



Munich Personal RePEc Archive

The Multiple Effects of Child Health Insurance in Vietnam

Dang, Thang

School of Economics, University of Economics Ho Chi Minh City
(UEH)

19 April 2017

Online at <https://mpra.ub.uni-muenchen.de/78614/>
MPRA Paper No. 78614, posted 19 Apr 2017 13:25 UTC

The Multiple Effects of Child Health Insurance in Vietnam

Thang Dang*

April 2017

Abstract

This paper estimates multiple effects of tremendous expansion in health insurance coverage for children on medical services utilizations for both children and parents by focusing on *Free Care for Children Under Six*, a child health insurance program that provides free access to health care practices for children under 6 in Vietnam. Using a regression discontinuity design, the paper finds that child health insurance has considerable positive effects on children's health care uses whereas it reduces parental health care utilization for some outcomes. In particular, child health insurance increases the probabilities of public inpatient visit and private outpatient visit by 22.3% and 33% respectively while it rises the frequencies of public inpatient visits and private outpatient visits by 0.32 times and 2.24 times respectively. In contrast, child health insurance reduces a mother's probabilities of public inpatient visit and public outpatient visit by 32.6% and 27% respectively, number of public inpatient visits by 0.41 times. Also, paternal impacts of child health insurance consists of a 23.2% reduction in the probability of private outpatient visit and a 1.01 time decrease in the frequency of private outpatient visits. The paper significantly provides a more insightful understanding of various impacts of a health policy on health care utilization from developing countries.

JEL Classifications: I12, I13, I18

Keywords: Child health insurance; health care utilization; regression discontinuity; Vietnam

* Thang Dang is a lecturer at School of Economics, University of Economics Ho Chi Minh City (UEH). *Address:* 1A Hoang Dieu, Phu Nhuan, Ho Chi Minh City, Vietnam. *E-mail:* thang.dang@thangdang.org. I would like to thank valuable comments and suggestions from the participants at the Small Talks Big Ideas (STBI) Seminar at School of Economics, University of Economics Ho Chi Minh City (UEH). Errors are only mine.

1 Introduction

The provision of policy interventions to lessen inequality in access to health insurance for children is exclusively significant for improving children's wellbeing in early lives and later outcomes as adults especially for those from poor and disadvantaged families (Chen and Jin 2012; Currie 2009). Therefore, more and more countries over the world especially developing countries have attempted to implement child health insurance programs towards universal health coverage (UHC) with ambitious goals to establish sufficient and equitable access to health care services for children (Maeda et al. 2014; Memirie et al. 2016). Some examples for child health insurance programs includes the 1992 School Health Insurance Programme (SHIP) in Egypt (Yip and Berman 2001), the 1997 *Children's Health Insurance Program* (CHIP) in the U.S.A. (Committee on Child Health Financing 2014; Dubay and Kenney 2009), the 2004 *National Health Insurance Scheme* (NHIS) in Ghana (Bonfrer et al. 2016; Gajate-Garrido and Ahiadeke 2015), or the 2005 *Provincial Maternal and Child Health Insurance Program* (known as *Plan Nacer*) in Argentina (Cortez et al. 2012) among general UHC programs in other countries (World Health Organization and World Bank 2014). Whether these programs really cause positive impacts on children's development in early lives and other highlighting outcomes in their adulthoods has become a very important question that is indispensable to be investigated seriously (Bisgaier and Rhodes 2011; Russ et al. 2010). The impact evaluation of the child health insurance programs has become an increasingly concerned topic over the years (World Health Organization 2015).

Almost previous studies on the impact evaluation of child health insurance exclusively focus on children's medical care outcomes and child health as well, for examples Bailey et al. (2016), Li and Baughman (2010), Zimmer (2011) for the U.S.A., Peng and Conley (2016) for China, or Wehby (2013) for South America. However, these studies disregarded other potential effects on other members within a family, importantly their parents. Such impact evaluations seemingly does not provide widely sufficient insights into the multiple impacts of child health insurance that has become a research gap. Focusing parents' health care utilization outcomes in addition to children's is undoubtedly important because not only children or parents do not act as independent agents within a family but also they all interactively influence on resource allocation decisions of the remainder (Becker 1981; Behrman 1997; Bergstrom

1997). Therefore, spending resources to improve child health investments is more likely to affect these of parents. This idea might even work more apparently for developing countries where poor households predominantly exists. This paper evaluates this proposition by estimating the multiple effects of child health insurance on health care utilization outcomes not only for both children but also for parents in Vietnam.

In 2005, the Government of Vietnam introduced a universal child health insurance program called *Free Care for Children Under Six* (FCCU6). Under the FCCU6 policy, all Vietnamese children under the age of 6 have free access to medical services from public health facilities. The FCCU6 policy has generated more and more opportunities for children under the age of 6 to achieve medical check-ups with a health insurance card granted by the government. Employing the FCCU6 policy as an exogeneous changes in children's health insurance status, this study provides evidence on the multiple impacts of child health insurance on medical utilizations for both children and their parents in Vietnam.

The FCCU6 cutoff rule of 6 years old enables this paper to use a regression discontinuity design (RDD) to estimate the causal impacts of child health insurance on children's and parents' health care utilization. Specifically, the rule insinuates that children whose age below the cutoff have a higher probability of being insured because they have rights to use health care services from public facilities without charge than those aged from the cutoff and above who do not freely access to medical services. As expected, this first-stage result of the paper shows that relative to children aged from 6 years old and above, there is an approximately 8% increase in the probability of having health insurance for children younger than 6 years old. Concurrently, the comparatively unmethodical essence of the FCCU6 cutoff proposes that being just beneath or over the age cutoff is locally random, and children with ages nearby the cutoff are thereby almost indistinguishable across all important characteristics except for possibly the probability of being insured. Hence, the discontinuous removal of the involvement in the FCCU6 policy for children whose ages from the age cutoff and over likely ascribes to the discontinuity in the probability of having health insurance. This discontinuity therefore capacitates this paper to carry out a fuzzy RDD to estimate the causal effects of child health insurance on health care utilizations for children and parents (Imbens and Lemieux 2008; Lee and Lemieux 2010).

Notably, utilization outcomes in this study are specifically measured by the probability of physician visit and the number of medical visits over last year. Moreover, this study's analysis examines these two outcomes for both inpatient and outpatient services at both public and private health sectors. It is useful to divide health care services into two types inpatient and outpatient services because these two services are key types of medical care services within the health care system and they also reflect various quality of services provided (Dang 2017). Although the FCCU6 policy grants free access to health care services for children aged younger than 6 at state-owned health facilities and it is expected that medical care utilization impacts are primarily occurred for services in the public sector, this study also examines the corresponding effects from the private sector.¹ To do this, this study aims to probe the substitution effects of health care services utilized between the public and private health sectors in Vietnam.

The analysis shows that child health insurance evidently increases child health care utilization for both the probability of doctor visit and the number of doctor visits. In particular, for the baseline results on average a child with health insurance has a higher probability of inpatient visit to a public health facility by 22.3% and a higher probability of outpatient visit to a private health facility by 33% than the counterpart. For another outcome, health insurance respectively increases the number of visits to inpatient services from the public health sector and outpatient services from the private health sector by approximately 0.32 times and 2.24 times. However, the paper to some extent finds reducing impacts of child health insurance on parental health care utilization. Child health insurance reduces a mother's likelihoods to visit to an inpatient service from a public health facility and an outpatient service from a public health facility by about 32.6% and 27% respectively while it also decreases maternal number of inpatient visits from the public health sector by nearly 0.412 times. Meanwhile, a father having an insured child tends to have a lower probability of outpatient visit from the private sector by 23.2% and a lower number of outpatient visits from private health facilities by 1.01 times than the counterpart. Importantly, the baseline estimates are extremely robust to the estimates from the robustness checks using various econometric specifications.

¹ Medical care practices from private health facilities and self-medications as well have been vastly regarded as increasingly additional approaches to medical treatments in addition health care practices from state-owned facilities in Vietnam over last decades (Hoai and Dang 2017; Ladinsky et al. 2000).

