CINCH competence in competition + health series

#2015/8

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Losing Health Insurance When Young:

Impacts on Usage of Medical Services and Health

Imprint

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Losing Health Insurance When Young:

Impacts on Usage of Medical Services and Health

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Dolores De la Mata and Carlos Felipe Gaviria*

Losing Health Insurance When Young:

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Abstract

In this study we exploit a regulation in Colombia that exogenously changes health insurance coverage of young adult dependents, specifically those turning 18 years old, to analyze the effects of losing health insurance coverage on their health service usage and health status. We assess this effect using a regression discontinuity design (RDD) and data from the Encuesta Nacional de Calidad de Vida Survey for Colombia from 2010 to 2013. Losing coverage implies an increase in the cost of some medical services which may reduce their consumption (i.e. preventive services). Additionally, since under Colombian regulations, emergency department (ED) visits cannot be denied to anyone, regardless of health insurance status, uninsured young adults tend to use this service more instead of regular medical services (such as preventive healthcare or visits to physicians or specialists). We find, consistent with the change in relative prices, that losing health insurance when turning 18 years old increases the visits to the ED, reduces preventive care visits with a physician, and reduces the usage of other medical services. These results imply a substitution of cheaper medical services for more expensive ones when individuals turn 18 years old in Colombia.

JEL Classifications: G22; I13; I18

Keywords: Health Insurance, Young Adults, Healthcare Usage, Emergency Department Visits, Columbia's Healthcare System, Regression Discontinuity, Developing Country

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We would like to thank seminar participants from the Universidad Javeriana and the CINCH Summer School in Health Economics 2015 for their comments. We would also like to thank Centro de Estudios Distributivos Laborales y Sociales (CEDLAS) for their financial support through the contest "Improving Capabilities in Impact Evaluation in Latin America", for which the present paper was selected.

1 Introduction

Health insurance coverage has always been a subject of interest in developed countries. In these countries, health insurance status has been shown to influence medical service usage, health status or financial decisions. However, the literature analyzing how health insurance status affects similar medical outcomes in developing countries is scarce. During the 1990s, almost all Latin American (LA) countries introduced healthcare system reforms aimed at universal healthcare coverage. In Colombia, such reforms were undertaken with the implementation of Law 100 of 1993; however, two decades later there are groups that still have problems accessing health insurance coverage. One of these groups is new young adults, those between 18 and 25 years old, for whom the share of uninsured individuals, was around 7 percent in the period 2010-2013 (when the official share of uninsured individuals for the entire population for the same period was around 9.13 percent).[1]

In part, lower healthcare coverage is caused by regulations that establish a maximum age until which dependents can have access to health insurance. Particularly, in Colombia, Decree 806 of 1998, a norm that regulates coverage for dependent children and spouses, states that dependent children under 18 are covered if at least one of the parents is enrolled in the social security system. Once a dependent turns 18, she can remain covered if one parent is enrolled in the system and if she is registered in a full-time study program. This rule applies until dependents turn 25 years old. Data for Colombia shows that between 2010 and 2013 almost 7 percent had lost their health insurance coverage at that age. But, is it really a problem for young adults to lose health insurance coverage? On one hand, this group could be considered one of the healthiest in the population, so a fraction of them losing coverage may not be a major problem. But on the other hand, losing coverage implies an increase in the cost of medical services offered by the system, except those services that are regulated in Colombia. Then, an increase in relative prices of medical services would reduce the consumption of these services. Hence, being uninsured implies altering the manner in which one uses medical services and, eventually, this may lead to a change in health status.

[1]Source: Ministerio de salud y protección social, 2012.

The present study addresses whether a change in the health insurance status of Colombian young adults, which alters the relative prices of medical services, affects their usage of medical services and, potentially leads to a change in their perception about their own health status. We analyze this effect at age 18, exploiting the discontinuity in health insurance coverage generated by Decree 806 as a source of exogenous variation. We estimate the effect on medical service usage and health status of young adults using a regression discontinuity design (RDD). Our data comes from the Colombian National Quality of Life Survey, *Encuesta Nacional de Calidad de Vida* (ENCV), for the period 2010-2013.

Although the decree generates a decrease in the probability of having health insurance, it is not completely assure that people losing health insurance, lose access to medical services (for instance private medical services usage increases), meaning, people look for the means to access to a physician. From another perspective the regulation creates a non-optimal usage of medical services since visits to ED increase and seeing a physician for preventive care decreases. Moreover, those who lose health insurance (uninsured people) are worse off than those insured, from a financial perspective, since uninsured people has to pay out-of-pocket.

According to Colombian regulation, emergency department (ED) visits cannot be denied to anyone, regardless of health insurance status. Thus, losing health insurance coverage in the Colombian case may entail a substitution of cheaper medical services, such as preventive care, for more expensive ones (from the point of view of the system), such as visits to the ED. This effect could be particularly harmful, as it might produce saturation of ED centers due to over-usage, causing stress on the whole system. Moreover, regarding preventive care usage, insured young adults would have more access to a physician than uninsured young adults. As a consequence, individual health status could be affected as insurance is lost.

Our results suggest that turning 18 years creates a discontinuity in the probability of having health insurance of -7.7 percentage points.[2] Hence, we find that losing health insurance coverage when turning 18 years old increases visits to the ED by 4 percentage points, reduces the usage of alternative medical services by 21 percentage points, reduces preventive care visits with a physician by 76 percentage points, and increases the usage of private medical services by

[2]Robustness checks were estimated to prove that this discontinuity was not found by chance.

9 percentage points. In terms of health status, losing health insurance coverage increases the proportion of people reporting having been sick in the month previous to the interview by 29 percentage points. Contrary to what was expected, other results suggest that losing health insurance increases the usage of medical services provided by the EPSs and reduces individuals´ perception of having poor health status. We performed a correction for medical services provided by the EPSs where we lag the age variable for one month in order to have a better match between the age and the reference period related to the usage of these services. Results using this correction (reduced form) show that medical services at EPSs show a negative effect. Also, since turning 18 years old involves diverse changes regarding the labor market, studying, living with parents, and marital status, we control for some of these characteristics that change discontinuously at the threshold and we find that the results are robust.

This study contributes to the current literature on the effects of insurance status on health insurance coverage, medical service usage, and other health outcomes in developing countries using a credible identification strategy. Specifically in Colombia, studies have focused on diverse effects and methodologies using the healthcare expansion motivated by Law 100 of 1993, but none of them focus specifically on its impact on young adults. Also, since universal health insurance has been an aim of policy-makers, this study will highlight how some regulations go against this purpose and what the consequences are. Besides, several studies analyzing the same topic in developed countries have found mixed results regarding usage of medical services and health status, hence, the discussion is still in debate in those countries. Our findings indicate that although Decree 806 generates a decrease in the probability of having health insurance, it is not totally accurate to say that people losing health insurance lose access to medical services (for instance private medical service usage increases), meaning that people still look for other means to gain access to a physician. From another perspective the regulation creates non-optimal usage of medical services since visits to the ED increase while seeing a physician for preventive care decreases. Moreover, from a financial perspective, those who lose health insurance (uninsured people) are worse off than those who are insured since uninsured people have to pay out-of-pocket for their medical services.

2 Literature Review

Many articles have studied the effects of health insurance coverage on medical service usage for different age groups, especially in developed countries. To estimate the causal effect of being insured/uninsured, the literature has highlighted the fact that randomized experiments or natural experiments can solve problems of endogeneity or reverse causality. This subject remains relevant for policy-makers in developed and developing countries. For instance, some studies have focused on analyzing the effects of expansions of public health insurance programs on take-up rates and crowding-out of private insurance in order to measure the effectiveness of a particular policy for different groups, especially low-income individuals. For the U.S., researchers have found that for different periods and policies, expansions in health insurance coverage increase the take-up rates among newly eligible children, especially for low-income children, while the crowding-out effect is mixed (Currie and Gruber, 1996; Card and Shore-Sheppard, 2004; Ham and Shore-Sheppard, 2005)[3]. Other studies have focused on the substitution of cheaper medical services for more expensive ones, as well as on health status and medical service usage as insurance status changes due to specific health regulations (Courtemanche and Zapata, 2014; Kolstad and Kowalski, 2012; Anderson et al., 2012, 2014; Miller, 2012a,b).

Finally, studies that exploit discontinuities in health insurance coverage at a specific age threshold, like in our study, to measure causal effects of health insurance status on medical outcomes in the U.S. are plentiful Card et al. (2008), Card et al. (2007), Levine et al. (2011), Anderson et al. (2012) and Anderson et al. (2014). Card et al. (2008) and Card et al. (2007) exploit a discontinuity generated in coverage when turning 65 years old, due to the availability of universal coverage for individuals 65 and over (Medicare). The first article finds evidence of an increase in the use of healthcare services as coverage increases, with a pattern of gains across groups that varies by the type of service, while the second finds improvements in mortality and an increase in visits to the ED. Levine et al. (2011) exploit an immediate change in legislation after the introduction of the State Children's Health Insurance Program (SCHIP) that raised the age limit of eligibility to age 19 between 1997 and 1999; they find that for different levels

[3]Authors take into consideration expansions for eligibility of those who are limited to essentially three low-income groups: senior citizens, the disabled, and families with dependent children.

of family income and in different states, there is a causal impact on health insurance coverage for those under the age of 19. Anderson et al. (2012) use a discontinuity generated when young adult dependents turn 19 years old by performing a RDD. They find that, contrary to expectations, losing health insurance coverage decreases usage of both inpatient and ED care. Authors attribute this result to a short-run response in which individuals may anticipate losing health insurance, thus they may 'stockpile' healthcare shortly before coverage expires. Anderson et al. (2014) complement the previous study by using a discontinuity generated when young adults who kept studying, lost their health insurance upon turning 23 years old, by carrying out a RDD. They found a decrease in ED visits and a decrease in hospital stays.

Research assessing the effects of healthcare reforms in Colombia is limited and scarce. Academic studies and reports have found that after implementing the reform (Law 100 of 1993), improvements in health (Zambrano et al., 2008), and reductions in out-of-pocket expenses (Ramon Castano, 2002); other studies have found that after the reform financial protection occurred particularly for people enrolled in the Subsidized System (SS) (Castano and Zambrano, 2007; Giedion and Villar, 2009; Miller et al., 2013). Additionally, health insurance reform has increased medical service usage not only for (poor) people enrolled in the SS (Trujillo et al., 2005; Gaviria et al., 2006; Giedion and Villar, 2009; Camacho and Conover, 2013; Miller et al., 2013), but also for those participating in the CS (Giedion and Villar, 2009). Particularly, Gaviria et al. (2006) found that healthcare reforms appear to have an adverse effect on consumption and labor market participation. However, none of these studies have centered their attention on young adults losing health insurance coverage due to the regulation concerning dependents.

Trujillo et al. (2005) evaluate the impact of the SS on the level of medical care usage using propensity score matching (PSM) methods, where the treatment group is made up of participants in the SS, while the control group is made up of non-participants in the SS. Results support the hypothesis that the SS increases medical care usage among participants (e.g. preventive care, ambulatory consultations, and hospitalizations). Gaviria et al. (2006) evaluate the impact of the SS on health and healthcare usage outcomes using an instrumental variable (IV) method. Results evidence a non-statistically significant effect on self-reported health status and a significant and positive effect on medical service usage (e.g. preventive and illness-related consultations). Giedion and Villar (2009) use the healthcare reform to identify differences in access and health status for the whole population. Their identification strategy relies on an IV method for analyzing the CS and a PSM method for studying the SS, where the treatment group includes insured people while the control group includes uninsured people. Results show a significant increase in medical care usage and a significant reduction in equity gaps (e.g. coverage and access to services).

Miller et al. (2013) use the eligibility program of the Sistema de Identificación de Beneficiarios (SISBEN) to study the impact of the SS on financial risk protection, medical service usage, and health outcomes. The authors used their own (un-manipulated) SISBEN score to look for the discontinuity in participation (enrollment) to implement a "fuzzy" RDD. Results suggest a considerable increase in preventive healthcare service usage and no significant changes in enrollment and hospitalizations. Finally, Camacho and Conover (2013), using a RDD, examine if the health insurance coverage accessibility of the poor to the SS, improved health outcomes for newborns and augmented access to medical services for pregnant mothers. The authors exploit a change in eligibility to be in the SS, which is determined discontinuously by the poverty index score SISBEN (which is based on a certain score threshold). They find that the SS had a significant and positive effect on health, reducing the incidence of low birth-weight between 1.7 and 3.8 percentage points, which shows an improvement in newborn health.

3 Institutional Background

The Colombian national healthcare system, established in 1967, was originally conceived as a pay-as-you-go system, in which the main provider was the state and formal workers supported the system by paying for insurance, which was not mandatory. Quickly this system, due to low enrollment rates of formal workers (only 23-25 percent of all formal workers were enrolled in the system), decayed into crisis (Clavijo and Torrente, 2008). As a result, the Colombian government issued Law 100 of 1993, which created a mixed public/private system with the purpose of achieving universal health insurance coverage. Law 100 created a social security system divided into two subsystems: the Contributory System (CS) that covers formal workers, for whom it is mandatory to get health insurance, and the Subsidized System (SS) that provides subsidized coverage to low-income people and underpaid informal workers (those who earn less than the minimum wage per month, which for 2015 is COP 644350 or approximately USD 270).

After implementing Law 100, the rates of insured people rose from 38.8% in 1994 to 91.7% in 2011. Thus after 20 years of it being implemented, Law 100 has achieved almost full health insurance coverage for all Colombians. However, there are regulations causing friction in the access to health insurance coverage for some groups such as young adults.[4]

3.1 Contributory System (CS)

The CS covers formal workers and pensioners who have to pay 12.5% of their monthly income for health insurance.[5] This payment secures health insurance for themselves and their dependents: spouses and children. Workers or salaried employees share the percentage with their employer in a proportion of 8.5% employer and 4% employee. Self-employed workers have to cover the whole percentage if their monthly earnings are above the minimum wage,[6] otherwise they are eligible for subsidized healthcare. Within the CS there are two special contributory subsystems called 'special regimes' that cover the military forces and professors of public universities. These special subsystems are similar to the regular CS, except for some differences in co-payments, deductibles, and which medical centers they use. In the CS each worker chooses a Health Promotion Agency (EPS) and no EPS can deny or reject any person who pays for insurance in the CS.[7]

[4]Also, recently, the system has evidenced other problems that have led the Ministry of Health and Social Protection to pass a law that modifies and strengths Law 100 in order to solve structural problems; this law is currently under discussion.

