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Government health insurance and spatial peer effects: New evidence from India

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ABSTRACT

What is the role of spatial peers in diffusion of information about health care? We use the implementation of a health insurance program in Karnataka, India that provided free tertiary care to poor households to explore this issue. We use administrative data on location of patient, condition for which the patient was hospitalized and date of hospitalization (10,507 observations) from this program starting November 2009 to June 2011 for 19 months to analyze spatial and temporal clustering of tertiary care. We find that the use of healthcare today is associated with an increase in healthcare use in the same local area (group of villages) in future time periods and this association persists even after we control for (1) local area fixed effects to account for time invariant factors related to disease prevalence and (2) local area specific time fixed effects to control for differential trends in health and insurance related outreach activities. In particular, we find that 1 new hospitalization today results in 0.35 additional future hospitalizations for the same condition in the same local area. We also document that these effects are stronger in densely populated areas and become pronounced as the insurance program becomes more mature suggesting that word of mouth diffusion of information might be an explanation for our findings. We conclude by discussing implications of our results for healthcare policy in developing economies.

1. Introduction

Despite a plethora of schemes that offer healthcare services completely free of costs or at a highly subsidized rate, take up of hospital care is very low, especially in developing countries. Two key reasons can explain this finding. First, there is a paucity of information about benefits and costs of treatment and second, there is also little ability to comprehend such information even if it were available, leading to lack of faith about hospital care (See Bauhoff et al., 2011, Jehu-Appiah et al., 2011; Rajasekhar et al., 2011). In such situations, patients often rely on anecdotal evidence from their peers or neighbors on the benefits of treatment.

Health insurance has traditionally been viewed as a means to enable financial risk protection and improve access for patients and their families. Past evaluations of insurance programs have thus focused on how health insurance affects consumption smoothing, utilization of care by the insured and better health outcomes. We suggest another potential role of health insurance (especially in the case of universal health insurance schemes), which is its role in diffusing information on the benefits of treatment in hospitals. We thus postulate that in a setting where all residents are insured and can avail of healthcare benefits, peer effects from neighbors would lead to increased use of hospital care.

In order to examine this hypothesis, we draw from the peer effects literature. In particular, we study the role of peer effects in technology diffusion i.e. the spread of an idea within a community. This depends upon the innovation itself, communication channels, time, and a social system. Oster and Thornton 2009, Bollinger and Gillingham 2012, and Conley and Udry 2005, show that there are strong peer effects in the adoption of different innovations such as menstrual cups, photovoltaic panels and new methods of pineapple farming in developing as well as developed country contexts. In the health literature, past work (for example, Sorensen, 2006; Fowler and Christakis, 2008; Cohen and Soto, 2007; Dahl et al., 2012; Godlonton and Thornton, 2012; Bodine-Baron et al., 2013) document peer effects in a variety of contexts related to decisions in taking paternity leave, obesity, HIV testing, vaccination and in choosing health plans. In our paper, we consider the introduction of a new health insurance scheme to be similar to a new technology that could potentially impact health outcomes.

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A central challenge in this literature is identifying the causal effects of peers and distinguishing them from endogenous peer formation (Manski, 1993, 2000). Prior work has either used random assignment to peer groups or regression based approaches to identify the impact of exogenous variation in the behavior of peers on one's decisions. We follow the latter approach and exploit exogenous variation in the timing of a government scheme to identify peer effects.

Specifically, we use data from a new universal health insurance program (called the *Vajpayee Arogyashree Scheme* or VAS) to show that take-up for healthcare in a particular geographical unit leads to increased take-up by neighbors from the same area. This positive association between current and future use could arise for a variety of reasons. For example, common health related behaviors or environmental factors could lead to clustering of disease and healthcare use. Similarly current and future use could be correlated due to health policies that increase access to care or promote greater utilization over time. Finally, the correlation between current and future use of care could reflect diffusion of information about benefits of treatment. Put simply a successful surgery in a local area today might promote others in the same area to seek treatment or surgery in the future. We are interested in evaluating the degree to which the association between current and future use of healthcare is being driven by word of mouth diffusion of information rather than other competing explanations.

To isolate the impact of increase in take up due to spread of information from any other factor, we propose the following analytical strategy. Our dependent variable is the number of patients admitted in all VAS empanelled hospitals for a given condition, taluk (group of villages) and month. Several taluks form a district, and many districts make up an Indian state. Indian census data of 2011 indicate that Karnataka has a population of about 60 million and there are about 220 *taluks* in Karnataka across the state's *29 districts*.