The remainder of the paper is organized as follows. The second section provides basic information about the universal child health insurance program in Vietnam while the third section discusses empirical strategy with a RDD estimation procedure. In the fourth section, data and the sample is described while the fifth section discusses empirical results. Finally, the paper is concluded in the sixth section.

2 Universal Child Health Insurance Program in Vietnam

Although the economic reform of Vietnam (know as the name of *Doi Moi*) since 1986 has engendered numerous economic opportunities for its citizens (Dang 2015) that are remarkably essential to improve living standards in general and more equal access to health care services in particular, Vietnam has extremely demanded for appropriate health policies to enhance its citizens' health care utilization. In that context, in 2005 the government of Vietnam introduced the FCCU6 policy with a mission is to provide sufficient health care services for children under the age of 6 at public health facilities by giving free of charge health insurance. The FCCU6 tremendously enhances the probability of health insurance for children especially for those aged under 6. The FCCU6 policy has worked under the compulsory social insurance scheme that the government of Vietnam has implemented towards UHC for its disadvantaged citizens including children at their early lives (Somanathan et al. 2013).

In this context, all Vietnamese children being younger than 6 years with a registered health insurance card legally provided by the 2005 FCCU6 scheme can totally access almost medical tests and treatments or common medications for both inpatient and outpatient services at public health facilities² without payments. The FCCU6 policy has therefore played a very important role as a key financing tool for more equitable access to health care services among Vietnamese children (Tien et al. 2011).

The FCCU6 policy has well established a very fundamental background for the evaluation of the impact of child health insurance on health care utilization in Vietnam and through which

² The public health care delivery system of Vietnam has functioned under a 4-level structure managed by the bureaucracy including (i) commune health stations, (ii) district hospitals, (iii) provincial hospitals and (iv) central hospitals (Somanathan et al. 2014).

contributes more evidence to the literature especially from developing countries. Available evaluation studies conducted to evaluate the impacts of the FCCU6 policy on health care utilization outcomes in Vietnam.

Among prior studies focusing Vietnam as the whole country, Nguyen and Wang (2013) employ a difference-in-differences (DD) method to estimate the effect of child health insurance on health care utilization for only children using pseudo-panel data from two VHLSS waves (2004 and 2006). In a DD framework, the FCCU6 policy is used to create the treated group and the untreated one as well to compare health care demands among children who are exposed to and are not exposed to the FCCU6 policy. This study finds that child health insurance tends to increase utilizations for both inpatient and outpatient services in the second public health facilities. This study only focuses on public health services and ignores potential impacts of the FCCU6 policy on utilizations for services from the private health sector.

More recently, Palmer et al. (2015) use a RDD approach to estimate the impacts of child health insurance using three waves of VHLSS (2006, 2008 and 2010). It finds that child health insurance plays a very important role to promote utilization outcomes for both inpatient and outpatient services measured by the probability and the number of visits. However, Palmer et al. only investigate the impacts on children's health care utilizations and neglect other effects which likely arise from the child's health insurance status for example parental health care use as examined in the current study. The current study also adopts a RDD for achieving the research objective nonetheless it explores the impacts of child health insurance on health care utilization not only for children but also their parents. By this way, this paper provides a more comprehensive insights into the impacts of child health insurance on health care utilization in a developing country like Vietnam.

3 Empirical Strategy

This section discusses how this paper employs a RDD to estimate the causal effects of universal health insurance program for children under the age of 6 (FCCU6) on health care services utilization outcomes for both children and parents in Vietnam.

Importantly, it is potential that child health insurance and health care utilization outcomes can interactively be determined because both of them are endogenously made by a household. This phenomenon likely leads to the production of biased estimates of the impacts. Using a RDD that harnesses the discontinuity in child health insurance coverage at the age of 6 enables this study to conquer the problem of adverse selection because RDD general speaking has a relatively high internal validity among other non-experimental techniques for causal inference (Athey and Imbens 2016; Varian 2016). Furthermore, this study combines an instrumental variables (IV) approach with a RDD to estimate the impacts of interest using a framework of two-stage least-squares (2SLS). Such a combined-approach framework thus significantly allows this study to efficiently control for potential threats to the identification due to apparently existent but omitted confounders³ of health care utilization outcomes in addition to child health insurance in the estimation model (Hahn et al. 2001).

Technically, under the FCCU6 rule all Vietnamese children younger than 6 years have free access to health care services from public health facilities, and 6 years old becomes the age cutoff for RDD in this study. This rule suggests that FCCU6 leads to the establishment of two children groups with potential different probabilities of being insured. The first group including children under the age of 6 years tends to a higher probability of being insured than the second group that consists of children aged from 6 and above. Regarding the context of development, Vietnam has been a low-income country where there has been a large proportion of poor households living with substandard conditions. Because of the considerable lack of resources for accessing health care services, children from poor families have a low probability of having health insurance especially in rural or remote areas. Moreover, the demand for medical services induced by children is likely sensitive to changes in price for medical practices compared to the whole population (Sauerborn et al., 1994). As a result, free access of health care services through FCCU6 in Vietnam results in a significant jump in the probability of health care insurance for children aged under 6 years in comparison with those from and above 6 years.

³ An example of possible confounders is the optional health insurance program for school-aged children that can be treated as a competitor clinging to the FCCU6 policy (Palmer et al. 2015).

This paper therefore implements a fuzzy RDD by instrumenting a FCCU6 policy exposure with an indication variable $FCCU6$, which equals one if a child is under the age of 6 years and zero otherwise. Mathematically, $FCCU6_i$ for a child i is specified by:

$$FCCU6_i = \begin{cases} 1 & \text{if } age_i < 6 \\ 0 & \text{otherwise} \end{cases} \quad (1)$$

where age_i which is expounded as the age of a child i at the time of survey is a forcing variable.

In this fuzzy RDD, the fraction of the jump in the regression of the health care utilization outcome that is denoted by $Utilization_i$ on the cutoff to the jump in the regression of the probability of the treatment that is an indication for the policy exposure $FCCU6_i$ on the cutoff from both sides of the cutoff is elucidated as the average causal effect of the treatment (Lee and Lemieux 2010). Formally, the discontinuity gap ratio estimand is

$$\tau_{RDD} = \frac{\lim_{a \downarrow 6} E(Utilization_i | age_i = a) - \lim_{a \uparrow 6} E(Utilization_i | age_i = a)}{\lim_{a \downarrow 6} P(FCCU6_i | age_i = a) - \lim_{a \uparrow 6} P(FCCU6_i | age_i = a)} \quad (2)$$

Importantly, the estimation of a RDD can be conducted with non-parametric and parametric methods. This study only relies on the parametric technique to estimate the causal effect of child health insurance on outcomes of interest over the non-parametric technique.

The paper conducts a 2SLS estimation procedure by estimating the following two-equation system. The first and second stages respectively estimate the following regression equations:

$$InsuredChild_i = \alpha_0 + \alpha_1 FCCU6_i + \alpha_2 \mathbf{X}'_i + f(age_i) + \gamma_t + \varpi_c + \varepsilon_i \quad (3)$$

and

$$Utilization_i = \beta_0 + \beta_1 \widehat{InsuredChild}_i + \beta_2 \mathbf{X}'_i + g(age_i) + \gamma_t + \varpi_c + \varepsilon_i \quad (4)$$

where $Utilization_i$ is health care utilization outcomes related to a child i ; $InsuredChild_i$ is the probability for a child i to be insured by health insurance; $\widehat{InsuredChild}_i$ in equation (4) is the predicted value of $InsuredChild_i$ from the first stage regression in equation (3); \mathbf{X}_i is a vector of child characteristics including (i) whether a child's gender is male, (ii) whether a child's household lives in a urban area, (iii) whether a child's ethnicity is *Kinh* or *Hoa* that is

the ethnic majority group in Vietnam, and (iv) dummies for six geographical regions in Vietnam: Red river delta, Midlands and northern mountainous areas, Northern and coastal central region, Central highlands, Southeastern area, and Mekong river delta; $f(age_i)$ and $g(age_i)$ are the quadratic functions of age for the corresponding child in the first and second stages respectively;⁴ γ_t indicates survey year fixed effects; ϖ_c indexes for cohort fixed effects; and ε_i and ϵ_i are the corresponding error terms in the first and second stages, respectively.

