Does Participating in Health Insurance Benefit the Migrant Workers in China? An Empirical Investigation

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Abstract:

Rural-to-urban migrant workers are an under-represented group in China's health insurance system, and the status of their health and healthcare utilization draws increasing attention in recent years. This paper uses the 2007-2010 State Council URBMI Household Survey data to evaluate the efficacy of major health insurance platforms on solving the "difficult and expensive care" problem among the migrant workers. We apply the 3A (Accessibility, Affordability & Appropriateness) framework to answer three main questions: does participating in the health insurance programs help to alleviate migrant workers' financial burden of healthcare? Does it provide better access to formal healthcare? Does it ultimately improve their health status? After controlling for the endogeneity of insurance participation, our results indicate that the Urban Employee Basic Medical Insurance (UEBMI) and the New Rural Cooperative Medical Scheme (NRCMS) are effective in lowering the out-of-pocket outpatient costs, increasing the number of physical exams, and improving the self-rated health for the migrant workers, while the Urban Resident Basic Medical Insurance (URBMI) and the commercial health insurance show significant benefit in boosting the health awareness and preventive care utilization. However, due to the lack of systematic financing scheme for outpatient care and the segmentation between insurance programs, the current policies have not effectively addressed the problem of self-medication and under-utilization among the migrant workers. Our study shows potential directions for improvement for each insurance scheme, and provides policy implications on serving the migrant workers' healthcare needs within China's basic medical insurance system.

Keywords:

Urban Employee Basic Medical Insurance (UEBMI); Urban Resident Basic Medical Insurance (URBMI); New Rural Cooperative Medical Scheme (NRCMS); Migrant Workers

JEL classification:

I10, I18, J61

1. Introduction

Medical insurance is an important component of a nation's social security system, and is considered an essential instrument to ensure equal access to medical resources and to promote population health (Chena, et al, 2007). One of the primary goals of the current healthcare reforms in China is to establish a universal medical insurance system to cover its urban and rural populations. Since the 1980s, China has gradually established a new basic medical insurance system in the rural and urban areas financed by individual contribution and government subsidies. The major types of insurance include the Urban Employee Basic Medical Insurance (UEBMI) that covers urban formal sector employees, the New Rural Cooperative Medical Scheme (NRCMS) that insures the large rural population, and the Urban Resident Basic Medical Insurance (URBMI) that targets on the urban workers in the informal sectors and the urban residents without employment. These health insurance programs are administered by different government agencies such as the Ministry of Health (MOH) or the Ministry of Human Resources and Social Security (MHRSS). In particular, the NRCMS program differs from the other urban based insurance programs in terms of eligibility, administration and financing schemes. As a result, China's medical insurance system features an "urban-rural duality", in which the large population of rural-to-urban migrant workers is caught in the gap, leading to increasing concerns of whether this unique group has benefited from the recent expansion in insurance coverage.

Since the 1980's, with the loosened migration restrictions (*hukou* system) and a sizeable income gap between the urban and rural areas, more and more rural labor force chose to enter the cities for employment opportunities, and a labor migration of unforeseen scale occurred in China. Based on the census data, the estimated size of migrant workers in 1990 is 20 million, in 1995 the estimate becomes 45 million, and in 2000 the number increased to 79 million. More recent data published by the National Bureau of Statistics (NBS) indicate that the number of migrant workers grew to 242 million in 2010. Currently, migrant workers have become an important part of China's labor market with a significant impact on the country's economic growth and social stability. However, migrant workers' health status and health care utilization behavior have been paid less attention by the policy makers. Some studies show that migrant workers are plagued with low participation in health insurance and inadequate utilization of medical care, making their

health status a major concern for the society (Song, 2010; Liang et al., 2010). After 2003, with the establishment of a new basic medical insurance system, most rural-to-urban migrant workers became qualified for one or more insurance schemes, including UEBMI, URBMI, NRCMS, commercial insurance, and other local insurance programs. However, robust evidence has not been established on whether these insurance schemes effectively solve the "difficult and expensive care" (*kan bing nan, kan bing gui*) problem among migrant workers.

This paper aims to bridge the gap in literature by evaluating the efficacy of the current health insurance system using the 2007-2010 nationally representative State Council URBMI Household Survey data. To the best of our knowledge, it is among the first attempts to systematically estimate the impact of the current insurance schemes on the health and healthcare utilization of China's migrant worker population. We apply the 3A (Accessibility, Affordability and Appropriateness) evaluation framework in health economics to assess whether participating in health insurance programs promotes migrant workers' use of medical services, reduce the financial burden of medical care, and improve their health. Compared with the existing studies that focus on a single scheme or outcome, the comprehensive scope of our assessment allows us to compare the effectiveness of all the current insurance programs under the uniform framework. Moreover, our study enhances the scientific understanding of the health and healthcare behavior of migrant workers, providing implications for not only China's healthcare reforms but the migrant health related policies in other developing countries as well (Ayanian et al. 1993; Haas et al. 1993).

The paper proceeds as follows: Section 2 provides an overview of China's health insurance system in relation to the migrant worker population; Section 3 briefly reviews the relevant literature; Section 4 describes our estimation methods and the data source; Section 5 presents the empirical results; Section 6 concludes the paper.

2. China's Health Insurance System and Role of Migrant Workers

China's traditional medical insurance system was established in the 1950s during the "command and control" era. The system consists of three insurance categories organized around people's workplace: the Labor Insurance Scheme (LIS) that covers workers in the state owned enterprises (SOE); the Government Employee Medical Insurance (GEMI) that covers the civil

servants; the Cooperative Medical Scheme (CMS) that covers members of agricultural communes in the rural areas. This institutional arrangement hinges on the employment structure in a planned economy where each urban worker is assigned to a working unit (*Danwei*) in the city and each rural worker belongs to an agricultural commune. The economic reforms starting in 1980 pointed the country firmly down the road of a market economy, and the privatization process is accelerated in both the urban and rural sectors. SOEs began to be challenged by private entities and lost their capability of subsidizing LIS premium for the urban employees. The commune-based collective agricultural production was replaced by the household-based "family responsibility system". As a result, the traditional medical insurance system collapsed.

From 1988, the Chinese government gradually took the initiative to establish a new health insurance system with the creation of several social insurance platforms. In 1998, the State Council promulgated its decision to replace the original LIS with the new Urban Employee Basic Medical Insurance (UEBMI). The difference between the two schemes is that UEBMI covers all employees in the urban formal sector that includes both the public and private enterprises, which greatly expanded the scope of LIS coverage. After 1998, efforts are made to incorporate some of the former GEMI enrollees into the UEBMI system. After 2010, most provincial government employees are transferred to UEBMI, leaving GEMI covering only the workers of the central government and its directly affiliated agencies.

In rural areas, the New Rural Cooperative Medical Scheme (NRCMS) was formally launched in 2003 by the State Council. The scheme is jointly funded by the government and farmers. Compared with the original CMS, NRCMS is mainly financed by subsidies from the central and local governments, which ensures sufficient funds to cover the inpatient and major outpatient expenses. In the few years after its implementation, NRCMS enjoyed rapid growth in coverage: from 2003 to 2009, the number of NRCMS enrollees rose from 80 million to 830 million, with the participation rate increasing from 75% to 94% among the rural population. At the same time, the benefit level also tripled, with the premium per capita increasing from 30 *Yuan* to 100 *Yuan* and government subsidies rising from 20 *Yuan* to 80 *Yuan* per capita.

On the other hand, a large population is still left out of insurance coverage in cities and towns, which consists of the urban workers in the informal sectors and the urban residents without employment. In order to achieve the goal of universal access to health care, the State Council

launched a pilot program in 2007 to provide basic medical insurance to the above group. The new program, dubbed Urban Resident Basic Medical Insurance (URBMI), was experimented in 79 pilot cities and spread out to the rest of the country in 2010. URBMI is intended for the urban residents who are not qualified for UEBMI, with an estimated target population size of 42.49 million (Lin, et al., 2009). These include the children, the elderly who reached retirement age without employer-sponsored medical benefits, the informal sector employees, and the self-employed or non-employed residents. URBMI also enjoyed fast growth in enrollment after its debut: according to the 2009 China Health Statistical Yearbook, the participation rate in the pilot cities achieved 60.4%, and the number of enrollees reached 11,826. With the above efforts, by the end of 2010, China established a new nation-wide basic medical insurance system in which UEBMI, URBMI and NRCMS are the main platforms and the commercial insurance and medical assistance programs play a supplementary role.

