Social health insurance: What determines enrolment in the Chinese new rural cooperative medical scheme

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SOCIAL HEALTH INSURANCE: WHAT DETERMINES ENROLMENT IN THE CHINESE NEW RURAL COOPERATIVE MEDICAL SCHEME

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Abstract

This paper assesses the determinants of enrolment in the New Rural Cooperative Medical Scheme (NRCMS), a heavily subsidized voluntary health insurance scheme in rural China. The analyses focus on the relationship between insurance purchase and health facility choice based on data drawn from the China Health and Nutrition Survey (CHNS). The results show that households from villages that reported use of village clinics are more likely to be insured compared with households from villages that reported use of county hospitals. The results indicate that the perception of quality of care is an important factor affecting people's enrolment decisions. The NRCMS is expected to help patients obtain better quality health services from higher-tier of the healthcare system that are unaffordable otherwise. However, given the prevailing fee-for-service payment mechanism for health care, the insurance may also drive up the healthcare cost and direct patients to use more expensive and unnecessary hospital care.

Keywords: social health insurance; China; health facility choice; quality of care

JEL: C21; C31; I11; I13; I18;

1 INTRODUCTION

In recent years, several developing countries have expanded, or are in the process of expanding, social health insurance with the ultimate aim of achieving universal coverage. Health insurance and risk-pooling schemes are commonly considered as desirable ways of enabling households to access health care and reduce potentially large out-of-pocket health expenditure. Many governments in developing countries have established social health insurance schemes for formal sector employees and recently aim to promote tax-funded schemes targeting people working in informal sectors, including farmers, children, students, migrant workers and elderly people without previous employment (Nguyen and Knowles, 2010). For many low- and middle-income countries, the informal sector workers usually comprise a large share of the population, however, reaching these people is considered to be challenging since they do not have formal employer-employee relation that the collection of contributions can be based on. Government organised voluntary schemes are often faced with low demand among the targeted population groups. Therefore, it is important to achieve a better understanding of the factors driving demand for voluntary health insurance in developing countries.

China adopted a government-run mandatory insurance program based on employment in 1998, however, the rest of the population, such as rural farmers and the unemployed urban poor, still remained uninsured. To achieve universal coverage and cover people who were not offered the employer-based insurance program, Chinese government introduced two voluntary schemes from 2003 onwards. The first program was the New Rural Cooperative Medical Scheme (NRCMS), a heavily subsidized voluntary health insurance program introduced in 2003 and aimed to cover more than 800 million people in rural China. In 2007, another voluntary social health insurance program, known as the Urban Resident Basic Medical Insurance (URBMI) scheme, was introduced to target 420 million urban residents who were not covered by the compulsory scheme. Both voluntary programs are heavily subsidized by central and local governments to increase healthcare access for the poor.

This study focuses on the NRCMS, of which several features are typical in the developing country setting. The targeted population of the NRCMS were previously not covered by any other health insurance at all; the insurance premium is heavily subsidized by both central and local governments; the program offers a single plan to everyone living in the same county; the reimbursement varies by different levels of government-sponsored health facilities; and insured patients may be faced with a wide range of barriers to access health care and insurance benefits. Since more than 80 percent of the rural residents were not covered by any health insurance

before the introduction of the NRCMS (Liu and Cao, 1992), the demand for the program was expected to be high, and the generous government subsidies should incentivise poor people to take part in the program. In addition, given the single plan in each county, consumers can only decide whether or not to purchase the NRCMS but not how much to purchase.

The main network for the provision of health services in rural China consists of primary care facilities, including village clinics and township health centres, and specialised county hospitals. Although most facilities are publicly owned, they rely heavily on revenues from drug sales and service charges to cover the difference between operational cost and budget allocation from governments (Liu, 2004). Following the market-oriented healthcare reform in the 1980s, the decentralized fiscal system and the commercialisation of healthcare providers have led to various problems, such as lack of funding and supervision for public health facilities and overuse of high-tech diagnostics and expensive drugs (Duckett et al., 2016, Wong et al., 2017). Most of the negative impact fall on primary care facilities, resulting in inadequate funding, poor infrastructure, lack of well-trained clinicians and doctors and low quality of care at primary care level (Liu et al., 2011). At the same time, patients have developed a well-founded distrust towards the quality of care provided by facilities at lower-tier of the healthcare system and prefer to use hospital services even for minor conditions (Duckett et al., 2016, Eggleston, 2012). Therefore, facility choice is considered to be an important factor in affecting health insurance enrolment decisions since the insurance will appear attractive by improving patients' access to better quality health services from higher-level hospitals that are unaffordable otherwise.

