



Does health insurance coverage lead to better health and educational outcomes? Evidence from rural China[☆]

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ABSTRACT

Using the 2006 China Agricultural Census (CAC), we examine whether the introduction of the New Cooperative Medical System (NCMS) has affected child mortality, maternal mortality, and school enrollment of 6–16 year olds. Our data cover 5.9 million people living in eight low-income rural counties, of which four adopted the NCMS by 2006 and four did not adopt it until 2007.

Raw data suggest that enrolling in the NCMS is associated with better school enrollment and lower mortality of young children and pregnant women. However, using a difference-in-difference propensity score method, we find that most of the differences are driven by endogenous introduction and take-up of the NCMS, and our method overcomes classical propensity score matching's failure to address selection bias. While the NCMS does not affect child mortality and maternal mortality, it does help improve the school enrollment of six-year-olds.

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1. Introduction

Many governments advocate nationwide health insurance in order to improve individual welfare. In this paper, we use the recent expansion of health insurance coverage in rural China to quantify the impact of health insurance on child mortality, maternal mortality, and school enrollment. Although the Chinese economy has continued to grow during the past 20 years, many rural residents remain poor and have difficulty obtaining access to health

care when they are sick.¹ To address the problems associated with the lack of health insurance in rural areas,² China initiated the National Cooperative Medical System (NCMS) in 2003, targeting rural residents with large subsidies from central and local governments. Unlike mandatory insurance proposed elsewhere, the NCMS is implemented county-by-county, allowing local governments to decide when to introduce the NCMS, how much premium to charge, and how many benefits to offer. If the county offers the NCMS, a

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¹ China shows an uneven progress against poverty (Ravallion and Chen, 2007). In 2005, China still has 208 million people living below the World Bank's \$1.25-per-day poverty line (Chen and Ravallion, 2008), most of them being rural. According to the 2007 National Statistical Yearbook, rural residents on average spend 5.34% of income on health care and the ratio increases to 10% for the poorest twenty percent. These numbers tend to underestimate the financial burden of health care cost because poor households are often under-treated. There is also a sizable health-expenditure disparity between urban and rural areas, largely due to the increasing gaps in income, health care utilization and local government budget deficit (Liu et al., 1999; Chou and Wang, 2009).

² The old community-based health insurance system broke down when the rural economy shifted away from the collective system in 1978 (Hsiao, 1984). As a result, patients face increased financial burden, reduced access to health care services, and compromised service quality (MOH, 1999).

rural household can choose to enroll in the NCMS for either every household member or none of them. Diffusion of the NCMS has been fast: in 2004, 14% of counties offered NCMS coverage (MOH, 2005); by June 30, 2008, all counties offered the NCMS, covering 91.54% of the rural population.³ A more detailed description of the NCMS can be found in Wagstaff et al. (2009).

In theory, health insurance can affect a household in many ways, ranging from increased health care utilization, better health, and higher productivity, to greater financial resources freed up from medical costs. Our data do not include direct measures of health care utilization, but they allow us to study the effect of the NCMS on mortality of pregnant women and young children at the village level and school enrollment at the individual level.

Mortality and educational outcomes have long been studied as potential consequences of health insurance. For example, the expansion of Medicaid coverage in the US has been shown to improve the mother's prenatal care, reduce infant mortality, and reduce the incidence of low birth weight (Currie and Gruber, 1996a, 1996b); the introduction of the State Children's Health Insurance Program (SCHIP) has been linked to better child health and better school performance (Joyce and Racine, 2005; Levine and Schanzenbach, 2009); and the adoption of nationwide health insurance has reduced the mortality rate of young children in Taiwan (Chou et al., 2011). There is also evidence that health insurance can relieve financial burdens on individual households (Miller et al., 2009), and an increase in financial resources available can boost children's school performance (Morris et al., 2004; Dahl and Lochner, 2005). Several survey articles have reviewed research on the impact of health insurance on health (Levy and Meltzer, 2008) and the impact of child health on educational outcomes in both developed and developing countries (Currie, 2009; Glewwe and Miguel, 2008).

