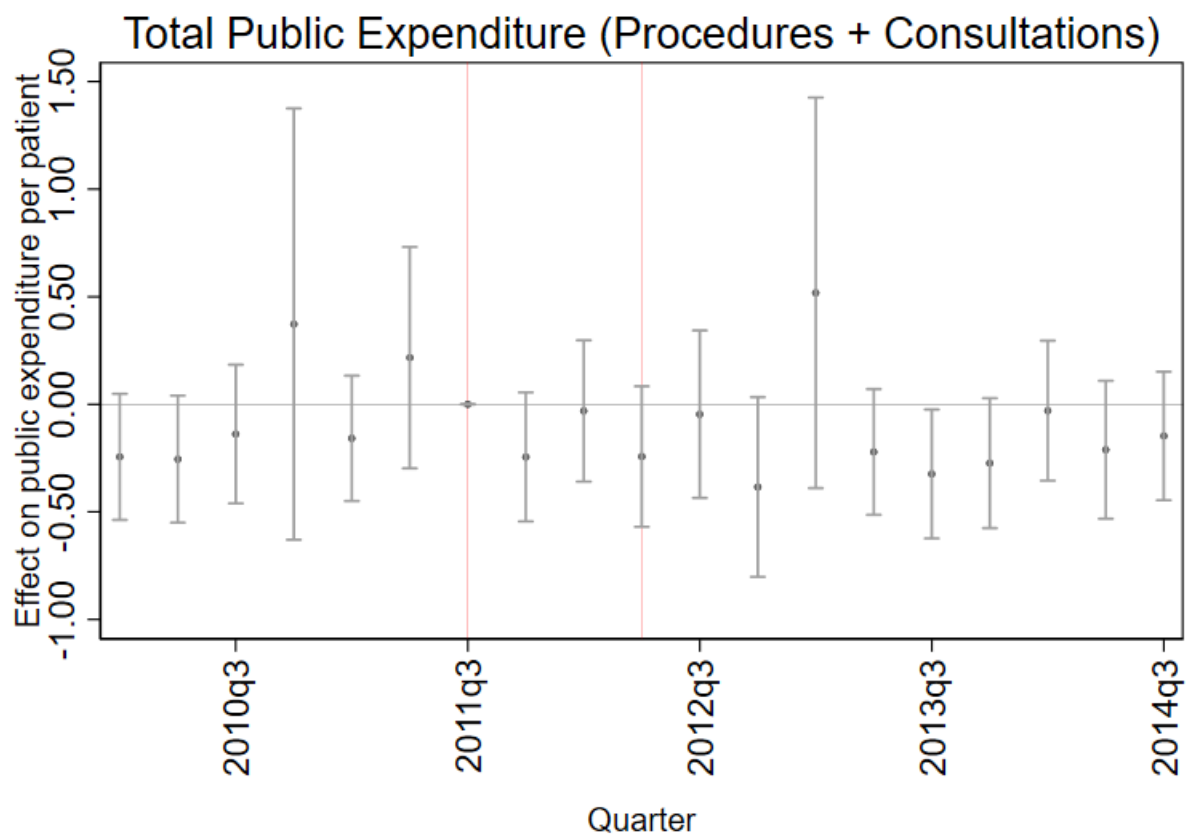


Figure (2) presents the results of an event study analysis for all healthcare services provided in Bogota between 2010 and 2014 for subsidized regime affiliates.

## 7.2 Additional results

Table 10: Frequency of Procedures Performed According to the Inclusion Period in the RS