China has achieved impressive insurance coverage in recent years, and the NRCMS covered more than 95 percent of rural residents in 2010. A better understanding of the determinants of insurance enrolment is beneficial for policy makers in China and other developing countries to figure out the mechanism underlying the take-up decision for social health insurance. This paper starts with the comparison of villages with and without the NRCMS, in terms of population density, economic activity, access to infrastructure and social services. It then examines factors affecting household enrolment in the scheme among villages where the NRCMS was already operating, with a particular focus on whether facility choice is a significant determinant of enrolment. Facility choice reflects people's perceptions about the price and quality of health services covered and uncovered by the insurance program. To avoid unobserved heterogeneity across households, facility choice reported at village level is used as the main independent variable. The results show that households of villages that reported use of village clinics are significantly more likely to be enrolled than households of villages that

reported use of county hospitals. Possible reasons may be related with people's perception of poor quality of care provided by village clinics and their desire to obtain better services from higher-level health facilities with insurance reimbursement. However, potential issues may also arise if the insurance leads to increased use of expensive and unnecessary hospital care, while more cost-effective care can be obtained from primary care facilities.

2 BACKGROUND

Since the transition from a closed centralized planned economy to a market economy in 1978 in China, there was a reduced reliance on general tax revenues for the funding of health services. The existing community-based rural health insurance program collapsed in most areas and the health insurance coverage rate dropped dramatically from 90 percent in 1980 to 5 percent in 1985 (Liu and Cao, 1992). Since then, most rural residents have remained uninsured. By the end of 2002, around 80 percent of the rural population did not have any health insurance, and 30 percent of patients could not afford hospitalization when they needed (Wagstaff, 2009).

To improve the access to health services for rural residents, the government introduced the NRCMS in 2003, which initially covered only 10 percent of rural counties in China (Sun et al., 2009). The placement of the pilot program was based on a set of criteria, such as local interest and capacity, development of economic status and healthcare delivery systems. By the end of 2008, the insurance was introduced nationally. All rural residents are eligible for the program and nobody can be rejected based on health status or other considerations.

The NRCMS operates at the county level, and local governments have a degree of autonomy over premium levels. The central government only formulates the lower limit on individual contributions, and each county office decides on the premium for its own county within the national range (Liu and Tsegai, 2011). The insurance is financed through both household contributions and government subsidies. At its initial year in 2003, the annual premium was 30 RMB (US$3.62) per person, with 20 RMB (US$2.42) from central and local governments, and 10 RMB (US$1.21) from households (Ministry of Health et al., 2003). Over time, governments gradually increased the subsidies into the program. By 2017, the annual premium increased to 630 RMB (US$93.2) per person, with 450 RMB (US$66.6) from central and local governments, and 180 RMB (US$26.6) from households (Ministry of Health et al., 2012). The premiums are not risk-rated at the individual level, and all insured individuals within the same county are offered the same premium level.

The benefit package of the NRCMS varies across counties and over time according to local resources and priorities. County governments have the authority to define local policy details, such as services covered and reimbursement rates. In most counties, the program refunds a fraction of inpatient care to patients, but not all counties cover outpatient services. The reimbursement rules are usually subjected to a combination of deductibles, co-payment, ceilings, and essential medicine and medical service lists to control for healthcare expenditure (Sun et al., 2009). The reimbursement rates are set at a higher level for health services delivered in lower-level facilities, creating incentives for rural patients to seek care from primary care facilities first and only go to secondary and tertiary care if needed (Li et al., 2017).

On the supply side, there has been increasing government investment to strengthen the infrastructure and human resources for primary care facilities since 2009, with the aim of improving the access, affordability and quality of primary care (Yip et al., 2012). Rural China's healthcare system consists of three tiers: village clinics, township health centres and county (and higher level) hospitals. Village clinics and township health centres form the base of the system and offer basic health services along with disease prevention and health promotion, while county hospitals provide the most specialized inpatient and outpatient medical care (Xing et al., 2015). Of these three tiers, county hospitals are usually perceived to offer the highest quality services since they are staffed by physicians and nurses with at least four or five years of medical school training at college level. In contrast, the majority of the village doctors had no more than a high school education and receive little supervision and professional training (Eggleston et al., 2006). Since most village doctors are private practitioners and substantially underpaid, it is very difficult to attract and retain skilled personnel, especially in less developed regions of China (Hew, 2006). These underlying problems are the main reasons behind the perception of poor quality of primary care in China. Since so far the government has put more emphasis on increasing the quantity rather than quality of primary care, the substantial gap in the quality of care delivered by primary care facilities and secondary or tertiary hospitals still exists (Wong et al., 2017). The quality issue is further compounded by the preference of general public towards 'high tech' and specialist hospital care (Duckett et al., 2016, Eggleston, 2012). According to a survey conducted among rural villagers in three provinces in China, about 30 percent of villagers rated quality of care provided by village clinics as poor or very poor, while only 10-20 percent of villagers rated the same for township health centres and less than 5 percent for county hospitals (Ratigan, 2015). The difference in quality perception appeared particularly pronounced in poor provinces due to the lack of funding from local governments (Ratigan, 2015). In the absence of a well-functioning referral system, patients

tend to bypass primary care facilities and go directly to higher level hospitals even for minor conditions, which may lead to healthcare cost escalation (Fe et al., 2016).