As is common in the literature (Imbens and Lemieux 2008), this paper estimates a linear probability model for the first stage. The first-stage equation is estimated using ordinary least squares (OLS) regression. For the second-stage, the paper applies nonlinear regression models with the aim to reduce as minimum as possible the potential bias from using linear regression models stemming from changes in a child's health care utilization outcomes along with changes in child age. In particular, a Probit model is employed when the dependent variable is the probability of doctor visits while a Poisson model is used with the frequency of doctor visits as a health care utilization outcome in the left-hand side of the regression equation. The crucial coefficient of interest is β_1 in the second stage, which expresses the local average treatment effect of (LATE) of child health insurance on health care utilizations for children and parents. Standard errors are robustly clustered at the provincial level.

In addition to use the 2SLS estimation procedure, this paper also estimates the reduced-form regressions to examine the impacts of FCCU6 on health care utilization outcomes using the following equation:

$$Utilization_i = \varphi_0 + \varphi_1 FCCU6_i + \varphi_2 \mathbf{X}'_i + h(age_i) + \gamma_t + \varpi_c + \xi_i \quad (5)$$

The estimate achieved by using a reduced-form regression is significantly treated as an additional check of the robustness of the baseline estimates using equation (4).

4 Data and the Sample

⁴ Importantly, a main reason for adding the quadratic functions of a child's age into the specification is to control for changes in health care demand when the child grows up.

This paper's empirical analysis is based on the individual data level from three waves of the Vietnam Household Living Standards Survey (VHLSS) (2010, 2012 and 2014). The VHLSS is a nationally representative survey conducted biannually with the aim to collect information on multi-dimensional aspects of Vietnamese households widely spanning from demographics, education, health to employment and income, assets, expenditure, housing, production and social activities. In each survey wave, there are roughly 9,200 households and 40,000 individuals in the sample across the whole country. Although the VHLSS simultaneously has all three levels including commune, household and individual for elicited information, this study mainly relies on individual data.

In particular, this study exploits the health section of given VHLSS waves to generate the necessary variables related to health insurance status and health care utilization outcomes for respondents. This study defines the variable of health insurance status as whether a respondent has health insurance card. Whilst, health care utilization outcomes are meticulously defined with various types of health service (inpatient and outpatient services) for two main health sectors (public and private sectors). This study uses eight variables for a respondent's health care utilization outcomes including (i) the probability of inpatient visit in the public health sector over last 12 months, (ii) the probability of outpatient visit in the public health sector over last 12 months, (iii) the frequency of inpatient visits in the public health sector over last 12 months, (iv) the frequency of outpatient visits in the public health sector over last 12 months, (v) the probability of inpatient visit in the private health sector over last 12 months, (vi) the probability of outpatient visit in the private health sector over last 12 months, (vii) the frequency of inpatient visits in the private health sector over last 12 months, and (viii) the frequency of outpatient visits in the private health sector over last 12 months.

The paper also uses a respondent's demographic information to generate main control variables for the analysis. These control variables consist of age, a dummy for male, a dummy for an urban area, a dummy for the ethnic majority, a dummy for female household head, household head's schooling year, dummies for six geographic regions and dummies for years of survey.

This study pools three VHLSS waves and limits all children aged from 1 and 10 into the final sample. Among observations from the sample, children aged under 6 are included in the

treatment group that is totally exposed to the FCCU6 policy while those aged 6–10 are treated as the control group that is out of the FCCU6 policy. Table 1 provides figures on descriptive statistics of the sample. Accordingly, the whole sample's size consists of 17,775 children with a treatment group of 8,878 children (49.9%) and a control group of 8,897 children (50.1%). The ratio of children being exposed to the FCCU6 policy is about 49.9%. The proportions for each wave of survey are 34.5%, 32.5% and 33% for respectively 2010, 2012 and 2014.

It is essential to recognize that statistical figures on socio-demographic characteristics of children from the treatment group are comparatively analogous to those in the control group. For example, the ratio of male children is approximately 51.5% for the whole sample while the treatment and control groups respectively account for nearly 51.5% and 5.16% of boys. Meanwhile, about 44% of children from the whole sample lives in urban areas while the treatment and control groups analogously amount to approximately 44.2% and 43.9% of municipal children. In addition, the statistics of the probability of children belonging to a majority group are roughly identical for the whole sample, the treatment and control groups as well with around 76%.

Regarding the proportions of insured children between the available groups, there is an obvious gap between children from the treatment group with 95% and those from the control group with 89.3%. Intuitively, the FCCU6 policy is potentially linked to this disparity. For the whole sample, about 92.1% of children have health insurance.

5 Empirical Results

5.1 The impact of the FCCU6 policy on child health insurance

The first-stage estimates the impact of the FCCU6 policy on the probability of being insured for a child using OLS with a baseline specification as in equation (2). The first-stage baseline coefficients are used to predict the probability of child health insurance used for the baseline second-stage estimation that is the impact of child health insurance on health care utilization outcomes for both children and parents.

The estimated coefficients are specifically presented in Table 2. Accordingly, for a child in the treatment group who was exposed to the FCCU6 policy has an increase of 8% in the probability of health insurance compared to the counterpart from the control group. The estimated coefficient of the FCCU6 policy exposure is statistically significant at 1%. Among other determinants of child health insurance using a baseline control variables in the first-stage estimation, dummies for living in an urban area, living in Red river delta, Midlands and northern mountainous areas, and Northern and coastal central region are positive predictors with statistical significances at 1%. Although male gender, dummies for living in Central highlands and Southeastern area have positive impacts on the probability of health insurance, it loses its statistical significance at any traditional level. Belonging to a majority group is detrimental to the possibility if a child is insured at a 1% statistical significance.

Graphically, it is apparent that the FCCU6 policy has considerable impacts on the probability of being insured for a child as demonstrated in Figure 1. Accordingly, there is a large jump on the probability for a child in the treatment group whose age is lower than 6 relative to one from the control group with age from 6 and above.

Importantly, the paper also find the same impacts of the FCCU6 policy on a child's probability of being insured when using other two alternative specifications compared to the baseline specification. While the first alternative specification simply excludes all co-founding controls, the second one adds two more variables related to household head's characteristics including (i) the probability of a female household head and (ii) household head's schooling year into the baseline control variables. The results are in particular reported in Table A1 in Appendices. As same as the baseline estimate, the FCCU6 policy increase the probability of being insured for a child by about 8% and both coefficients of interest are statistically significant at 1%. The estimated coefficients using these two alternative specifications are used to predict the probability of child health insurance in the second-stage of the estimation procedure for the objective of checking the robustness of the baseline impacts.

5.2 The impact of child health insurance on child health care utilization

The second-stage estimation shows the causal impact of child health insurance on child health care utilization outcomes measured by two variables (i) the probability of doctor visit, and (ii) the number of doctor visits.

The results of baseline estimates for children are reported in Table 3. Accordingly, health insurance increases the probability of doctor visit for both inpatient and outpatient services for both health sectors as shown in Panel A of Table 3. On the impact magnitude, a child with being insured tends to have a higher probability to achieve an inpatient visit by 22.3% than a child without health insurance at a public health (column 1). Also, child health insurance rises a child's probability of an outpatient visit from the private health sector by 33% (column 2). For the frequency of doctor visits, child health insurance leads to increases in inpatient visits from the public sector and outpatient visits from the private sector by roughly 0.32 times (column 1) and 2.24 times (column 2).

However, only the coefficient for the probability of inpatient service visit from the public sector and that for an outpatient service from the private sector are statistically significant at 5% while other coefficients lose their significances at any conventional level. The paper is failure to find statistically significant impacts of child health insurance on a child's probability of inpatient visit from the private sector, probability of outpatient visit from the public sector, number of inpatient visits to private health facilities and number of outpatient visits to public health facilities.