[5]Pensioners only pay 12% out their monthly pension.

[6]Which in 2015 was established at approximately USD 270.

[7]EPS stands for *Entidad Promotora de Salud*, which is a private company in charge of providing health insurance to the people enroll to the system CS or SS. There are more than 50 EPSs to choose from in Colombia. This number has fluctuated between 1993 and 2015.

3.2 Subsidized System (SS)

The SS was created to enroll poor people, informal workers who earn less than the minimum wage, and vulnerable people (including homeless people). The SS is financed by a 1 percent payroll tax paid by formal workers plus a share of general tax revenues. To identify these individuals, the government administers a household survey, SISBEN (*Sistema de Identificación de Potenciales Beneficiarios de Programas Sociales*), to detect whether basic needs are being met. From this information, SISBEN scores each family and classifies them into different categories. The government uses these categories to assign families to different social programs and subsidies. Subsidized health insurance is granted to those people who are classified in SISBEN levels I and II. Before being granted with health insurance, individuals have to go through a selection process that takes several months. After being chosen, the person is assigned to an EPS from a list of providers, which could differ from the list of EPSs in the CS.

3.3 Regulation of Dependents' Coverage: Decree 806 of 1998

After Law 100 of 1993, many laws and decrees were issued with the intention of either improving or extending health insurance coverage. We are interested in Decree 806 of 1998 that regulates health insurance coverage for dependents under 18 years old. Under the norm, all dependent children are insured if one of the parents is enrolled in the social security system (CS or SS). Once they turn 18, dependents can remain covered if one parent is enrolled in the CS and if they are enrolled in full-time formal study programs.[8] This rule applies until they turn 25 years old. This same rule applies for dependents enrolled in the SS, however, dependents that lose health insurance in the SS have the chance to apply for SS as an adult during the same year.

3.4 Access to Medical Services

Law 100 of 1993, along with other regulations, set up the obligatory plan which regulates medical procedures, medical treatments, and medicaments for a list of diseases and health conditions that are covered by each system. This obligatory plan of services is called the *Plan*

[8] In educational institutions certified by the Ministry of Education.

Obligatorio de Salud (POS). The POS of the CS (POS-C) was different to that of the POS of the SS (POS-S) in terms of the packages of services and procedures they covered, the POS-C being more generous than the POS-S. The POS was unified for both systems in 2010.[9]

Insured people from both systems have access to medical services through an EPS. The EPS refers people, based on where they live, to an *Institución Prestadora de Servicios* (IPS) that offers basic medical attention: physician visits, dental visits, and laboratory exams (sometimes even x-rays).[10] Every time insured people, from both systems, use a health service, they pay a deductible based on their monthly income. When the health problem requires specialized procedures, physicians from the IPS refer patients to specialized health service centers, clinics or hospitals (medium or high complexity centers), for which they also pay the deductible.[11] In urban areas, it is common to have different EPSs for the CS and the SS, while in rural areas due to the scarce number of EPSs, both systems would share the same EPS. By regulation, each EPS has to take some percentage of people from the SS.

Besides deductibles, co-payments are sometimes required, mainly for beneficiaries of the CS, and are basically charged when the beneficiary under treatment requires procedures linked to hospitalizations or surgeries. Income level determines how much individuals have to pay for deductibles and co-payments in the CS.[12] However, within the CS, those enrolled in one of the special regimes do not make co-payments. In the SS those who are classified in SISBEN level I or individuals who present similar socioeconomic conditions of those in SISBEN level I do not pay deductibles or co-payments.[13] All those classified in SISBEN level II have to pay co-payments.

Moreover, when a beneficiary or the principal policy-holder[14] loses health insurance for any

[9]Due to lawsuits claiming inequality in access to medical services and procedures.

[10]An IPSs is an institutions that provides medical services, sometimes to different EPSs or sometimes to only one EPS. Besides, the social security system ranks IPSs according to three levels of complexity: low, medium and high.

[11]Similar to the IPS, some of these centers provide medical services to insured people from one or multiple EPSs.

[12]In any case both co-payment and deductible can be charged together for the same procedure or service.

[13]Also, children under age one, abandoned children, homeless people, forcibly displaced people, seniors living in nursing homes, indigenous people, demobilized people, and Roma are excluded from paying deductibles and co-payments (*gitanos*).

[14]The principal policy-holder is the person who pays for the insurance, of which extra people are beneficiaries (i.e. spouses or children).

reason, the EPS has to provide health services for beneficiaries for at least 30 days if they were continuously insured for 12 months or up to three months when continuously the person was insured for longer than five years.[15] However, this applies to the policy-holder when he loses health insurance, but not to dependents who lose health insurance due to Decree 806. Also when the person is under medical treatment, has any disability or is pregnant, the EPS has to continue providing the services until the condition is overcome.[16] In the case of uninsured people, they do not pay deductibles or co-payments as they only have access to medical services by fully paying for any service and procedure utilized in either a public or private institution, unless it is an emergency. The emergency department (ED) constitutes the cheap option, since following the 'regular' procedure is costlier. Below I will explain this peculiarity.

There is an idiosyncrasy in the Colombian system regarding ED visits. Since health is a constitutional right for all citizens in Colombia, no EPS or medical center can deny access to any person to an ED, independent of insurance status, when life is at risk. Another particularity is that in the first 30 days after health insurance enrollment, the person only has access to the ED. Thereafter, the insured person has access to all medical services.

When visiting the ED there are differences in the payment of deductibles and co-payments. For instance, after insured people in the CS are attended in the ED and all the necessary medical procedures (exams, x-rays, surgeries, hospitalization, etc.) are performed to stabilize the condition enough to responsibly discharge the patient, the principal policy-holder pays a deductible and the beneficiary pays a co-payment. Insured people in the special regime do not pay deductibles or co-payments in the ED. In the SS, similar to those in the CS, their beneficiaries classified in SISBEN level II have to pay co-payments when visiting the ED. People in SISBEN level I as well as those considered vulnerable (the group listed above in footnote 13) do not have to pay any co-payment. In no case people insured in the SS have to pay a deductible. Uninsured people, when visiting the ED and after all the procedures have been performed, are charged with the full price. If the person does not have the means to pay, the government has to assume the costs.

[15] These services are only for ongoing treatment or procedures recommended from an ED visit.

[16] The Colombian Constitution guarantees two principles: continuity and integrity of patients' rights.

In practice, for insured people in the CS, when visiting the ED, first there is an initial classification done by a physician (for the purpose of being classified as an emergency or not), which is excluded from deductibles,[17] unless the event is classified as a non-emergency, in which case the insured individual has to pay the deductible and make an appointment to see a regular doctor (meaning they are not attended in the ED).

When the event is determined as a non-emergency those insured in the CS have to pay the deductible, the attention is denied and they have to follow the 'regular' procedure (make an appointment with a physician).[18] For those in the SS, if the ED visit is not classified as an emergency, they are denied access and recommended to ask for an appointment with a physician, but they are not charged anything, similar to those that are uninsured.

Under these regulations the cost of going to an EPS physician (regular procedure), relative to an ED visit, is lower for an insured person than for an uninsured person. To illustrate this better, imagine that when one insured individual presents an acute health problem he has to ask for an appointment with a physician and thereafter, another one, if he is referred to a specialist. For each of these appointments, the individual has to pay a deductible or co-payment (if any), besides the time waiting for the appointment. Meanwhile, for an uninsured person with a health problem, she may avoid going to see a private physician and may choose to wait until the condition worsens to go to the ED, hence not paying any deductibles or co-payments.[19]

4 Data Sources

4.1 Sample

We perform the analysis using the survey *Encuesta Nacional de Calidad de Vida* (ENCV) for Colombia, which is currently available for 2010, 2011, 2012, and 2013.[20] The survey has dif-

[17] By law, no one can be forced to pay a deductible before being attended in an ED.

[18] For instance by law anyone can be forced to pay deductive before being attended in an ED.

[19] Some insured workers, using strategic behavior, may prefer to skip the 'regular' procedure of seeing a physician (also getting exams or x-rays or going to see a specialist) and wait until they get worse to go to the ED. This scenario could be explained by reasons such as saving money, saving time or may also be motivated by medical leave payments, among other explanations.

[20] ENCV was also available for 2008 but without including the date the survey was taken, key for building the variable age in months, therefore we omitted this year. Also, the survey was not done in 2009.

ferent sections containing information about households, families, and individuals for health, education, household composition, household expenses, labor market, among others. The information is representative at the country level and at the regional level.[21][22] From these surveys we construct all the variables of interest: age, health insurance coverage, health usage outcomes, health status outcomes, and individual characteristics.

4.2 Age

We define age in months for each individual at the interview date by using the reported birth month and year and the month and year in which the survey was performed. We use another variable that reports the current age in years so as to correct for those cases in which the current age differed from the age in months.[23]

4.3 Health Insurance Coverage

Since the interest of the present article is to study the effect of dependents losing health insurance coverage when turning 18 years old, we built different variables accounting for health insurance coverage as follows: a dummy variable indicating if the individual has CS insurance, a dummy variable indicating if the person has SS insurance, and a dummy variable indicating if the person has either of them (CS or SS insurance). We do not consider private insurance because it can only be acquired as 'complementary' insurance to the public option. Usually this private insurance is bought by people enrolled in the CS to complement their health insurance coverage for some medical treatment, health services, and procedures that are not covered by the regular healthcare system. Additionally, the question in which we rely to identify them is only available for 2010 and 2011. Besides, the proportion of people with this complementary insurance is low.

[21] Region is an administrative division, different than *Departamento* (state).

[22] There are other sections, different from the ones listed that are utilized in two or more years but no more. For instance, 'personal expenses' is a section in the survey for years 2010 and 2011 but not for the following years.

[23] For instance those who reported being 18 years old, though their age in months was below 216 months (equivalent to 18 years old) and for those reporting being 18 years old and their age in months was 229 months (equivalent to 19 years old and one month).

Even though the healthcare system defines dependents as children and spouses of the person enrolled in the CS or SS, we find in our data that for all years, more than 95 percent of the dependents are from people enrolled in the CS.

Since we use self-reported information regarding health insurance coverage, we rely on the fact that people are informed about the regulation, Decree 806 of 1998, explained in the Section 3.3, that regulates dependents in the healthcare system. A challenge is to ensure that interviewed people (or their parents) know this specific regulation. There is a possibility in which at the moment of the interview those who turned 18 years old were not aware of the regulation. In this sense a case could arise where the interviewee does not know the regulation and then his/her answer is that they are 'insured', when they are actually not. This lack of information can be possible for those young adults close to the threshold. One correction we perform is to identify those dependents older than 18 years old who reported having health insurance, but that were not studying or working, and change their status to being uninsured. It is possible that, from the group we corrected for above, there are dependents turning 18 years old who are spouses of a principal policy-holder who is not working or studying. Also, there are individuals with disabilities (physical and mental) turning 18 years old who are insured under Colombian law as well, without studying or working. For these two groups we did not change their health insurance status so as to capture only the uninformed individuals. By making this correction, we found approximately 390 individuals who reported being an insured dependent but that were not studying or working (for the interval of 18-20 years old).

4.4 Health Service Usage

We build three variables for the usage of medical services using the set of questions about (self-reported) healthcare use. The first dummy variable called medical services by EPS, takes the value of one if the person, after presenting a health problem in the 30 days previous to the interview, consulted a physician within the network of her EPS, and zero if she either did not have a health problem or, if she had had a health problem, but did not consult a physician within the EPS network.[24] The second dummy variable, private medical services, takes the value of one if the person, after presenting a health problem in the 30 days previous to the interview, consulted a physician, specialist or other health worker out-of-pocket, and zero if she either did not have a health problem or, if she had had one, did not consult any health worker out-of-pocket. The last dummy variable, alternative medical services, takes the value of one if the person utilized alternative health procedures or visited alternative healthcare practitioners or specialists,[25] and zero if she either did not have a health problem or, if she had had one, did not consult any alternative healthcare practitioners.

For visits to the ED, we create a dummy variable using the question whether the person visited the ED in the last 30 days due to a health problem.[26] For hospitalization, we create a dummy variable using the question whether the person has been hospitalized in the last 12 months. For preventive care, we construct a dummy variable from the question that asks whether the person visited a physician or a dentist for prevention in the last year (we also aggregate both options into one variable for any preventive care).

We expect medical service usage to decrease when people lose health insurance coverage by turning 18 years old. Also, we expect that, at the threshold, private medical service usage increases when people lose coverage. For alternative medical services, since they are not covered by EPSs, we can infer that that could probably rise at the threshold if they substitute these for the services provided by the EPS. But since these services also include home remedies and self-medication we do not know what to expect because it depends on subjective factors, that are not necessarily related to EPS service, but more related to what they perceive about health.[27]

[24] These EPS-provided services are partially financed by the EPS for those enrolled in the healthcare system.

[25] Such as pharmacists, druggists, healers (including alternative healing like art therapy), herbalists, homeopaths, acupuncturists, and midwives. Services that are not provided by EPSs. Also this includes the use of home remedies and self-medication.

[26] This question is not available for 2010. Besides, in 2011 the question of visiting the ED was not asked in a single particular question as in 2012 and 2013, but as one of the options in the question regarding what the person did to treat a health problem that had occurred in the past 30 days.

[27] For instance, a person who sneezes half of the day, believes it to be a health problem (a cold), and thus decides to take anti-cold medication without seeking medical services.

4.5 Health Status

We measure health status using self-reported information about the perception that the person has about her own health status. This question is the same for all surveys throughout the years and has four levels: excellent, good, regular, and bad. We build one dummy variable taking the value of one when the person reported having either regular or bad health. Additionally, we create a dummy variable that takes the value of one if the individual reports being sick the 30 days previous to the interview and zero otherwise.

4.6 Individual Characteristics

Finally we construct variables for different characteristics in which we include: gender, marital status, live with parents, work status, and study status. These variables are relevant for the present study since the regulation for young adults states that by turning 18 years old, dependents lose health insurance coverage only if they are not studying. For study status we used a question asking if the person was currently enrolled in a study program at the time of the interview. For work status we build a dummy taking value one if the person spent most of his time the week before the interview working and zero otherwise. But also turning 18 years old involves other changes that have to be analyzed. For instance, been married or living with parents could influence the usage of medical services if these characteristics change discontinuously at the threshold. For been married we create a dummy taking value of one if the person is married or has been living with someone longer than two years and zero otherwise. For living with parents, the dummy variable takes the value of one if the person live with the mother, the father or both; and zero otherwise.