3 LITERATURE REVIEW

There is not much evidence on the demand for social health insurance in rural China. Wang et al. (2006) and Zhang and Wang (2008) find that individuals with worse health status are more likely to enrol in the community-based health insurance in rural China. Adverse selection mainly occurs in partially enrolled households (Wang et al., 2006), and the magnitude remains similar over time (Zhang and Wang, 2008). Zhang et al. (2006) also find that social capital, as measured by reciprocity and trust indices, is significantly and positively associated with the willingness-to-join the insurance. However, all the three studies above analyse the demand for Rural Mutual Health Care (RMHC), an experimental scheme only introduced in Fengshan township (with a population size of around 37,000) in Guizhou province (the poorest province in China) in 2002. Therefore, their results may not be readily generalised to the rest of rural areas. More recently, Liu et al. (2014) examine the enrolment in the NRCMS based on a large-scale dataset - China Health and Nutrition Survey (CHNS) and find that the demand for health insurance is affected by the insurance decisions of co-villagers through social learning. However, the paper only focuses on the impact of social learning and does not discuss other factors affecting demand. This study should be the first one so far to investigate the relationship between health facility choice and enrolment decisions of a social health insurance scheme in the context of a developing country. Facility choice is important in modelling the demand for the NRCMS because it reflects the expected benefits of the insurance given various price and quality levels across different levels of health facilities. There are a few relevant studies that discuss about the importance of quality perception in preventing people from obtaining benefits from health insurance in Vietnam and Lao PDR, suggesting that people tend to give up the insurance benefits if they perceive health services covered by the schemes to be of inferior quality (Alkenbrack et al., 2013, Nguyen and Knowles, 2010, Sepehri et al., 2009).

4 DATA AND METHODOLOGY

4.1 CHINA HEALTH AND NUTRITION SURVEY (CHNS)

The data used in this study are drawn from the China Health and Nutrition Survey (CHNS), a large-scale longitudinal dataset on Chinese households and their surrounding communities. The sample was selected from nine provinces across the eastern, middle and western regions of China, which consist of approximately 56 percent of the total Chinese population (Jones-Smith and Popkin, 2010). Four counties in each province were selected based on the stratification by income, and communities within the counties and households within the communities were randomly selected. Data were collected in 1989, 1991, 1993, 1997, 2000, 2004, 2006, 2009 and 2011. There are individual, household and community-level surveys, with detailed information on healthcare utilization, socioeconomic and demographic characteristics, health insurance, health facilities and social services.

The study sample only includes people who live in rural areas and hold rural registration status (*Hukou*). The village-level analyses are conducted among both NRCMS and non-NRCMS villages in 2004 and 2006, before the insurance was rolled out nationally. The household-level analyses include households living in villages where the NRCMS was introduced and were not covered by any other health insurance scheme. Although the survey question on insurance enrolment status did not distinguish between the old Cooperative Medical Scheme (CMS) and the NRCMS before 2009, the community heads or health workers reported the introduction dates of the insurance in the villages. Since the NRCMS was first introduced in 2003, villages that started the insurance in 2003 or later should be considered as NRCMS villages. To avoid inconsistency in the NRCMS status reported by community health workers across years, if a village is identified as an NRCMS village in one wave, it remains to be covered by the insurance in all the following waves. The household-level analyses take use of 4 waves of data from 2004 to 2011, and the insurance was rolled-out step-by-step across the country in waves 2004 and 2006. There were 6 NRCMS villages out of 136 villages in total in 2004, while the number increased to 46 in wave 2006. In waves 2009 and 2011, the majority of the rural villages were already covered by the NRCMS.

The attrition rate of households from 2004 to 2011 is relatively high. No individual appeared in all four waves. There were 3,162 individuals who appeared in three waves, 5,894 in two waves, and 3,875 in only one wave. The analysis sample only includes individuals who appeared in more than one wave. Sensitivity tests are conducted by limiting the sample among people who show in three waves and two waves, respectively, and the results remain similar[1].

[1] Results are available upon request.