It is apparent child health insurance has considerable impacts on the promotion of primary health care services utilization among Vietnamese children using a baseline specifications. To check the robustness of the baseline estimates, the paper uses two different specifications including (i) one in which baseline controls are all ruled out, and (ii) one in which *female household head* and *household head's schooling year* are included in addition to baseline controls. The results show that the baseline estimates are extremely robust to various estimation specifications as shown in Table 4. While the signs of the robustness impacts maintains as positive as the baseline impacts and the sizes of the impacts are nearly similar to the baseline coefficients. In particular, the marginal effects of a child's health insurance using both amended models are 22.5–22.8% increases in the probability of public inpatient visit (column 1 of Panel A) and 31.6–31.7% increases in the probability of private outpatient

visit (column 2 of Panel A) while the incremental numbers of visits due to an insured child are around 0.32 times for inpatient services from the public sector (column 1 of Panel B) and nearby 2.2 times for outpatient services from the private sector (column 2 of Panel B).

In addition, the estimated coefficients using reduced-form regressions also show the statistically significant impacts of child health insurance on utilization outcomes for inpatient services from the public sector and these for outpatient services from the private sector. The estimates are presented in Table A2. In particular, the FCCU6 policy is positively associated with 1.8% and 2.6% increases in the probabilities of public inpatient visit and private outpatient visit respectively while it correspondingly increases the frequencies of public inpatient visits and private outpatient visits by roughly 0.03 and 0.18 times. Other coefficients lose its statistical significance as the baseline estimates for a child' impacts.

5.3 The impact of child health insurance on maternal health care utilization

Next, the baseline estimates on the impact of child health insurance on maternal health care utilization are presented in Table 5. In contrast with child outcomes, maternal health care utilization is negatively connected with child health insurance for both outcomes from both public and private health sectors.

However, the paper also finds statistically significant impacts for almost utilization outcomes from public health facilities including the probability of inpatient visit and the probability of outpatient visit (column 1 of Panel A) and the frequency of inpatient visits (column 1 of Panel B). The impacts on all outcomes from the private sector including the probability of inpatient visit and the probability of outpatient visit (column 2 of Panel A), the number of inpatient visit and the number of outpatient visit (column 2 of Panel B), and the number of outpatient visits from the public sector (column 1 of Panel B) are statistically insignificant at any traditional level. Among significant estimates, the paper shows that child health considerably reduces maternal health care utilization with around 32.6% and 27% for the probabilities of inpatient and outpatient visit from the public health sector respectively, and roughly 0.41 times for the number of inpatient visits to public health facilities.

Moreover, the paper finds that the baseline estimates for mothers are tremendously robust to the robustness estimates in terms of the signs and the magnitudes of the impacts as well. The results of the robustness check for mothers' estimates are specifically demonstrated in Table 6. In particular, a mother with an insured child tends to have lower probabilities to visit a public facility by between 32.1–33.9% for inpatient services and between 27.5–29.2% for outpatient services (column 1 of Panel A) than one without an insured child. Moreover, child health insurance on average lowers a mother's number of doctor visits for inpatient services from the public health sector by 0.41–0.43 times.

Employing reduced-form regressions, the paper finds the statistically significant impacts of the FCCU6 policy on the probabilities of physician visit and the number of inpatient visits to public health facilities. The estimates are presented in Table A3 of Appendices. In particular, the FCCU6 policy drops the probabilities of inpatient and outpatient visit to public facilities by approximately 2.6% and 2.2% respectively while it also declines the quantity of public inpatient visits by about 0.03 times. Other coefficients similarly show negative impacts of the FCCU6 on other outcomes of maternal health care utilization despite its loss of statistical significance at any conventional level.

5.4 The impact of child health insurance on paternal health care utilization

The paper finds the statistically significant impacts of child health insurance on fathers' health care utilization for some utilization outcomes. Table 7 in particular reports the baseline estimates.

For the probability of doctor visit, while child health insurance increases the probability for inpatient services, it reduces the probability for outpatient services for both the public and private health sectors as indicated in Panel A of Table 7. However, only estimates for the probability of outpatient visit from the private sector are statistically significant at a traditional level. On average, a father having an insured child is more likely to visit private health facilities for outpatient services by 23.5–24.8% compared to the controlled father.

Meanwhile, child health insurance rises the frequency of inpatient doctor visits for both public and private sectors although the corresponding estimates lose its statistical significance as shown in Panel B of Table 7. On the contrary, the paper finds the positive links between child health insurance and a father's number of outpatient visits for both health sectors. However, only the impact on the number of outpatient visits from the private sector is statistically significant with a 5% level (column 2 of Panel B). In particular, child health insurance reduces a father's frequency of private outpatient visits 1.01 times.

The results of robustness checks as presented in Table 8 strongly validate the firmness of the baseline estimates for paternal health care utilization impacts of child health insurance. Using various specifications, the paper finds that the statistically significant impacts of child health insurance on a father's both likelihood and number of outpatient visit(s) from the private health sector. Child health insurance is causally related to a decrease in a father's probability of health facility visit by 23.5–24.8% and a fall in paternal frequency of physician visits by 1.01–1.04 times.

Finally, using reduced-form regressions as shown in Table A4 the paper finds unfavorable effects of the FCCU6 policy on a father's probability of visit and quantity of visits for outpatient services at private health facilities with 1% and 5% levels of statistical significance respectively. In particular, the FCCU6 policy is negatively linked to an about 13.2% decrease in the likelihood of outpatient visit and a 0.08-time reduction in the number of outpatient visits. The paper fails to find statistically significant effects of the FCCU6 policy on other outcomes of paternal health care utilization.

6 Concluding Remarks

Exploiting a policy that provides free of charge access to health care services from public health facilities with a registered health insurance card for all children under the age of 6, this paper evaluates the multiple impacts of child health insurance on health care utilization of both children and parents in Vietnam. Hence, this study significantly contributes more evidence to the literature on socio-economic determinants of health care utilization in general (Dao et al. 2008) and maternal and paternal health care utilization in particular

(Goland et al. 2012; Målqvist et al. 2013) in Vietnam that has been investigated over last decade. Moreover, this study adds more evidence to the research literature on the role of health insurance as a determinant of health care utilization in a developing country like Vietnam (for examples Nguyen 2012, 2016; Nguyen and Knowles 2010; Nguyen and Wang 2013; Palmer 2014; Palmer et al. 2015).

Consistent with other previous studies on the same topic for Vietnam, for examples Nguyen and Wang (2013) using a DD approach and Palmer et al. (2015) using a RDD as well, this study finds considerable and positive effects of child health insurance on a child's health care utilization outcomes, the probabilities of public inpatient visit and private outpatient visit and the frequencies of public inpatient and private outpatient visits in particular. This paper is also congruous with the findings from other countries for examples the positive effects of health insurance on Indonesian children's medical use (Somanathan 2008).

More importantly, this study is the first looking at the impact of child health insurance on parental health care utilization in Vietnam and developing countries as well. This is obviously a significantly added contribution to the literature. The paper finds that child health insurance generally reduces health care utilization for both mothers and fathers. Given findings, this study provides a potential implication that there are possible trade-offs between health care utilization for children and that for parents. It is likely rational in a low-income country like Vietnam. When a household faces limited resources both in finance and time, investments in children's health care probably impose adverse impacts of health care investments in their parents. In principle, the effect on parental health care utilization can be regarded as the substitution of children's medical utilization.