Table 1 presents some descriptive statistics for the differences in means for insured and uninsured people, and for people younger and older than 18 years old. The differences are calculated pooling the whole sample (2010-2013). The sub-sample that we consider to calculate the means and differences is individuals that are 6 months away from 18 years old (or 216 months) on both sides of the threshold. Results show for those younger and older than 18, significant differences in living with parents, marital status, work status, and study status;

while for uninsured and insured people, there are differences in gender, live with parents, work status, and study status. In terms of medical service usage and health status we observe differences in the groups uninsured and insured. For instance hospitalizations, visits to the ED, medical service usage, and preventive care significantly differ for insured and uninsured people.

Table 1: Differences in means for insured and uninsured people and for people younger and older than 18 years old, for 2010 to 2013.

	Difference for people older than 18 and younger than 18 Years 2010 to 2013 +-6 months				Differences for uninsured and insured people Years 2010 to 2013 -+6 months			
	Younger than 18	Older than 18	Differ	P value	Uninsured	Insured	Differ	P value
Any health insurance	0,9117	0,8738	0,0379	0,0000				
Any health insurance adj	0,9117	0,8427	0,0690	0,0000				
CS	0,2790	0,2324	0,0466	0,0000				
SS	0,6327	0,6414	-0,0087	0,4884				
Male	0,5101	0,4985	0,0116	0,3711	0,5465	0,4993	0,0471	0,0248
Work status	0,2655	0,3192	-0,0538	0,0001	0,2520	0,1885	0,0635	0,0001
Study status	0,5968	0,5166	0,0802	0,0000	0,4142	0,5742	-0,1600	0,0000
Married	0,0444	0,0601	-0,0157	0,0064	0,0441	0,0533	-0,0092	0,3241
Live with parents	0,7984	0,7731	0,0253	0,0488	0,6794	0,7904	-0,1110	0,0000
Sick last month	0,0793	0,0769	0,0024	0,7268	0,0787	0,0779	0,0008	0,9404
Hospitalized last year	0,0675	0,0728	-0,0053	0,4233	0,0520	0,0724	-0,0204	0,0568
ED visits	0,0356	0,0393	-0,0037	0,4575	0,0236	0,0393	-0,0157	0,0495
Medical services by EPS	0,0457	0,0433	0,0024	0,6540	0,0205	0,0475	-0,0270	0,0018
Alternative medical serv	0,0124	0,0124	0,0000	0,9965	0,0268	0,0106	0,0162	0,0005
Private medical service	0,0050	0,0064	-0,0013	0,4934	0,0094	0,0053	0,0042	0,1904
Poor health status	0,0094	0,0067	0,0027	0,2449	0,0142	0,0072	0,0070	0,0607
Preventive physician	0,1492	0,1531	-0,0039	0,6762	0,1039	0,1569	-0,0530	0,0004
Preventive dentist	0,0867	0,0762	0,0105	0,1388	0,0567	0,0845	-0,0278	0,0155

Note: The sub-sample used is individuals whose age is +- 6 months from 216 months (18 years old). Column A shows differences between people older than 18 and younger than 18 years old. Column B shows differences for insured and uninsured people.

5 Empirical Strategy

To address the causal effect of losing health insurance coverage on medical service usage, it is necessary to solve endogeneity problems associated with adverse selection. In the present study, as a natural experiment, we exploit the enactment of Decree 806 of 1998 which generates an exogenous change in the probability of being insured when an individual turns 18 years old. We are interested in disentangling how people's medical service usage and health status are altered (MS_i) due to losing health insurance coverage (HI_i) when turning 18 years old ($A_i \geq 18$) in a developing country with a mixed healthcare system.

Let $Pr(HI_i = 1|A = a)$ be the conditional probability of having health insurance coverage given the age. We expect that, due to Decree 806, the probability of having health insurance coverage after turning 18 years old would be lower than the probability of having health insurance coverage before turning 18 years old. This means that the limit when getting closer to 18 years old from the right is lower than the limit coming from the left ($lim_{A\downarrow c}Pr(HI_i = 1|A = a) < lim_{A\uparrow c}Pr(HI_i = 1|A = a)$). For a sharp RDD these limits will take the values zero and one.

However, in our case, there is no perfect compliance since many dependents keep their coverage after turning 18 years old, for they remain enrolled in educational programs or some of them find a formal job. Thus, the probability of having health insurance generates a discontinuity when turning 18 years old, meaning that the difference between the limits of the probability of having health insurance when close to 18 years old, from both sides, is less than one [$lim_{A\downarrow c}Pr(HI_i = 1/A = a) \neq lim_{A\uparrow c}Pr(HI_i = 1/A = a)$] and so we estimate a fuzzy RDD. Let Y_i be the outcomes of interest (measure of health care use or health status).[28] We estimate how the usage of medical services and health status change for those turning 18 years old as a consequence of losing health insurance coverage at that age (threshold).

The estimation of losing health insurance for a fuzzy RDD, following Hahn et al. (2001), is

[28] Our data is a repeated cross section, which means we use data at the individual level from surveys from different years, but the individuals are not followed along years (different samples and individuals for each year). All equations below should have both subscripts: one identifying individuals and one identifying year, but since we are not following the same individual across years we decided to omit the year indicator without changing the nature of the analysis. Although we control for year fixed effects in all our estimations.

similar to finding the Wald estimator in the vicinity of the threshold (used in the Two Stage Least Square) in which the difference in the conditional expected values of medical service usage, Y_i, just before and just after turning 18 years old (numerator), is divided (weighted) by the difference in the conditional expected values of losing health insurance coverage, HI_i, just before and just after turning 18 years old (denominator). Then, assuming that there are no other factors different to health insurance changing at the threshold, the causal effect of losing health insurance coverage on the usage of medical services and health status when turning 18 years old, can be estimated[29] as follows:

$$\begin{aligned} Wald_{est} = \tau_{fuzzy} &= \lim_{A \downarrow c} E[Y_i/HI_i = 0, A = a] - \lim_{A \uparrow c} E[Y_i/HI_i = 1, A = a] \\ &= -\left[\frac{\lim_{A \downarrow c} E[Y_i/A = a] - \lim_{A \uparrow c} E[Y_i/A = a]}{\lim_{A \downarrow c} E[HI_i/A = a] - \lim_{A \uparrow c} E[HI_i/A = a]}\right] \end{aligned} \tag{1}$$

where c is the threshold which takes the value of 216 months (18 years). Since the denominator is always negative in our case, to estimate the effect of interest value of the effect we multiplied the numerator of (1) by -1.[30] In this expression the numerator is the reduced form and the denominator is the first stage.

Thus, the fuzzy estimator τ estimates the Local Average Treatment Effect (LATE) for the group of people at the cut-off. With a relevant number of observations close to the threshold a non-parametric approach is recommended. For the analysis we grouped individuals into a number of identical intervals using the assignment variable, age, in months. This is often referred to in the literature as 'bin'. The simplest non-parametric approach in our case will compare the conditional means of the two closest bins, one at each side of the threshold, if the number of observations is big enough to do so. In the present study we use a small bandwidth around the

[29]Formally, we are making two assumptions: (i) that the expected value for medical service usage and health status (Y_i) is a continuous function of age close to the threshold (Local Continuity Assumption) such that $E[Y_i/HI_i = 1, A_i]$ and $E[Y_i/HI_i = 0, A_i]$ are continuous in A at a_0; and (ii) age provokes the probability of having health insurance to increase or decrease (causing a discontinuity at a_o), meaning that the probability of having health insurance is a monotonic function of age (Monotonicity Assumption). The monotonicity can go either direction $HI_i(1) \leq HI_i(0)$ or $HI_i(1) \geq HI_i(0)$ but since the probability of having health insurance reduces when turning 18 we assume $HI_i(1) \leq HI_i(0)$ for all i.

[30]This happens because the treated people should have lower rates of health insurance coverage than the control people, in other words: $lim_{A\downarrow c}E[Y_i/HI_i = 1, A = a] < lim_{A\uparrow c}E[Y_i/HI_i = 0, A = a]$.

threshold. To estimate the parameter of interest we estimate the following specification with a Local Linear Regression (LLR) for the numerator and denominator of Equation 1 as follows:

$$Y_i = \alpha + \beta_0 D_i + \beta_1 f(A_i - 216) + \beta_2 f(A_i - 216) D_i + \beta_3 X_t + \theta_i \tag{2}$$

$$HI_i = \alpha + \pi_0 D_i + \pi_1 f(A_i - 216) + \pi_2 f(A_i - 216) D_i + \pi_3 X_t + \mu_i \tag{3}$$

where D_i is an indicator for the assignment variable such that $D_i = 1$ if $A \geq 216$ and $D_i = 0$ if $A < 216$. $A_i - 216$ is the age centered at 216 months. $f(.)$ represents the association between the age of individuals and the outcome of interest (usage of medical services or health status). We assume that the association is lineal at both sides of the cutoff but allowing it to be different at both sides; X_t is a vector containing year and month fixed effects, so as to control for unobservable characteristics by year and month of birth. Since the assignment variable is discrete we follow Lee and Card (2008) and we estimate the standard error with clusters at the age (measured in months).

We limit the analysis to observations located within a close vicinity of the cut-off. Since the assignment variable is discrete there is not a specific rule to follow for the bandwidth selection, but to avoid asymptotic biases, we use the smallest optimal bandwidth in the LLR by using as a criterion of selection the Plugg-in Approach, proposed by Imbens and Lemieux (2008) (See Section 5.1).[31] Besides, we estimate different models for other bandwidths.

Additionally, we make different estimations using parametric methods, particularly we perform an Instrumental Variable (IV) Approach following Hahn et al. (2001), which is basically a Two Stage Least Square (2SLS), in which D_i, the age indicator, is the instrument for HI_i (first stage). Then in the second stage we use the estimated coefficients for HI_i to estimate the causal effect of HI_i on medical service usage and health status (Y_i) as follows:

First stage:

$$HI_i = \gamma_0 + \gamma_1 D_i + \gamma_2 f^k(A_i - 216) + \gamma_3 f^k(A_i - 216) D_i + \gamma_4 X_t + \upsilon_i \tag{4}$$

[31] The same optimal bandwidth is used of the numerator and denominator.

Second stage:

$$Y_i = \rho_0 + \rho_1(\hat{HI_i}) + \rho_2 f^k(A_i - 216) + \rho_3 X_t + \xi_i \tag{5}$$

In the IV specification, $f^k(.)$ is a lineal polynomial ($k = 1$) and the standard errors are clustered by age in months. We choose the same bandwidths used in the non-parametric approach, while X_t represents the vector for year and month fixed effects which is included in both stages.

5.1 Optimal Bandwidth Selection

Table 2 presents results for the estimation of the optimal bandwidth following the plug-in criteria. We observe that the optimal bandwidth chosen is close to the threshold (bandwidth 2) for all variables, except poor health.[32]

Table 2: Optimal bandwidth selection: Plug-in procedure

	Imbens optimal 'Bandwidth'
Variables/Years	2010, 2012 and 2013
Any health insurance	2
Insurance CS	2
Insurance SS	2
ED visits	2
Hosp last year	2
Medical services by EPS	2
Alternative medical services	2
Private medical services	2
Poor health	1
Sick lastmonth	2
Prev physician	2
Prev dentist	2
Prev care	2
Study status	2
Work status	2
Male	2
Married	2
Live with parents	2

6 Internal Validity and Robustness

In this section we perform a series of checks to assure that the assumptions behind the fuzzy RDD hold. In this sense we carry out the following validity checks: (i) discontinuity in the probability of having health insurance at the threshold; (ii) discontinuity in the probability

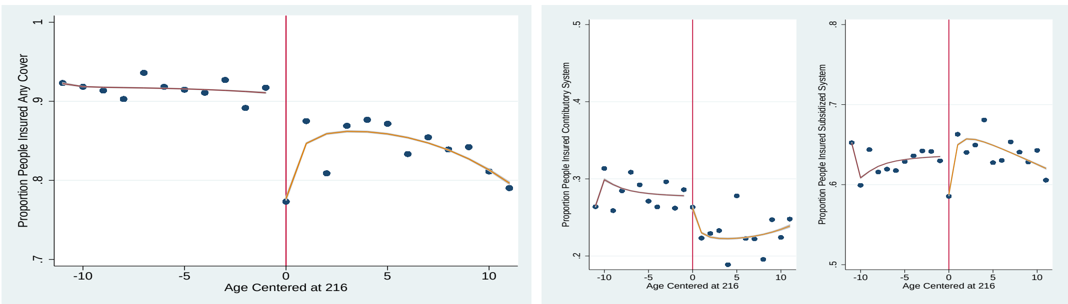
[32]We also performed optimal bandwidth selection for all the heterogeneous effects in 7.3. See Appendix A.1.

of having health insurance at placebo cut-off points as recommended in Imbens and Lemieux (2008) and Jacob et al. (2012); and finally, (iii) discontinuities in characteristics at the threshold.

6.1 Discontinuity in the Probability of Having Health Insurance at the Threshold

One of the assumptions for a fuzzy RDD is the existence of a discontinuity in the probability of having health insurance coverage at the threshold. For checking this we first perform a graph analysis. All graphs in Figure 1 show the proportion of individuals at each age (measured in months and centered at 216) that have any health insurance coverage (Graph (a)), have health insurance in the CS (left graph of Figure (b)), or have health insurance in the SS (right graph of Figure (b)). All variables are aggregated using information from the ENCV.[33] As expected, we observe a discontinuity at age 216, just when individuals turn 18 years old, in the probability of having any coverage. This reduction is explained by a reduction in the probability of having CS coverage and the SS.

Figure 1: Health Insurance Coverage by Age



(a) Any health insurance (b) CS coverage (left) & SS coverage (left)

Source: ENCV 2010, 2012 and 2013.

Results in Table 3 present the estimation of the discontinuity in the probability of having health insurance coverage at the threshold (denominator of Equation (1)) for bandwidths 2 to 4. Following results in Section 5.1, we emphasize the results obtained using a bandwidth of 2 for each separate year (Panels A to D) and pooling together all years (Panels E and F).