4.2 FACTORS ASSOCIATED WITH INSURANCE AVAILABILITY IN THE VILLAGE

The determinants of demand for the NRCMS may not generalize to the entire population if the availability of insurance is systematically selective. For example, the high enrolment rates in pilot regions may not be easily achieved in other areas if the pilot regions have easier access to health facilities, better quality health services or higher socioeconomic status. Therefore, it is important to investigate whether the availability of the NRCMS is correlated with factors that might affect household demand for the insurance. Following the method developed by Jones-Smith and Popkin (2010), Table 1 compares villages with and without the NRCMS across 12 domains that reflect the urbanicity level of the villages. These 12 domains include population density, economic activities, traditional/modern markets, transportation infrastructure, sanitation facilities, communications, housing, education, diversity, health infrastructure and social services. Villages with access to urban social health insurance schemes are excluded since they might be suburbs of the cities, and are usually more developed and urbanized compared with the rest of rural villages. The variables used for the urbanicity scale are derived from individual, household and community-level surveys. Each of the 12 domains is scored from 1 to 10 and added up to be the urbanicity scale. Higher scale scores indicate higher levels of urbanization. According to Table 1, the villages that introduced the insurance in 2004 appear similar with those that did not, while in 2006 the villages without the insurance seem to be more urbanized, in terms of economic activities, access to modern markets and social services.[2]

[*Table 1 about here*]

4.3 HOUSEHOLD DEMAND FOR THE NRCMS

Since participation in the NRCMS is on a household basis, all household members are treated as insured if the household head is reported as enrolled. The dependent variable is thus defined as a binary indicator of the NRCMS household membership and the unit of analysis is at household level. As previously noted, the survey makes no distinction between the old and new schemes before 2009, so the insured households living in the NRCMS villages in waves 2004 and 2006 are assumed to be covered by the NRCMS (Liu et al., 2014). The insurance take-up rates among the NRCMS villages are quite high, with an average of 80 percent in 2004, 74 percent in 2006, 94 percent in 2009 and 96 percent in 2011.

[2] According to Table 1, there are 136 villages in the 2004 sample and 77 villages in the 2006 sample. 60 villages were dropped from 2004 to 2006, while one new village was added. The attrition rate of villages from 2004 to 2006 is high.

The main independent variable is health facility choice, which is used as a proxy for the observed wide variation in the price and quality of health services received by patients. To overcome the unobserved heterogeneity across households, facility choice is captured at village level rather than at household level. The survey question is answered by village health workers and is formulated as follows "When residents in this village need health services, which health facilities can they use?" Respondents can select more than one category from fourteen types of health facilities in total. Five dummies are constructed for village clinics, township health centres, county hospitals, city hospitals and other types of health facilities, respectively. The reference category is the use of county hospitals, which is omitted from the model.

Some may argue that the causality between health facility choice and insurance enrolment may run in both directions. Since the facility choice variables are defined at village level, it captures an average villager's perception of ability to use different types of health facilities and helps to reduce some omitted variable bias related with the unobserved health needs at household level. However, simultaneous causality may still exist if the households choose their residence on the basis of their willingness-tojoin the NRCMS. In principle, one can identify the causal effect of facility choice on insurance enrolment if there is a valid instrumental variable (IV) that is correlated with facility choice but not with insurance enrolment conditional on all other covariates. However, finding an appropriate IV seems challenging here since any variable that has an impact on facility choice may also have a potential influence on insurance enrolment. The validity of IV remains questionable.

The analyses use the following model to estimate the demand for the NRCMS:

$$I_i^* = \beta' C_i + \gamma' X_i + \varepsilon_i \ , \quad \begin{cases} I_i = 1 \text{ if } I_i^* > 0; \\ I_i = 0 \text{ otherwise} \end{cases} \tag{1}$$

where I_i^* is a continuous and latent variable measuring the net benefits of the NRCMS, I_i is the observed insurance coverage, C_i denotes the vector of facility choice dummies, X_i includes a number of household characteristics, β and γ are vectors of coefficients, ε_i measures unobserved factors.

The variables included in X_i can be broadly classified into two groups: household head characteristics including gender, ethnicity, marital status, age, education level (illiterate, finished primary school, junior high school or senior high school and above), occupation (farmers and others), the presence of major diseases (hypertension, diabetes, heart disease, stroke and asthma) and health risk preference (overweight, smoking and daily alcohol drinker); and other household-level characteristics including household size, geographic regions (east, middle or western provinces), age distribution (percentage of household members less than 18 years old,

percentage of household members older than 55 years old), household income, asset index and percentage of household members with major diseases. To account for the potential reverse impact of insurance take-up on household income and health risk preference, these variables are lagged by one survey period.

The analyses begin with a simple logit model containing only health facility choice dummies. To lessen the chance that omitted variables are driving the correlation between insurance and facility choice, the model subsequently adds demographics, age, income, education levels, health status and risk preference. The most comprehensive model also controls for time trend and county fixed effects.

