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"Doctor my eyes": A natural experiment on the demand for eye care services

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ABSTRACT

Preventive health care is promoted by many organisations from the World Health Organisation (WHO) to regional and national governments. The degree of cost-sharing between individuals and the health care service affects preventive service use. For instance, out-of-pocket fees that are paid by individuals for curative services reduce preventive care demand. We examine the impact of subsidised preventive care on demand. We motivate our analysis with a theoretical model of inter-temporal substitution in which individuals decide whether to have a health examination in period one and consequently whether to be treated if required in period two. We derive four testable hypotheses. We test these using the subsidised eye care policy introduced in Scotland in 2006. This provides a natural experiment that allows us to identify the effect of the policy on the demand for eye examinations. We also explore socio-economic differences in the response to the policy. The analysis is based on a sample from the British Household Panel Survey of 52,613 observations of people, aged between 16 and 59 years, living in England and Scotland for the period 2001–2008. Using the difference-in-difference methodology, we find that on average the policy did not affect demand for eye examinations. We find that demand for eye examinations only increased among high income households, and consequently, inequalities in eye-care services demand have widened in Scotland since the introduction of the policy.

1. Introduction

Preventive health care is promoted by many organisations from the World Health Organisation (WHO) to regional and national governments. Preventive care can detect illnesses earlier, making them easier to treat or reducing mortality. The Grossman model (1972) provides a theory of the demand for health, but the model does not include uncertainty and this makes it difficult to distinguish between the demand for preventive and curative care (Kenkel, 1994). Okeke et al. (2013) propose a theory of demand for preventive care and (possible) subsequent treatment and apply this to study screening demand in Nigeria.

Many preventive care services require individuals to pay an out of pocket user fee. User fees are a positive price charged by providers to users at the point of delivery. Economically, the rationale for user fees is to improve allocative efficiency and act as a revenue collection mechanism (Stabile and Thomson, 2014). Existing empirical evidence indicates that the degree of cost-sharing influences the use of preventive services; in particular, that out-of-pocket fees borne by individuals reduce the demand for preventive care (e.g. cancer screening, vaccinations, etc.) by increasing the price paid by the individual at the time of consumption. The overwhelming majority of studies conducted in developed countries conclude that cost-sharing reduces demand for preventive services (Christensen, 1995; Friedman et al., 2002; Kiefe et al., 1994; Krůtilová, 2010; Lundberg et al.,1998; Nexøe et al., 1997; Solanki et al., 2000; Stoner et al.,1998). Similarly, for studies conducted in low- and middle-income countries (LMICs), the evidence suggests that the introduction or increase in user fees has almost and everywhere led to a decrease in utilisation (Schokkaert and Van de Voorde, 2011; Cohen and Dupas, 2010; Borghi et al., 2006; Souteyrand et al., 2008).

Economic theory further predicts that cost-sharing generates adverse distributional consequences as low income individuals reduce utilisation more than the remaining population. Most empirical studies find that user fees lead to a stronger reduction in utilisation among the poor (James et al., 2006) in both developed

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countries (Thomson et al., 2003) and LMICs (Sepehri and Chernomas, 2001). Thus, user fees threaten equality of access as poorer individuals may not always seek appropriate care or postpone necessary health care consumption.

Most studies focus on the cost of preventive care and its effect on demand, and ignore costs that arise from treatment required after screening. Okeke et al. (2013) provide a novel contribution by examining the impact of subsidising treatment costs on the demand for cancer screening in Nigeria. We further add to the literature by investigating how the removal of an out-of-pocket fee for eye tests influences the demand for testing when follow-up treatment costs are not covered and are borne by individuals.

This study contributes to the literature on demand for preventive care by exploring the effect on demand of subsidising preventive care to make it free at the point of delivery. We study the impact of subsidising preventive care in the context of demand for eye care services in Scotland. In 2006, the Scottish Government introduced a subsidised eye examination policy that provided examinations at private optometrists at no out of pocket cost to all individuals who are resident in Scotland. Previously, Scotland and the rest of the United Kingdom (UK) had the same eye care service, in which individuals paid for eye tests out of pocket at a private optometrist. In this paper, we examine the effect of the policy change in Scotland using difference in difference methods in which Scotland is the treated group and England is used as the control group. Our analysis provides empirical evidence about the determinants of preventive care demand.