Table 1 summarizes the financing channels, the scope of coverage, and the eligibility conditions of major medical insurance platforms currently available to migrant workers. In terms of financing, all of the three social insurance platforms are financed jointly by government subsidies and individual contribution: UEBMI is mainly financed by employers and employees, and the premium payment is equal to 8% of the total salary amount, with 6% paid by employers and 2% by employees (retirees are exempted). URBMI is mainly financed by individual payment, with limited government subsidies: for example, in 2007, the average premium payment in the first wave pilot cities is 236 *Yuan* per adults and 97 *Yuan* per children, 36% of which is paid by central and local governments, and the individual contribution takes up the remaining 64% (Lin et al., 2009). On the other hand, considering the economic vulnerability of rural families, NRCMS is primarily funded by government subsidies, with supplemental contribution from the participating households. For example, in 2011, the average government subsidy for NRCMS premium is 200 *Yuan* per person, while the average individual payment is only 50 *Yuan*. In addition to the financing arrangement, the benefit scope is also different among the insurance schemes. Generally speaking, the above social insurance programs emphasize on reimbursing the costs of inpatient care and catastrophic / chronic disease treatment (such as cancer, diabetes and heart disease), with limited coverage for outpatient expenses (Lin et al., 2009). Future reforms on the above insurance platforms will be to expand the reimbursement level: the central government's twelfth five-year

plan made in 2012 stated that UEBMI, URBMI and NRCMS will achieve a national average reimbursement level of 75% for inpatient care and above 50% for all outpatient care by 2015.

[Insert Table 1 Approximately Here]

In addition to the basic insurance platforms, migrant workers may also participate in the commercial health insurance plans and the various "migrant worker health programs" in different cities. The commercial insurance mainly covers the out-of-pocket and over-the-ceiling medical expenditures within the basic schemes and the imported / experimental drugs and treatment items not reimbursed by the basic health insurance. Unlike the basic schemes, commercial plans are solely financed by individual premium payment with no subsidies from the government, thus they are suitable for the migrant workers in better economic conditions or those with unmet medical needs given the basic coverage. Moreover, commercial insurance may also attract some of the self-employed migrants and small business owners who are unable to join UEBMI due to their employment status. During the recent years, some commercial insurance providers also worked with local governments in the operation of NRCMS plans, and achieved considerable success in efficient claim processing and risk management (examples include Jiangyin county in Jiangsu province and Xinxiang county in Henan province). Compared with the social insurance programs, commercial health insurance has the following advantages: (1) higher flexibility, with various premium and reimbursement levels that can accommodate the need of migrant workers with different employment and health status; (2) higher portability, with cross-region reimbursement for out-of-town medical treatment, a function made possible by the commercial health information management systems.

Lastly, following the request of Ministry of Human Resources and Social Security, local municipalities started to launch different types of "migrant worker health programs" after 2006, which are custom-made insurance plans tailored to the local financial capacity and the migrant workers' medical need in each city. The typical programs include the following: (1) the "Beijing model", implemented in such cities as Beijing and Guangzhou, aims to integrate the migrant worker population into the existing UEBMI program, allowing different financing and reimbursement levels from the permanent urban employees. (2) The "Shanghai model",

implemented in such cities as Shanghai and Chengdu, features a comprehensive insurance package specially designed for migrant workers, a package that includes health insurance, pension and worker's compensation and is administered independently from UEBMI and URBMI. (3) The "Shenzhen model", implemented in such cities as Shenzhen, is a cooperative medical program among migrant workers, characterized with inexpensive and easy enrollment and an annually balanced fund budget. Despite the institutional difference among the above models, these migrant worker health programs all follow the principles of "low premium rate, inpatient first, pay-as-you-go budget and employer premium contribution", taking into account the basic health care needs and the limited financial capability of migrant workers.

In the above health insurance system, the rural-to-urban migrant workers are a unique group: on the one hand, their "urban-rural duality" makes them eligible for one or more insurance programs; on the other hand, the lack of employment stability lowers their willingness to participate in any insurance, limiting their access to health care and making them a vulnerable group in China's new health system. NRCMS is typically the first choice of many migrants due to its low premium and high government subsidy. However, NRCMS requires its enrollees to seek medical care in their registered county of residence (*Hukou* location), and has discriminating policies against out-of-county medical utilization (such as the required physician referrals or lower reimbursement rates). For migrant workers, this geographic limitation means higher opportunity cost of seeking medical care in the cities. Thus the seemingly broad coverage of NRCMS does not translate to strong protection for migrant workers against disease risks. Alternatively, they can also participate in the urban insurance schemes, such as UEBMI and URBMI. However, the eligibility of UEBMI requires employment in the urban formal sector, for which most migrant workers do not qualify. URBMI has looser eligibility standard that does not depend on employment status, however, its high out-of-pocket premium rate becomes a barrier for wide participation among migrant workers. Similarly, the commercial health insurance also relies on individual payment, thus is only suitable for those with better economic condition and special health care needs. Moreover, given their limited experience, the commercial health insurance companies in China are usually incompetent in solving the adverse selection and moral hazard issues, thus can only offer annual plans without guarantee for renewal, all of which can negatively affect the enrollment will of rural-to-urban migrant workers, leading to persistently low participation rates among this

population. As for the localized migrant worker health programs, although they have the advantage of good affordability and easy enrollment, their priority on inpatient reimbursement is incompatible with the need of most migrant workers who are relatively young, healthy and far more likely to use outpatient care than inpatient care. Lastly, the lack of coordination among different platforms and regions results in considerable fragmentation in China's health insurance system, which fails to accommodate the geographic mobility of migrant workers and significantly limits the cost-effectiveness of insurance purchase.

As a result, the large migrant population is left in the coverage gap between various insurance schemes, and their medical and health status becomes a major concern for the society. According to the China Economic and Social Development Bulletin published in 2008, the number of urban migrant workers with medical insurance is only 42.49 million, accounting for 35.4% of the total migrant worker population, far below the coverage rates of the other groups. In 2009, the Chinese central government launched a new roadmap for the national health reforms, in which the migrant workers' health care needs were emphasized on. Since then, provincial and municipal governments have begun to integrate the migrant labor force into the existing social security system, including UEBMI and URBMI. In this paper, we aim to use the nationally representative household survey data collected in recent years to comprehensively examine the impact of such insurance expansion on the migrant worker population.

3. Literature Review

As an instrument to reduce the financial risk associated with diseases and injuries, health insurance has been found by many studies to significantly promote people's health outcomes such as mortality rate, self-rated health status, and quality of life indicators (Brown et al., 1998). For example, Ayanian et al. (1993) reports that among women with breast cancer, the uninsured patients have higher post-discharge mortality rate and lower survival rates compared to patients with health insurance. Using the instrumental variable approach, Hadley and Waidmann (2006) concludes that having medical insurance increases the probability of respondents reporting "excellent" health from 13.3% to 16.6%, and increases the probability of "very good" health from 29.8% to 33.9%. Based on the 1987 National Medical Expenditure Survey data, Short and Lair

(1995) shows that while the health outcome of the uninsured children is superior to those participating in the public insurance programs such as SCHIP, it is significantly worse than the children with private insurance coverage.

An important mechanism through which health insurance affects health is by encouraging enrollees' medical utilization which is conventionally measured by the number of emergency / outpatient visits, the number and length of inpatient stay, the frequency of preventive care usage, the indicators of unmet medical need, etc. (Brown et al.1998). In the existing studies, the evidence on the impact of health insurance on healthcare utilization is mixed. For example, Weissman et al. (1991) and Saver and Peterfreund (1993) find that uninsured patients are more likely to delay doctor visits due to financial burden, thus have longer length of hospitalization. At the same time, insured patients are found to have higher rate of utilization for the outpatient, inpatient and preventive care (Ross and Mirowsky, 2000; Buchmueller et al, 2005; Hoffman and Paradise, 2008). On the other hand, some studies reached different conclusions. For example, by observing 3 groups of patients (uninsured, privately insured, publicly insured) at an urban academic medical center, Kwack et al. (2004) finds no significant difference of medical utilization between the insured and uninsured groups; based on the Health and Retirement Study data, Sudano and Baker (2003) finds that people who recently lose their insurance coverage tend to use less preventive care (influenza vaccination), but they find no evidence of increased utilization among the newly insured individuals.

The seemingly positive link between insurance coverage and health (utilization) draws increasing controversy because such correlation may not indicate causal relationship. The main reason is that insurance participation, medical utilization and health status can be simultaneously affected by unobserved factors such as individual cultural background, risk preference, social and political environment, etc. (Freeman, et al., 2008). These factors in turn lead to the endogeneity of health insurances participation, thus may cause biased estimates on its impact (Levyand Meltzer, 2004). To address the endogeneity issue, many studies use the instrumental variable (IV) approach or the natural experimental designs that capitalize on the exogenous shocks on insurance policies. For example, Currie and Gruber (1996) uses the change in Medicaid eligibility between 1984 and 1992 as a natural experiment, and finds that the expansion in the public insurance coverage significantly lowers the neonatal mortality rate in U.S.. Lichtenberg (2001) studies the expansion

of Medicare in 1999, and observes a marked increase in utilization of hospital and emergency room care among the newly insured elderly. On the other hand, Lurie et al. (1986) and Haas et al. (1993) use the termination of a public health insurance program as an instrument to evaluate the impact of insurance loss, and they find no significant difference in health outcomes between the affected group and the control group.