5 RESULTS:

5.1 DESCRIPTIVE STATISTICS

Table 2 presents the summary statistics for independent variables by insurance status from 2004 to 2011. The heads of the insured households tend to be older people who are married, and belong to ethnic minority groups. There is some evidence of adverse selection at household level since insured households tend to have a higher proportion of members who are elderly, overweight and have major diseases. The NRCMS may lower their costs in ill health states and make them take fewer precautions or invest less in preventive measures. The insured also tend to earn higher levels of income, possess more assets and live in eastern and middle provinces.

[*Table 2 about here*]

5.2 ESTIMATION RESULTS

Table 3 presents the marginal effects of health facility choice on insurance enrolment by subsequently adding different sets of independent variables to test the robustness of the results. Each column of the table represents a separate logit.

Model 1 uses only the facility choice dummies, and five parameters are estimated including the intercept. There is a significant positive relationship between the use of other types of health facilities and insurance enrolment. However, it is difficult to draw any meaningful conclusions from the significant results since the other types include both private and government-sponsored health facilities, such as private clinics, district hospitals, army hospitals etc.

In Model 2, a set of six demographic variables are added to the model. These variables include information on gender, household size, ethnicity, marital status and regions. The relationship between the use of village clinics and insurance purchase increased slightly, and the coefficient becomes significant at 10 percent level. Model 3 adds three age-related variables: age of the household head and proportions of household members under 18 years old or above 55 years old. The relationship between the facility choice and insurance enrolment is not much affected.

Model 4 includes two variables representing household income and wealth level. The relationship between the choice of village clinics and the probability of getting insurance becomes significant at 1 percent level. Residents in villages that use village clinics are 3 percent more likely to be covered by the NRCMS compared with residents in villages that use county hospitals. In Models 5 and 6, after the addition of three variables on education and one variable on occupation, the relationship between the use of village clinics and insurance still remains robust.

Model 7 includes two health variables (presence of chronic conditions of household head, proportion of household members with chronic diseases), and Model 8 adds risk-related health behaviours of the household head (overweight, smoking and alcohol drinking). Both the magnitude and significance of the correlation between the use of village clinics and insurance enrolment stay the same. Time trend and county fixed effects are further controlled in Models 9 and 10. Given that the insurance package differs over time and geographically, these variables should explain the majority of the correlation between facility choice and insurance. In fact, including these variables largely reduces the relationship between the use of village clinics and the insurance, but the coefficient still remains significant at 10 percent level. People in villages that reported use of village clinics are 1 percentage point more likely to have insurance compared with those from villages that reported use of county hospitals. Together, these results present a consistent picture. There is a positive and significant relationship between the use of village clinics and insurance enrolment. The correlation remains significant and robust across most of the models.

[*Table 3 about here*]

6 DISCUSSION AND CONCLUSION

This paper investigates the determinants of the NRCMS participation, with a focus on the relationship between health facility choice and insurance enrolment. At village level, the scheme has been successfully piloted in less urbanized areas, with poorer access to local and social services. At household level, households of villages that reported use of village clinics are more likely to enrol in the NRCMS compared with households of villages that reported use of county hospitals. While there is a lack of exogenous sources of variation in facility choice to make causal claims, the correlation appears robust to a larger number of additional controls. In addition, reverse causality should not be a problem since households who are more likely to get the insurance would not move to villages with better access to village clinics, given that almost half of the village clinics are not covered by the NRCMS. Further sensitivity analyses are also conducted to explore whether the pre-existing health facility use at village level in 2000 correlates with the household insurance enrolment from 2004 to 2011. Results indicate a statistically significant relationship between the use of village clinics and insurance enrolment, with similar magnitudes as the coefficients presented in Table 3.[3] Therefore, it is plausible to interpret the associations as showing the preference towards village clinics to affect insurance enrolment rather than the reverse. It is also worth noting that the insurance enrolment should not be driven by the variations in insurance benefit packages across counties because the last model has controlled for county fixed effects given that benefit packages are defined at county level.

The results may indicate that the perception of quality of care is an important factor influencing the enrolment in the NRCMS. Those who use village clinics are more likely to enrol in the insurance since they expect to obtain better quality services from township health centres and county hospitals with insurance reimbursement. The impact of quality perception on enrolment in social health insurance is also found in Lao PDR and Vietnam, where people who perceive quality of care covered by the insurance to be poor are less likely to get enrolled or tend to give up insurance benefits (Alkenbrack et al., 2013, Nguyen and Knowles, 2010, Sepehri et al., 2009). In China, the healthcare delivery system is dominated by government-sponsored hospitals, and primary care facilities are largely lagged behind the development of hospitals due to the lack of funding and resources. Previous literature has found substantial gaps in the quality of healthcare between primary care facilities and hospitals, in terms of the management of chronic diseases (Li et al., 2017), treatment errors (Sylvia et al., 2014) and overuse of antibiotics (Yin et al., 2013) and injections (Liu et al., 2015a, Yang et al., 2014). In addition, most patients have an unrealistic expectation towards specialised hospital care, and their sceptics about the quality of primary care are not necessarily related with the true quality level (Fe et al. 2016). Patients tend to