[33]For 2010, 2012, and 2013. See results in Table 3.

There is a statistically significant reduction of 8.8 percentage points at the threshold in the probability of having any coverage (Column 1, Panel A) for year 2010. For 2012 the reduction is 8.2 percentage points (Column 1, Panel C). For 2013 it drops by 9.9 percentage points (Column 5, Panel D). For Bandwidth 2 there is no effect for the year 2011. For the aggregated data, in Panels E and F, we observe that the probability of having health insurance has a statistically significant reduction of 7.1 percentage points for years 2010 to 2013 (Column 1, Panel E). The group without year 2011 has a statistically significant decrease of 7.6 percentage points (Column 5, Panel F). This reduction is comparable with the one seen in Figure 1.

The above results are robust across bandwidths for all years and groups except for 2011. The pattern in 2011 seems erratic (positive in bandwidths 3 and 4, then negative after bandwidth 5 without mentioning that it was not possible to estimate bandwidth 2). Indeed when we re-estimate the model excluding the year 2011, the estimated discontinuity was larger but not by much (an increase of only 0.5 percentage points). By looking at any health insurance adjusted, which corrects for dependents who reported to have health insurance after turning 18 years old there are not studying either working (this correction is explained in detail in Section 4.3), we see that the estimated effect is bigger than that for any health insurance. This could reflect that we are underestimating the actual effect of Decree 806 on health insurance.

For health insurance coverage in the CS we observe statistically significant decreases for 2010 and 2012 of 11.3 and 6.2 percentage points (Column 1, Panel A and C). For 2013 there is no significant effect (Column 4). For the pool years 2010 to 2013 and 2010, 2012 and 2013 (Panels E and F) there are statistically significant decreases in the probability of having health insurance coverage in the CS of 5.9 and 5.7 percentage points (Columns 1 and 4, respectively). These results are comparable to those seen in the left part of Figure 1 (b)).

For health insurance coverage in the SS, there is a small statistically significant decrease in the probability of having coverage of 1.9 percentage points (Column 1, Panel C) for the year 2012. For the rest of the years there are no significant effects. For the group of years 2010 to 2013 and the group excluding 2011 there are no effects.

Table 3: Estimates for the Probability of Having Health Insurance for Each Year, and Group of Years

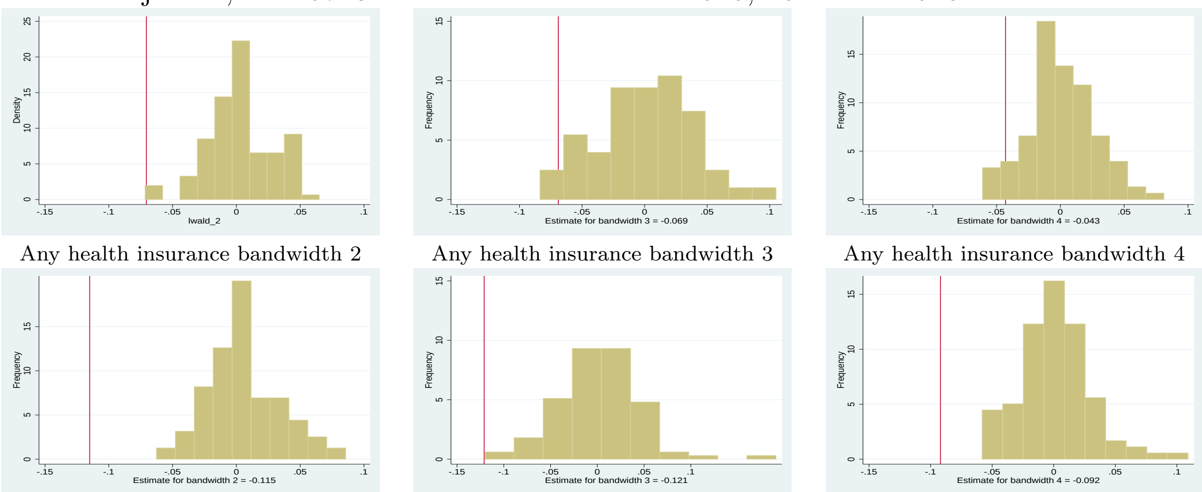
Variables/Bandwidth	(1) 2	(2) 3	(3) 4	(4) 2	(5) 3	(6) 4
	A. Year 2010			B. Year 2011		
Any health insurance	-0.0881***	-0.124***	-0.116***	-0.0162	0.00905	0.00904*
	(0.00781)	(0.0113)	(0.0152)	(0.0659)	(0.00615)	(0.00503)
Any health insurance adj	-0.0968***	-0.135***	-0.126***	-0.122	-0.0584***	-0.0494***
	(0.0124)	(0.0236)	(0.0269)	(0.0771)	(0.0177)	(0.0163)
CS	-0.113***	-0.0666**	-0.0846***	0.0853	0.0103	0.0298
	(0.0290)	(0.0276)	(0.0271)	(0.0911)	(0.0122)	(0.0200)
SS	0.0247	-0.0573***	-0.0309*	-0.101	-0.00122	-0.0207
	(0.0213)	(0.0179)	(0.0167)	(0.101)	(0.00964)	(0.0219)
Observations	456	632	803	751	1,036	1,326
	C. Year 2012			D. Year 2013		
Any health insurance	-0.0817**	-0.0962***	-0.0314	-0.0654**	-0.0992***	-0.0734***
	(0.0348)	(0.0136)	(0.0342)	(0.0297)	(0.0264)	(0.0207)
Any health insurance adj	-0.165***	-0.168***	-0.0986**	-0.122***	-0.149***	-0.120***
	(0.0349)	(0.0272)	(0.0444)	(0.0355)	(0.0478)	(0.0406)
CS	-0.0624**	-0.0567**	0.00808	0.00695	0.00913	0.000740
	(0.0307)	(0.0223)	(0.0447)	(0.0283)	(0.0390)	(0.0347)
SS	-0.0193***	-0.0395	-0.0395	-0.0723	-0.108*	-0.0742
	(0.00410)	(0.0329)	(0.0400)	(0.0577)	(0.0642)	(0.0533)
Observations	620	858	1,079	541	776	1,021
	E. Years 2010-2013			F. Years 2010, 2012 and 2013		
Any health insurance	-0.0706***	-0.0688***	-0.0433***	-0.0765***	-0.102***	-0.0667***
	(0.00476)	(0.00890)	(0.0145)	(0.00363)	(0.0134)	(0.0208)
Any health insurance adj	-0.115***	-0.121***	-0.0920***	-0.127***	-0.148***	-0.110***
	(0.00638)	(0.0242)	(0.0279)	(0.00448)	(0.0299)	(0.0352)
CS	-0.0586***	-0.0182	-0.000285	-0.0573***	-0.0331**	-0.0157
	(0.0117)	(0.0114)	(0.0191)	(0.0155)	(0.0154)	(0.0199)
SS	-0.0120	-0.0506***	-0.0430*	-0.0193	-0.0689***	-0.0510*
	(0.00878)	(0.0191)	(0.0250)	(0.0132)	(0.0253)	(0.0290)
Observations	2,368	3,302	4,229	1,617	2,266	2,903

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. All coefficients are estimates of the parameter π_0 in Equation (3). All regressions in Panels A to D control for month of birth fixed effects. All regressions in Panel E and F control for year and month of birth fixed effects.

6.2 Discontinuity in the Probability of Insurance at Placebo Cut-off Points

In order to check that the estimated discontinuity in the probability of having health insurance coverage at the threshold is not found just by chance, we estimate a series of placebo tests for 107 different placebo cut-off points going from 14 years old (168 months) to 23 years old (268 months) for a bandwidth of 2, 3 and 4 months. In Figure 2 we plot the distribution of the discontinuity estimates at the placebo thresholds. In the total of 107 estimations, only one cut-off point has a similar value to the estimated value at the threshold for bandwidth 2 (month 222, with a value: -0.0715); for bandwidth 3, eight cut-off points (7.5%) were above the absolute estimated value (only five are negative, equivalent to 4.6% of the cut-off points); while for bandwidth 4 there are 10 cut-off points (9.3%) above the absolute estimated value (six are negative, equivalent to 5.6%). Some of the placebo thresholds for which we get a greater discontinuity are close to the correct threshold (216).[34] Moreover, considering the health insurance coverage which has been adjusted, the estimation calculated at the threshold is the biggest of all in both cases (see lower Panels in Figure 2). All these results indicate that undoubtedly the discontinuity found in the probability of having health insurance at the threshold of 216 months did not happen by chance.

Figure 2: Distribution of Estimated Coefficients for Any Health Insurance and Any Health Insurance Adjusted, for 107 Cut-off Points for Years 2010, 2012 and 2013.



Any health insurance bandwidth 2 | Any health insurance bandwidth 3 | Any health insurance bandwidth 4

Any health insurance adj bandwidth 2 | Any health insurance adj bandwidth 3 | Any health insurance adj bandwidth 4

Source: Own calculations based on ENCV 2010, 2012 and 2013

6.3 Discontinuities in Characteristics at the Threshold

To ensure that all the assumptions of the fuzzy RDD hold, it is important that the conditional expected values of other characteristics different from health insurance status, do not change discontinuously at the threshold.[35]

Table 4 presents estimates for different characteristics where we pooled the sample. We observe for optimal bandwidth 2 statistically significant changes for work status and male (Column 1 of Table 4), but not for live with parents, married, and study status. At a firsthand

[34]Months for which values exceed the estimated value of bandwidth 2: 222; for bandwidth 3: 169, 184, 214, 217, 222, 225, 246, and 250; for bandwidth 4: 169, 184, 214, 217, 222, 225, 245, 246, 250, and 252.

[35]First we carried out a graphical analysis where we evidenced tendencies, yet there were no significant discontinuities (see Figure 5, Appendix A.2).

glance, discontinuous changes at the threshold of characteristics such as male, married, and live with parents could threaten the validity of the RDD. Given the potential threat of certain characteristics like male and work status changing discontinuously at the threshold, we estimate Equation (2) including male and work status as controls and find that the results do not change significantly from those found in Table 3 (Section 6.1).

Another concern is related to changes in health habits when individuals turn 18 years old in Colombia since alcohol and tobacco become legal for them to consume at that age. One could imagine that turning 18 years old may involve an increase in the consumption of alcohol and tobacco. This new behavior could potentially affect medical service usage. In the ENCV there are no questions asking about alcohol and tobacco consumption at the individual level. Thus, we use other data and arguments that can inform us about whether after turning 18 years old there is a sudden change in these habits. One argument is related to emancipation. By living with their parents, young adults are subject to a sort of 'parent-child control' (*my house, my rules*) even after turning 18 years old. Besides, many young adults in Colombia, as in other developing countries, are socially and economically dependent on their parents still, even after turning 18 years old. This delays a sudden change in alcohol and tobacco consumption, opposite to those who emancipate immediately after turning 18 years old. Thus the variable, live with parents, could potentially inform us of sudden changes or the lack thereof in tobacco and alcohol consumption for young adults. The results in Table 4 (Column 1) show us that this variable does not change discontinuously at the threshold, indicating that almost all the dependents of the sample still live with their parents after turning 18 years old.

By using data from the United Nations Office on Drugs and Crime (UNODC) and their 2011 survey done in Colombia on the consumption of psychoactive substances (tobacco, alcohol, marijuana, cocaine, etc.) by high school students (between 13 and 17 years old), habits regarding alcohol and tobacco consumption are made clear (the survey is representative at the national level). For instance, the data shows that tobacco consumption in the year prior to the interview, among 16, 17, and 18 years old was 16.4%, 16.2%, and 11.7% respectively.[36] More-

[36] When considering the consumption in the last month before the interview, the proportions are: 13.6%, 13.1%, and 9.2% respectively.

over, alcohol consumption in the year prior to the interview among the same ages is: 63%, 62%, and 58.5% respectively.[37] Thus for the present study, alcohol and tobacco consumption are not considered a major threat for the validity of our identification strategy, since 'bad habits' are clearly not suddenly formed when turning 18 years old.

Furthermore, we explore the idea that parents who indulge in tobacco and alcohol could be more permissive to minors regarding their consumption. We use information from the 2010 ENCV that show the weekly expenses on tobacco and alcohol by each household (only year available). We estimate Equation (1) controlling for this, but the sample is significantly reduced and there are no significant effects.[38]

Table 4: Estimates for Different Characteristics for Bandwidths 2 to 4, for 2010, 2012 and 2013

	(1)	(2)	(3)
Variables/Bandwidth	2	3	4
Study status	-0.0329	0.00579	0.0292
	(0.0214)	(0.0232)	(0.0231)
	(0.0214)	(0.0232)	(0.0231)
Work status	-0.0240***	-0.0494***	-0.0185
	(0.00862)	(0.00731)	(0.0146)
Male	-0.0330*	-0.0843***	-0.0315
	(0.0198)	(0.0126)	(0.0208)
Married	0.00115	-0.0244***	-0.0337***
	(0.0121)	(0.00578)	(0.00485)
Live with parents	-0.0361	-0.0624***	-0.0296
	(0.0229)	(0.0196)	(0.0190)
Observations	2,368	3,302	4,205

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. All coefficients are estimates of the parameter β_0 Equation (2), using as a dependent variable the following characteristics: Study status, work status, gender, live with parents and married.All regressions control for year and month of birth fixed effects.

7 Results

7.1 Visual Analysis of Medical Service Outcomes

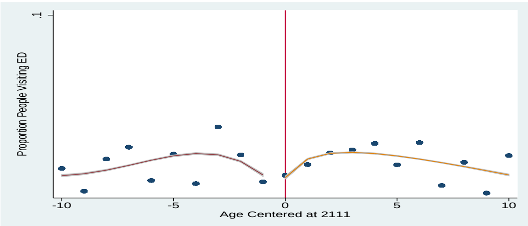
All graphs in Figures 3 and 4 show the proportion of individuals at each age (measured in months and centered at 216) that used different types of medical services. In Figure 3 we observe small discontinuities going down for hospitalizations in the year previous to the interview (Graph (b)) and for alternative medical services (Graph (d)). For visits to the ED (Graph (a)) and

[37] Also when considering alcohol consumption in the last month prior to the interview, the proportions are: 37%, 33%, and 32% respectively.