Compared to the studies in the developed countries, relatively little attention has been paid to the impact of China's recent health insurance expansion. Among the existing insurance platforms, NRCMS is the most studied one due to its early initiation and the strong financial commitment it received from the government. Wagstaff et al. (2009a) finds that participating in NRCMS significantly increases famers' likelihood of outpatient visits and inpatient admission. Using China Nutrition and Health Survey data, Lei and Lin (2009) shows that although NRCMS tends to promote the use of preventive medical services, it does not play a significant role in alleviating the out-of-pocket medical cost and encouraging the regular medical utilization among the rural residents. Wagstaff et al. (2009b) even finds that the out-of-pocket spending has increased among the NRCMS enrollees. Yip and Hsiao (2009) suggests that the failure of NRCMS to reduce patients' financial burden is because of the demand-side and the supply-side moral hazard. In recent years, some evaluation efforts have also emerged for the urban based insurance schemes, particularly URBMI. Lin et al. (2009) finds that the participation rate of URBMI is related to people's income, pre-existing health conditions and the pattern of medical utilization, and that enrolling in URBMI significantly reduces the low-income patients' financial barrier to medical care. On the other hand, Liu et al. (2008) finds that URBMI has no significant impact on people's medical utilization behavior.

The health and healthcare status of Chinese migrant workers has also attracted scholarly interest in recent years. The existing studies find that rural-to-urban migrant workers are a high-risk group for acute infectious diseases, and their general health level is relatively poor (Pan et al., 1995); because of their adverse working environment, many of them are also subject to high risk of occupational diseases (Wang and Cai, 2002); moreover, this group is prone to a variety of psychological conditions such as anxiety and depression (Kang, 2004). In the studies of medical utilization behavior, some scholars find that migrant workers tend to rely on self-medication (self-diagnosis and self-treatment) when falling ill, and seldom seek formal medical care (Liang et

al., 2010); many of them delay necessary treatment or hospitalization due to lack of insurance coverage or high out-of-pocket expenditure (Song et al., 2010). The above summary indicates the necessity for more rigorous research on assessing the potential impact of China's recent health reforms on migrant workers' health and healthcare status.

4. Data and Method

4.1. Estimation Method

In this paper, we follow the convention in health economics literature and use the 3A (Accessibility, Affordability and Appropriateness) framework to evaluate the effectiveness of the current health insurance schemes for which migrant workers are eligible. Our primary goal is to examine whether these schemes help to alleviate migrant workers' financial burden of medical care, whether they provide better access to formal healthcare, and whether they ultimately improve migrant workers' health status. For these purposes, we select the following variables as outcome measures: we use the ratio of out-of-pocket (OOP) payment in the total inpatient / outpatient expenditure to measure the patients' financial burden of treatment; we use the number of physical exams in the previous year to measure the preventive care utilization and whether a migrant worker reports doctor visit(s) after falling sick during the past 2 weeks to measure her access to remedial care, respectively; we use the self-rated health status to measure the individual's overall health outcome, which is classified into five levels (Excellent, Good, Fair, Not Good and Poor). Numerous studies find that such subjective health rating is a good indicator of the respondent's actual health status (Hadley and Waidmann, 2006). To investigate the mechanism of the insurance impact on medical utilization through enhanced health awareness, our last outcome variable is whether the migrant worker regularly acquires health related knowledge. Accordingly, our estimation strategy consists of the following econometric models:

(1) Ordinary Least Squares (OLS) Model. Conventional OLS method will be used for regressions on out-of-pocket payment ratios of the inpatient and outpatient expenses. The regression equation takes on the following form:

$$y_i = \sum_{j=1}^{m} I_{ij}\theta_j + X_i\beta + Z_i\gamma + u_i \qquad (1)$$

where y_i is migrant worker i's reported out-of-pocket payment as a percentage of the total inpatient / outpatient costs during the last illness event. I_{ij} is a dummy variable indicating migrant worker i's participation in the j-th medical insurance program (NRCMS, UEBMI, URBMI, Commercial Insurance, or Other Insurance); m is the number of available insurance schemes. X_i is a vector of individual characteristics such as age, sex, race, income, marital and employment status. Z_i is a vector of city and year dummies, and is used to control the unobserved heterogeneity in time and geographical environment. θ_j is the key parameter of interest, and its sign and statistical significance reveal the marginal effect of insurance participation on the migrant worker's financial burden due to illness.

(2) Binary Choice Model. Our outcome measures of a migrant worker's medical care utilization and health awareness are dummy (0-1) variables, thus the estimation calls for the use of binary choice models whose underlying mechanism takes on the following form:

$$Y_i^* = \sum_{j=1}^{m} I_{ij}\theta_j + X_i\beta + Z_i\gamma + u_i \qquad (2)$$

$$\Pr(Y_i = 1 \mid I, X, Z) = \Pr(Y_i^* > 0 \mid I, X, Z) = G(\sum_{j=1}^{m} I_{ij}\theta_j + X_i\beta + Z_i\gamma) \qquad (3)$$

where Y_i is a dummy variable indicating whether migrant worker i has doctor visit(s) after falling sick during the past 2 weeks or whether she frequently makes an effort to acquire health related knowledge (asked directly by the survey questionnaire). The realization of Y_i is determined by the worker's underlying tendency of medical utilization or level of health awareness that is denoted by the latent variable Y_i^*. Y_i would take on a value of 1 if Y_i^* is above zero, and 0 otherwise. G(.) is a nonlinear link function which represents the cumulative distribution of the random variable u_i. In this paper, we assume u_i follows the standard normal distribution, and use the Probit model for estimation. Accordingly, the marginal effect of participating in health insurance j on the expected probability of positive Y_i can be represented by $\theta_j \times \phi(\sum_{j=1}^{m} I_{ij}\theta_j + X_i\beta + Z_i\gamma)$, where ø(.) is the standard normal probability density function, and the variables in the bracket are evaluated at the sample average values.

(3) Ordered Response Model. This model will be used in evaluating the impact of health

insurance on the self-reported health status (SRH) among the migrant workers; the model can be specified with the following equations:

$$H_i^* = \sum_{j=1}^{m} I_{ij}\theta_j + X_i\beta + Z_i\gamma + u_i \qquad (4)$$

$$\Pr(H_i = 1 \mid I, X, Z) = \Pr(H_i^* \le 1 \mid I, X, Z) = F(1 - \sum_{j=1}^{m} I_{ij}\theta_j - X_i\beta - Z_i\gamma) \qquad (5)$$

$$\Pr(H_i = 2 \mid I, X, Z) = \Pr(1 < H_i^* \le 2 \mid I, X, Z) = F(2 - \sum_{j=1}^{m} I_{ij}\theta_j - X_i\beta - Z_i\gamma) - F(1 - \sum_{j=1}^{m} I_{ij}\theta_j - X_i\beta - Z_i\gamma) \qquad (6)$$

... ...

$$\Pr(H_i = 5 \mid I, X, Z) = \Pr(H_i^* > 4 \mid I, X, Z) = 1 - F(4 - \sum_{j=1}^{m} I_{ij}\theta_j - X_i\beta - Z_i\gamma) \qquad (7)$$

where H_i denotes the self-reported health level of migrant worker i, evaluated in a five-point scale with the possible values of 5 (excellent), 4 (good), 3 (fair), 2 (not good) and 1 (poor). Given the discrete and sequential nature of H_i, we use the ordered response model to estimate equation (4) - (7). Similar to the binary choice model, we assume H_i is determined by the unobserved and continuous latent variable H_i^* that represents migrant worker i's true health status. Since H_i^* holds linear relationship with the explanatory variables (I, X and Z), the realization of H_i thus depends on the neighboring thresholds between which the value of H_i^* falls in, with the corresponding probability determined by u's cumulative distribution function F(.). Following the convention in the literature, we use the standard normal specification of F(.), and work with the ordered probit model. The maximum likelihood estimation based on equation (4) - (7) gives consistent estimators for θ_j, β and γ, and the marginal effect of insurance participation on the migrant workers' health status can be calculated accordingly using the sample average of I, X and Z. The above ordered response model can account for the non-linear impact of insurance on health outcomes, thus is generally considered to be superior to the conventional OLS models[1].

(4) Zero Inflated Negative Binomial (ZINB) Model. The ZINB model will be used to examine the impact of various insurance schemes on the utilization of preventive care[2]. Since the

[1] Ferrer-i-Carbonell and Frijters (2004) point out that traditional OLS regression on such discrete psychometric indicators may give more precise standard error estimation compared to the non-linear models. For robustness test purpose, we also used OLS for the evaluation of self-reported health, and get consistent results.