[3] Results are available upon request.

seek care at secondary or tertiary hospitals even for minor diseases as long as they can afford the services, rather than making use of primary care that may better suit their health needs (Bhattacharyya et al., 2011, Yang and Yang, 2009, Yip and Hsiao, 2014). Since the referral system is almost absent in rural China, people can choose whichever level of health facilities they can afford. The low quality of care and patients' long-standing distrust towards primary care services make the insurance attractive among people who use village clinics. Therefore, improving quality of care at primary care level and encouraging patients to seek appropriate care from low-level facilities is crucial for the successful implementation of the NRCMS. If the insurance enrolment is associated with greater use of hospital services, it can threaten the sustainability and financial viability of the NRCMS scheme.

Another key finding is that the incentives to enrol in the NRCMS for people who use township health centres and county hospitals are less strong than those who use village clinics. On the face of it, the finding seems to contradict insurance policy since almost half of the village clinics are not government-run and therefore not covered by the NRCMS while township health centres and county hospitals are almost always well-covered (Li et al., 2017). However, it is important to note that the co-payments are still high at the point of care under the NRCMS, due to its low reimbursement levels and limited scope of covered services. In addition, since the payments for doctors usually depend on revenues they generate within the hospital, this creates perverse incentives for them to over-prescribe drugs and tests for patients, especially the insured ones with better ability to pay (Lu, 2014). Most drugs sold in hospital pharmacies are charged at a higher profit margin than the wholesale price, and pharmaceutical companies may even offer doctors kickbacks from selling their drugs (Tam, 2011, Yip and Hsiao, 2009). Despite the recent introduction of zero drug mark-up policy, some health facilities have developed adaptive strategies by seeking new sources of revenue, such as an increased use of inpatient care (Yi et al., 2015). All these factors may contribute to an inefficient healthcare delivery system and drive up the cost of health care for insured patients. Policy approaches to address the distorted behaviour among health providers mainly include provider payment reforms that aim to delink income of health facilities from drug sales or service charges and encourage high-quality clinical care. These approaches can be considered as an extension of the quality improvement efforts discussed earlier from primary care to specialised hospital care.

The NRCMS has achieved near universal coverage by 2011, however, this is mainly due to the programmatic strategy that led to wide but shallow coverage (Yu, 2015). Governments are still faced various challenges of maintaining the attractiveness of the insurance in the long run, and thus it is important to understand the

mechanism underlying the NRCMS take-up decision. The lessons learned here could also be of interest to governments in other developing countries to achieve universal coverage through social health insurance, especially in low-capacity setting where quality of care becomes an issue. In settings where resources are limited, governments need to strategically plan how to efficiently distribute the health spending according to the specific health needs of their targeted population. Various options are available, including increasing insurance reimbursement rates, extending coverage to outpatient services, investing in the infrastructure and workforce at primary care level and implementing provider reforms to reduce supply-induced demand for unnecessary care. Policy makers should not only focus on increasing government subsidies in financing the insurance, but need to address the structural problems of the healthcare delivery system as well, such as low quality of care at primary care level and distorted providers' behaviour to over-prescribe drugs and services. These problems may increase the overall health expenditure and lead the health system to a vicious cycle of health cost escalation in response to increased government funding into the insurance scheme (Yang and Wu, 2017). Thus, strengthening health system at grass-root level and launching pilot reform of incentive structures in public hospitals are more pressing in the coming years (Yip and Hsiao, 2008). Both tasks have already been incorporated as major targets in the government action plan issued in 2009 (Chen, 2009). Nevertheless, there is little evidence that has shown significant progress of these policies toward their objectives. Recent studies still identified these issues as the main challenges in the current healthcare system (Li et al., 2017, Liu et al., 2015b, Wang et al., 2014, Yang and Wu, 2017, Yip and Hsiao, 2014). In addition, the system does not routinely collect data on quality of care and therefore fails to monitor the progress of quality improvement efforts at different levels of health facilities (Li et al., 2017). Finally, it is important to integrate village clinics and town hospitals in the healthcare delivery model and let them take on a gate-keeping role to higher-tier hospitals and provide primary care services for the rural population (Liu et al., 2011). A well-established referral system is essential to link the primary care, secondary and tertiary care providers and help to direct patients to use the most appropriate services and reduce the cost burden arising from inappropriate use of expensive hospital services.