(a) Procedures Included with the Unification

| Care setting          | Ambulatory            |                       |                    | Emergency           |                    |                     | Hospitalization    |                    |                    |
|-----------------------|-----------------------|-----------------------|--------------------|---------------------|--------------------|---------------------|--------------------|--------------------|--------------------|
| VARIABLES             | (1)<br>All            | (2)<br>Female         | (3)<br>Male        | (4)<br>All          | (5)<br>Female      | (6)<br>Male         | (7)<br>All         | (8)<br>Female      | (9)<br>Male        |
| eligibilityxpost      | 0.0243***<br>(0.0054) | 0.0342***<br>(0.0074) | 0.0118<br>(0.0079) | 0.0065*<br>(0.0035) | 0.0020<br>(0.0037) | 0.0122*<br>(0.0063) | 0.0133<br>(0.0082) | 0.0060<br>(0.0078) | 0.0224<br>(0.0157) |
| Observations          | 1,890,900             | 1,047,960             | 842,880            | 1,890,900           | 1,047,960          | 842,880             | 1,890,900          | 1,047,960          | 842,880            |
| Number of individuals | 31,515                | 17,466                | 14,048             | 31,515              | 17,466             | 14,048              | 31,515             | 17,466             | 14,048             |
| Individual FE         | Yes                   | Yes                   | Yes                | Yes                 | Yes                | Yes                 | Yes                | Yes                | Yes                |
| Year-Month FE         | Yes                   | Yes                   | Yes                | Yes                 | Yes                | Yes                 | Yes                | Yes                | Yes                |
| Frequency of use mean | 0.0790                | 0.0897                | 0.0657             | 0.0148              | 0.0140             | 0.0158              | 0.0268             | 0.0203             | 0.0349             |
| % of mean             | 30.69                 | 38.15                 | 17.98              | 44.19               | 14.50              | 76.84               | 49.61              | 29.42              | 64.21              |

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

(b) Procedures Included Prior to the Reform

| Care setting          | Ambulatory            |                       |                      | Emergency            |                    |                     | Hospitalization     |                    |                    |
|-----------------------|-----------------------|-----------------------|----------------------|----------------------|--------------------|---------------------|---------------------|--------------------|--------------------|
| VARIABLES             | (1)<br>All            | (2)<br>Female         | (3)<br>Male          | (4)<br>All           | (5)<br>Female      | (6)<br>Male         | (7)<br>All          | (8)<br>Female      | (9)<br>Male        |
| eligibilityxpost      | 0.0080***<br>(0.0018) | 0.0095***<br>(0.0022) | 0.0061**<br>(0.0030) | 0.0050**<br>(0.0022) | 0.0032<br>(0.0021) | 0.0072*<br>(0.0041) | 0.0079*<br>(0.0043) | 0.0057<br>(0.0041) | 0.0106<br>(0.0082) |
| Observations          | 1,890,900             | 1,047,960             | 842,880              | 1,890,900            | 1,047,960          | 842,880             | 1,890,900           | 1,047,960          | 842,880            |
| Number of individuals | 31,515                | 17,466                | 14,048               | 31,515               | 17,466             | 14,048              | 31,515              | 17,466             | 14,048             |
| Individual FE         | Yes                   | Yes                   | Yes                  | Yes                  | Yes                | Yes                 | Yes                 | Yes                | Yes                |
| Year-Month FE         | Yes                   | Yes                   | Yes                  | Yes                  | Yes                | Yes                 | Yes                 | Yes                | Yes                |
| Frequency of use mean | 0.0167                | 0.0174                | 0.0158               | 0.00672              | 0.00624            | 0.00731             | 0.0131              | 0.00974            | 0.0173             |
| % of mean             | 47.93                 | 54.77                 | 38.60                | 74.55                | 51.53              | 98.95               | 60.24               | 58.40              | 61.54              |

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Subtable 10a presents the estimates, using the DID technique, of the effect of increasing the number of available services on the frequency of procedures performed that were included in the SR health plan with the unification. Subtable 10b does the same for previously included procedures. In both cases, the sample used in columns 1, 4, and 7 includes all patients aged 57 to 62 in 2011. Columns 2, 5, and 8 present the results for women. Columns 3, 6, and 9 present the results for men. Columns 1 to 3 present the results for procedures performed in the outpatient setting. Columns 4 to 6 present the results for the emergency room setting. And columns 7 to 9 present the results for the hospital setting. The frequency of use mean is calculated in the pre-intervention phase.