[2] Technically, the ZINB model can also be applied to the evaluation of remedial care utilization with the number of doctor visits as the outcome variable. However, since our data cannot control the severity of illness for each outpatient visit, such models tend to overestimate the insurance impact among the more severe cases. Thus we choose the binomial indicator to measure the remedial care utilization, and use the probit model for estimation.

outcome measure (number of physical exams in the previous year) is count data in nature, the literature convention is to use Poisson or Negative Binomial (NB) regressions. Considering the potential over-dispersion in the physical exam counts, we use NB as the benchmark distribution for the underlying count data process. Meanwhile, numerous studies find that migrant workers are less likely to use preventive medical care compared to other groups, and their tendency of self-medication is persistently strong. As a result, the numbers of reported physical exams among migrant workers usually contain a large amount of zero values (zero values account for about 60% in our sample). The problem of excess zeros tends to result in estimation bias, as such data can be censored implicitly. We address this issue with the ZINB model, which supplement the benchmark count process (following an NB distribution) with a participation decision making process (following a binomial distribution) in order to adjust for the difference between medical users and non-users. The ZINB model can be expressed as follows:

$$g(h)=\begin{cases} f_1(h=0)+(1-f_1(h=0))\,f_2(h=0), if\ \ h=0 \\ (1-f_1(h=0))\,f_2(h), if\ \ h\geq 1 \end{cases} \tag{8}$$

$$f_1(h\mid\mu)=\frac{\exp(\mu)}{[1+\exp(\mu)]^2} \tag{9}$$

$$f_2(h\mid\mu,\alpha)=\frac{\Gamma(\alpha^{-1}+h)}{\Gamma(\alpha^{-1})\Gamma(h+1)}\left(\frac{\alpha^{-1}}{\alpha^{-1}+\mu}\right)^{\alpha^{-1}}\left(\frac{\mu}{\alpha^{-1}+\mu}\right)^{h} \tag{10}$$

$$\mu=\exp\left(\sum_{j=1}^{m} I_{ij}\theta_j+X_i\beta+Z_i\gamma+u_i\right) \tag{11}$$

where h is the reported number of physical exams, and g(.) represents its probability mass function. μ is the expected number of exams, and its logarithm has a linear relationship with the explanatory variables I, X and Z. $f_1(.)$ and $f_2(.)$ are the probability density functions of the logistic distribution and negative binomial distribution, respectively. Since the NB distribution is in fact a composite of Poisson and Gamma, the parameter α thus can be seen as the variance of Gamma distribution. The above model treats the observed number of physical exams as the outcome of two decision making processes: the migrant worker first decides on whether to participate in the utilization of preventive care; conditional on participation, she then decides on how many exams to take in a given year. Consequently, the observed zero values in our data can be a result of the

"non-participating" decision or a natural choice made by the participants. Compared to the conventional NB regression, the above ZINB specification better characterizes the decision making mechanisms of the migrant workers, and it generally provides a better fit for data with excess zero values. The maximum likelihood estimation based on equation (8) – (11) reveals the marginal impact of insurance participation on the expected number of physical checkups.

(5) Instrumental Variable Approach. The above models implicitly assume that health insurance participation is an exogenous variable. However, the aforementioned reasons in Section 3 suggest that health and healthcare utilization are often determined simultaneously with insurance participation by various unobserved factors, making the insurance indicator I_{ij} endogenous. To explicitly address this issue, we incorporate the instrumental variable (IV) method in our models. A valid IV should have a high degree of correlation with migrant workers' insurance enrollment (powerfulness condition), but does not directly affect their health level and healthcare seeking behavior (exclusion restriction). Accordingly, we select the following 5 IVs in reference to the 5 endogenous "insurance variables" in the structural equations.

First, since the eligibility of UEBMI is highly dependent on the employment status, we use "whether the respondent is employed in the formal sector" as IV for participating in the UEBMI program[3]. Second, due to the short implementation time of URBMI, its participation rate is determined to a large extent by how well do urban residents know about the program. Therefore, we use the indicator on "whether the respondent is aware of the URBMI scheme" as an instrumental variable for its participation (the questionnaire explicitly asks about this information). Finally, to control for the endogeneity of NRCMS, commercial insurance and other insurances, we follow the approach of prior studies (Bhattacharya et al., 2003; Card, 1993; Currie and Cole, 1993; Goldman et al., 2001; Pan et al., 2012) and use the calculated local participation rate of each insurance type as instrumental variables. That is, for each insurance scheme, we divide the number of its enrollees within a sample residential community (usually an urban neighborhood, or *Xiaoqu*) by the total number of respondents in this community in a given year. These variables often reflect the popularity of each program in the local area. Due to the information spillover and social

[3] According to the labor law in China, all employers in the urban formal sector are required to provide UEBMI benefit to the employees. In certain areas (e.g. Beijing and Fujian), some of the informal sector workers are also entitled to UEBMI coverage through special migrant health programs. Thus, the respondent's employment status is highly correlated with UEBMI enrollment, but the two variables are not identical.

interaction, such community participation rates are often highly correlated with the insurance behavior of individual residents. On the other hand, it is not likely that the above IVs have an independent impact on the outcome variables without affecting the insurance participation, thus they meet the exclusion restrictions. For example, whether a worker is employed by the formal sector is shown not to have a direct effect on her health and utilization outcomes (Liu et al., 2010; Xie, 2009). Also, the URBMI awareness and the community insurance participation rates are usually determined by such factors as the promotional efforts of local health program administrators and the information channels of local residents, and they are not directly linked to the individual health status and medical usage.

With the introduction of IVs, the above models will be denoted correspondingly as IV-OLS, IV-Probit, IV-Ordered Probit and IV-ZINB models. In addition to the main estimation results (in Table 3), we also provide the first stage results of the above IV models in Table A1 in the appendix, and report the statistical tests on the powerfulness and validity of each IV (the former measures the correlation between the IVs and the endogenous independent variables, the latter concerns the correlation between the IVs and the error terms). Our first finding is that the F statistics on the joint significance of the IVs in the first stage regressions range between 79.73 and 2275.56, far exceeding the recommended threshold value of 10 (Stock et al., 2002), indicating the strong correlation between IVs and insurance participation. Thus, the selected IVs are not likely to be weak. Secondly, we follow Wooldridge (2002)'s method and indrectly test the validty of the instruments by regressing the second stage residuals on the IVs[4]. The results show that the IVs are not significant under the 10% confidence level (with p values rangeing between 0.13 and 0.69), suggesting weak correlation between the IVs and the residuals. Thus, the selected IVs are likely to meet the exclusion restrictions.

In Table A2, we also show the estimation results of the benchmark models without using the IVs for comparative purpose. The results suggest that ignoring the endogeneity of migrant workers' insurance participation will cause serious estimation bias. For example, the UEBMI and URBMI indicators are both shown to be negatively correlated with migrant health status. Such relationship cannot be interpreted as insurance causing health to deteriorate; rather, it reveals the endogeneity

[4] Since our models are exactly identified (the number of IVs equals the number of endogenous explanatory variables), we are unable to use the conventional Sargan-Bassman test the validity of IVs. Thus we employ the indirect testing approach due to Wooldridge (2002).

of insurance participation, i.e. the sicker migrants are more willing to enroll in such insurance programs. This phenomenon is also called "adverse selection" in the insurance literature, the ignorance of which tends to cause biased estimation of the insurance impacts. Thus, the explicit treatment with instrumental variables proves to be necessary in our study.

4.2. Data and Sample

The data used in this study are from the State Council Urban Resident Basic Medical Insurance (URBMI) Household Survey, which is initiated by the State Council of China, sponsored by the Ministry of Human Resources and Social Security, and conducted by Peking University Guanghua School of Management. The survey uses multi-stage clustering sampling method to choose nationally representative sample of urban households. Among the 79 pilot cities in the first round of URBMI implementation, 9 representative cities are chosen, which includes Baotou (Inner- Mongolia SAR), Changde (Hunan Province), Chengdu (Sichuan Province), Jilin (Jilin Province), Shaoxing (Zhejiang Province), Xiamen (Fujian Province), Xining (Qinghai Province), Urumqi (Xinjiang SAR), and Zibo (Shangdong Province). Within each city, the survey randomly selects representative communities (*Xiaoqu*) and residential households as secondary and primary sampling units, and the questionnaire covers detailed information on individual and household demographics, health insurance enrollment, subjective and objective health status, and the pattern and cost of medical care utilization. The first wave of URBMI survey was conducted in 2007 after the URBMI program was initially launched; the follow-up surveys were conducted annually until 2010. The URBMI survey is designed as a partially longitudinal survey, with approximately 1/4 of the total sample being replaced each year by new households. New observations are also added in case a prior subject moves, not at home or declines to participate in the follow-up survey. The first four waves of data contain approximately 127,000 observations in total, making it one of the largest dataset to study the health related issues in urban China.