References

- Athey, S., Imbens, G.: *The State of Applied Econometrics: Causality and Policy Evaluation*, Stanford, mimeo (2016).
- Bailey, S.R., Marino, M., Hoopes, M., Heintzman, J., Gold, R., Angier, H., O'Malley, J.P., DeVoe, J.E.: *Healthcare Utilization After a Children's Health Insurance Program Expansion in Oregon*. *Maternal and Child Health Journal* **20**, 946–954 (2016)
- Becker, G.S.: *Treatise on the Family*. Harvard University Press, Cambridge (1981)

- Behrman, J.R.: Intrahousehold Distribution and the Family. In: Rosenzweig, M.R., Stark, O. (eds.) *Handbook of Population and Family Economics Vol. 1A*, pp. 125-187. North-Holland Publishing Company, Amsterdam (1997)
- Bergstrom, T.C.: A Survey of Theories of the Family. In: Rosenzweig, M.R., Stark, O. (eds.) *Handbook of Population and Family Economics Vol. 1A*, pp. 21-79. North-Holland Publishing Company, Amsterdam (1997)
- Bisgaier, J., Rhodes, K.V.: Auditing access to specialty care for children with public insurance. *New England Journal of Medicine*. **364**, 2324-2333 (2011)
- Bonfrer, I., Breebaart, L., van de Poel, E.: The Effects of Ghana's National Health Insurance Scheme on Maternal and Infant Health Care Utilization. *PLoS ONE*. **11**, 11 (2016)
- Chen, Y., Jin, G.Z.: Does Health Insurance Coverage Lead to Better Health and Educational Outcomes? Evidence from Rural China. *Journal of Health Economics*. **31**, 1–14 (2012)
- Committee on Child Health Financing: Children's Health Insurance Program (CHIP): accomplishments, challenges, and policy recommendations. *Pediatrics*. **133**, 784-793 (2014)
- Cortez, R., Romero, D., Camporeale, V., Perez, L.: Results-based financing for health in Argentina: The Plan Nacer program. Health, Nutrition, and Population Family of the World Bank's Human Development Network, Washington, DC (2012)
- Currie, J.: Policy Interventions to Address Child Health Disparities: Moving Beyond Health Insurance. *Pediatrics*. **124**, 3 (2009)
- Dang, T.: Does the More Educated Utilize More Health Care Services? Evidence from Vietnam Using a Regression Discontinuity Design, MPRA Paper 77641, University Library of Munich, Germany (2017)
- Dang, T.: Intergenerational mobility of earnings and income among sons and daughters in Vietnam, MPRA Paper 75357, University Library of Munich, Germany (2015)
- Dao, H.T., Waters, H., Le, Q.V.: User fees and health service utilization in Vietnam: How to protect the poor?. *Public Health*. **122**, 1068-1078 (2008)
- Dubay, L., Kenney, G.: The Impact of CHIP on Children's Insurance Coverage: An Analysis Using the National Survey of America's Families. *Health Services Research*. **44**, 2040–2059 (2009)
- Gajate-Garrido, G., Ahiadeke, C.: The effect of insurance enrollment on maternal and child health care utilization: The case of Ghana, IFPRI Discussion Paper 01495. International Food Policy Research Institute (IFPRI), Washington, DC (2015)
- Goland, E., Hoa, D.T.P., Målqvist, M.: Inequity in maternal health care utilization in Vietnam. *International Journal for Equity in Health*. **11**, 24 (2012)
- Hahn, J., Todd, P., Klaauw, W.V.D.: Identification and estimation of treatment effects with a regression discontinuity design. *Econometrica*. **69**, 201-209 (2001)
- Hoai, N.T., Dang, T.: The determinants of self-medication: Evidence from urban Vietnam. *Social Work in Health Care*. **56**, 260-282 (2017)
- Imbens, G.W., Lemieux, T.: Regression discontinuity designs: A guide to practice. *Journal of Econometrics*. **142**, 615–635 (2008)

- Ladinsky, J.L., Nguyen, H.T., Volk, N.D.: Changes in the Health Care System of Vietnam in Response to the Emerging Market Economy. *Journal of Public Health Policy*. **21**, 82–98 (2000)
- Lee, D.S., Lemieux, T.: Regression discontinuity designs in economics. *Journal of Economic Literature*. **48**, 281-355 (2010)
- Li, M., Baughman, R.: Coverage, Utilization, and Health Outcomes of the State Children's Health Insurance Program. *INQUIRY: The Journal of Health Care Organization, Provision, and Financing*. **47**, 296-314 (2010)
- Maeda, A., Cashin, C., Harris, J., Ikegami, N., Reich, M.R.: Universal health coverage for inclusive and sustainable development : a synthesis of 11 country case studies. World Bank Group, Washington, DC (2014)
- Målqvist, M., Lincetto, O., Ng Du, N.H., Burgess, C., Hoa, D.T.P.: Maternal health care utilization in Viet Nam: increasing ethnic inequity. *Bulletin of the World Health Organization*. **91**, 254–261 (2013)
- Memirie, S.T., Verguet, S., Norheim, O.F., Levin, C., Johansson, K.A.: Inequalities in utilization of maternal and child health services in Ethiopia: the role of primary health care. *BMC Health Services Research*. **16**, 51 (2016)
- Nguyen, C.: The impact of health insurance programs for children: evidence from Vietnam. *Health Economics Review*. **6**, 34 (2016)
- Nguyen, C.: The impact of voluntary health insurance on health care utilization and out-of-pocket payments: new evidence for Vietnam. *Health Economics*. **21**, 946-966 (2012)
- Nguyen, H., Knowles, J.: Demand for voluntary health insurance in developing countries: The case of Vietnam's school-age children and adolescent student health insurance program. *Social Science & Medicine*. **71**, 2074-2082 (2010)
- Nguyen, H., Wang, W.: The effects of free government health insurance among small children- evidence from the free care for children under six policy in Vietnam. *International Journal Health Planning and Management*. **28**, 3–15 (2013)
- Palmer, M., Mitra, S., Mont, D., Groce, N.: The impact of health insurance for children under age 6 in Vietnam: A regression discontinuity approach. *Social Science & Medicine*. **145**, 217-226 (2015)
- Palmer, M.G.: Inequalities in Universal Health Coverage: Evidence from Vietnam. *World Development*. **64**, 384–394 (2014)
- Peng, X., Conley, D.: The implication of health insurance for child development and maternal nutrition: evidence from China. *European Journal of Health Economics*. **17**, 521–534 (2016)
- Russ, S., Garro, N., Halfon, N.: Meeting children's basic health needs: From patchwork to tapestry. *Children and Youth Services Review*. **32**, 1149–1164 (2010)
- Sauerborn, R., Nougara, A., Latimer, E.: The elasticity of demand for health care in Burkina Faso: differences across age and income groups. *Health Policy Plan*, **9**, 185–192 (1994)

- Somanathan, A., Dao, H.L., Tien, T.V.: Integrating the Poor into Universal Health Coverage in Vietnam, Universal Health Coverage Studies Series (UNICO) Studies Series No. 24. World Bank Group, Washington, DC (2013)
- Somanathan, A., Tandon, A., Dao, H.L., Hurt, K.L., Fuenzalida-Puelma, H.L.: Moving toward Universal Coverage of Social Health Insurance in Vietnam: Assessment and Options. Directions in Development. World Bank Group, Washington DC (2014)
- Somanathan, A.: The Impact of Price Subsidies on Child Health Care Use: Evaluation of the Indonesian Healthcard, Policy Research Working Paper No.4622. World Bank Group, Washington, DC (2008)
- Tien, T.V., Phuong, H.T., Mathauer, I., Phuong, N.T.K.: A Health Financing Review of Vietnam with a Focus on Social Health Insurance: Bottlenecks in Institutional Design and Organizational Practice of Health Financing and Options to Accelerate Progress Towards Universal Coverage. World Health Organization, Geneva (2011)
- Varian, H.R.: Causal inference in economics and marketing. PNAS. **113**, 7310–7315 (2016)
- Wehby, G.L.: Child health insurance and early preventive care in three South American countries. Health Policy and Planning. **28**, 328–338 (2013)
- World Health Organization and World Bank: Monitoring progress towards universal health coverage at country and global levels: Framework, measures and targets. World Bank Group, Washington, DC (2014)
- World Health Organization: Tracking universal health coverage: first global monitoring report. World Bank Group, Washington, DC (2015)
- Yip, W., Berman, P.: Targeted health insurance in a low income country and its impact on access and equity in access: Egypt's school health insurance. Health Econ. **10**, 207-220 (2001)
- Zimmer, D.M.: The Effects of the State Children's Health Insurance Program on Insurance Status and Health Care Utilization of Children. Journal of Family and Economic. **32**, 373–383 (2011)