Table 11: Frequency of procedures performed according to the classification

## (a) Surgical procedures

| Care setting          | Ambulatory          |                    |                     | Emergency           |                     |                     | Hospitalization    |                    |                    |
|-----------------------|---------------------|--------------------|---------------------|---------------------|---------------------|---------------------|--------------------|--------------------|--------------------|
|                       | (1)                 | (2)                | (3)                 | (4)                 | (5)                 | (6)                 | (7)                | (8)                | (9)                |
| VARIABLES             | All                 | Female             | Male                | All                 | Female              | Male                | All                | Female             | Male               |
| eligibilityxpost      | -0.0014<br>(0.0012) | 0.0004<br>(0.0012) | -0.0037<br>(0.0024) | -0.0003<br>(0.0008) | -0.0002<br>(0.0009) | -0.0005<br>(0.0015) | 0.0007<br>(0.0006) | 0.0002<br>(0.0006) | 0.0012<br>(0.0012) |
| Observations          | 1,890,900           | 1,047,960          | 842,880             | 1,890,900           | 1,047,960           | 842,880             | 1,890,900          | 1,047,960          | 842,880            |
| Number of individuals | 31,515              | 17,466             | 14,048              | 31,515              | 17,466              | 14,048              | 31,515             | 17,466             | 14,048             |
| Individual FE         | Yes                 | Yes                | Yes                 | Yes                 | Yes                 | Yes                 | Yes                | Yes                | Yes                |
| Year-Month FE         | Yes                 | Yes                | Yes                 | Yes                 | Yes                 | Yes                 | Yes                | Yes                | Yes                |
| Frequency of use mean | 0.00773             | 0.00700            | 0.00864             | 0.00108             | 0.000843            | 0.00138             | 0.00144            | 0.00119            | 0.00175            |
| % of mean             | -18.69              | 5.578              | -43.12              | -31.05              | -21.34              | -38.43              | 45.84              | 17.50              | 69.85              |

Robust standard errors in parentheses  
 \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

## (b) Imaging procedures

| Care setting          | Ambulatory          |                       |                     | Emergency             |                    |                      | Hospitalization      |                    |                      |
|-----------------------|---------------------|-----------------------|---------------------|-----------------------|--------------------|----------------------|----------------------|--------------------|----------------------|
|                       | (1)                 | (2)                   | (3)                 | (4)                   | (5)                | (6)                  | (7)                  | (8)                | (9)                  |
| VARIABLES             | All                 | Female                | Male                | All                   | Female             | Male                 | All                  | Female             | Male                 |
| eligibilityxpost      | 0.0011*<br>(0.0007) | 0.0026***<br>(0.0010) | -0.0006<br>(0.0008) | 0.0016***<br>(0.0006) | 0.0007<br>(0.0007) | 0.0026**<br>(0.0011) | 0.0025**<br>(0.0011) | 0.0005<br>(0.0010) | 0.0051**<br>(0.0020) |
| Observations          | 1,890,900           | 1,047,960             | 842,880             | 1,890,900             | 1,047,960          | 842,880              | 1,890,900            | 1,047,960          | 842,880              |
| Number of individuals | 31,515              | 17,466                | 14,048              | 31,515                | 17,466             | 14,048               | 31,515               | 17,466             | 14,048               |
| Individual FE         | Yes                 | Yes                   | Yes                 | Yes                   | Yes                | Yes                  | Yes                  | Yes                | Yes                  |
| Year-Month FE         | Yes                 | Yes                   | Yes                 | Yes                   | Yes                | Yes                  | Yes                  | Yes                | Yes                  |
| Frequency of use mean | 0.00663             | 0.00766               | 0.00534             | 0.00258               | 0.00241            | 0.00280              | 0.00318              | 0.00250            | 0.00404              |
| % of mean             | 17.07               | 33.38                 | -12.06              | 60.18                 | 31.05              | 91.36                | 79.28                | 18.67              | 125.9                |

Robust standard errors in parentheses  
 \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

