



Insurance coverage and agency problems in doctor prescriptions: Evidence from a field experiment in China[☆]



Fangwen Lu

Renmin University of China, 59 Zhongguancun Street, Beijing 100872, China

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ABSTRACT

This study examines doctors' prescribing decisions using controlled hospital visits with randomized patient insurance and doctor incentive status. The results suggest that, when they expect to obtain a proportion of patients' drug expenditures, doctors write 43% more expensive prescriptions to insured patients than to uninsured patients. These differences are largely explained by an *agency hypothesis* that doctors act out of self-interest by prescribing unnecessary or excessively expensive drugs to insured patients, rather than by a *considerate doctor hypothesis* that doctors take account of the tradeoff between drug efficacy and patients' ability to pay.

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1. Introduction

China's health expenditures totaled over 220 billion US dollars in 2009, and both health insurance coverage and health expenditures are rising rapidly.¹ Understanding the relationship between insurance coverage and expenditures is thus a key policy question for China and other developing countries. Previous studies have found that health care spending is highly correlated with insurance provision, and some of them speculate that doctors' incentives for generating more drug sales may be one mechanism underlying the strong correlation (Wagstaff and Lindelow, 2008; Wagstaff et al., 2009).

Arrow (1963) identifies the principle-agent problem between patients and doctors as one of the fundamental market failures in the health care market. In China, doctors can pocket profits from selling drugs. As patients have limited knowledge about proper treatments, doctors may recommend treatments to increase their own income

rather than their patients' well-being. When patients have health insurance, doctors can leverage the greater ability to pay and prescribe further away from what is optimal for patients. This is an *agency explanation* for the increasing health expenditures under insurance coverage. Alternatively, doctors may hope to improve patients' well-being by taking into account both drug efficacy and their patients' ability to pay. This *considerate doctor hypothesis* can also drive up health expenditures under insurance coverage. The two hypotheses have opposite welfare implications: under the *considerate doctor hypothesis*, larger drug expenditures on insured patients represent improvements in treatment, although not necessarily in an efficient way; under the *agency hypothesis*, increased expenditures are associated with unnecessary or undesirable treatments. This paper provides the first in-field, experimental test of the relative importance of these two hypotheses.

To test these two hypotheses, it is crucial that we use a controlled field experiment rather than observational data. Observational studies are plagued by two endogeneity problems, involving which patients receive insurance coverage and which doctors have incentives to promote drug sales, and, more importantly, an identification problem due to the tendency that patients also respond to insurance. This study avoids these challenges by using controlled hospital visits with randomized insurance and incentives. In the experiment, the same patients were randomly presented as having insurance or not having insurance during hospital visits in Beijing, China. Doctors were randomly told either that the patient will buy drugs at the doctor's hospital (providing doctors with a financial incentive to prescribe more drugs)

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E-mail address: lufangwen@ruc.edu.cn.

¹ Author's calculations from WHO World Health Statistics (2011).

or that the drugs will be purchased elsewhere (eliminating the doctor's financial incentive, as drug sales elsewhere do not affect doctors' income). Testers describe health problems and communicate with doctors according to a standard script, thus eliminating different drug requests from patients due to insurance coverage.

The results demonstrate that doctors actively react to patients' insurance coverage when they have an incentive to do so, and provide strong support for the agency hypothesis, but little evidence for the considerate doctor hypothesis. When doctors are provided with an incentive to promote drug sales, prescriptions for insured patients cost 43% more on average than those for uninsured patients. Doctors prescribe more drugs and more expensive drugs to insured patients. Furthermore, doctors are more likely to prescribe unneeded drugs to the insured (64%) than to the uninsured (40%). In contrast, doctors without a personal financial incentive do not respond to patients' insurance status, which rules out the considerate doctor explanation. Doctors' personal incentives affect prescriptions to the insured patients, as usually predicted. Overall, this study shows that the interaction between insurance coverage and agency problems has significant impacts on medical expenditures, and that misaligned incentives contribute to rising health expenditures as insurance coverage expands.

Besides providing evidence on the separate effects of financial incentives and insurance coverage, this study explores the interacting effects of incentives and insurance, and tests whether it is doctors' self-interest or their concern for patients that leads to rising health expenditures under insurance coverage. The contributions are as follows.

First, it adds evidence to health agency literature (see McGuire (2000) for a review). Dalen et al. (2010) show that the treatment cost is lower if it is covered by the hospital whose doctors treat patients, rather than by the Norwegian national insurance. Currie et al. (2011) explore how patients' knowledge affects doctors' prescription of antibiotics and infer agency problems among Chinese doctors. They took a similar audit study approach as adopted in the current study — sending testers to see doctors. Rather than relying on indirect inference, the current study explicitly randomizes doctors' personal financial incentives, and provides evidence that is directly applicable to policy interventions to remove doctor incentives. In a subsequent audit study, Currie et al. (2012) further show that removing doctors' financial incentives has a stronger effect than does increasing patients' knowledge. Unlike the two studies by Currie et al., this analysis inspects the impact of health insurance, and especially how insurance coverage interacts with doctors' agency problems.