Tables and Figures

Table 1. Descriptive Statistics of the Sample

Variable and its definition	Full sample		Treatment		Control	
	Mean	SD	Mean	SD	Mean	SD
Health care utilization outcomes for children						
<i>Public health care services</i>						
Probability of inpatient visit: The probability of an inpatient visit to public health care services during the last 12 months (=1 if yes, =0 otherwise)	0.067	0.250	0.094	0.292	0.040	0.195
Probability of outpatient visit: The probability of an outpatient visit to public health care services during the last 12 months (=1 if yes, =0 otherwise)	0.320	0.467	0.419	0.493	0.222	0.416
Frequency of inpatient visits: The number of inpatient visit to public health care services over the last 12 months (times)	0.093	0.445	0.131	0.492	0.055	0.389
Frequency of outpatient visits: The number of outpatient visit to public health care services over the last 12 months (times)	0.853	1.892	1.175	2.234	0.532	1.403
<i>Private health care services</i>						
Probability of inpatient visit: Probability of any inpatient visit to private health care services during the last 12 months (=1 if yes, =0 otherwise)	0.004	0.060	0.005	0.069	0.002	0.049
Probability of outpatient visit: Probability of any outpatient visit to private health care services during the last 12 months (=1 if yes, =0 otherwise)	0.166	0.372	0.196	0.397	0.137	0.344
Frequency of inpatient visits: The number of inpatient visits to private health care services over the last 12 months (times)	0.006	0.204	0.009	0.280	0.003	0.070
Frequency of outpatient visits: The number of outpatient visits to private health care services over the last 12 months (times)	0.601	1.959	0.781	2.269	0.422	1.569
Health care utilization outcomes for mothers						
<i>Public health care services</i>						
Probability of inpatient visit: Probability of any inpatient visit to public health care services during the last 12 months (=1 if yes, =0 otherwise))	0.072	0.259	2.269	0.257	0.073	0.260

Probability of outpatient visit: Probability of any outpatient visit to public health care services during the last 12 months (=1 if yes, =0 otherwise))	0.195	0.396	0.162	0.368	0.228	0.420
Frequency of inpatient visits: The number of inpatient visits to public health care services over the last 12 months (times)	0.092	0.381	0.088	0.361	0.096	0.400
Frequency of outpatient visits: The number of outpatient visits to public health care services over the last 12 months (times)	0.525	1.653	0.426	1.472	0.624	1.810
<i>Private health care services</i>						
Probability of inpatient visit: Probability of any inpatient visit to private health care services during the last 12 months (=1 if yes, =0 otherwise)	0.005	0.067	0.004	0.063	0.005	0.071
Probability of outpatient visit: Probability of any outpatient visit to private health care services during the last 12 months (=1 if yes, =0 otherwise)	0.106	0.308	0.086	0.281	0.126	0.332
Frequency of inpatient visits: The number of inpatient visits to private health care services over the last 12 months (times)	0.006	0.107	0.005	0.086	0.007	0.125
Frequency of outpatient visits: The number of outpatient visits to private health care services over the last 12 months (times)	0.310	1.353	0.264	1.385	0.355	1.318
Health care utilization outcomes for fathers						
<i>Public health care services</i>						
Probability of inpatient visit: Probability of any inpatient visit to public health care services during the last 12 months (=1 if yes, =0 otherwise))	0.031	0.172	0.025	0.155	0.037	0.188
Probability of outpatient visit: Probability of any outpatient visit to public health care services during the last 12 months (=1 if yes, =0 otherwise))	0.118	0.323	0.090	0.287	0.145	0.353
Frequency of inpatient visits: The number of inpatient visits to public health care services over the last 12 months (times)	0.042	0.298	0.034	0.271	0.051	0.322
Frequency of outpatient visits: The number of outpatient visits to public health care services over the last 12 months (times)	0.298	1.281	0.229	1.164	0.368	1.385
<i>Private health care services</i>						
Probability of inpatient visit: Probability of any inpatient visit to private health care services during the last 12 months (=1 if yes, =0 otherwise)	0.003	0.055	0.003	0.053	0.003	0.057
Probability of outpatient visit: Probability of any outpatient visit to private health care services during the last 12 months (=1 if yes, =0 otherwise)	0.079	0.270	0.064	0.245	0.095	0.293

Frequency of inpatient visits: The number of inpatient visits to private health care services over the last 12 months (times)	0.008	0.255	0.009	0.279	0.008	0.229
Frequency of outpatient visits: The number of outpatient visits to private health care services over the last 12 months (times)	0.224	1.163	0.173	0.973	0.274	1.323
Main control variables						
Male: Child's gender is male (=1 if yes, =0 otherwise)	0.515	0.500	0.515	0.500	0.516	0.500
Urban: Child's household is in an urban area (=1 if yes, =0 otherwise)	0.263	0.440	0.266	0.442	0.260	0.439
Majority: Child's ethnic is majority, <i>Kinh</i> or <i>Hoa</i> (=1 if yes, =0 otherwise)	0.759	0.428	0.763	0.426	0.756	0.430
Female household head: Child's household head is a female (=1 if yes, =0 otherwise)	0.805	0.396	0.798	0.402	0.812	0.390
Household head's full schooling year: Child's education of household head (full year of schooling)	7.140	4.220	7.283	4.253	6.997	4.183
Red river delta: The geographic region is Red river delta (=1 if yes, =0 otherwise)	0.180	0.385	0.189	0.391	0.172	0.378
Midlands and northern mountainous areas: The geographic region is Midlands and northern mountainous areas (=1 if yes, =0 otherwise)	0.213	0.409	0.220	0.414	0.206	0.404
Northern and coastal central region: The geographic region is Northern and coastal central region (=1 if yes, =0 otherwise)	0.215	0.411	0.206	0.405	0.223	0.417
Central highlands: The geographic region is Central highlands (=1 if yes, =0 otherwise)	0.092	0.290	0.088	0.283	0.097	0.296
Southeastern area: The geographic region is Southeastern area (=1 if yes, =0 otherwise)	0.102	0.302	0.100	0.301	0.103	0.304
Mekong river delta: The geographic region is Mekong river delta (=1 if yes, =0 otherwise)	0.198	0.398	0.197	0.398	0.198	0.399
Age: Child's age at the time of survey (years)	5.502	2.869	3.007	1.429	7.992	1.413
Survey 2010: The year of survey is 2010 (=1 if yes, =0 otherwise)	0.345	0.475	0.350	0.477	0.339	0.473
Survey 2012: The year of survey is 2012 (=1 if yes, =0 otherwise)	0.325	0.469	0.320	0.467	0.331	0.471
Survey 2014: The year of survey is 2014 (=1 if yes, =0 otherwise)	0.330	0.470	0.330	0.470	0.330	0.470
Policy exposure: Child's probability of being exposed to the policy (=1 if yes, =0 otherwise)	0.499	0.500	1.000	0.000	0.000	0.000
Child insured: Child's probability of being insured (=1 if yes, =0 otherwise)	0.921	0.269	0.950	0.218	0.893	0.309

Observations

17,775

8,878

8,897

Table 2. First-stage using baseline specification: The impacts of policy on a child's probability of being insured

Explanatory variables	Dependent variable: Child insured
Policy exposure	0.080*** (0.010)
Male	0.003 (0.004)
Urban	0.020*** (0.007)
Majority	-0.032** (0.012)
Red river delta	0.104*** (0.020)
Midlands and northern mountainous areas	0.076*** (0.023)
Northern and coastal central region	0.078*** (0.020)
Central highlands	0.041 (0.026)
Southeastern area	0.036 (0.024)
Mekong river delta	Omitted
Quadratic function of age	Yes
Survey year fixed effects	Yes
Cohort fixed effects	Yes
Constant	0.771*** (0.029)
R-squared	0.048
Observations	17,775

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Ordinary least squares are used. Robust standard errors are clustered at the provincial level and reported in parenthesis. Controls consist of male, urban, majority, and dummies for six geographical regions.