We use the 2007-2010 datasets, which are the most complete and updated data available to us. It is also the only publicly available nationwide data that contains detailed information on household enrollment in all of the current insurance schemes (including the most recent URBMI program). The population under consideration is the rural-to-urban migrant workers in the sample cities. Due to the floating nature of this group (migrant workers change their residential locations

frequently), significant sample attrition occurs across years, resulting in a highly unbalanced panel. The difficulty in recouping the information on missing observations rules out the possibility to conduct longitudinal studies on the migrant worker population. Therefore, we use the pooled cross-sectional sample between 2007 and 2010. Another advantage of the pooled cross-section approach is that we can fully utilize the new information brought by the observations added in the later waves, when the long-term effect of insurance participation is more noticeable. From the original data, we use the following criteria to jointly identify our study sample: (1) those who live in an urban location with rural *Hukou*; (2) those of legal working age (between 18-60 for male and between 18-55 for female); (3) those who have a job and regular source of income, i.e. we exclude retirees, students, visitors and the unemployed. The resulting sample contains 3,971 rural-to-urban migrant workers whose information is available on all variables[5].

Table 2 reports the sample descriptive statistics of key variables. We first focus on the sample insurance profiles. Due to the aforementioned reasons, the rural-to-urban migrant workers in China can be eligible for multiple types of medical insurance; however, their unstable employment and living condition often lowers their participation rate. This is reflected in our sample: 2.9% of the sample migrant workers are covered by two types of insurance, among whom 1.5% have dual coverage of NRCMS and URBMI, 1.2% are covered by NRCMS and UEBMI, and 0.2 are jointly covered by UEBMI and commercial insurance. On the other hand, the participation of various insurance programs by the sample migrant workers is considerably lower than that of the comparable urban / rural residents. NRCMS has the highest participation rate, with 32.5% of sample migrant workers enrolled in this program. The urban based UEBMI and URBMI only have participation rates of 26.6% and 16.7%, respectively[6]. A year-on-year comparison from 2007 to 2010 suggests that the participation of UEBMI and URBMI increases each year, while that of NRCMS declines. The reason is two folded: on the one hand, urban-based insurance spread rapidly in cities as a result of government subsidy and promotion efforts; on the other hand, the

[5] The original sample size is 4,310, from which we delete 307 observations due to missing information on income and preventive care utilization; we further delete 32 observations that have Government Employee Medical Insurance coverage (civil servants not representative of the migrant worker group); the final sample size is 3,971.

[6] According to the regulation of health insurance programs in the sample cities, the calculated sample eligibility rates among migrant workers are 19.75%, 67.62% and 100% for UEBMI, URBMI and NRCMS respectively (rural *hukou* holders are all eligible for NRCMS at their residential county); among the eligible migrant workers, the actual enrollment rates for UEBMI, URBMI and NRCMS are 84.6%, 39.3% and 32.5%, which are respectively lower than the enrollment rates of non-migrant worker group.

accelerated urbanization process in China converts millions of rural households into urban residents, thus expands the eligibility and popularity of UEBMI and URBMI. Due to the short implementation time of URBMI, its participation rate is influenced by its recognition. In our sample, we find that an average of 67% of migrant workers is aware of this program, and this recognition rate is increasing quickly after 2007 due to the government back-up. Commercial insurance is also not popular among migrant workers, with an average enrollment rate of 6.3% and declining over time; this is possibly caused by its higher premium cost and lack of government subsidy. Due to the limited number of migrant worker health programs offered by the sample cities, the coverage rate of "other insurance" is even lower (5.3% on average).

The key outcome variables in our study pertain to the health status and medical utilization. Table 2 shows that the sample average self-rated health is close to 4 ("good"), which is roughly equivalent to the average health level of the general population. On the other hand, the frequency of medical care utilization is considerably lower among migrant workers: only less than half of the respondents report having an health check-up during the previous year, and the average number of health exams per person is declining over time; for those who report illness events within the previous two weeks, only 40.8% seek formal medical care in the hospitals, i.e. more than 59% of the patients choose self-medication. Though the utilization rate goes up in 2009 and 2010, it still reveals the poor access to medical care among migrant workers. An important reason for this phenomenon is the high OOP medical costs: our data show that most migrant workers do not enjoy reimbursement for outpatient treatment, as NRCMS and URBMI in many areas have not established systematic financing scheme for outpatient care; among the reimbursed patients, the average ratio of OOP payment is 15.1% and increasing over time; although the inpatient care is covered by all types of insurance schemes, the average OOP payment is still as high as 43.6%, leaving patients exposed to considerable financial risks after being hospitalized.

[Insert Table 2 Approximately Here]

We then turn to the descriptive statistics of the control variables. Table 2 shows that male workers account for about 56% of the total sample, suggesting a slightly higher representation of male in the migrant worker population. The sample average age is 36.8 years, and the average

years of formal schooling is about 10 years (slightly higher than the 9-year compulsory education level), both of which display a rising trend over the 2007-2010 period. The majority of the sample is married (85%) and of Han ethnicity (94%), though workers of minority ethnicity account for an increasing share in more recent years. As for the employment status, only 24.8% of migrant workers are employed in the formal sector. Although this figure has increased over time, it shows that most rural-to-urban migrant workers are still in the informal sector, implying the potential importance of the URBMI program that primarily targets on such population. The average household income in the sample is 3,494 *Yuan* per month, which is significantly lower than the overall income level of urban households, reflecting the disadvantaged socio-economic status of migrant workers. Furthermore, their total income level is relatively stable in 2007-2010, which is a sharp contrast to the rapid growth in the urban per capita income during this period.

5. Empirical Results

Table 3 reports the main estimation results. In reference to the 3A analytical framework, model (1) - (5) measure the outcomes in health and health care utilization, with dependant variables specified as self-rated health levels, number of physical exams, whether seeking formal healthcare after illness, and the OOP payment ratios of outpatient and inpatient care, respectively. Model (6) examines the insurance impact on the promotion of health awareness, and its dependent variable is whether the respondent frequently acquires health related knowledge. Apart from the control variables listed in Table 2, our regressions also include the full set of year and city dummies to control the fixed effects of unobserved time and geographical heterogeneity (such as the economic, cultural or institutional context)[7]. Furthermore, the coefficients shown in Table 3 are second-stage regression results, with the endogeneity of insurance participation being controlled using the instrumental variables. Since model (2), (3), (6) are non-linear regressions, the marginal effects of insurance are calculated separately at the sample mean levels and reported in Table 4.

We first focus on migrant workers' demographic characteristics. Table 3 suggests that age presents significant and negative influences on the medical utilization and health awareness. This

[7] Due to the large number of city dummies that are not the focus of this study, we do not report their detailed coefficient estimates in Table 3. However, we note that the associated city fixed effects are statistically significant, suggesting that city-specific heterogeneity presents a non-negligible impact on the outcomes.

is consistent with our expectation: due to the generational gap in education and knowledge, older migrant workers naturally have a lower level of health awareness and are less likely to take regular health exams compared to younger workers. In terms of gender difference, the general health status and awareness level of female are slightly better than those of male. Marital status has no significant impact on the key outcome indicators, but being married is associated with improved health awareness, possibly due to the fact that married workers pay more attention to their own health. From the perspective of socio-economic status, higher household income is shown to be correlated with improved health, a pattern consistent with the prior findings on the "income-health gradient" (Smith, 1999). Education also contributes to improved health awareness and preventive care usage, because highly educated people with more human capital accumulation tend to put more value on their remaining working life, thus are more likely to take regular health exams to avoid disease risks. The time trend in the outcomes is revealed by the year dummies: compared with the base year 2007, the general health levels of migrant workers see slight improvement in 2008-2010, but the frequency of health exams and the tendency of acquiring health related knowledge declined considerably; on the other hand, remedial care utilization and the OOP payment rates did not improve significantly during this period, implying the persistent financial barriers among this group.

[Insert Table 3 Approximately Here]

Next, we turn our attention to the impact of health insurance, which serves the main purpose of our study. The first set of assessment examines whether participating in insurance helps to reduce migrant workers' financial barrier to medical care. This is revealed by model (4) and (5) that shows UEBMI significantly reduces the ratio of OOP payment. Compared with the uninsured migrant workers, enrolling in UEBMI reduces the OOP ratio for outpatient expenses by 76.8%. This suggests that the relatively well established reimbursement system of UEBMI is conducive to the reduction in migrant workers' financial burden. In contrast, although NRCMS, URBMI and other types of insurance can also reduce the hospital costs, their impact is not statistically significant, suggesting that they have not sufficiently solved the "expensive-care" issue. This finding is consistent with previous studies that also find expansion in insurance coverage fails to

reduce the out-of-pocket spending in China (Wagstaff et al., 2009b; Lei and Lin, 2009). The phenomenon is mainly caused by three reasons: first, an effective reimbursement channel has not been established by NRCMS and URBMI for outpatient care in many areas, which leads to poor protection for enrollees; second, NRCMS has discriminative policies on out-of-county treatment such as reduced reimbursement rates and complex reimbursement procedures, which inevitably restricts the migrant workers' use of urban medical resources; lastly, as suggested by Yip and Hsiao (2009), moral hazard from the demand side (patients over-consume medical care when not paying full price) and supply side (providers over-prescribe services and drugs when they know patients have insurance coverage) tends to exacerbate the problem of cost inflation and limit the effectiveness of insurance expansion.