The paper makes three contributions to the literature. First, we examine the issue of subsidising preventive care within a natural experiment framework. The subsidisation of eye examinations in Scotland is a transparent exogenous source of variation in the cost of preventive care that enables us to identify the control and treatment groups and explore the policy effect on the demand for eye examinations, using suitable econometric techniques on a large population-representative sample. The majority of studies in the preventive care literature either offer qualitative evidence or employ simple statistical analysis using small-size data sets (as discussed in Okeke et al., 2013). We find that on average the policy had no effect on the demand for eye examinations. Second, we explore how people of different socioeconomic status responded to the policy. We find that only higher income individuals increased their demand for eye examinations. This analysis provides useful information for policy makers and highlights how the policy has affected inequality in health care use. Third, we contribute to the wider debate about the benefits of universal subsidised health care when public spending is reduced. The remainder of the paper is organised as follows: in Section 2 we present a theoretical model and derive testable hypotheses for our empirical analysis, in Section 3 we discuss the natural experiment based on the eye examinations subsidy policy in Scotland and the data used in the empirical analysis, in Section 4 we present our empirical analysis and in Section 5 we conclude.

2. Theoretical framework

We model individuals' decisions to have a health examination using an inter-temporal choice framework (Okeke et al., 2013). The demand for health examinations is driven by individuals' demand to acquire information about their health status that may be useful for the detection and treatment of health conditions. The demand for health testing differs from the demand for health care. At the time of the decision to undergo an examination, the individual has an expectation about his/her health state, but does not have full information. Therefore, the individual is uncertain about the future benefit of the information they will receive from the examination.

We assume a two period model in which individuals derive utility from health and consumption. There are two health states "good health" and "bad health" with probability of each state being $1-p$ and p, respectively. In period one, the individual decides whether to have an examination or not. Depending on the outcome of the examination, the individual will undergo a treatment or not in period two. Without loss of generality, we can also assume that in period 1 all individuals have good health. The decision to have an examination involves some cost (c) that reflects both the financial cost and opportunity cost of time. The latter is important, because even if an examination is fully-subsidised individuals would still have to consider the time price of attending and "consuming" health care. Traditionally the opportunity cost of time is measured either as forgone labour income, if time is taken from paid employment, or cost of leisure time, if time is taken from non-labour time (Cauley, 1987; Janssen, 1992; Torgerson et al., 1994). A priori, it is not clear whether it is the people at the top of the income distribution or those at the lower part of the income distribution who are expected to have a higher opportunity cost of time. In relation to forgone earnings, individuals who are salaried workers should not face a wage reduction when attending for health care. However, hourly-paid workers and piece workers would lose labour-income. Therefore, one could hypothesise that the lower socio-economic groups potentially face a higher opportunity cost since they are more likely to be hourly paid or piece workers. One could come to the opposite conclusion when considering leisure time. The price of leisure time is the wage rate that people forgo by not offering to work. Hence, the opportunity cost of time should be higher for those high in the income distribution, since their leisure time costs more. In the paper, for the purpose of our analysis we acknowledge that there is an opportunity cost of time associated with attending health care, but do not make any further assumptions regarding its relative size between high and low socio-economic groups. When the examination predicts the bad health state in period two, the individual undergoes a treatment that also incurs some cost (s). Treatment is assumed to restore individuals' health to the good state.

To derive testable hypotheses, we assume that individuals have a utility function characterised by constant relative risk aversion and a risk aversion parameter equal to 1, so we assume a logarithmic functional form for the utility function. Following the tradition of state-dependent utility (Zeckhauser, 1970, 1973; Arrow, 1974; Viscusi and Evans, 1990), we introduce a multiplicative parameter for the individual's health status (u for good health state and v for bad health state). The logarithmic utility function is expressed as $u[log(Y)]$ for good health state and $v[log(Y)]$ for bad health state, where Y represents level of income. If we further assume that utility and the marginal utility of consumption are greater when the person is in a good health state, an assumption widely considered in the literature (Viscusi and Evans, 1990), then $u > v$.

Our framework can then be described as follows:

Person has health examination in period 1

$$\text{In period 1:} \quad U = ulog(Y-c) \tag{1}$$

$$\text{In period 2:} \quad U = p(max[ulog(Y-s),\ vlog(Y)]) + (1-p)ulog(Y) \tag{2}$$

Person does not have health examination in period 1