**Table 3. The impacts of child’s insurance on child’s health care utilization outcomes:
Baseline estimates**

Dependent variable	Public health sector (1)	Private health sector (2)
<i>Panel A. The probability of doctor visit</i>		
Probability of inpatient visit	0.223** (0.112)	0.026 (0.027)
Probability of outpatient visit	0.212 (0.173)	0.330** (0.159)
<i>Panel B. The frequency of doctor visits</i>		
Frequency of inpatient visits	0.318* (0.178)	0.070 (0.053)
Frequency of outpatient visits	0.773 (0.715)	2.238*** (0.852)
Controls	Yes	Yes
Quadratic function of age	Yes	Yes
Survey year fixed effects	Yes	Yes
Cohort fixed effects	Yes	Yes
Observations	17,775	17,775

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. IV-Probit regression is used for the probability of doctor visit, and IV-Poisson regression is used for the frequency of doctor visits. Reported coefficients are marginal effects. Robust standard errors are clustered at the provincial level and reported in parenthesis. Control variables consist of male, urban, majority, and dummies for six geographical regions.

**Table 4. The impacts of child insurance on child health care utilization outcomes:
Robustness, various specifications**

Dependent variable	Public health sector		Private health sector	
	(1)	(2)	(3)	(4)
<i>Panel A. The probability of doctor visit</i>				
Probability of inpatient visit	0.228** (0.110)	0.225** (0.113)	0.026 (0.027)	0.025 (0.027)
Probability of outpatient visit	0.203 (0.172)	0.210 (0.173)	0.316* (0.163)	0.317** (0.159)
<i>Panel B. The frequency of doctor visits</i>				
Frequency of inpatient visits	0.322* (0.177)	0.319* (0.179)	0.070 (0.054)	0.071 (0.054)
Frequency of outpatient visits	0.756 (0.729)	0.766 (0.719)	2.168*** (0.834)	2.200** (0.857)
Controls	No	Yes	No	Yes
Quadratic function of age	Yes	Yes	Yes	Yes
Survey year fixed effects	Yes	Yes	Yes	Yes
Cohort fixed effects	Yes	Yes	Yes	Yes
Observations	17,775	17,775	17,775	17,775

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. IV-Probit regression is used for the probability of doctor visit, and IV-Poisson regression is used for the frequency of doctor visits. Reported coefficients are marginal effects. Robust standard errors are clustered at the provincial level and reported in parenthesis. Control variables consist of male, urban, majority, female household head, household head's schooling year, and dummies for six geographical regions.

Table 5. The impacts of child insurance on mother's health care utilization outcomes: Baseline estimates

Dependent variable	Public health sector	Private health sector
	(1)	(2)
<i>Panel A. The probability of doctor visit</i>		
Probability of inpatient visit	−0.326*** (0.087)	−0.004 (0.030)
Probability of outpatient visit	−0.270* (0.150)	−0.005 (0.132)
<i>Panel B. The frequency of doctor visits</i>		
Frequency of inpatient visits	−0.412*** (0.139)	−0.012 (0.038)
Frequency of outpatient visits	−0.293 (0.691)	−0.105 (0.425)
Controls	Yes	Yes
Quadratic function of age	Yes	Yes
Survey year fixed effects	Yes	Yes
Cohort fixed effects	Yes	Yes
Observations	17,775	17,775

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. IV-Probit regression is used for the probability of doctor visit, and IV-Poisson regression is used for the frequency of doctor visit. Reported coefficients are marginal effects. Robust standard errors are clustered at the provincial level and reported in parenthesis. Control variables consist of male, urban, majority, and dummies for six geographical regions.

Table 6. The impacts of child insurance on mother's health care utilization outcomes: Robustness, various specifications

Dependent variable	Public health sector		Private health sector	
	(1)	(2)	(3)	(4)
<i>Panel A. The probability of doctor visit</i>				
Probability of inpatient visit	-0.321*** (0.086)	-0.339*** (0.087)	-0.0009 (0.029)	-0.004 (0.030)
Probability of outpatient visit	-0.275* (0.149)	-0.292* (0.151)	-0.010 (0.134)	-0.018 (0.131)
<i>Panel B. The frequency of doctor visits</i>				
Frequency of inpatient visits	-0.405*** (0.138)	-0.428*** (0.140)	-0.010 (0.038)	-0.012 (0.038)
Frequency of outpatient visits	-0.304 (0.694)	-0.364 (0.693)	-0.113 (0.439)	-0.148 (0.425)
Controls	No	Yes	No	Yes
Quadratic function of age	Yes	Yes	Yes	Yes
Survey year fixed effects	Yes	Yes	Yes	Yes
Cohort fixed effects	Yes	Yes	Yes	Yes
Observations	17,775	17,775	17,775	17,775

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. IV-Probit regression is used for the probability of doctor visit, and IV-Poisson regression is used for the frequency of doctor visit. Reported coefficients are marginal effects. Robust standard errors are clustered at the provincial level and reported in parenthesis. Control variables consist of male, urban, majority, female household head, household head's full schooling year, and dummies for six geographical regions.

**Table 7. The impacts of child insurance on father’s health care utilization outcomes:
Baseline estimates**

Dependent variable	Public health sector (1)	Private health sector (2)
<i>Panel A. The probability of doctor visit</i>		
Probability of inpatient visit	0.065 (0.065)	0.010 (0.017)
Probability of outpatient visit	-0.154 (0.130)	-0.232* (0.122)
<i>Panel B. The frequency of doctor visits</i>		
Frequency of inpatient visit	0.094 (0.104)	0.068 (0.080)
Frequency of outpatient visit	0.682 (0.465)	-1.011** (0.446)
Controls	Yes	Yes
Quadratic function of age	Yes	Yes
Survey year fixed effects	Yes	Yes
Cohort fixed effects	Yes	Yes
Observations	17,775	17,775