Future research on the potential impact of the NRCMS on patients' treatment-seeking behaviour is underway in which it will be possible to see whether the insured patients will switch to high-level hospitals to obtain better quality of care. Given the lack of empirical evidence on people's care-seeking pattern, the findings would provide useful insights for policy makers on whether the insurance would lead to cost escalation.

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Table 1: Insurance availability at village level in 2004 and 2006

	2004				2006			
	Non-NRCMS	NRCMS	Difference	P-value	Non-NRCMS	NRCMS	Difference	P-value
Urbanicity scale (overall)	54.50	56.08	-1.58	0.83	52.49	46.75	5.74	0.08*
Population density	5.60	5.42	0.18	0.75	5.73	5.22	0.51	0.12
Economic activities	4.97	6.42	-1.45	0.24	5.54	4.25	1.29	0.04**
Traditional markets	4.30	1.58	2.72	0.09	3.03	1.94	1.09	0.13
Modern markets	3.76	6.33	-2.57	0.04**	3.71	2.49	1.22	0.04**
Transportation infrastructure	5.60	3.89	1.71	0.11	4.95	5.83	-0.89	0.12
Sanitation	5.51	7.48	-1.97	0.10	4.75	4.58	0.18	0.75
Communications	5.22	5.99	-0.77	0.17	5.65	5.31	0.34	0.25
Housing	5.63	6.58	-0.95	0.32	5.41	5.16	0.25	0.57
Education	2.96	3.19	-0.24	0.60	2.86	2.61	0.26	0.22
Diversity	4.26	4.25	0.01	0.98	4.54	4.39	0.15	0.49
Health infrastructure	4.41	3.70	0.71	0.39	4.15	3.49	0.66	0.16
Social services	2.27	1.25	1.02	0.23	2.18	1.49	0.68	0.03**
Number of villages	130	6			31	46		

Notes: [a] * indicates statistical significant at 10% level. ** indicates statistical significant at 5% level. [b] All the variables are defined at village level. [c] The following definitions of the 12 domains are based on Jones-Smith and Popkin (2010). (1) Population density: total population of the village divided by village area; (2) Economic activities: daily wage of an ordinary male worker (RMB), proportion of workforce engaged in non-agricultural work; (3) Traditional markets: Distance to and opening hours of the free markets nearby; (4) Modern markets: number of supermarkets in the village, number of modern markets (cafes, internet cafes, indoor restaurants, outdoor fixed and mobile eateries, bakeries, ice cream vendors, fruit and vegetable stores and vendors, bars) in the village; (5) Transportation infrastructure: type of the most commonly used roads in or around the village, distance to the nearest bus stop, distance to the nearest train station; (6) Sanitation: proportion of households with treated water, proportion of households without excreta present outside the home; (7) Communications: availability of cinema, daily newspaper, postal service, telephone service in the village, percent of households with a computer, television or mobile phone; (8) Housing: average number of days a week that electricity is available in the village, percent of households in the village with indoor tap water, percent of households in the village with flush toilets, percent of households in the village with gas cooker; (9) Education: average education level among adults older than 21 years old; (10) Diversity: variation in village education level, variation in village income level; (11) Health infrastructure: number and types of health facilities/pharmacies in or near the village (<12km); (12) Social services: provision of preschool for children under 3 years old and availability of commercial medical insurance, free medical insurance and insurance for women and children. . Notice that the availability of NRCMS is not included here.

Table 2: Summary statistics of independent variables by insurance status

Variables	Non-NRCMS	NRCMS	Difference	P-value
Facility choice at village level				
Village clinics	0.70	0.70	0.00	0.99
Township health centre	0.68	0.69	-0.01	0.46
County hospitals[+]	0.45	0.43	0.01	0.47
City hospitals	0.07	0.09	-0.01	0.09
Other types of health facilities	0.21	0.30	-0.09	0.00***
Household head characteristics				
Female	0.19	0.16	0.03	0.03*
Minorities	0.13	0.16	-0.03	0.01**
Married	0.84	0.88	-0.05	0.00***
Age	50.67	52.45	-1.78	0.00***
Illiterate[+]	0.26	0.27	-0.00	0.85
Finished primary school	0.30	0.27	0.03	0.06
Finished junior high school	0.32	0.35	-0.03	0.06
Finished senior high school and above	0.12	0.11	0.00	0.65
Farmer	0.54	0.52	0.02	0.18
Presence of major diseases	0.14	0.17	-0.03	0.01**
Overweight	0.65	0.72	-0.07	0.00***
Smoking	0.62	0.61	0.01	0.37
Daily alcohol drinker	0.23	0.22	0.01	0.65
Household-level characteristics				
Household size	4.36	4.13	0.23	0.00***
East region	0.22	0.26	-0.03	0.01*
Middle region	0.43	0.45	-0.01	0.36
West region[+]	0.31	0.24	0.07	0.00***
Percentage of household members less than 18 years old	0.20	0.16	0.04	0.00***
Percentage of household members older than 55 years old	0.22	0.26	-0.04	0.00***
Household income	9.57	9.87	-0.30	0.00***
Asset index	1.41	1.54	-0.13	0.00***
Percentage of household members with major diseases	0.07	0.10	-0.03	0.00***
N	1111	11793		

Notes: [a] Variable names with [+] are omitted in the regressions as a reference category. [b] * indicates statistical significant at 10% level. ** indicates statistical significant at 5% level. *** indicates statistical significant at 1% level.