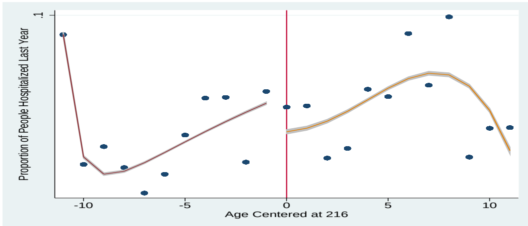
[38] The results are not reported here but are available upon request.

the usage of EPS medical services (Graph (c)), there is no clear evidence of discontinuities at the threshold. This visual result seems daunting since we were expecting to see a discontinuity going up for visits to the ED and one discontinuity going down for medical services provided by the EPS.

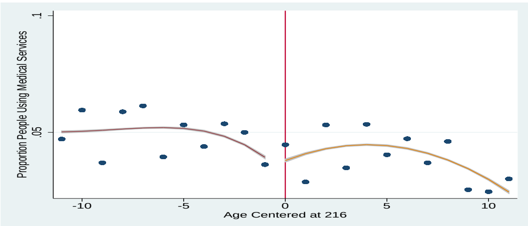
Figure 3: Proportion of Usage of Different Health Services by Age in Months.



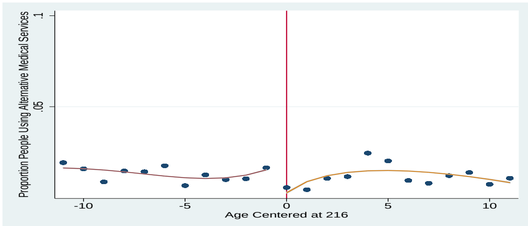
(a) Visits ED



(b) Hospitalization last year



(c) EPS medical services

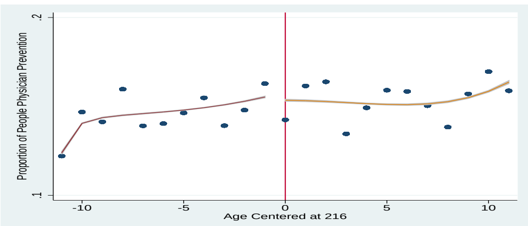


(d) Alternative medical services

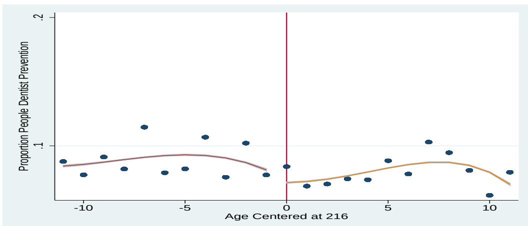
Source: ENCV 2010, 2012 and 2013.

Figure 4 shows not clear discontinuities for visiting a dentist for prevention purposes (Graph b), or preventive visits to a physician (Graph a). However, further analysis is required.

Figure 4: Proportion of Usage of Preventive Care the Last Year.



(a) Preventive physician



(b) Preventive dentist

Source: ENCV 2010, 2012 and 2013.

7.2 Regression Analysis

Table 5 presents the baseline results of the effect of losing health insurance coverage on medical service usage and health status for the pooled sample.[39][40]

Panel A of Table 5 reports the estimates for the discontinuity in the probability of having health insurance coverage at the threshold for the sample under analysis. These results are the same as those presented in Table 3, Panel F.

Panels B and C show the estimated results for the treatment effect of Equation (1) where the outcomes are different measures for the usage of medical services and health status. Results show that losing health insurance coverage at age 18 increases visits to the ED by 4.1 percentage points (in a range of 4.1 to 21.5). Although ED visits are not statistically significant for bandwidth 2, the sign of the coefficient is positive across all bandwidths (meaning there is an increase in visits to the ED) and is statistically significant for bandwidths 3 and 4.

We classify medical services into three categories: medical services provided by the EPS, alternative medical services, and private medical services (Panel B). The fuzzy RDD estimates show that losing health insurance when turning 18 years old increases the usage of private medical services by 9.5 percentage points (in a range of 9.5 to 21). We also find that when people lose health insurance, there is a statistically significant decrease in the usage of alternative medical services by 21.4 percentage points (in a range of 21.4 to 30), along with a decrease in visits to a physician for prevention purposes by 76.6 percentage points (in a range of 76.6 to 84) (all results are robust across bandwidths). Finally, the usage of medical services provided by the EPS does not decrease as we expected. Instead, we observe that losing health insurance coverage increases the usage of medical services provided by the EPS by 28.2 percentage points (in a range of 28.2 to 63).

There could be some possible explanations for this unexpected result, for example, the nature of the question, since the question from which we extracted the variable asks whether the person went to an EPS after having a health problem within the 30 days prior to the

[39] Similar to the results in Section 6.2, in which 2011 does not show a robust significant discontinuity for the probability of having health insurance, the following analysis considers only the years 2010, 2012, and 2013. We estimate the same regressions including the year 2011 and results are robust (see Appendix A.3, Table 13).

[40] The estimated coefficients in Table 5 were obtained using the 'rd' command in STATA.

Table 5: Estimations for the Effect of Losing Health Insurance, on Different Medical Services and Health Status for a Bandwidth 2 to 4, Years 2010, 2012 and 2013

	Bandwidth 2	Bandwidth 3	Bandwidth_4
Variables	A. Health insurance status		
Any health insurance	-0.0765***	-0.102***	-0.0667***
	(0.00363)	(0.0134)	(0.0208)
Any health insurance adj	-0.127***	-0.148***	-0.110***
	(0.00448)	(0.0299)	(0.0352)
CS	-0.0573***	-0.0331**	-0.0157
	(0.0155)	(0.0154)	(0.0199)
SS	-0.0193	-0.0689***	-0.0510*
	(0.0132)	(0.0253)	(0.0290)
	B. Medical services outcomes		
ED visits$^{(a)}$	0.0405	0.139***	0.215***
	(0.0597)	(0.0453)	(0.0503)
Hospitalization	0.0598	0.00266	0.298
	(0.0880)	(0.0572)	(0.200)
Medical services by EPS	0.282***	0.633***	0.502***
	(0.0637)	(0.106)	(0.0986)
Alternative medical service	-0.214**	-0.287***	-0.303***
	(0.0959)	(0.0638)	(0.113)
Private medical service	0.0950**	0.215***	0.149***
	(0.0432)	(0.0594)	(0.0481)
Preventive physician	-0.760***	-0.846***	-0.842***
	(0.171)	(0.198)	(0.196)
Preventive dentist	0.109	0.455***	0.250**
	(0.0820)	(0.118)	(0.118)
	C. Health Status outcomes		
Poor health	-0.221*	-0.247**	-0.226**
	(0.129)	(0.110)	(0.105)
Sick last month	0.291***	0.645***	0.497***
	(0.0512)	(0.0837)	(0.156)
Observations	1,617	2,266	2,888

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. In Panel A, all coefficients are estimates of the parameter π_0 in Equation (3). Coefficients reported in part A are for the denominator of the Wald estimator (first stage). Panel B and C, coefficients are estimated using Equation (1). All regressions control for year and month of birth fixed effects, and standard errors clustered by age in months. (^{a}) is only available for years 2012 and 2013. The rest of the outcomes are available for all years.

interview. It could be possible that the period of reference for the answer (the last 30 days) does not coincide exactly with the same period of the answer given for the health insurance status (the day of the interview). To test this argument we use the one period lag of the variable age in months as a running variable and we estimate the reduced form for medical services by EPS (numerator of Equation (2)) to compare with the reduced form using age in months at the interview date. Intuitively, lagging the age allows us to compare answers for medical services by EPS of those who are 217 months old with those that are 216 months old.

The variable medical services by EPS changes its sign when using a one-period lag of age in months compared to the reduced form without the adjustment in age. This result is statistically significant and favors our argument of mismatched answers in which young adults at the threshold are using medical services by the EPS in the period before they turned 18, when some of them were more likely to be insured.

Results in Table 6 show when using a one-period lag of age in months (Panel A) that medical services by EPS is positive and statistically significant for bandwidth 2 (Column 1, Panel A), while for age in months (Panel B), estimated coefficients are positive and statistically significant (Column 1, Panel A).

Table 6: Estimates for the Reduced Form for Medical Services by EPS Using a One-period Lag Age in Months and Age in Months as Forcing Variables, for Pooled Years 2010, 2012, and 2013

	(1)	(2)	(3)
Variable/Bandwidth	2	3	4
	A. One-period lag age in months		
Medical services by EPS	-0.0220***	-0.0505***	-0.0235
	(0.00427)	(0.00170)	(0.0148)
	B. Age in months		
Medical services by EPS	0.0206***	0.0398***	0.0299***
	(0.00479)	(0.00802)	(0.00990)
Observations	1,617	2,266	2,903

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. All coefficients are estimates of parameter π_0 of Equation (2), where the outcome variable is medical services by EPS. All regressions control for year and month of birth fixed effects, and standard errors clustered by age in months.

We find that losing health insurance coverage increases dental visits for preventive purposes by 10.9 percentage points (in a range of 10.9 to 45.5) (however this is not statistically significant for bandwidth 2). Finally, for health status outcomes we find a statistically significant decrease in their perception of having poor health by 22.1 percentage points (in a range of 22.1 to 24). However, losing health insurance coverage increases the proportion of people who were sick in the month previous to the interview by 29.1 percentage points (in a range of 29.1 to 64.5). All results are statistically significant across bandwidths.

The above results are in accordance (except for medical services by EPS which are less robust) with the ones suggested in the literature and are consistent with the incentives the Colombian system introduces once an individual loses health insurance coverage, arguing that when individuals lose coverage they tend to increase visits to ED, as well as tend to reduce seeing a physician for preventive purposes.

7.3 Heterogeneous Effects

In this section we analyze three heterogeneous effects. First we evaluate whether there are different effects by gender; second we analyze heterogeneous effects by urban and rural areas;

and third we analyze differences within each health insurance subsystem (CS and SS) by creating two sub-samples, one for those insured in the CS with those who are uninsured (removing people insured by the SS) and another for those who are insured in the SS with those who are uninsured (removing people insured by the CS).

7.3.1 Heterogeneous Effects by Gender

Table 6 shows the estimates of Equation (1) by gender. There is a statistically significant decrease in the probability of having any health insurance of 10.3 percentage points for males and 5.1 percentage points (Columns 1 and 4, Panel A of Table 6, respectively). The effect is comparable to that seen in Figure 6.[41]

Panels B and C present estimations for medical service usage and health status. For males who lose coverage when turning 18 years old, there is a statistically significant decrease in the usage of alternative medical services by about 14 percentage points, and a decrease in visits to a dentist and physician for preventative purposes by about 66 and 31 percentage points, respectively (Column 1, Panel B). These results are robust across bandwidths, except for visits to a physician for preventative purposes. Moreover, for males who lose health insurance coverage, there is a statistically significant increase in their perception of having bad health status by 18.8 percentage points (Column 1, Panel C). This result is robust across bandwidths.

For the group of females who lose health insurance coverage when turning 18 years old, there are statistically significant increases in: (i) visits to the ED by 33.3 percentage points, (ii) EPS medical service usage by 90 percentage points, (iii) private medical service usage by 12.7 percentage points, and (iv) visits to a physician for preventive purposes (contrary to results in Table 5) by 75.6 percentage points (Column 4, Panel B). There is a statistically significant decrease in alternative medical service usage by 39 percentage points. Furthermore, for females who lose coverage when turning 18 years old, there is a statistically significant decrease in their bad health status by 70 percentage points and a statistically significant increase in the

[41]A graphic analysis is provided in Appendix A.4. Moreover, for the heterogeneous effects the optimal bandwidth is still two months away from the threshold. Characteristics such as married, live with parents, and work status do not change discontinuously when turning 18 years old.

proportion of females feeling sick in the 30 days previous to the interview (Column 4, Panel C).[42] These results are robust when controlling for marital status, which changes discontinuously at the threshold (Table 14 and 15, Appendix A.4). We estimate coefficients for the sample of pregnant females, so as to corroborate that the effect was not driven by pregnant young adults, and the results were not statistically significant for this group at any bandwidth considered.

Table 7: Estimates for Heterogeneous Effects by Gender for Years 2010, 2012 and 2013

	Male			Female		
	(1)	(2)	(3)	(4)	(5)	(6)
Variables/Bandwidth	2	3	4	2	3	4
			A. Health insurance status			
Any health insurance	-0.103***	-0.166***	-0.0940***	-0.0505***	-0.0406***	-0.0385***
	(0.00665)	(0.0199)	(0.0362)	(0.00567)	(0.0122)	(0.0118)
Any health insurance adj	-0.146***	-0.190***	-0.122***	-0.108***	-0.107***	-0.0976***
	(0.0113)	(0.0290)	(0.0428)	(0.0176)	(0.0342)	(0.0332)
			B. Medical services outcomes			
ED visits$^{(a)}$	-0.0838	0.0266	6.37e-05	0.333*	0.434***	0.725**
	(0.0619)	(0.0235)	(0.0207)	(0.172)	(0.159)	(0.321)
Hospitalization	-0.0102	0.490*	0.603	-0.0367	-1.761*	-0.567
	(0.0312)	(0.281)	(0.373)	(0.328)	(0.990)	(0.593)
Medical services by EPS	-0.0920	0.338***	0.238**	0.897***	1.341***	1.035***
	(0.0595)	(0.0947)	(0.0962)	(0.168)	(0.461)	(0.353)
Alternative medical services	-0.140*	-0.330***	-0.307*	-0.389***	-0.229**	-0.325***
	(0.0847)	(0.120)	(0.174)	(0.0821)	(0.0952)	(0.0949)
Private medical services	0.0817	0.0967*	0.0383	0.127*	0.586*	0.422**
	(0.0567)	(0.0531)	(0.0475)	(0.0696)	(0.327)	(0.189)
Preventive Physician	-0.663*	-0.268***	-0.495***	-1.157	-2.775**	-1.807**
	(0.387)	(0.0955)	(0.140)	(0.706)	(1.347)	(0.708)
Preventive dentist	-0.311*	-0.376	-0.303	0.756***	2.608*	1.404*
	(0.186)	(0.244)	(0.285)	(0.169)	(1.496)	(0.832)
			C. Health Status outcomes			
Poor health	-0.204	-0.133**	-0.160**	-0.239	-0.601	-0.406**
	(0.125)	(0.0604)	(0.0777)	(0.170)	(0.377)	(0.194)
Sick last month	-0.128	0.480**	0.267*	1.003***	0.981**	0.955
	(0.153)	(0.195)	(0.158)	(0.139)	(0.466)	(0.601)
Observations	1,035	1,447	1,832	995	1,399	1,788

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. In Panel A, all coefficients are estimates of the parameter π_0 in Equation (3). Coefficients reported in part A are for the denominator of the Wald estimator (first stage). Panel B and C, coefficients are estimated using Equation (1). All regressions control for year and month of birth fixed effects, and standard errors clustered by age in months. (^{a}) is only available for years 2012 and 2013. The rest of the outcomes are available for all years.