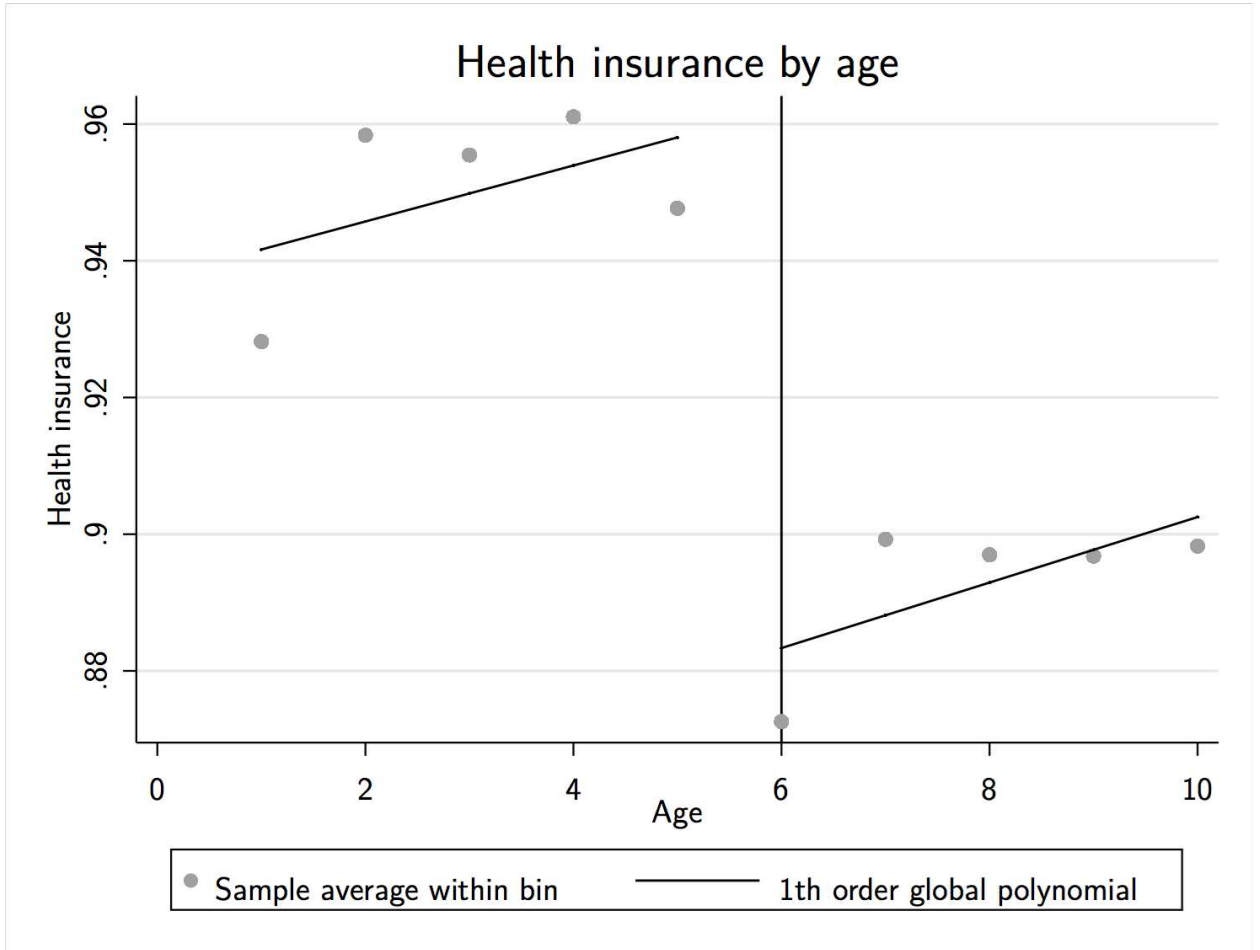
Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. IV-Probit regression is used for the probability of doctor visit, and IV-Poisson regression is used for the frequency of doctor visit. Reported coefficients are marginal effects. Robust standard errors are clustered at the provincial level and reported in parenthesis. Control variables consist of male, urban, majority, and dummies for six geographical regions.

Table 8. The impacts of child insurance on father’s health care utilization outcomes: Robustness, various specifications

Dependent variable	Public health sector		Private health sector	
	(1)	(2)	(3)	(4)
<i>Panel A. The probability of doctor visit</i>				
Probability of inpatient visit	0.066 (0.066)	0.060 (0.066)	0.010 (0.017)	0.008 (0.017)
Probability of outpatient visit	-0.154 (0.130)	-0.173 (0.132)	-0.235* (0.123)	-0.248** (0.120)
<i>Panel B. The frequency of doctor visits</i>				
Frequency of inpatient visits	0.096 (0.103)	0.090 (0.105)	0.071 (0.083)	0.065 (0.079)
Frequency of outpatient visits	0.664 (0.467)	0.614 (0.481)	-1.007** (0.433)	-1.035** (0.445)
Controls	No	Yes	No	Yes
Quadratic function of age	Yes	Yes	Yes	Yes
Survey year fixed effects	Yes	Yes	Yes	Yes
Cohort fixed effects	Yes	Yes	Yes	Yes
Observations	17,755	17,755	17,755	17,755

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. IV-Probit regression is used for the probability of doctor visit, and IV-Poisson regression is used for the frequency of doctor visit. Reported coefficients are marginal effects. Robust standard errors are clustered at the provincial level and reported in parenthesis. Control variables consist of male, urban, majority, female household head, household head’s full schooling year, and dummies for six geographical regions.

Figure 1. Child health insurance status by age



Appendices

Table A1. First-stage using various specifications: The impacts of policy on a child's probability of being insured

Explanatory variables	Dependent variable: Child insured	
	(1)	(2)
Policy exposure	0.080*** (0.010)	0.080*** (0.010)
Male		0.003 (0.004)
Urban		0.016** (0.007)
Majority		-0.039*** (0.012)
Female household head		0.002 (0.008)
Household head's schooling year		0.002*** (0.001)
Red river delta		0.096*** (0.020)
Midlands and northern mountainous areas		0.070*** (0.023)
Northern and coastal central region		0.074*** (0.020)
Central highlands		0.037 (0.026)
Southeastern area		0.033 (0.024)
Mekong river delta		Omitted
Quadratic function of age	Yes	Yes
Survey year fixed effects	Yes	Yes
Cohort fixed effects	Yes	Yes
Constant	0.816*** (0.017)	0.764*** (0.032)
R-squared	0.027	0.049
Observations	17,775	17,775

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Ordinary least squares are used. Robust standard errors are clustered at the provincial level and reported in parenthesis. Controls consist of male, urban, majority, female household head, household head's full schooling year and dummies for six geographical regions.

Table A2. The impacts on child’s health care utilization outcomes: Reduced-form regressions

Dependent variable	Public health sector (1)	Private health sector (2)
<i>Panel A. The probability of doctor visit</i>		
Probability of inpatient visit	0.018** (0.009)	0.002 (0.002)
Probability of outpatient visit	0.017 (0.014)	0.026** (0.013)
<i>Panel B. The frequency of doctor visits</i>		
Frequency of inpatient visits	0.025* (0.014)	0.006 (0.004)
Frequency of outpatient visits	0.062 (0.057)	0.179*** (0.068)
Controls	Yes	Yes
Quadratic function of age	Yes	Yes
Survey year fixed effects	Yes	Yes
Cohort fixed effects	Yes	Yes
Observations	17,775	17,775

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. IV-Probit regression is used for the probability of doctor visit, and IV-Poisson regression is used for the frequency of doctor visits. Reported coefficients are marginal effects. Robust standard errors are clustered at the provincial level and reported in parenthesis. Control variables consist of male, urban, majority, and dummies for six geographical regions.

Table A3. The impacts on mother's health care utilization outcomes: Reduced-form regressions

Dependent variable	Public health sector	Private health sector
	(1)	(2)
<i>Panel A. The probability of doctor visit</i>		
Probability of inpatient visit	−0.026*** (0.007)	−0.0003 (0.003)
Probability of outpatient visit	−0.022* (0.012)	−0.0004 (0.011)
<i>Panel B. The frequency of doctor visits</i>		
Frequency of inpatient visits	−0.033*** (0.011)	−0.0009 (0.003)
Frequency of inpatient visits	−0.023 (0.055)	−0.008 (0.034)
Controls	Yes	Yes
Quadratic function of age	Yes	Yes
Survey year fixed effects	Yes	Yes
Cohort fixed effects	Yes	Yes
Observations	17,775	17,775

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. IV-Probit regression is used for the probability of doctor visit, and IV-Poisson regression is used for the frequency of doctor visits. Reported coefficients are marginal effects. Robust standard errors are clustered at the provincial level and reported in parenthesis. Control variables consist of male, urban, majority, and dummies for six geographical regions.

Table A4. The impacts on father's health care utilization outcomes: Reduced-form regressions

Dependent variable	Public health sector (1)	Private health sector (2)
<i>Panel A. The probability of doctor visit</i>		
Probability of inpatient visit	0.005 (0.005)	0.001 (0.001)
Probability of outpatient visit	-0.012 (0.010)	-0.132* (0.069)
<i>Panel B. The frequency of doctor visits</i>		
Frequency of inpatient visits	0.008 (0.008)	0.005 (0.006)
Frequency of outpatient visits	0.055 (0.037)	-0.081** (0.036)
Controls	Yes	Yes
Quadratic function of age	Yes	Yes
Survey year fixed effects	Yes	Yes
Cohort fixed effects	Yes	Yes
Observations	17,775	17,775

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. IV-Probit regression is used for the probability of doctor visit, and IV-Poisson regression is used for the frequency of doctor visit. Reported coefficients are marginal effects. Robust standard errors are clustered at the provincial level and reported in parenthesis. Control variables consist of male, urban, majority, and dummies for six geographical regions.