Model (2) and (3) reveals the impact of insurance enrollment on the accessibility of medical and preventive care among migrant workers. The results of model (3) indicate that participating in various insurance schemes did not promote the use of formal medical care after sickness among the sample migrants. This result is different from some previous China based studies that find insurance participation increases the likelihood of outpatient visits and inpatient admission (Wagstaff et al., 2009b). The reason lies in migrant workers' strong tendency for self-diagnosis and self-medication when sick, which in turn is caused by their unstable living condition and unfamiliarity with the medical resources within the city (Liang, et al., 2010). Thus, how to improve the access to care and promote medical utilization among migrant workers remains an issue of continued importance for policy makers in China. On the other hand, model (2) suggests that most health insurance programs significantly contribute to the preventive care utilization measured by the frequency of health exams during the previous year. In particular, UEBMI has the most prominent effect: compared to the uninsured migrant workers, those who enjoy the UEBMI coverage increase their average number of health check-ups by 0.273 times per year (see Table 4). Furthermore, the other types of insurance such as URBMI, NRCMS and commercial insurance are also found to promote preventive care usage. This finding is confirmed by many other studies such as Wagstaff et al. (2009b) and Lei and Lin (2009). Curiously, except for certain commercial plans that explicitly reimburse regular physical exams, the other government-sponsored health insurance schemes do not currently cover such services, so why do they still exert a positive effect? We hypothesize that the main channel through which health insurances promotes preventive care

utilization is that it increases the health awareness of the enrolled migrant workers. Existing studies show that participating in health insurance programs make people more aware of their health conditions and encourage them to frequently acquired health related knowledge (Cheng and Chiang, 1997; Dave and Kaestner, 2009)[8]. This is especially the case in China where government supported insurance schemes periodically distribute health related information to their enrollees for public health education purpose. By promoting the health awareness among the enrolled migrants, such insurance schemes indirectly increase their tendency to undergo regular health check-ups as an effective tool to avoid major disease risks. This hypothesis is formally tested by model (6), which shows that participating in insurance significantly improves migrant workers' health awareness. For example, participating in NRCMS, UEBMI and URBMI can increase the probability of frequent acquisition of health related knowledge by 60.9%, 65.2% and 80.6%; moreover, commercial insurance and the other insurance programs also raises this probability by 33.1% and 25.2%, respectively (see Table 4). Improved health awareness helps migrant workers to pay more attention to their own health, cultivating the good habit of regular physical exams, thus plays an indirect role in promoting the preventive care usage.

Finally, the results of model (1) shed lights on the impact of insurance on migrant workers' overall health. From the coefficient estimates, we find that most health insurance schemes have a potentially positive influence on migrant workers' self-rated health, among which only NRCMS demonstrates a statistically significant impact. Compared with the uninsured, enrolling in NRCMS increases the migrant worker's probability of reporting "excellent" health (health=5) by 9.8% on average, and decreases the probability for "fair", "not good" and "poor" health by 7.6%, 1.5% and 0.3%, respectively (see Table 4). A possible explanation is that the low premium rates and generous government subsidies made it easier for the migrant workers to benefit from the NRCMS coverage. On the other hand, although the other insurance programs such as URBMI also have the potential for health improvement, their long-term effect on health outcomes has not been fully revealed due to their short implementation time and low enrollment rates among migrant workers.

[8] According to the prior studies, health insurance can promote the enrollee's health awareness through the direct and indirect channels: (1) through periodical distribution of health related information, the insurance administrator can proactively manage compensation risks and avoid catastrophic medical costs, which directly improves the enrollee's health awareness; (2) insurance coverage usually promotes access to medical care, thus enrollees are more likely to know about their health problems and risks through the increased interaction with their physicians, which indirectly promotes the patients' health awareness.

An overall comparison of all medical insurance platforms indicates that UEBMI and NRCMS are the most effective schemes in improving migrant workers' health and healthcare utilization. On the other hand, URBMI, commercial insurance and other insurance programs also have positive impact on migrant workers' health awareness and preventive care utilization, but their contribution is limited in alleviating the financial burden of treatment, promoting the accessibility of medical care, and improving the overall health status among migrant workers.

[Insert Table 4 Approximately Here]

Lastly, to compare the impact of health insurance among different population groups, we select the non-migrant observations (the permanent urban residents) from the original URBMI Household Survey data, and apply the same models and instrumental variables to test the effectiveness of various health insurance platforms among this group. The regression results (marginal effects) are reported in Table 5. Firstly, in the dimension of medical cost (model (4) and (5)), the influences of participating in the major insurance schemes are similar between the migrant and non-migrant samples, with slight difference in the quantitative magnitude of marginal effects. Secondly, the results of model (3) indicate that most insurance schemes can potentially promote the access to care by increasing the tendency of non-migrants to seek formal medical care after illness (although with limited statistical significance); this is in sharp contrast with the findings on migrant workers. Thirdly, with respect to the preventive care utilization (model (2)) and health awareness (model (6)), Table 5 suggests that health insurance participation has a larger impact among the urban residents compared to the migrant workers, with nearly all the insurance indicators having higher statistical significance and marginal effects vis-à-vis Table 4[9]. Finally, the most noticeable difference between the two samples lies in the promotional effect on self-reported health: after controlling the personal and environmental characteristics, almost all major insurance platforms significantly improve the health status of urban residents. In particular, URBMI has the most substantial impact: compared to the uninsured, URBMI increases a non-migrant's probability

[9] In Table 5, the coefficient estimates of *othermi* in model (2) change significantly from Table 4, primarily because the category of "other medical insurance" has different meanings for the two samples: for migrant workers, it mainly refers to the local migrant worker insurance programs offered by different cities; for non-migrants, it refers to the other types of insurance available to urban residents (e.g. Government Employee Medical Insurance).

of reporting "excellent" health by 25.1%, and reduces the probability for "fair", "not good" and "poor" health by 22.5%, 5.1% and 1%, respectively. The above results suggest that the current health insurance programs in China offers considerably better protection to the non-floating population than the migrant workers, which in turn reflects the disadvantage and vulnerability of the rural-to-urban migrant workers. The primary reason again lies in the fragmentation of China's new health insurance system, which fails to accommodate the geographic and sectorial mobility of migrant workers and limits their potential benefit from the insurance participation.

[Insert Table 5 Approximately Here]

6. Conclusions

With the launching of UEBMI, NRCMS, and URBMI during the past two decades, China has established a basic medical insurance system with strong government commitment. In this non-uniform insurance system, the rural-to-urban migrant workers fall in the gap of coverage: although their urban-rural duality makes them eligible for one or multiple insurance schemes, their disadvantaged socio-economic status and various institutional restrictions lead to considerably lower insurance participation rate compared to other groups, making migrant workers a vulnerable population in China's healthcare system. In recent years, the health status of migrant workers has drawn increasing attention from policy makers and the general public. In the 2009 roadmap for new health reforms, the central government of China reiterated its focus on ensuring equal access to care, and listed the "medical insurance of migrant workers" on their priority agenda. Meanwhile, local governments are also making efforts to embrace this floating labor force in the existing insurance network. However, to what extent can migrant workers benefit from the expansion in coverage? This paper tries to answer this question using the most recent national household survey data. Specifically, we aim to evaluate whether participating in health insurance helps migrant workers to (1) alleviate their financial burden of medical care, (2) promote their access to health (including preventive and remedial) care resources, and (3) improve their overall health status.

Our empirical results show that among the currently available health insurance schemes, UEBMI and NRCMS present the most tangible benefits to migrant workers: compared with the

uninsured, these two health programs significantly reduce the ratio of out-of-pocket payment for outpatient treatment, and they also increase the preventive care utilization and the overall self-assessment of health among the enrolled migrants. These benefits are owing to the relatively well established reimbursement system of UEBMI and NRCMS. On the other hand, URBMI and commercial insurance also play an effective role in facilitating the use of preventive health care: compared to the uninsured, the average number of health check-ups increases by 0.1 – 0.2 times per year among the enrollees. Further inspection illustrates that the mechanism of such impacts depends on the promotion of subjective health awareness: compared with the uninsured group, the participants of these insurance schemes are more likely to pay attention to their health, with a marginal increase of 33.1% to 80.6% in the probability of regular acquisition of health related knowledge. However, due to the fragmentation of the insurance system and the lack of effective outpatient reimbursement channels, these insurance programs fail to make sufficient contribution to the improvement of migrant workers' health and their access to formal medical care.