Our key independent variable is the number of patients hospitalized for a given condition and taluk in the previous month. To account for any underlying trends that may influence take up of hospital care, we include taluk fixed effects, condition fixed effects and time fixed effects. To account for unobserved heterogeneity in disease prevalence and tertiary care hospitalizations, we control for local area specific health condition fixed. We also control for local area specific time fixed effects to allow for differential trends in health and insurance related to outreach activities varying geographically over time. We argue that the remaining identifying variation is exogenous and determined by the random occurrence and treatment of chronic conditions in the population. In other words, consider the thought experiment where two taluks who have the same underlying risk factors for a chronic disease but in one taluk a patient decides to seek hospital care for a chronic condition and in the other taluk patients do not seek hospital care. Will the hospitalization of the patient encourage others in the same taluk to seek hospital care in the future? This is what we investigate in our analysis.

We expect that information diffusion will have some decay. This means that a hospitalization this month leads to higher information diffusion in the next month, but the impact dies down in consecutive months. To account for this phenomenon, we borrow from the marketing literature and perform a grid search to find a value of depreciation that minimizes the root mean square error of the impact of present take up for tertiary healthcare on its lag. Our results indicate that after accounting for depreciation, 1 new tertiary care hospitalization today results in 0.35 additional future hospitalizations for the same condition in the same local area. We are also able to document that these effects increase with time as VAS matures and patients have more time to determine the outcomes of treatment.

If it is indeed the case that take up for hospital care increases because of diffusion of information through a network of geographic peers, the impact would also be evident amongst peers from neighboring taluks. To test this hypothesis, we control for take up for hospital care in a same condition and month but from a neighboring taluk. In line with our expectations, we find that the impact is statistically significant but not as strong as that within the same taluk.

Interestingly we also find that information diffusion gets stronger with time and is more significant in taluks with higher population density. In geographies with low population density, one new hospitalization, results in an increase in future hospitalizations by an additional 0.28 units, whereas in geographies with high population density, one new hospitalization today increases future hospitalizations by an additional 0.41 units. Since we are interested in studying increase in take up for healthcare only for tertiary illnesses, we believe that the impact of higher population density is through word of mouth publicity and not a mere increase in incidence of illness as tertiary illnesses are known to be non-communicable and occur typically with a low probability.

As an additional robustness check, we control for heterogeneity in hospital type by splitting our sample of patients based on whether they enrolled in public or private hospitals. We find that while information diffusion is significant in both cases, take-ups based on past cases are stronger in the case of private hospitals. Our findings suggest that spatial diffusion of information might play an important role in explaining the take up of healthcare over and above other factors that could drive uptake of healthcare insurance schemes in these contexts (Panda et al., 2013, Sinha et al., 2006, Binnendijk et al., 2013 and Dror et al., 2007).

The paper proceeds as follows. Section 2 offers a summary of the institutional background that relates to our study. Our data and empirical framework are outlined in Section 3. Results are presented in Section 4 and we conclude in Section 5.

2. Institutional background

The government healthcare system in India offers medical services free of charge in public hospitals across the country. However, several individuals, including the poor, also seek treatment from private hospitals. As a result, out-of-pocket payments for hospital bills represent an estimated 69% of total health spending in India (Kumar et al., 2011; Ma and Sood, 2008). Such high out of pocket costs for healthcare can drive households into poverty and also limit the use of costly but lifesaving medical care.

While most schemes focus on primary illnesses, in recent times tertiary illnesses have posed a larger threat in developing economies due to the large costs associated with treatment. To address these concerns, several state governments and the national government in India have introduced government-sponsored insurance schemes for financing medical costs for tertiary care. Table 1a provides a summary some of the recently introduced health insurance schemes in India.

However as per results from a survey we conducted amongst healthcare professionals, we find that lack of information and knowledge about the schemes is one of the primary reasons for lack of use of such insurance schemes. One of our respondents highlighted that literate individuals have a much higher probability of availing benefits of this scheme as they are better able to understand the information given to patients.

Our survey also revealed that often the insurance schemes are misused by hospitals by tweaking bills, providing unnecessary care, and illegally making richer patients eligible for the scheme. To reduce such misuse, some government schemes impose a ceiling on the maximum amount to be reimbursed for each treatment. However, according to a doctor who works for one of the leading private hospitals in Bangalore, this ceiling on reimbursement implies that patients often don't get the best treatment because price ceilings force doctors to treat using an inferior but cheaper method.

Despite the shortcomings in implementation of these schemes, universal insurance has shown to reduce incidence of poverty and improve health outcomes at least in the Indian context. For instance, a World Bank report (La Forgia and Nagpal, 2012) finds that over the last