Table 3: The demand for the NRCMS based on logit regressions from 2004 to 2011: marginal effects of facility choice on insurance enrolment

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
Village clinics	0.01	0.02*	0.02*	0.03***	0.03***	0.03***	0.03***	0.03***	0.02**	0.01*
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Township health centres	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
City hospitals	0.01	0.02	0.02	0.02	0.01	0.01	0.01	0.01	-0.00	-0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Other types of health facilities	0.04***	0.05***	0.04***	0.05***	0.05***	0.05***	0.05***	0.05***	0.02***	0.02***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Female		0.01	0.01	-0.00	-0.00	-0.00	-0.00	-0.01	-0.01	-0.00
		(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Household size		-0.01**	-0.00	0.00	0.00	0.00	0.00	0.00	-0.00	-0.00
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Minorities		0.03**	0.03**	0.03**	0.03**	0.03**	0.03**	0.03**	0.02**	0.01
		(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Married		0.03***	0.04***	0.02**	0.02**	0.02**	0.02**	0.02**	0.02**	0.02**
		(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
East region		0.03***	0.02**	0.04***	0.04***	0.04***	0.04***	0.04***	0.04***	0.09***
		(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)
Middle region		0.02**	0.02**	0.04***	0.04***	0.04***	0.04***	0.03***	0.03***	0.04**
		(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)
Age			0.00	0.00	0.00	0.00	0.00	0.00	-0.00	-0.00
			(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Percentage of household members less than 18 years old			-0.05**	-0.02	-0.02	-0.02	-0.02	-0.02	0.00	-0.00
			(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)
Percentage of household members older than 55 years old			0.00	0.02	0.02	0.02	0.01	0.02	0.01	0.01
			(0.02)	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)	(0.01)
Household income (lagged)				0.00	0.00	0.00	0.00	0.00	-0.00	-0.00
				(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Asset index (lagged)				0.05***	0.05***	0.05***	0.05***	0.05***	0.02***	0.01**
				(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)
Finished primary school					-0.02	-0.02	-0.02	-0.02*	-0.02**	-0.01
					(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Finished junior high school					-0.01	-0.01	-0.01	-0.01	-0.01	-0.00
					(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Finished senior high school and above					-0.02	-0.02	-0.02	-0.01	-0.00	-0.00
					(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Farmer						0.00	0.00	0.01	0.00	0.00
						(0.01)	(0.01)	(0.01)	(0.01)	(0.00)
Presence of major diseases							-0.00	-0.00	-0.01	-0.01
							(0.01)	(0.01)	(0.01)	(0.01)
Percentage of household members with major diseases							0.02	0.01	-0.00	0.01
							(0.03)	(0.02)	(0.02)	(0.02)
Overweight (lagged)								0.02**	0.01	0.01**
								(0.01)	(0.01)	(0.00)
Smoking (lagged)								-0.02***	-0.01*	-0.01*
								(0.01)	(0.01)	(0.00)
Daily alcohol drinker (lagged)								-0.01	-0.00	0.00
								(0.01)	(0.01)	(0.00)
Time trend									0.05***	0.05***
									(0.00)	(0.00)
County fixed effects	No	No	No	No	No	No	No	No	No	Yes

Log likelihood	-3761.38	-3425.33	-3411.84	-2484.11	-2480.15	-2479.87	-2479.11	-2417.80	-2176.83	-1963.81
No. Parameters	4	10	13	15	18	19	21	24	25	61
No. Observations	12904	12165	12164	9925	9921	9921	9921	9784	9784	9471
pseudo R^2	0.007	0.017	0.020	0.046	0.047	0.047	0.047	0.054	0.148	0.224

Notes: [a] Robust standard errors clustered at household level in brackets. * indicates statistical significant at the 10% level. ** indicates statistical significant at the 5% level. *** indicates statistical significant at the 1% level.

Highlights

- This paper assesses the relationship between insurance purchase and health facility choice.
- The analysis uses data from the China Health and Nutrition Survey.
- People's insurance enrolment decisions depend on their health facility choice.
- Improving quality of care may help to achieve universal health insurance coverage.
- The study may help to expand insurance coverage in other developing countries.