7.3.2 Heterogeneous Effects by Urban and Rural Areas

Here we use a division used in the ENCV for all years so as to identify people living in urban and rural areas. We construct a dummy variable taking the value of one if the individual lives in a rural area and zero otherwise.[43] The estimated coefficients are presented in Table 8 where

[42]Some of the estimations are 'too big to be true' because the effect of the treatment variable (denominator) weights the reduced form (numerator) which inflates the effect even over the value of one.

[43]A visual inspection is done in Appendix A.5.1, Figure 7. The optimal bandwidth is still two months away from the threshold.

we see statistically significant decreases in the probability of having any health insurance by 7.6 percentage points for urban areas and by 10.4 percentage points for rural areas (Columns 1 and 4, Panel A, respectively). These results are robust across bandwidths.

For urban dwellers who lose health insurance coverage when turning 18 years old there are statistically significant increases in hospitalizations by 23.7 percentage points, in EPS medical service usage by 22.9 percentage points, and in private medical service usage by 23 percentage points (Column 1, Panel B) (these results are robust across bandwidths for EPS medical services and private medical services). When losing health coverage, there are as well statistically significant decreases in alternative medical service usage by 15.6 percentage points and in visits to a physician for preventative purposes by 87 percentage points (Column 1, Panel B); these results are robust across bandwidths. In terms of health status when losing health insurance, urban dwellers show a statistically significant increase in the proportion of those feeling sick the month previous to the interview by 48.3 percentage points (Column 1, Panel C).

For rural dwellers who lose health insurance there is a robust, statistically significant decrease for visits to a physician for preventive purposes by 37.2 percentage points (while there is a decrease for visits to the ED by 17.6 percentage points, hospitalizations by 29 percentage points, and alternative medical service usage by 9.3; these are not robust across bandwidths). Moreover, there are statistically significant increases in medical service usage by 38.5 percentage points and visits to a dentist for preventive purposes (this last one is not robust across bandwidths) (Column 4, Panel B). When losing coverage, rural dwellers' perception of their health as being poor decreases by 27.7 percentage points (statistically significant), while the proportion of rural dwellers feeling sick in the 30 days previous to the interview increases (statistically significant) (Column 4, Panel C).[44]

7.3.3 Heterogeneous Effects by Health Insurance: CS and SS

For this analysis we construct two different samples, one for each subsystem. For those insured in the CS we create a dummy variable taking the value of one if the person is enrolled only

[44]Since married status and male change discontinuously at the threshold for people living in rural areas, we included these characteristics as controls and the results do not change. The same happens when including male as a control for people living in urban areas (see Table 16 and 17, Appendix A.5.2).

Table 8: Heterogeneous Effects by Rural and Urban Areas

	Urban areas			Rural areas		
	(1)	(2)	(3)	(4)	(5)	(6)
Variables/Bandwidth	2	3	4	2	3	4
			A. Health insurance status			
Any health insurance	-0.0755***	-0.111***	-0.0620***	-0.104***	-0.0725***	-0.0857***
	(0.0275)	(0.00438)	(0.0108)	(0.0216)	(0.0229)	(0.0260)
Any health insurance adj	-0.156***	-0.175***	-0.123***	-0.104***	-0.0671**	-0.0835***
	(0.0275)	(0.000919)	(0.0316)	(0.0394)	(0.0273)	(0.0282)
			B. Medical services outcomes			
ED visits$^{(a)}$	0.0590	0.108	0.158	-0.176***	0.270**	0.245
	(0.0789)	(0.0885)	(0.114)	(0.0247)	(0.129)	(0.206)
Hospitalization	0.237***	0.0245	0.305*	-0.291***	-0.398***	-0.0568
	(0.0344)	(0.0848)	(0.174)	(0.0522)	(0.114)	(0.168)
Medical services by EPS	0.229**	0.331***	0.278***	0.385***	1.335***	0.821**
	(0.0951)	(0.0327)	(0.0985)	(0.0871)	(0.369)	(0.367)
Alternative medical services	-0.156**	-0.305***	-0.242***	-0.0934***	-0.311***	-0.296
	(0.0766)	(0.0253)	(0.0510)	(0.0153)	(0.112)	(0.183)
Private medical services	0.230***	0.333***	0.237***	-0.0265	-0.185*	-0.119**
	(0.0367)	(0.0548)	(0.0476)	(0.0232)	(0.100)	(0.0473)
Preventive Physician	-0.871***	-0.726***	-0.566***	-0.372***	-1.358***	-1.582**
	(0.262)	(0.110)	(0.210)	(0.0607)	(0.521)	(0.746)
Preventive dentist	-0.0911*	0.310**	0.216	0.982***	0.819**	0.387
	(0.0509)	(0.151)	(0.240)	(0.201)	(0.346)	(0.383)
			C. Health Status outcomes			
Poor health	-0.147	-0.000679	-0.0226	-0.277***	-0.845***	-0.607**
	(0.110)	(0.0643)	(0.0521)	(0.0208)	(0.243)	(0.282)
Sick last month	0.483***	0.515***	0.446**	0.509***	0.726***	0.448**
	(0.0773)	(0.0499)	(0.174)	(0.0586)	(0.180)	(0.186)
Observations	1,577	2,209	2106	392	542	1,564

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. In Panel A, all coefficients are estimates of the parameter π_0 in Equation (3). Coefficients reported in part A are for the denominator of the Wald estimator (first stage). Panel B and C, coefficients are estimated using Equation (1). All regressions control for year and month of birth fixed effects, and standard errors clustered by age in months. (^{a}) is only available for years 2012 and 2013. The rest of the outcomes are available for all years. Columns (1) to (3) are for urban areas; columns (4) to (6) are for rural areas.

in the CS and zero if they are uninsured (we eliminate those insured in the SS). Similarly, we create another dummy variable for those enrolled in the SS, taking the value of one if they are only insured in the SS and zero if they are uninsured (we eliminate those insured in the CS). In each sub-sample we compare insured (either in the CS or SS) with uninsured people.[45]

Estimates from Equations (2) and (3) by health insurance system (CS and SS), with year and month fixed effects for the years 2010, 2012, and 2013 are presented in Table 9. There are statistically significant decreases in health insurance for those in the CS by 18.1 percentage points and for those in the SS by 9.1 percentage points (Columns 1 and 4, Panel A); these results are robust across bandwidths.

For those who lose insurance in the CS when turning 18 years old, there are decreases

[45] A visual inspection was performed in Appendix A.6, Figure 8. Furthermore, the optimal bandwidth for these sub-samples are still two months away from the threshold. Live with parents and work status change discontinuously at the threshold, however (live with parents is not robust since this variable switches signs from bandwidth 2 to 3 for those enrolled in the CS). We control for these characteristics and results do not change drastically.

in hospitalizations and the usage of alternative medical services by 7.4 and 16.9 percentage points, respectively (Column 1, Panel B). While losing health insurance in the CS increases their perception of having bad health status by 31.6 percentage points (statistically significant), there is a reduction in the proportion of individuals that felt sick the month previous to the interview by 21.2 percentage points (Column 1, Panel C). The first result is robust across bandwidths while the second is not. For those who lose health insurance in the SS there are decreases in the usage of alternative medical services and visits to a physician for preventive purposes by 18.3 and 11.4 percentage points respectively.[46] As well there is an increase in the usage of medical services by 38.3 percentage points (Column 4, Panel B). Furthermore, those losing health insurance in the SS tend to be more sick the month previous to the interview, that is by 47.3 percentage points (Column 4, Panel C).

The results in general evidence how individuals losing health insurance coverage in the SS affects particularly the usage of medical services by EPS, alternative medical services, and health status. While for those whose probability of having health insurance decreases in the CS, there are no major changes in the usage of medical services by EPS, alternative medical services or health status. Interestingly, even when estimated coefficients are not statistically significant (such as for visits to the ED), we perceive that the increase in visits to the ED is driven by those who lose subsidized health insurance rather than contributory health insurance.

7.4 Parametric Estimations

In this section we estimate the Wald estimator with a parametric Instrumental Variable (IV) approach as suggested by Hahn et al. (2001), in which the probability of having health insurance is instrumented by the change in age ($1(D_i \geq 216)$), when individuals turn 216 months (18 years old). This Two Stage Least Square (2SLS) method uses the estimated coefficients for the probability of having health insurance (first stage, Equation (4)) in a second stage (Equation (5)) that estimates the effect of losing health insurance on medical services and health outcomes. Table 10 presents estimations for first stage Equation (4) of 2SLS described in Section 5. We

[46] This is the estimated effect of the reduced form (numerator), but since it is weighted for the estimated treatment effect, its value increases.

Table 9: Heterogeneous Effects for Health Insurance: CS and SS, Years 2010, 2012 and 2013

	Contributory System			Subsidized System		
	(1)	(2)	(3)	(4)	(5)	(6)
Variables/Bandwidth	2	3	4	2	3	4
	A. Health insurance status					
Health insurance	-0.181***	-0.211***	-0.134***	-0.0910***	-0.135***	-0.0882***
	(0.0186)	(0.0173)	(0.0388)	(0.00312)	(0.0205)	(0.0297)
	B. Medical services outcomes					
ED visits$^{(a)}$	-0.0728	-0.0475	-0.00337	0.0976	0.146**	0.237
	(0.0911)	(0.0689)	(0.0715)	(0.0843)	(0.0648)	(0.146)
Hospitalization	-0.0738***	0.0123	0.0637*	-0.0137	-0.0763	0.257
	(0.0278)	(0.0149)	(0.0366)	(0.0607)	(0.0873)	(0.286)
Medical services by EPS	0.00512	0.0239	0.125**	0.383***	0.753**	0.518**
	(0.0167)	(0.0470)	(0.0531)	(0.115)	(0.302)	(0.213)
Alternative medical services	-0.169***	-0.246***	-0.236***	-0.183*	-0.268***	-0.254*
	(0.0162)	(0.0170)	(0.0266)	(0.106)	(0.0984)	(0.137)
Private medical services	0.0846	0.0777***	0.105***	0.0659	0.150*	0.0403
	(0.0639)	(0.0120)	(0.0215)	(0.0520)	(0.0843)	(0.0634)
Preventive Physician	-0.0549	-0.175**	-0.123**	-1.143***	-1.422**	-1.229**
	(0.117)	(0.0722)	(0.0622)	(0.223)	(0.634)	(0.579)
Preventive dentist	0.0164	0.0394	0.0589	0.164	0.535***	0.283*
	(0.0536)	(0.0431)	(0.0679)	(0.111)	(0.197)	(0.166)
	C. Health Status outcomes					
Poor health	-0.0702	-0.00313	-0.0123	-0.274	-0.323	-0.327
	(0.0499)	(0.0290)	(0.0342)	(0.177)	(0.197)	(0.205)
Sick last month	-0.212*	-0.257***	-0.0486	0.473***	0.817***	0.491**
	(0.121)	(0.0575)	(0.111)	(0.129)	(0.286)	(0.197)
Observations	614	845	1,062	1,182	1,653	2,133

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. In Panel A, all coefficients are estimates of the parameter π_0 in Equation (3). Coefficients reported in part A are for the denominator of the Wald estimator (first stage). Panel B and C, coefficients are estimated using Equation (1). All regressions control for year and month of birth fixed effects, and standard errors clustered by age in months. (^{a}) is only available for years 2012 and 2013. The rest of the outcomes are available for all years. Columns (1) to (3) are for people only insured in the CS; columns (4) to (6) are for people only insured in the SS.

see statistically significant decreases in the probability of having health insurance when people turn 18 years old of 8.25 percentage points for optimal bandwidth 2 (Column 1). Also we see no statistically significant changes in the probability of having health insurance in either the CS or SS.

Table 10: 2SLS Estimates for the Probability of Having Health Insurance, First Stage, Years 2010, 2012 and 2013

	(1)	(2)	(3)
Variables/Bandwidth	2	3	4
Any health insurance	-0.0825**	-0.0649*	-0.0628**
	(0.0260)	(0.0290)	(0.0248)
CS	-0.0243	-0.0123	-0.0175
	(0.0293)	(0.0208)	(0.0210)
SS	-0.0582	-0.0526	-0.0453
	(0.0501)	(0.0441)	(0.0422)
Observations	1,609	2,255	2,888

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. All coefficients are estimates of the parameter γ_1 in Equation (4). All regressions control for year and month of birth fixed effects, and standard errors clustered by age in months.

Estimations for the second stage (Table 11) evidence similar results as those found in Table 3 (Section 6) for optimal bandwidth 2. Losing health insurance increases the usage of medical services provided by the EPS, the usage of private medical services, and visits to the dentist for prevention in a statistically significant way and by 30.8, 14.4, and 27.4 percentage points respectively (Column 1, Panel A). Also statistically significant, losing health insurance reduces the probability of seeing a physician for prevention and the usage of alternative medical services by 47.6 and 14.8 percentage points respectively (Column 1, Panel A). Moreover, losing health insurance increases the proportion of individuals feeling sick in the month previous to the interview by 51.5 percentage points, while reducing their perception of having poor health status by 15.2 percentage points (Column 1, Panel B). For visits to the ED, there is a positive, but not a statistically significant effect. Similar results were found in the non-parametric analysis.

8 Discussion

The enactment of Decree 806 of 1998 in Colombia, which regulates health insurance for dependents, creates a discontinuity in the probability of having health insurance. This natural experiment gives us the chance to understand the causal effect of losing health insurance cover-

Table 11: 2SLS Estimates for the Effect of Losing Health Insurance on Medical Services Usage and Health Status, Second Stage, Years 2010, 2012 and 2013.