## (c) Clinical laboratory

| Care setting          | Ambulatory            |                       |                       | Emergency            |                    |                     | Hospitalization     |                    |                    |
|-----------------------|-----------------------|-----------------------|-----------------------|----------------------|--------------------|---------------------|---------------------|--------------------|--------------------|
|                       | (1)                   | (2)                   | (3)                   | (4)                  | (5)                | (6)                 | (7)                 | (8)                | (9)                |
| VARIABLES             | All                   | Female                | Male                  | All                  | Female             | Male                | All                 | Female             | Male               |
| eligibilityxpost      | 0.0255***<br>(0.0046) | 0.0315***<br>(0.0065) | 0.0180***<br>(0.0065) | 0.0085**<br>(0.0042) | 0.0041<br>(0.0043) | 0.0139*<br>(0.0078) | 0.0168*<br>(0.0088) | 0.0110<br>(0.0082) | 0.0239<br>(0.0168) |
| Observations          | 1,890,900             | 1,047,960             | 842,880               | 1,890,900            | 1,047,960          | 842,880             | 1,890,900           | 1,047,960          | 842,880            |
| Number of individuals | 31,515                | 17,466                | 14,048                | 31,515               | 17,466             | 14,048              | 31,515              | 17,466             | 14,048             |
| Individual FE         | Yes                   | Yes                   | Yes                   | Yes                  | Yes                | Yes                 | Yes                 | Yes                | Yes                |
| Year-Month FE         | Yes                   | Yes                   | Yes                   | Yes                  | Yes                | Yes                 | Yes                 | Yes                | Yes                |
| Frequency of use mean | 0.0612                | 0.0692                | 0.0511                | 0.0153               | 0.0146             | 0.0161              | 0.0295              | 0.0218             | 0.0392             |
| % of mean             | 41.63                 | 45.43                 | 35.22                 | 55.46                | 28.30              | 86.12               | 56.79               | 50.70              | 61                 |

Robust standard errors in parentheses  
 \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

## (d) Other non-surgical procedures

| Care setting          | Ambulatory           |                      |                    | Emergency           |                    |                      | Hospitalization    |                     |                    |
|-----------------------|----------------------|----------------------|--------------------|---------------------|--------------------|----------------------|--------------------|---------------------|--------------------|
|                       | (1)                  | (2)                  | (3)                | (4)                 | (5)                | (6)                  | (7)                | (8)                 | (9)                |
| VARIABLES             | All                  | Female               | Male               | All                 | Female             | Male                 | All                | Female              | Male               |
| eligibilityxpost      | 0.0072**<br>(0.0035) | 0.0095**<br>(0.0038) | 0.0043<br>(0.0062) | 0.0019*<br>(0.0010) | 0.0005<br>(0.0010) | 0.0035**<br>(0.0018) | 0.0012<br>(0.0030) | -0.0001<br>(0.0033) | 0.0028<br>(0.0053) |
| Observations          | 1,890,900            | 1,047,960            | 842,880            | 1,890,900           | 1,047,960          | 842,880              | 1,890,900          | 1,047,960           | 842,880            |
| Number of individuals | 31,515               | 17,466               | 14,048             | 31,515              | 17,466             | 14,048               | 31,515             | 17,466              | 14,048             |
| Individual FE         | Yes                  | Yes                  | Yes                | Yes                 | Yes                | Yes                  | Yes                | Yes                 | Yes                |
| Year-Month FE         | Yes                  | Yes                  | Yes                | Yes                 | Yes                | Yes                  | Yes                | Yes                 | Yes                |
| Frequency of use mean | 0.0199               | 0.0229               | 0.0163             | 0.00258             | 0.00235            | 0.00286              | 0.00571            | 0.00453             | 0.00717            |
| % of mean             | 36                   | 41.41                | 26.50              | 71.84               | 22.41              | 122.3                | 21.23              | -1.333              | 38.98              |

Robust standard errors in parentheses  
 \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

## (e) Community health intervention and procedures

| Care setting          | Ambulatory          |                     |                       | Emergency           |                    |                    | Hospitalization    |                     |                    |
|-----------------------|---------------------|---------------------|-----------------------|---------------------|--------------------|--------------------|--------------------|---------------------|--------------------|
|                       | (1)                 | (2)                 | (3)                   | (4)                 | (5)                | (6)                | (7)                | (8)                 | (9)                |
| VARIABLES             | All                 | Female              | Male                  | All                 | Female             | Male               | All                | Female              | Male               |
| eligibilityxpost      | -0.0001<br>(0.0001) | -0.0001<br>(0.0002) | -0.0001**<br>(0.0000) | 0.0000*<br>(0.0000) | 0.0000<br>(0.0000) | 0.0000<br>(0.0000) | 0.0000<br>(0.0000) | -0.0000<br>(0.0000) | 0.0000<br>(0.0000) |
| Observations          | 1,890,900           | 1,047,960           | 842,880               | 1,890,900           | 1,047,960          | 842,880            | 1,890,900          | 1,047,960           | 842,880            |
| Number of individuals | 31,515              | 17,466              | 14,048                | 31,515              | 17,466             | 14,048             | 31,515             | 17,466              | 14,048             |
| Individual FE         | Yes                 | Yes                 | Yes                   | Yes                 | Yes                | Yes                | Yes                | Yes                 | Yes                |
| Year-Month FE         | Yes                 | Yes                 | Yes                   | Yes                 | Yes                | Yes                | Yes                | Yes                 | Yes                |
| Frequency of use mean | 0.000214            | 0.000364            | 2.59e-05              | 7.21e-06            | 1.04e-05           | 3.24e-06           | 4.33e-06           | 5.20e-06            | 3.24e-06           |
| % of mean             | -43.49              | -31.12              | -260.2                | 49                  | 97.77              | 103                | 77.03              | 98.28               | -93.82             |