Based on the above evidence, we conclude that China's migrant workers have benefited to various extents from participating in the health insurance programs so far. However, due to the imperfect reimbursement system and the poor coordination between insurance platforms, none of the insurance schemes have made significant improvement for migrant workers in all of the three outcome categories, i.e. the accessibility, affordability and appropriateness of medical care. Our results show potential directions for improvement for each insurance scheme, and how they can draw experience from each other to better protect the migrant workers. In particular, our findings point to the common weakness among the insurance schemes – the lack of systematic financing mechanism for outpatient care, which is shown to inhibit the medical utilization and intensify the self-medication behavior of migrant workers. Our study also suggests that the unstable employment and living conditions of rural-to-urban migrant workers also limits their willingness to participate in social insurance and to utilize the medical resources. Thus, expanding the coverage of the current schemes alone is not likely to be effective in satisfying their medical needs, as each scheme is administered independently. Rather, emphasis should be put on filling the "gaps" between platforms to make insurance benefits portable and transferable across employment sectors and geographic regions. Considering the economic and political importance of the migrant worker population, these implications are not only essential to the success of current health care

reforms, but also instrumental to the sustainable development of China's economy and society in the long run.

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Table 1 Major Medical Insurance Schemes and the Eligibility of Migrant Workers

Program Name	Implementation Time	Eligibility Condition for Migrant Workers	Financing Level and Reimbursement Scope
NRCMS	Officially launched in 2003 by State Council, expanded nationwide by 2009, administered by Ministry of Health (MOH).	All rural residents are eligible; voluntary enrollment on household basis; out-of-town medical care is limited, and the medical expenses incurred in the cities has to be reimbursed in *Hukou* registration location.	Financed by government subsidies with individual contribution; mainly cover hospital care and catastrophic illness, some areas also cover chronic care and outpatient costs
UEBMI	Experimentation starts in 1988; expands to 56 pilot cities in 1996; nationwide coverage in 1998, administered by Ministry of Human Resources and Social Security (MHRSS).	Cover migrant workers employed in urban formal sector (state-owned/collective/private enterprises and NGO's); some cities also cover part-time workers; mandatory enrollment as fringe benefit.	Jointly financed by employer and employee; funds are managed on city-level to cover inpatient and catastrophic illness treatment, with individual savings account to cover outpatient, drug, and out-of-pocket portion of inpatient expenses; cost sharing with deductible and ceiling.
URBMI	Experimented in 2007 among 79 pilot cities; nationally implement in 2010, administered by MHRSS.	Cover migrant workers in urban informal sector, the unemployed and the self-employed migrant workers; voluntary enrollment on individual basis.	Financed mainly by individual contribution with limited government subsidies; mainly cover hospital care and catastrophic illness; some cities also have outpatient coverage.
Commercial Insurance	Gradually introduced in 1980's after the collapse of traditional insurance system; officially recognized as a major supplement to the basic insurance platforms in 2009.	All migrant workers are eligible, particularly suitable for those unable to join UEBMI and those in better economic condition or with higher expected medical expenses; voluntary enrollment on individual basis.	Financed solely by individual payment with no government subsidies; mainly cover out-of-pocket expenses, big-ticket items and the imported / experimental drugs that are not covered by the basic insurance schemes; "portable" coverage with permitted out-of-town treatment.
Migrant Worker Insurance	After 2006, many cities launched their own custom-made insurance programs for migrants; administered by local government and supervised by MHRSS.	Cover migrant workers with stable employment relation with urban employers; not eligible for the self-employed or the unregistered migrants; voluntary enrollment on individual basis.	Financed mainly by employer contribution with localized reimbursement schemes; emphasize on low premium, catastrophic illness and annual budget balance; examples include "Shanghai model", "Beijing model" and "Shenzhen model".

Table 2 Sample Summary Statistics of Select Variables

Variable	Definition	Overall	2007	2008	2009	2010
health	Health status	3.995	3.892	4.015	3.985	4.101
	(1=poor, 5=exclt)	(0.799)	(0.839)	(0.826)	(0.790)	(0.721)
exam	No of health exams	0.442	0.439	0.488	0.464	0.386
	last year	(0.608)	(0.637)	(0.657)	(0.590)	(0.544)
meduse	Had doctor visits in	0.408	0.342	0.296	0.542	0.532
	past 2 weeks	(0.492)	(0.476)	(0.461)	(0.502)	(0.504)
outoop	OOP ratio in last	0.151	0.189	—	0.094	0.201
	outpatient visit	(0.242)	(0.265)	—	(0.132)	(0.348)
inoop	OOP ratio in last	0.4359	0.408	0.486	0.499	0.365
	inpatient visit	(0.277)	(0.280)	(0.314)	(0.256)	(0.264)
knowledge	Frequently acquire	0.533	0.417	0.538	0.570	0.622
	health knowledge	(0.499)	(0.493)	(0.499)	(0.495)	(0.485)
nrcms	Insured by NRCMS	0.325	0.433	0.316	0.305	0.235
		(0.469)	(0.496)	(0.465)	(0.461)	(0.424)
uebmi	Insured by UEBMI	0.266	0.193	0.245	0.287	0.345
		(0.442)	(0.395)	(0.431)	(0.453)	(0.476)
urbmi	Insured by URBMI	0.167	0.009	0.178	0.234	0.272
		(0.373)	(0.094)	(0.382)	(0.423)	(0.445)
comins	Commercial plans	0.063	0.070	0.062	0.064	0.055
		(0.243)	(0.256)	(0.242)	(0.245)	(0.229)
othermi	Other insurance	0.053	0.041	0.057	0.049	0.068
		(0.225)	(0.198)	(0.231)	(0.217)	(0.252)
male	Gender indicator	0.559	0.564	0.554	0.557	0.559
		(0.497)	(0.496)	(0.497)	(0.497)	(0.497)
age	Age in years	36.821	35.755	36.929	37.083	37.654
		(9.516)	(9.887)	(9.291)	(9.434)	(9.275)
eduyr	Years of education	9.891	9.261	10.238	10.103	10.090
		(3.230)	(3.398)	(3.005)	(3.273)	(3.094)
married	Married	0.851	0.822	0.865	0.861	0.863
		(0.356)	(0.383)	(0.342)	(0.346)	(0.344)
race	Ethnic minority	0.063	0.056	0.062	0.057	0.076
		(0.242)	(0.230)	(0.242)	(0.232)	(0.265)
income	Monthly household	3.494	3.170	3.095	3.419	4.259
	income (in 1,000)	(4.663)	(6.740)	(3.059)	(2.647)	(4.372)
ivurbmi	Aware of URBMI	0.672	0.459	0.692	0.753	0.815
	program	(0.469)	(0.499)	(0.462)	(0.431)	(0.389)
ivuebmi	Working in formal	0.248	0.214	0.239	0.252	0.289
	sector	(0.432)	(0.410)	(0.427)	(0.434)	(0.454)
observation	Sample size	3,971	1,123	884	933	1,031

Notes: (1) Statistics shown are sample mean and standard deviation (in parentheses); (2) statistics on meduse are based on the sample who reported being sick during the past 2 weeks; (3) out-of-pocket (OOP) payment ratios for outpatient / inpatient care are calculated based on the observations with such expenses (no such obs in 2008).

Table 3 Main Regression Results

	(1) health	(2) exam	(3) meduse	(4) outoop	(5) inoop	(6) knowledge
nrcms	0.302**	0.218***	-0.045	-0.118	0.002	1.785***
	(0.141)	(0.091)	(0.473)	(0.179)	(0.016)	(0.167)
uebmi	0.268	0.639***	-0.781	-0.768**	-0.013	2.236***
	(0.180)	(0.158)	(0.645)	(0.352)	(0.019)	(0.218)
urbmi	0.525	0.241**	-2.518	-0.699	-0.018	5.614***
	(0.460)	(0.114)	(1.920)	(1.105)	(0.051)	(0.552)
comins	0.055	0.241***	0.400	0.029	0.002	0.833***
	(0.095)	(0.097)	(0.410)	(0.182)	(0.011)	(0.120)
othermi	0.154	0.208***	-0.234	-0.042	-0.001	0.726*
	(0.103)	(0.087)	(0.417)	(0.170)	(0.006)	(0.434)
age	0.032	0.009*	0.042	-0.087	-0.007*	-0.194***
	(0.036)	(0.004)	(0.157)	(0.055)	(0.004)	(0.043)
male	-0.016***	0.057***	-0.007	-0.001	-0.000	-0.012***
	(0.003)	(0.014)	(0.012)	(0.004)	(0.000)	(0.003)
eduyr	0.010	0.068	0.029	0.020*	0.001	0.070***
	(0.007)	(0.110)	(0.029)	(0.011)	(0.001)	(0.009)
married	0.049	0.171**	-0.066	-0.010	0.003	0.255***
	(0.056)	(0.077)	(0.256)	(0.094)	(0.006)	(0.067)
race	-0.007	0.015***	-0.620*	0.083	0.009	0.186**
	(0.073)	(0.006)	(0.357)	(0.113)	(0.010)	(0.092)
income	0.012**	-0.031	0.014	0.019	-0.000	-0.005
	(0.005)	(0.107)	(0.034)	(0.016)	(0.000)	(0.004)
year08	0.083	-0.094	0.003	0.523***	0.004	-0.705***
	(0.088)	(0.115)	(0.266)	(0.094)	(0.008)	(0.105)
year09	0.039	-0.335***	1.155***	0.691**	0.003	-0.844***
	(0.104)	(0.122)	(0.397)	(0.327)	(0.012)	(0.126)
year10	0.199*	-0.009*	1.024***	0.714***	0.001	-1.785***
	(0.117)	(0.004)	(0.319)	(0.251)	(0.012)	(0.167)
City dummy	Yes	Yes	Yes	Yes	Yes	Yes
Sample size	3,971	3,971	277	277	3,971	3,971

Notes: (1) ***,** and * denote 1%, 5% and 10% significance levels, respectively; (2) robust standard errors in parentheses; (3) estimates shown in the table are the second-stage regression results, and endogeneity of insurance participation has been controlled using instrumental variables; (4) results of model (3) and (4) are based on the sample of migrant workers who reported being sick during the last 2 weeks (the questionnaire asks about information on medical utilization and treatment costs only among these respondents), thus their sample sizes are smaller than the other models.