Variables/Bandwidth	(1) 2	(2) 3	(3) 4
	A. Medical services outcomes		
ED visits$^{(a)}$	0.0546	0.113	-0.0610
	(0.0542)	(0.129)	(0.137)
Hospitalization	0.424	0.449*	0.155
	(0.300)	(0.258)	(0.255)
Medical services by EPS	0.308***	0.268	-0.0274
	(0.0536)	(0.210)	(0.271)
Alternative medical service	-0.148***	-0.265**	-0.299**
	(0.0375)	(0.135)	(0.124)
Private medical service	0.144***	0.112***	0.0937***
	(0.0148)	(0.0226)	(0.0253)
Preventive physician	-0.476***	-0.467	-0.320
	(0.0560)	(0.364)	(0.371)
Preventive dentist	0.274***	0.222***	0.195**
	(0.0644)	(0.0355)	(0.0796)
	B. Health Status outcomes		
Poor health	-0.152**	-0.175*	-0.172**
	(0.0617)	(0.0939)	(0.0729)
Sick last month	0.515***	0.344	-0.0949
	(0.176)	(0.266)	(0.443)
Observations	1,609	2,255	2,888

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. In Panel A and B, all coefficients are estimates of the parameter ρ_1 in Equation (5). All regressions control for year and month of birth fixed effects, and standard errors clustered by age in months. (^{a}) is only available for years 2012 and 2013. The rest of the outcomes are available for all years.

age on young adults, and how relevant this is for this population. Although the decree generates a decrease in the probability of having health insurance, it is not totally accurate that people losing health insurance also lose access to medical services (for instance private medical services usage increases), meaning, people look for other means to get access to a physician. From another perspective, the regulation creates a non-optimal usage of medical services since visits to the ED increase and seeing a physician for preventive care decreases. Moreover, from a financial perspective, those who lose health insurance (uninsured people) are worse off than those insured since uninsured people have to pay out-of-pocket for medical services.

Our results confirm what has been stated in the literature: uninsured people tend to use the medical services that are relatively cheaper for them. In this case, ED visits are, relative to medical services provided by an EPS, cheaper for uninsured individuals than for insured people.

We have already highlighted some arguments that support this result. For instance, ED attention cannot be denied by any EPS regardless of the person's health insurance status. Also as a constitutional right, health and life are priorities over all others. Thus, opposite to the results found by Anderson et al. (2012), here we find evidence that dependents losing health insurance coverage decreases preventive service use and increases their usage of ED services.

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A Appendix

A.1 Optimal Bandwidth Selection for Heterogeneous Effects

Table 11 presents the optimal bandwidth selection using the plug-in approach suggested by Imbens and Kalyanaraman (2012) for different heterogeneous effects. We observe that the optimal bandwidth is 2 regardless of the effect considered .

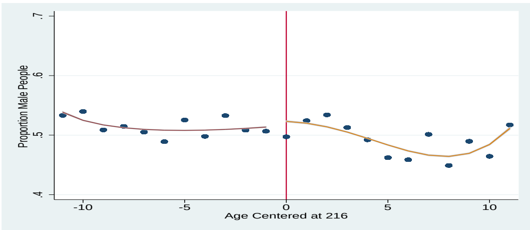
Table 12: Optimal Bandwidth Selection for Different Heterogeneous Effects

	Imbens optimal bandwidth					
Variables/Groups	Male	Female	Urban	Rural	CS	SS
ED visits	2	2	2	2	2	2
Hospitalization	2	2	2	2	2	2
Medical services by EPS	2	2	2	2	2	2
Alternative med. serv.	2	2	2	2	2	1
Private med serv.	2	2	2	2	2	1
Preventive physician	2	2	2	2	2	2
Preventive dentist	2	2	2	2	2	2
Poor health	1	2	1	2	2	2
Bad health	2	2	2	2	2	1
Sick last month	2	2	2	2	2	2
Any health insurance	2	2	2	2	-	-
CS	2	2	2	2	3	-
SS	2	2	2	2	-	2
Study status	2	2	2	3	2	2
Work status	2	2	2	2	2	2
Gender (male=1)	-	-	2	3	3	2
Married	2	2	2	2	2	2
Live with parents	2	2	2	2	2	2

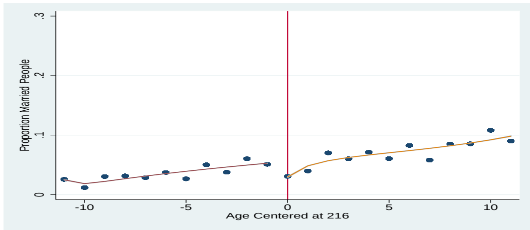
A.2 Graphs for Different Characteristics for the Pooled Years (2010, 2012, and 2013)

Figure 5 presents different characteristics. As we observe for male (Graph (a)) and live with parents (Graph (c)), there is no evidence of discontinuities at the threshold, while for married, there is a small discontinuity going down (Graph (b)) and for work status there is a small discontinuity going up (Graph (d)). Seeing the big picture, it looks like being married and work status follow increasing patterns, more than a discontinuous tendency; however, further regression analysis is required for more accurate understanding. We note how work status increases with age around the threshold, allowing us to depict labor market participation.

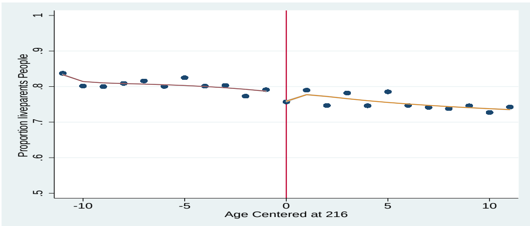
Figure 5: Proportion of Different Characteristics by Age in Months for 2010, 2012 and 2013



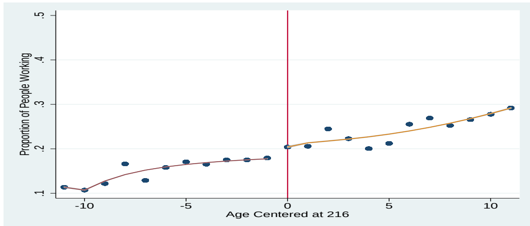
(a) Male



(b) Married people



(c) Live with parents



(d) Working status

Source: ENCV 2010, 2012 and 2013.

A.3 Estimates for Measuring the Effect of Losing Health Insurance on Medical Outcomes and Health Status for the Pooled Years 2010 to 2013

Table 12 presents estimations when including year 2011 in the pooled years 2010, 2012, and 2013. Results do not drastically change from those obtained in Table 5.

A.4 Heterogeneous Effects by Gender

A.4.1 Graphical Analysis

A visual inspection of the probability of having health insurance coverage by gender (Figure 6) evidences a decreasing discontinuity for both groups, which is bigger for males than females (Graphs (a) and (b) of Figure 8, respectively). Moreover, for the male group there is a compensation between the CS and the SS (left and right graphs in Graphs (c), Figure 6). For the female group, both subsystems have a decreasing discontinuity which is bigger for the females in the CS than for those in the SS (left and right graphs in Graph d, Figure 6).

Table 13: Estimations for the Effect of Losing Health Insurance on Medical Services and Health Status for Bandwidths 2 to 4, Pooled Years 2010 to 2013

	Bandwidth_2	Bandwidth_3	Bandwidth_4
Variables	A. Health insurance status		
Any health insurance	-0.0706***	-0.0688***	-0.0433***
	(0.00476)	(0.00890)	(0.0145)
Any health insurance adj	-0.115***	-0.121***	-0.0920***
	(0.00638)	(0.0242)	(0.0279)
CS	-0.0586***	-0.0182	-0.000285
	(0.0117)	(0.0114)	(0.0191)
SS	-0.0120	-0.0506***	-0.0430*
	(0.00878)	(0.0191)	(0.0250)
	B. Medical services outcomes		
ED visits	-0.114***	0.259***	0.308***
	(0.00750)	(0.0240)	(0.0847)
Hospitalization	-0.190***	-0.224***	0.0672
	(0.00898)	(0.0434)	(0.168)
Medical services by EPS	0.160	0.401***	0.342***
	(0.105)	(0.0452)	(0.0809)
Alternative medical service	-0.172**	-0.263***	-0.257***
	(0.0803)	(0.0468)	(0.0819)
Private medical service	0.00299	0.0891***	0.0192
	(0.0589)	(0.0121)	(0.0423)
Preventive Physician	-0.326	-0.567***	-0.443***
	(0.222)	(0.0784)	(0.133)
Preventive dentist	0.0520***	0.645***	0.210
	(0.0112)	(0.0648)	(0.201)
	C. Health Status outcomes		
Poor health	-0.163*	-0.215***	-0.182***
	(0.0906)	(0.0535)	(0.0490)
Sick last month	0.0172	0.106	0.0955
	(0.198)	(0.185)	(0.206)
Observations	2,368	3,302	4,205

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. In Panel A, all coefficients are estimates of the parameter π_0 in Equation (3). Coefficients reported in part A are for the denominator of the Wald estimator (first stage). Panel B and C, coefficients are estimated using Equation (1). All regressions control for year and month of birth fixed effects, and standard errors clustered by age in months. (^{a}) is only available for years 2012 and 2013.

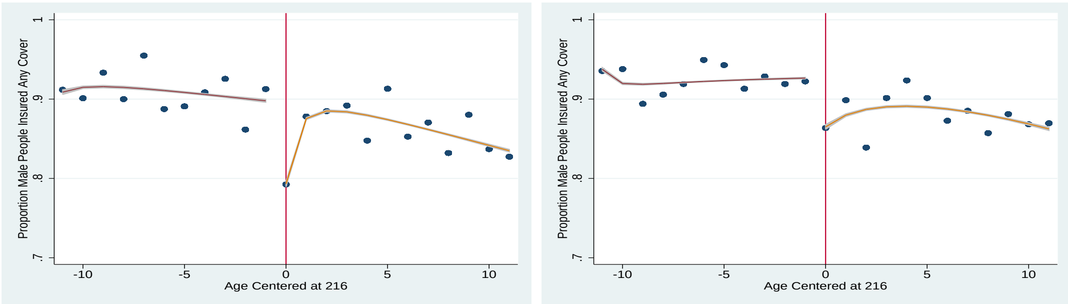
A.4.2 Characteristics for Heterogeneous Effects by Gender

Table 13 shows the estimated coefficients for the different characteristics for the male and female groups. We observe for the male group that for bandwidth 2, work status, married, and live with parents change discontinuously at the threshold. For the female group the 'rd' command did not estimate coefficients for bandwidth 2. This only happens when estimating characteristics since it calculates coefficients for the probability of having health insurance.

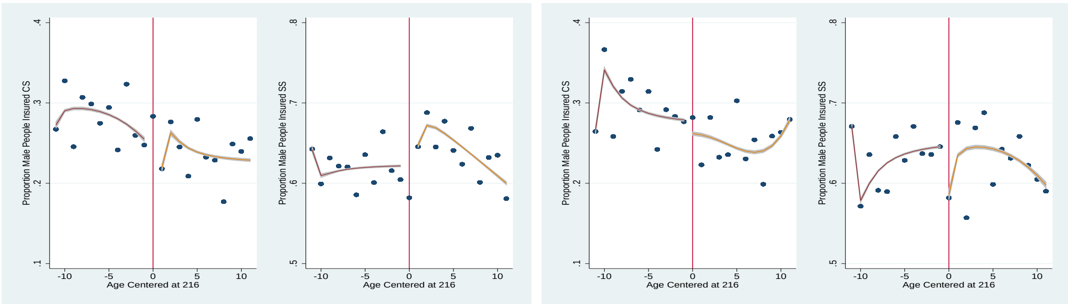
A.4.3 Estimates for Heterogeneous Effects by Gender Controlling for Married and Live with Parents

Even though we do not have estimates for live with parents and married for the female group, we control for these characteristics (Table 14). We observe that the main results obtained in

Figure 6: Proportion of Insured People: Healthcare, CS and SS, by Gender, for Years 2010, 2012, and 2013.



(a) Any health insurance male (b) Any health insurance female



(c) CS male (left) & SS male (right) (d) CS female (left) & SS female (right)

Source: Own calculations based on ENCV 2010-2013.

Section 7.3.1 do not change for either group, male or female.

Table 14: Estimates for Different Characteristics for Bandwidth 2 to 4, Heterogeneous Effects by Gender for the Pooled Years

	Male			Female		
	(1)	(2)	(3)	(4)	(5)	(6)
Variables/Bandwidth	2	3	4	2	3	4
Study status	0.0230	-0.00442	0.0195	-0.091	0.0118	0.0389
	(0.0172)	(0.0176)	(0.0203)	(0.110)	(0.0372)	(0.0408)
Work status	0.0375***	0.00246	0.0145	-0.112**	-0.0793***	-0.0483**
	(0.00960)	(0.00867)	(0.0113)	(0.057)	(0.00921)	(0.0206)
Married	-0.0208***	-0.0378***	-0.0362***	-0.043	-0.0223***	-0.0340***
	(0.00142)	(0.00573)	(0.00344)	(0.048)	(0.00795)	(0.00833)
Live with parents	-0.103***	-0.126***	-0.102***	0.043	0.0242	0.0555***
	(0.00309)	(0.0263)	(0.0295)	(0.093)	(0.0186)	(0.0152)
Observations	1,035	1,447	1,832	995	1,399	1,788

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. All Coefficients are estimates of the parameter β_0 in Equation (2), using fixed effects of year and birth-month, and standard errors clustered by age in months.