Robust standard errors in parentheses  
 \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 11 presents the estimates, using the DID technique, of the effect of increasing the number of available services on the frequency of procedures according to its classification. In all subtables, the sample used in columns 1, 4, and 7 includes all patients aged 57 to 62 in 2011. Columns 2, 5, and 8 present the results for women. Columns 3, 6, and 9 present the results for men. Columns 1 to 3 present the results for procedures performed in the outpatient setting. Columns 4 to 6 present the results for the emergency room setting. And columns 7 to 9 present the results for the hospital setting. The frequency of use mean is calculated in the pre-intervention phase.

Table 12: Performance of procedures in patients with chronic and/or high-cost pathologies

| Care setting          | Ambulatory           |                    |                      | Emergency            |                    |                      | Hospitalization      |                    |                      |
|-----------------------|----------------------|--------------------|----------------------|----------------------|--------------------|----------------------|----------------------|--------------------|----------------------|
| VARIABLES             | (1)<br>All           | (2)<br>Female      | (3)<br>Male          | (4)<br>All           | (5)<br>Female      | (6)<br>Male          | (7)<br>All           | (8)<br>Female      | (9)<br>Male          |
| eligibilityxpost      | 0.3855**<br>(0.1571) | 0.0840<br>(0.1111) | 0.9365**<br>(0.3924) | 0.3855**<br>(0.1571) | 0.0840<br>(0.1111) | 0.9365**<br>(0.3924) | 0.3855**<br>(0.1571) | 0.0840<br>(0.1111) | 0.9365**<br>(0.3924) |
| Observations          | 170,760              | 110,400            | 60,360               | 170,760              | 110,400            | 60,360               | 170,760              | 110,400            | 60,360               |
| Number of individuals | 2,846                | 1,840              | 1,006                | 2,846                | 1,840              | 1,006                | 2,846                | 1,840              | 1,006                |
| Individual FE         | Yes                  | Yes                | Yes                  | Yes                  | Yes                | Yes                  | Yes                  | Yes                | Yes                  |
| Year-Month FE         | Yes                  | Yes                | Yes                  | Yes                  | Yes                | Yes                  | Yes                  | Yes                | Yes                  |
| Frequency of use mean | 1.180                | 0.959              | 1.586                | 1.180                | 0.959              | 1.586                | 1.180                | 0.959              | 1.586                |
| % of mean             | 32.66                | 8.762              | 59.03                | 32.66                | 8.762              | 59.03                | 32.66                | 8.762              | 59.03                |

Robust standard errors in parentheses  
\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Note: Table (12) presents the estimates made using the DID technique of the effect of increasing the number of available services on the frequency of procedures performed in patients with chronic and/or high-cost pathologies. The sample used in columns 1, 4, and 7 includes all patients aged 57 to 62 in 2011. Columns 2, 5, and 8 present the results for women. Columns 3, 6, and 9 present the results for men. Columns 1 to 3 present the results for procedures performed in the outpatient setting. Columns 4 to 6 present the results for the emergency room setting. And columns 7 to 9 present the results for the hospital setting. The frequency of use mean is calculated in the pre-intervention phase.