Turning to the effects of the NCMS in particular, the existing evidence is mixed. On the positive side, some studies show that the NCMS reduced illness-related poverty, increased inpatient/outpatient utilization of health services and reduced the rate of non-hospitalization after two weeks of diagnosis (Chen et al., 2005; Yuan et al., 2006; Wagstaff et al., 2009; Wang, 2007; Zhu et al., 2007; Fang et al., 2006; Zhang et al., 2007). Because deliveries constitute a significant fraction of hospitalizations, many studies compare the percent of hospitalized deliveries before and after the NCMS. Cheng et al. (2008) report an increase in the hospitalized delivery rate from 85% to 96.9% in 14 counties of Hubei (2002–2006), from 77.5% to 92.5% in 3 counties of Chongqing (2003–2007), and from 32.43% to 83.24% in the rural area of Qinghai (2002–2007).⁴ Similar increases have been shown in Guangxi (Liao, 2009) and Yunnan (Lu and Li, 2010). These studies find that the NCMS increased the health of women and infants because mortality risk is much lower for hospital delivery than for home delivery.⁵ Two of them also report a significant decline in maternal and birth deaths after the NCMS (Liao, 2009; Lu and Li, 2010). On the negative side, some researchers have expressed concerns that the low reimbursement rate in the NCMS will limit its effectiveness (Zhang et al., 2006; Yi et al., 2009), and that the China Health and Nutrition

Survey lacks evidence of better health care utilization and improved health condition after the adoption of the NCMS (Lei and Lin, 2009).

This paper aims to provide additional evidence regarding the impact of the NCMS, using a large cross-sectional data set from the 2006 China Agriculture Census. Unlike Wagstaff et al. (2009), we do not track individuals before and after the introduction of the NCMS. But our data cover neighboring areas within a poor inland province including four counties that introduced the NCMS at the time of the survey (end of 2006) and four counties that did not introduce the NCMS until 2007. The eight counties are geographically adjacent to each other, belong to the same administrative district, and are similar in demographics, access to health care services, and access to public education. Because the data were collected as a part of the census, our sample includes 5.9 million individuals, 1.4 million households, and 1.4 million school age children across 3977 villages.⁶ The advantage of such a large sample is that it helps capture severe health risks that are small probability events and could have a catastrophic impact on a rural household without health insurance. Furthermore, the high poverty in this area makes it attractive for identifying the impact of the NCMS on a financially vulnerable population.

It is difficult to establish a causal relationship between health insurance and measurable outcomes in observational data because they both may be influenced by unobservable factors. There are two sets of endogenous unobservables that may contaminate the estimation. One is heterogeneous county-level characteristics. For instance, if the NCMS counties are richer and in better fiscal condition, then the population in the NCMS counties could have better health and educational outcomes compared with the population in the non-NCMS counties even without the NCMS. The other set is heterogeneous household-level characteristics. For example, comparing two households residing in the same NCMS county, richer and more health-conscious households may be more likely to take up the insurance.

The classical cross-sectional propensity score matching method focuses on estimating the effect of a treatment program (i.e. the NCMS counties in our context) by comparing the treated individual with an untreated one. The validity of the method relies on the assumption that treated and untreated individuals are similar in unobservables if they are matched on observables (Rosenbaum and Rubin, 1983). To correct the two kinds of selection bias mentioned above, instead of directly estimating the treatment effect of enrolling in the NCMS, we estimate the treatment effect of the NCMS being offered in a county. This is an intent-to-treat analysis.

Specifically, we propose a difference-in-difference (DID) propensity score method using both NCMS and non-NCMS county data, with which we can explore within-county heterogeneity and cross-county difference. The key assumption in classical cross section matching, that individuals matched in observables are similar in the unobservables, can be relaxed when we construct the propensity score to use households in the non-NCMS counties as a control for similar households in the NCMS counties, regardless of the participation status of the households. The heterogeneity within a county allows us to control for the unobservable county specific attributes and thus account for the endogenous introduction of the NCMS county by county. Our method is similar to the DID matching strategy proposed by Heckman et al. (1997) and Heckman et al. (1998). The main difference is that they use longitudinal (or repeated cross-section) data to difference out the time-invariant

³ News release from Guang Ming Daily, written by Ying Zhang, October 22, 2008, accessed at <http://www.hyey.com/Article/zhengcezhuan/xinnonghe/now/xiyue/200810/141630.html> on June 5, 2010. This article cites data source from the Ministry of Health.

⁴ Focusing on one county of Qinghai, Shi (2008) shows that the rate of hospitalized delivery increased from 90.16% in 2004 to 98.67% in 2006.

⁵ According to WHO (2005), most maternal deaths take place in developing countries and the leading causes are haemorrhage (severe bleeding, 25%), infections (15%), and eclampsia (12%). Skilled professional care is essential to save lives at and after birth.

⁶ There are actually 3986 villages in the data but 9 did not provide any village-level information. We deleted them from analysis.

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