Table 4 Marginal Effect of Health Insurance Participation (Migrant Worker Sample)

	(1) health					(2)	(3)	(4)	(5)	(6)
	health_1	**health_2**	**health_3**	**health_4**	**health_5**	**exam**	**meduse**	**outoop**	**inoop**	**knowledge**
nrcms	-0.003*	-0.015**	-0.076**	-0.004	0.098**	0.093***	-0.014	-0.118	0.002	0.609***
uebmi	-0.002	-0.013	-0.067	-0.004	0.087	0.273***	-0.245	-0.768**	-0.013	0.652***
urbmi	-0.005	-0.026	-0.132	-0.007	0.170	0.103**	-0.790	-0.699	-0.018	0.806***
comins	-0.001	-0.003	-0.014	-0.001	0.018	0.103***	0.125	0.029	0.002	0.331***
othermi	-0.001	-0.008	-0.039	-0.002	0.050	0.089***	-0.074	-0.042	-0.001	0.252*

Notes: (1) ***, ** and * denote 1%, 5% and 10% significance levels, respectively; (2) marginal effects are calculated at the sample mean.

Table 5 Marginal Effect of Health Insurance Participation (Non-migrant Worker Sample)

	(1) health					(2)	(3)	(4)	(5)	(6)
	health_1	**health_2**	**health_3**	**health_4**	**health_5**	**exam**	**meduse**	**outoop**	**inoop**	**knowledge**
nrcms	-0.004***	-0.021***	-0.090***	0.014***	0.100***	1.006***	0.180	0.012	-0.002	0.223***
uebmi	-0.006***	-0.033***	-0.143***	0.022***	0.159***	1.707***	0.096	-0.382***	-0.003	0.445***
urbmi	-0.010***	-0.051***	-0.225***	0.035***	0.251***	1.189***	0.136	-0.088	-0.003	1.005***
comins	-0.001**	-0.007**	-0.031**	0.005**	0.035**	0.601***	-0.059	-0.002	0.003	0.146***
othermi	-0.000	-0.001	-0.002	0.000	0.002	-0.091***	0.023	-0.028	0.001	0.010

Notes: (1) Regressions are based on the non-migrant urban resident sample, using the same models and instrumental variables as in Table 4; (2) ***, ** and * denote 1%, 5% and 10% significance levels, respectively; (3) marginal effects are calculated at the sample mean.

Appendix:

Table A1 First Stage Regression Results of the IV Models

	(1) urbmi	(2) nrcms	(3) uebmi	(4) comins	(5) othermi
ivnrcms	-0.209***	0.991***	-0.186***	0.001	0.001
	(0.013)	(0.009)	(0.014)	(0.006)	(0.005)
ivuebmi	-0.137***	-0.053***	0.461***	0.001	0.010**
	(0.013)	(0.009)	(0.014)	(0.006)	(0.005)
ivurbmi	0.088***	0.001	-0.002	0.001	-0.001
	(0.012)	(0.008)	(0.012)	(0.005)	(0.004)
ivcomins	-0.027	-0.011	-0.138***	0.994***	0.001
	(0.026)	(0.018)	(0.028)	(0.012)	(0.009)
ivothermi	-0.080***	0.002	0.147***	-0.001	1.004***
	(0.027)	(0.019)	(0.029)	(0.012)	(0.010)
gender	0.021**	0.006	-0.033***	0.004	0.000
	(0.010)	(0.007)	(0.011)	(0.005)	(0.004)
age	0.001*	0.000	0.003***	0.000	0.000
	(0.001)	(0.000)	(0.001)	(0.000)	(0.000)
eduyr	-0.009***	-0.002*	0.026***	0.000	0.001
	(0.002)	(0.001)	(0.002)	(0.001)	(0.001)
married	-0.041**	0.021*	0.044***	0.001	0.003
	(0.016)	(0.011)	(0.017)	(0.007)	(0.006)
race	-0.014	0.012	-0.002	-0.012	0.009
	(0.022)	(0.015)	(0.023)	(0.010)	(0.008)
incomen	-0.000	0.002***	0.002	0.001**	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)
year08	0.146***	0.003	-0.016	-0.001	-0.001
	(0.015)	(0.010)	(0.016)	(0.007)	(0.005)
year09	0.173***	0.005	0.024	-0.003	0.000
	(0.015)	(0.010)	(0.015)	(0.007)	(0.005)
year10	0.193***	-0.001	0.043***	-0.004	-0.001
	(0.015)	(0.010)	(0.015)	(0.007)	(0.005)
City dummy	Yes	Yes	Yes	Yes	Yes
Sample size	3,971	3,971	3,971	3,971	3,971
F value	**79.73**	**2426.09**	**311.86**	**1408.92**	**2275.56**

Notes: (1) ***,** and * denote 1%, 5% and 10% significance levels, respectively; (2) robust standard errors in parentheses; (3) the reported F values correspond to the joint significance test of all instrumental variables in the first stage regressions.

Table A2 Regression Results of the Benchmark Models (without Using IVs)

	(1) health	(2) exam	(3) meduse	(4) outoop	(5) inoop	(6) knowledge
nrcms	0.022	0.843***	0.279	0.037	0.003	0.137***
	(0.046)	(0.179)	(0.204)	(0.060)	(0.005)	(0.052)
uebmi	-0.117**	1.375***	0.022	-0.261***	-0.001	0.226***
	(0.051)	(0.222)	(0.235)	(0.068)	(0.006)	(0.061)
urbmi	-0.206***	2.232***	-0.277	-0.039	-0.007	0.099
	(0.063)	(0.587)	(0.305)	(0.088)	(0.006)	(0.069)
comins	0.036	0.518***	0.167	-0.083	0.004	0.420***
	(0.069)	(0.100)	(0.285)	(0.108)	(0.008)	(0.091)
othermi	0.210**	0.248***	-0.254	-0.060	-0.006	-0.118
	(0.086)	(0.096)	(0.402)	(0.109)	(0.006)	(0.097)
age	0.036	-0.111**	0.052	-0.091*	-0.007*	-0.133***
	(0.036)	(0.043)	(0.170)	(0.051)	(0.004)	(0.042)
gender	-0.014***	-0.007**	-0.014	-0.002	-0.000	0.003
	(0.002)	(0.003)	(0.010)	(0.003)	(0.000)	(0.003)
eduyr	0.015**	0.041***	0.015	0.005	0.000	0.075***
	(0.006)	(0.009)	(0.028)	(0.008)	(0.001)	(0.008)
married	0.041	0.176**	-0.004	-0.029	0.003	0.158**
	(0.055)	(0.071)	(0.257)	(0.077)	(0.006)	(0.065)
race	-0.001	0.077	-0.682**	0.101	0.010	0.150*
	(0.074)	(0.091)	(0.341)	(0.097)	(0.010)	(0.090)
income	0.013**	0.000	-0.003	0.010	-0.000	0.004
	(0.005)	(0.003)	(0.036)	(0.012)	(0.000)	(0.004)
year08	0.191***	-0.296***	-0.129	0.507***	0.002	0.151**
	(0.053)	(0.108)	(0.256)	(0.073)	(0.006)	(0.060)
year09	0.188***	-0.486***	0.620**	0.506***	-0.000	0.272***
	(0.051)	(0.130)	(0.246)	(0.076)	(0.006)	(0.060)
year10	0.369***	-0.758***	0.626**	0.576***	-0.003	0.449***
	(0.050)	(0.147)	(0.257)	(0.067)	(0.005)	(0.060)
City dummy	Yes	Yes	Yes	Yes	Yes	Yes
Sample size	3,971	3,971	277	277	3,971	3,971

Notes: (1) ***,** and * denote 1%, 5% and 10% significance levels, respectively; (2) robust standard errors in parentheses; (3) results of model (3) and (4) are based on the sample of migrant workers who reported being sick during the last 2 weeks (the questionnaire asks about information on medical utilization and treatment costs only among these respondents), thus their sample sizes are smaller than the other models.