Table 13: Performance of procedures in patients not identified with chronic and/or high-cost pathologies

| Care setting          | Ambulatory            |                       |                     | Emergency             |                       |                     | Hospitalization       |                       |                     |
|-----------------------|-----------------------|-----------------------|---------------------|-----------------------|-----------------------|---------------------|-----------------------|-----------------------|---------------------|
| VARIABLES             | (1)<br>All            | (2)<br>Female         | (3)<br>Male         | (4)<br>All            | (5)<br>Female         | (6)<br>Male         | (7)<br>All            | (8)<br>Female         | (9)<br>Male         |
| eligibilityxpost      | 0.0735***<br>(0.0222) | 0.0839***<br>(0.0264) | 0.0612*<br>(0.0371) | 0.0735***<br>(0.0222) | 0.0839***<br>(0.0264) | 0.0612*<br>(0.0371) | 0.0735***<br>(0.0222) | 0.0839***<br>(0.0264) | 0.0612*<br>(0.0371) |
| Observations          | 1,720,140             | 937,560               | 782,520             | 1,720,140             | 937,560               | 782,520             | 1,720,140             | 937,560               | 782,520             |
| Number of individuals | 28,669                | 15,626                | 13,042              | 28,669                | 15,626                | 13,042              | 28,669                | 15,626                | 13,042              |
| Individual FE         | Yes                   | Yes                   | Yes                 | Yes                   | Yes                   | Yes                 | Yes                   | Yes                   | Yes                 |
| Year-Month FE         | Yes                   | Yes                   | Yes                 | Yes                   | Yes                   | Yes                 | Yes                   | Yes                   | Yes                 |
| Frequency of use mean | 0.138                 | 0.145                 | 0.129               | 0.138                 | 0.145                 | 0.129               | 0.138                 | 0.145                 | 0.129               |
| % of mean             | 53.43                 | 57.74                 | 47.64               | 53.43                 | 57.74                 | 47.64               | 53.43                 | 57.74                 | 47.64               |

Robust standard errors in parentheses  
\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Note: Table (13) presents the estimates made using the DID technique of the effect of increasing the number of available services on the frequency of procedures performed in patients not identified with chronic and/or high-cost pathologies. The sample used in columns 1, 4, and 7 includes all patients aged 57 to 62 in 2011. Columns 2, 5, and 8 present the results for women. Columns 3, 6, and 9 present the results for men. Columns 1 to 3 present the results for procedures performed in the outpatient setting. Columns 4 to 6 present the results for the emergency room setting. And columns 7 to 9 present the results for the hospital setting. The frequency of use mean is calculated in the pre-intervention phase.

Table 14: Performance of procedures in frequent users

| Care setting          | Ambulatory         |                     |                    | Emergency           |                     |                    | Hospitalization    |                     |                     |
|-----------------------|--------------------|---------------------|--------------------|---------------------|---------------------|--------------------|--------------------|---------------------|---------------------|
| VARIABLES             | (1)<br>All         | (2)<br>Female       | (3)<br>Male        | (4)<br>All          | (5)<br>Female       | (6)<br>Male        | (7)<br>All         | (8)<br>Female       | (9)<br>Male         |
| eligibilityxpost      | 0.0244<br>(0.0856) | -0.0487<br>(0.0903) | 0.1223<br>(0.1601) | -0.0067<br>(0.0897) | -0.1314<br>(0.1084) | 0.1639<br>(0.1520) | 0.1539<br>(0.1792) | -0.1739<br>(0.1531) | 0.6037*<br>(0.3640) |
| Observations          | 93,960             | 54,240              | 39,720             | 93,960              | 54,240              | 39,720             | 93,960             | 54,240              | 39,720              |
| Number of individuals | 1,566              | 904                 | 662                | 1,566               | 904                 | 662                | 1,566              | 904                 | 662                 |
| Individual FE         | Yes                | Yes                 | Yes                | Yes                 | Yes                 | Yes                | Yes                | Yes                 | Yes                 |
| Year-Month FE         | Yes                | Yes                 | Yes                | Yes                 | Yes                 | Yes                | Yes                | Yes                 | Yes                 |
| Frequency of use mean | 1.333              | 1.348               | 1.312              | 0.390               | 0.335               | 0.465              | 1.177              | 0.831               | 1.649               |
| % of mean             | 1.830              | -3.612              | 9.320              | -1.711              | -39.27              | 35.29              | 13.08              | -20.94              | 36.61               |

Robust standard errors in parentheses  
\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Note: Table (14) presents the estimates made using the DID technique of the effect of increasing the number of available services on the frequency of procedures performed in frequent users of health services. The sample used in columns 1, 4, and 7 includes all patients aged 57 to 62 in 2011. Columns 2, 5, and 8 present the results for women. Columns 3, 6, and 9 present the results for men. Columns 1 to 3 present the results for procedures performed in the outpatient setting. Columns 4 to 6 present the results for the emergency room setting. And columns 7 to 9 present the results for the hospital setting. The frequency of use mean is calculated in the pre-intervention phase.