Second, this study provides insights into the effect of health insurance coverage on doctors' prescribing decisions. Due to the nature of observational data, most empirical evidence exploring the impacts of health insurance estimates the combined effects due to responses from both patients and doctors (Anderson et al., 2012; Card et al., 2008; Carrera, 2011; Lundin, 2000; Wagstaff and Lindelow, 2008; Wagstaff et al., 2009; Zweifel and Manning, 2000). However, understanding whether it is the doctor or the patient who is reacting to insurance coverage is essential for controlling rising health expenditures. Mort et al. (1996) and McKinlay et al. (1996) are exceptions that focus on doctors, but they explore doctors' reports of likely decisions rather than actual behaviors. This study explores actual hospital visits conducted in a standardized manner, and provides clean evidence on how doctors respond to a patient's insurance status.

Third, this study demonstrates a strong interacting effect between doctors' financial incentives and insurance coverage. It helps to explain the correlation between drug expenditures and insurance coverage. Agency problems are considered in many studies as a possible explanation for the rising drug expenditures associated with insurance coverage (Feldstein, 1970; Kessel, 1958; Wagstaff and Lindelow, 2008; Wagstaff et al., 2009). Two papers by Iizuka (2007, 2012) are closely related to the current study; they take into account both doctors' incentives and

patients' out-of-pocket costs, with one paper analyzing hypertension drug expenditures and the other exploring the choice of generic versus brand-name drugs. The controlled random experiment in the current study has two advantages over previous studies in exploring the interacting effects of insurance coverage and doctors' agency problems. One, this study eliminates differential patient requests, which makes it clear that the findings explain decision making by doctors rather than by patients. Two, the study randomizes doctors' incentives, which rules out other factors in explaining the correlation between doctors' incentives and their prescribing behaviors.

In addition, this study adds to the growing literature using audit studies. The audit study approach has been used in a wide range of contexts, including the job market, car sales market, car repair market, and sports card trading, as well as drug prescription (Ayres and Siegelman, 1995; Bertrand and Mullainathan, 2004; Currie et al., 2011; Kravitz et al., 2005; List, 2004; Schneider, 2012).

The paper proceeds as follows. Section 2 introduces the insurance scheme and doctor incentives in China. Section 3 presents the experimental design and the predictions tested. Section 4 describes the data, and Section 5 presents the main results. Section 6 discusses alternative interpretations. Section 7 summarizes the paper and draws conclusions.

2. Institutional background

In China, most outpatients are treated by doctors in hospital clinics, and drugs dispensed in hospital pharmacies accounted for 74% of drug sales in 2009 (Chinese Medicine Development Research Center, 2010). Drug sales account for 40–50% of all hospital revenues.² In Beijing, the government decides the type of drugs that hospital pharmacies can sell. The government also decides both the wholesale drug price and the retail drug price at hospital pharmacies. Because a type of drug can be produced by multiple firms in different packages, a price is specified for each drug-brand-package. Except at community-level clinics, hospital pharmacies are allowed to charge a retail price that is 15% higher than the wholesale price. This 15% mark-up is intended to compensate hospitals for operating costs, given that the government sets hospital visiting fees at a very low level (Liu et al., 2000; Yip and Hsiao, 2008). There are many other pharmacies outside of hospitals. Outside pharmacies face different wholesale prices and operating costs. The prices at outside pharmacies can be slightly below those in hospital pharmacies (usually not as much as 15% below), and sometimes the former can also sell drugs at higher prices.

Doctors tend to be salaried employees affiliated with hospitals, but their performance pay often depends on the revenues generated in their own hospitals (Tang et al., 2007). Kickbacks from pharmaceutical companies can provide further incentives for doctors to prescribe (Yip and Hsiao, 2008). It is important to note that doctors are usually unable to share profits from drug sales other than in their own hospital pharmacies. In most cases when they prescribe, doctors see the price for each drug-brand-package on their computer screen. The doctors specify the drug-brand-package combinations from the pharmacy inventory list, and pharmacists cannot change them.

There are several large public health insurance systems, which separately target rural residents, urban residents and employees, and government workers. Although they differ in terms of deductibles and copay rates, different insurance systems share several common features. First, the insurance authorities have limited ability to monitor the quality of health care (Wagstaff and Lindelow, 2008). Second, doctors are paid on a fee-for-service basis when treating insured patients, in the same manner as they are paid for treating uninsured patients. Third, the copay rates are usually the same for brand-name drugs and generic drugs.

² From <http://finance.sina.com.cn/roll/20110805/151410269229.shtml> (in Chinese).

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