Table 15: Estimates for Heterogeneous Effects by Gender. Controlling for Married and Live with Parents for both Groups; Years 2010, 2012 and 2013

	Male			Female		
	(1)	(2)	(3)	(4)	(5)	(6)
Variables/Bandwidth	2	3	4	2	3	4
			A. Medical services outcomes			
ED visits$^{(a)}$	-0.0816	0.0400	0.0292	0.277*	0.331**	0.632**
	(0.0629)	(0.0340)	(0.0356)	(0.144)	(0.160)	(0.279)
Hospitalization	-0.0636	0.477	0.641	0.0463	-1.371***	-0.408
	(0.0402)	(0.324)	(0.438)	(0.214)	(0.398)	(0.527)
Medical services by EPS	-0.0855*	0.392***	0.312**	0.764***	1.073***	0.936***
	(0.0468)	(0.143)	(0.142)	(0.156)	(0.170)	(0.309)
Alternative medical services	-0.147	-0.368**	-0.347	-0.349***	-0.191*	-0.310***
	(0.107)	(0.155)	(0.215)	(0.0879)	(0.106)	(0.0903)
Private medical services	0.0511	0.0697	0.0167	0.0872	0.484***	0.396**
	(0.0640)	(0.0572)	(0.0423)	(0.0565)	(0.102)	(0.159)
Preventive Physician	-0.742	-0.366**	-0.616***	-1.060	-2.227***	-1.647***
	(0.471)	(0.144)	(0.189)	(0.672)	(0.524)	(0.562)
Preventive dentist	-0.262	-0.349	-0.289	0.648***	2.079***	1.255*
	(0.220)	(0.320)	(0.351)	(0.143)	(0.626)	(0.715)
			B. Health Status outcomes			
Poor health	-0.210	-0.147*	-0.177*	-0.181	-0.485***	-0.372**
	(0.139)	(0.0758)	(0.0952)	(0.157)	(0.151)	(0.166)
Sick last month	-0.144	0.514**	0.313**	0.829***	0.795***	0.870
	(0.181)	(0.217)	(0.156)	(0.258)	(0.304)	(0.586)
Observations	1,035	1,447	1,832	995	1,399	1,788

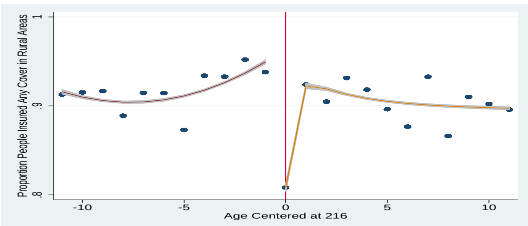
Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. In Panel A, all coefficients are estimates of the parameter π_0 in Equation (3). Coefficients reported in part A are for the denominator of the Wald estimator (first stage). Panel B and C, coefficients are estimated using Equation (1). All regressions control for year and month of birth fixed effects, and standard errors clustered by age in months. (^{a}) is only available for years 2012 and 2013. Columns (1) to (3) for the male group; columns (4) to (6) for the female group.

A.5 Heterogeneous Effects by Urban and Rural Areas

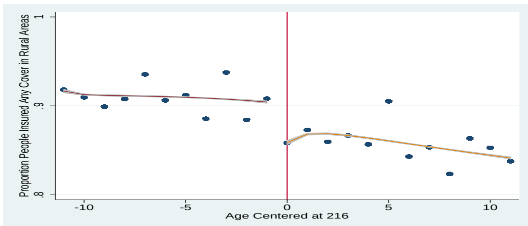
A.5.1 Graph Analysis

A visual inspection shows a small decreasing discontinuity for any health insurance coverage for rural areas (Graph (a)) and for urban areas (Graph (b)). For rural areas we see a compensation happening where for those insured in the CS, it decreases while for those in the SS, it increases (left and right graphs of Figure (c)). For urban areas we only see a decreasing discontinuity for those insured in the CS (left graph of Figure (d)).

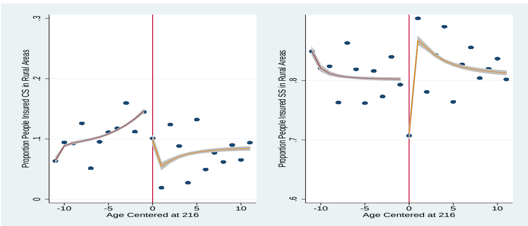
Figure 7: Proportion of People in Rural-urban Areas Having Health Insurance for any Health, CS and SS, Age in Months, for the Pooled Years 2010, 2012 and 2013



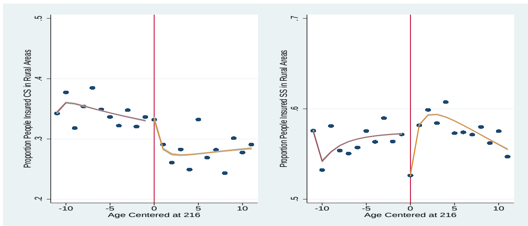
(a) Any health insurance rural areas



(b) Any health insurance urban areas



(c) CS rural (left) SS rural (right)



(d) CS urban (left) SS urban (right)

Source: ENCV 2010-2013.

Table 16: Estimated Coefficients for Different Characteristics for Heterogeneous Effects by Urban-rural Areas

	Urban areas			Rural areas		
	(1)	(2)	(3)	(4)	(5)	(6)
Variables/Bandwidth	2	3	4	2	3	4
Study status	-0.0374**	0.0322	0.0348**	0.118*	-0.0940***	-0.0155
	(0.0186)	(0.0244)	(0.0171)	(0.0642)	(0.0250)	(0.0483)
Work status	-0.0716***	-0.102***	-0.0486**	-0.0322	0.113***	0.0758**
	(0.00635)	(0.00313)	(0.0220)	(0.0748)	(0.0336)	(0.0309)
Male	-0.0854***	-0.153***	-0.0928***	0.0577***	0.116***	0.136***
	(0.0144)	(0.00995)	(0.0248)	(0.00575)	(0.0186)	(0.0177)
Married	0.00574	0.0224***	0.00903	-0.0283***	-0.136***	-0.146***
	(0.0127)	(0.00238)	(0.00643)	(0.0102)	(0.0156)	(0.00775)
Live with parents	-0.0530***	-0.113***	-0.0787***	-0.0149	0.0658	0.116*
	(0.0128)	(0.00790)	(0.0152)	(0.0478)	(0.0556)	(0.0597)
Observations	1,577	2,209	2106	392	542	1,564

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. All coefficients are estimates of the parameter β_0 in Equation (2). All regressions control for year and month of birth fixed effects, and standard errors clustered by age in months.

Table 17: Estimated Coefficients for Heterogeneous Effects by Urban-rural Areas, Controlling for Characteristics Changing at the Threshold

	Urban controlling for male and live with parents			Rural controlling for male and married		
	(1)	(2)	(3)	(4)	(5)	(6)
Variables/Bandwidth	2	3	4	2	3	4
			A. Medical services outcomes			
ED visits$^{(a)}$	0.0460	0.0903	0.150	-0.197***	0.225*	0.244
	(0.0706)	(0.0963)	(0.116)	(0.0462)	(0.129)	(0.201)
Hospitalization	-0.139***	0.149*	-0.208	-0.290***	-0.333***	-0.0324
	(0.0149)	(0.0832)	(0.204)	(0.108)	(0.0426)	(0.155)
Medical services	-0.208***	-0.331***	-0.285***	0.480***	1.370***	1.061**
	(0.0648)	(0.0608)	(0.0982)	(0.134)	(0.454)	(0.446)
Alternative medical services	0.155*	0.311***	0.252***	-0.108***	-0.299**	-0.335*
	(0.0939)	(0.0473)	(0.0696)	(0.0230)	(0.122)	(0.197)
Private medical services	-0.225***	-0.329***	-0.237***	-0.0355	-0.177***	-0.136***
	(0.0367)	(0.0544)	(0.0576)	(0.0240)	(0.0523)	(0.0512)
Preventive Physician	0.900***	0.761***	0.588**	-0.241***	-0.962*	-1.369**
	(0.231)	(0.184)	(0.258)	(0.0643)	(0.552)	(0.689)
Preventive dentist	0.0627	-0.348**	-0.248	1.073***	0.706***	0.358
	(0.0661)	(0.146)	(0.258)	(0.340)	(0.168)	(0.371)
			B. Health Status outcomes			
Poor health	0.163	0.0157	0.0303	-0.305***	-0.798**	-0.670**
	(0.116)	(0.0660)	(0.0514)	(0.0584)	(0.315)	(0.299)
Sick last month	-0.463***	-0.518***	-0.455**	0.688***	0.915***	0.749***
	(0.0668)	(0.0535)	(0.177)	(0.219)	(0.166)	(0.139)
Observations	1,309	1,667	2,117	390	542	707

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. In Panel A, all coefficients are estimates of the parameter π_0 in Equation (3). Coefficients reported in part A are for the denominator of the Wald estimator (first stage). Panel B and C, coefficients are estimated using Equation (1). All regressions control for year and month of birth fixed effects, and standard errors clustered by age in months. (^{a}) is only available for years 2012 and 2013. Columns (1) to (3) for urban areas; columns (4) to (6) for rural areas.

A.5.2 Estimates for Different Characteristics for Heterogeneous Effects Urban and Rural Areas

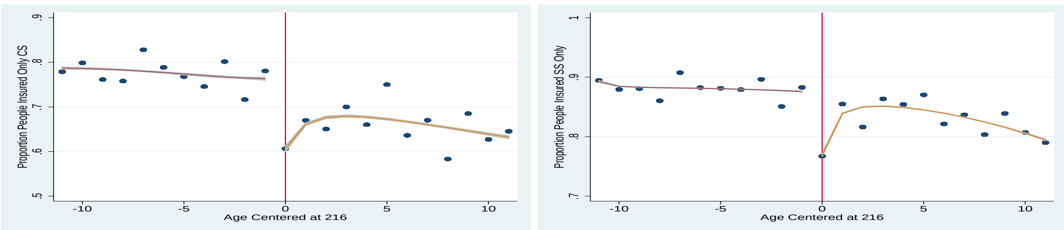
A.5.3 Estimates for Heterogeneous Effects of Urban and Rural Areas, Controlling for Characteristics Changing at the Threshold

A.6 Heterogeneous Effects by Healthcare System: CS and SS

A.6.1 Graphical Analysis

The graphical analysis shows a decreasing discontinuity at the threshold for those people insured in the CS (Graph (a) of Figure 8), while for those insured in the SS, there does not seem to be any discontinuity (Graph (b) of Figure 8).

Figure 8: Proportion Insured People in either CS or SS with Uninsured People, Age in Months, for Years 2010, 2012 and 2013



(a) Health insurance only CS

(b) Health insurance only SS

Source: ENCV 2010, 2012 and 2013.

A.6.2 Estimates for Different Characteristics for Heterogeneous Effects by Healthcare System: CS and SS

Table 17 show that the only characteristics changing discontinuously at the threshold are live with parents and work status. This is common for both sub-samples.

A.6.3 Estimates for Heterogeneous Effects by Health Care System, Controlling for Characteristics Changing at the Threshold

Table 18: Estimates for Characteristics. Group of People in either the CS or the SS for Years 2010, 2012 and 2013

	Contributory System			Subsidized System		
	(1)	(2)	(3)	(4)	(5)	(6)
Variables/Bandwidth	2	3	4	2	3	4
Study status	-0.0658**	-0.0424	-0.00619	-0.0114	0.00521	0.0125
	(0.0265)	(0.0307)	(0.0320)	(0.0277)	(0.0140)	(0.0113)
Work status	0.0507***	-0.0228***	0.0178	-0.0505***	-0.0759***	-0.0292
	(0.0116)	(0.00876)	(0.0220)	(0.0105)	(0.0105)	(0.0227)
Male	-0.0378	-0.0832***	-0.0487**	-0.0144	-0.0414***	0.00109
	(0.0361)	(0.0318)	(0.0235)	(0.0171)	(0.0104)	(0.0159)
Married	-0.00690	0.0415***	-5.11e-05	-0.00539	-0.0582***	-0.0574***
	(0.00677)	(0.00636)	(0.0182)	(0.0153)	(0.00940)	(0.00638)
Live with parents	0.0523***	-0.0211	0.00884	-0.0487*	-0.0459	-0.00900
	(0.0189)	(0.0173)	(0.0178)	(0.0253)	(0.0281)	(0.0315)
Observations	614	845	1,062	1,182	1,653	2,133

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. All coefficients are estimates of parameter β_0 in Equation (2). All regressions control for year and month of birth fixed effects, and standard errors clustered by age in months.

Table 19: Estimates for Heterogeneous Effect by Health Care System, Controlling for Live with Parents

	CS controlling for live with parents			SS controlling for live with parents		
	(1)	(2)	(3)	(4)	(5)	(6)
Variables/Bandwidth	2	3	4	2	3	4
	B. Medical services outcomes					
ED visits$^{(a)}$	-0.0770	-0.0423	-0.00377	0.105	0.154**	0.239*
	(0.0812)	(0.0657)	(0.0671)	(0.0963)	(0.0661)	(0.138)
Hospitalization	-0.0665**	0.00951	0.0613*	-0.0561**	-0.116	0.250
	(0.0289)	(0.0125)	(0.0351)	(0.0253)	(0.102)	(0.302)
Medical services by EPS	-0.000153	0.0237	0.118**	0.398***	0.775**	0.521**
	(0.0194)	(0.0431)	(0.0484)	(0.132)	(0.309)	(0.208)
Alternative medical services	-0.153***	-0.232***	-0.224***	-0.180	-0.266***	-0.254*
	(0.0142)	(0.0223)	(0.0318)	(0.111)	(0.100)	(0.135)
Private medical services	0.0913	0.0689***	0.101***	0.0585	0.146	0.0395
	(0.0613)	(0.0147)	(0.0213)	(0.0541)	(0.0894)	(0.0634)
Preventive Physician	-0.0413	-0.167**	-0.115*	-1.145***	-1.429**	-1.230**
	(0.108)	(0.0738)	(0.0593)	(0.246)	(0.637)	(0.570)
Preventive dentist	-0.00371	0.0426	0.0539	0.196*	0.560***	0.287*
	(0.0522)	(0.0423)	(0.0598)	(0.118)	(0.182)	(0.163)
	C. Health Status outcomes					
Poor health	-0.0556	-0.00606	-0.0106	-0.282	-0.330*	-0.328*
	(0.0500)	(0.0264)	(0.0340)	(0.193)	(0.192)	(0.197)
Sick last month	-0.183*	-0.244***	-0.0446	0.486***	0.841***	0.495**
	(0.110)	(0.0541)	(0.109)	(0.145)	(0.293)	(0.208)
Observations	614	845	1,062	1,182	1,653	2,133

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. In Panel A, all coefficients are estimates of the parameter π_0 in Equation (3). Coefficients reported in part A are for the denominator of the Wald estimator (first stage). Panel B and C, coefficients are estimated using Equation (1). All regressions control for year and month of birth fixed effects, and standard errors clustered by age in months. (^{a}) is only available for years 2012 and 2013. Columns (1) to (3) for those insured in the CS; columns (4) to (6) for those insured in the SS.

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