Table 15: Performance of procedures in non-frequent users

| Care setting          | Ambulatory            |                       |                    | Emergency           |                     |                    | Hospitalization      |                     |                     |
|-----------------------|-----------------------|-----------------------|--------------------|---------------------|---------------------|--------------------|----------------------|---------------------|---------------------|
| VARIABLES             | (1)<br>All            | (2)<br>Female         | (3)<br>Male        | (4)<br>All          | (5)<br>Female       | (6)<br>Male        | (7)<br>All           | (8)<br>Female       | (9)<br>Male         |
| eligibilityxpost      | 0.0438***<br>(0.0091) | 0.0635***<br>(0.0133) | 0.0193<br>(0.0120) | 0.0181*<br>(0.0096) | 0.0143*<br>(0.0079) | 0.0228<br>(0.0191) | 0.0390**<br>(0.0152) | 0.0315*<br>(0.0164) | 0.0484*<br>(0.0273) |
| Observations          | 1,796,940             | 993,720               | 803,160            | 1,796,940           | 993,720             | 803,160            | 1,796,940            | 993,720             | 803,160             |
| Number of individuals | 29,949                | 16,562                | 13,386             | 29,949              | 16,562              | 13,386             | 29,949               | 16,562              | 13,386              |
| Individual FE         | Yes                   | Yes                   | Yes                | Yes                 | Yes                 | Yes                | Yes                  | Yes                 | Yes                 |
| Year-Month FE         | Yes                   | Yes                   | Yes                | Yes                 | Yes                 | Yes                | Yes                  | Yes                 | Yes                 |
| Frequency of use mean | 0.0778                | 0.0917                | 0.0606             | 0.0116              | 0.0121              | 0.0110             | 0.00295              | 0.00256             | 0.00343             |
| % of mean             | 56.35                 | 69.28                 | 31.93              | 155.6               | 118.4               | 206.1              | 1325                 | 1231                | 1411                |

Robust standard errors in parentheses  
\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Note: Table (15) presents the estimates made using the DID technique of the effect of increasing the number of available services on the frequency of procedures performed in non-frequent users of health services. The sample used in columns 1, 4, and 7 includes all patients aged 57 to 62 in 2011. Columns 2, 5, and 8 present the results for women. Columns 3, 6, and 9 present the results for men. Columns 1 to 3 present the results for procedures performed in the outpatient setting. Columns 4 to 6 present the results for the emergency room setting. And columns 7 to 9 present the results for the hospital setting.

## 7.2.1 Robustness

Table 16: Variations in attendance at consultations (Time-reduced sample)

| (a) Ambulatory consultations |                       |                       |                      | (b) Emergency Room Consultations |                    |                     |                     |
|------------------------------|-----------------------|-----------------------|----------------------|----------------------------------|--------------------|---------------------|---------------------|
| VARIABLES                    | (1)<br>All            | (2)<br>Female         | (3)<br>Male          | VARIABLES                        | (1)<br>All         | (2)<br>Female       | (3)<br>Male         |
| eligibilityxpost             | 0.0115***<br>(0.0034) | 0.0138***<br>(0.0051) | 0.0088**<br>(0.0044) | eligibilityxpost                 | 0.0010<br>(0.0009) | -0.0003<br>(0.0012) | 0.0026*<br>(0.0014) |
| Observations                 | 945,450               | 523,980               | 421,440              | Observations                     | 945,450            | 523,980             | 421,440             |
| Number of individuals        | 31,515                | 17,466                | 14,048               | Number of individuals            | 31,515             | 17,466              | 14,048              |
| Individual FE                | Yes                   | Yes                   | Yes                  | Individual FE                    | Yes                | Yes                 | Yes                 |
| Year-Month FE                | Yes                   | Yes                   | Yes                  | Year-Month FE                    | Yes                | Yes                 | Yes                 |
| Frequency of use mean        | 0.0876                | 0.105                 | 0.0666               | Frequency of use mean            | 0.0101             | 0.0100              | 0.0103              |
| % of mean                    | 13.17                 | 13.16                 | 13.16                | % of mean                        | 9.727              | -3.138              | 25.35               |

Robust standard errors in parentheses  
\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Robust standard errors in parentheses  
\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

The sample includes observations until June 2012, before people under 60 were eligible for the unification. Table 16 presents the estimates obtained using the DID technique of the effect of increasing the number of available services on outpatient visits and emergency services (see the corresponding tables 16a and 16b). The sample used in the first column includes all patients between 57 and 62 years of age in 2011. Moreover, the sample in columns two and three corresponds to women and men, respectively. The frequency of use mean is calculated in the pre-intervention phase.

Table 17: Variations in procedures (Time-reduced sample)

| VARIABLES             | (1)<br>All            | (2)<br>Female        | (3)<br>Male           |
|-----------------------|-----------------------|----------------------|-----------------------|
| eligibilityxpost      | 0.0982***<br>(0.0264) | 0.0698**<br>(0.0279) | 0.1334***<br>(0.0479) |
| Observations          | 945,450               | 523,980              | 421,440               |
| Number of individuals | 31,515                | 17,466               | 14,048                |
| Individual FE         | Yes                   | Yes                  | Yes                   |
| Year-Month FE         | Yes                   | Yes                  | Yes                   |
| Frequency of use mean | 0.232                 | 0.231                | 0.233                 |
| % of mean             | 42.35                 | 30.24                | 57.25                 |

Robust standard errors in parentheses  
\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

The sample includes observations until June 2012, before people under 60 were eligible for the unification. Table 17 presents the estimates obtained using the DID technique of the effect of increasing the number of available services on the number of procedures performed. The sample used in the first column includes all patients between 57 and 62 years of age in 2011. Moreover, the sample in columns two and three corresponds to women and men, respectively. The frequency of use mean is calculated in the pre-intervention phase.

Table 18: Variations in the stay at inpatient services (Time-reduced sample)

| (a) Observation stay  |                    |                    |                    | (b) Hospitalization stays |                       |                     |                      |
|-----------------------|--------------------|--------------------|--------------------|---------------------------|-----------------------|---------------------|----------------------|
| VARIABLES             | (1)<br>All         | (2)<br>Female      | (3)<br>Male        | VARIABLES                 | (1)<br>All            | (2)<br>Female       | (3)<br>Male          |
| eligibilityxpost      | 0.0006<br>(0.0004) | 0.0003<br>(0.0005) | 0.0010<br>(0.0006) | eligibilityxpost          | 0.0010***<br>(0.0004) | 0.0008*<br>(0.0005) | 0.0012**<br>(0.0006) |
| Observations          | 945,450            | 523,980            | 421,440            | Observations              | 945,450               | 523,980             | 421,440              |
| Number of individuals | 31,515             | 17,466             | 14,048             | Number of individuals     | 31,515                | 17,466              | 14,048               |
| Individual FE         | Yes                | Yes                | Yes                | Individual FE             | Yes                   | Yes                 | Yes                  |
| Year-Month FE         | Yes                | Yes                | Yes                | Year-Month FE             | Yes                   | Yes                 | Yes                  |
| Frequency of use mean | 0.00320            | 0.00295            | 0.00352            | Frequency of use mean     | 0.00140               | 0.00116             | 0.00169              |
| % of mean             | 18.81              | 10.25              | 27.72              | % of mean                 | 68.94                 | 66.45               | 71.07                |

Robust standard errors in parentheses  
\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Robust standard errors in parentheses  
\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

The sample includes observations until June 2012, before people under 60 were eligible for the unification. Table 18 presents the estimates, obtained using the DID technique, of the effect of increasing the number of available services on emergency room admissions in which patients are left in observation and hospital admissions (see corresponding tables 18a and 18b). The sample used in the first columns includes all patients between 57 and 62 years of age in 2011. The sample in columns two and three corresponds to women and men, respectively. The frequency of use mean is calculated in the pre-intervention phase.