Japan and the World Economy 36 (2015) 56–66

Contents lists available at ScienceDirect

Japan and the World Economy

journal homepage: www.elsevier.com/locate/jwe

Subsidies for influenza vaccination, vaccination rates, and health outcomes among the elderly in Japan

Yoko Ibuka[a,*], Shun-ichiro Bessho[b]

[a] Graduate School of Economics and Management, Tohoku University, 27-1 Kawauchi, Aoba-ku, Sendai, Miyagi 980-8576, Japan
[b] Faculty of Economics, Keio University, 2-15-45 Mita, Minato-ku, Tokyo 108-8345, Japan

ARTICLE INFO

Article history:
Received 10 October 2014
Received in revised form 5 May 2015
Accepted 28 July 2015
Available online 7 August 2015

JEL classification:
H23
H75
I12
I18

Keywords:
Demand
Preventive care
Health production
Policy evaluation
Healthcare decision

ABSTRACT

Vaccination against infectious diseases produces externalities, and providing subsidies is one way of internalizing the externality. The effect of subsidies as a policy tool depends on individual's response to the cost of vaccine. However, there have been few studies on the effects of vaccine costs on vaccination uptake. Using regional variations in vaccination subsidy amount within Japan's current immunization program, we examined the impact of subsidies for the cost of influenza vaccine on the vaccination rates and on two health outcome measures. Our results show that an increase in the subsidy amount by 1,000 yen (10 USD) leads to a one percentage point increase in the vaccination rate among the elderly, suggesting that vaccination rate is responsive to the costs of vaccination. On the other hand, we found no substantial effects on health outcomes.

1. Introduction

Vaccination is viewed as an effective tool for protecting the elderly from serious and possibly life-threatening consequences of influenza infections. Consequently, governments and health authorities in many developed countries recommend the vaccination of elderly individuals for seasonal influenza (Haverkate et al., 2012; CDC, 2014; Members of the Western Pacific Region Global Influenza Surveillance and Response System, 2013). Under Japan's current national immunization program, the influenza vaccination is recommended only for elderly and high-risk individuals, and the vaccination costs for these individuals is subsidized through reimbursements provided by government authorities. However, unlike the United States, where Medicare Part B covers the entire cost of the influenza vaccination for the elderly (CMS, 2014), this vaccination in most areas of Japan is only partially subsidized. Moreover, the amount reimbursed to individuals is determined by each individual municipality, and therefore, varies with an individuals' place of residence (MHLW, 2010a). In 2010, one third of municipalities provided less than 2,000 Japanese yen (20 USD) per shot, while another one third provided 3,000 yen (30 USD) or more. These figures indicate that the amount of the subsidy varies considerably across municipalities.

In terms of economic theory, subsidies for vaccination as a governmental intervention are justified by externalities of vaccination. Vaccination against infectious diseases provides indirect, herd-protection effect to non-vaccinated individuals (Boulier et al., 2007). Optimal policies for vaccination programs, such as providing subsidies to internalize the externality, have been analyzed theoretically (Francis, 1997, 2004; Philipson, 2000). However, empirical evaluation of the effect of subsidy provision on vaccine demand or health outcomes has been limited (Kondo et al., 2009). The effect of subsidies as a policy tool depends on individual's response to the cost of vaccine, and hence to understand what extent the demand for vaccine is responsive to out-of-pocket costs is essential. One of the reasons for the lack of empirical research in this area is that national immunization programs usually set a single price for all the target population, which makes policy evaluations based on observational data difficult (Kondo et al.,

* Corresponding author.
E-mail addresses: ibuka@econ.tohoku.ac.jp (Y. Ibuka), bessho@econ.keio.ac.jp (S.-i. Bessho).

http://dx.doi.org/10.1016/j.japwor.2015.07.001
0922-1425/

2009). The regional variation in the subsidy amount in Japan, however, makes it possible to examine how differences in subsidy amount affect vaccination rates as well as influenza outcomes.

A few existing studies have shown that the cost of vaccination plays an important role in vaccine uptake mainly among children in low-income families and among the elderly (Ohmit et al., 1995; Rodewald et al., 1997; Yoo et al., 2010; Kondo et al., 2009; Ohkusa, 2005). Rodewald et al. (1997) found that vaccination rates in the United States were positively correlated with reimbursement of vaccination costs for children in low-income households. Similarly, Yoo et al. (2010) found that Medicaid reimbursement, which ranges from 8 to 18 USD, increased the vaccination rate by 6–9.2 percentage points in three-year study period.

Regarding influenza vaccination for the elderly, which is the target population of our analysis, three studies have examined the effect of the costs of, or subsidies for, flu shots on vaccination uptake. The first of these is that by Ohmit et al. (1995) for the United States showing that Medicare coverage, together with other public health interventions to promote vaccination, significantly increases vaccination coverage among the elderly population. The other two studies examine the effect of vaccination costs on the vaccination rate among elderly individuals in Japan (Kondo et al., 2009; Ohkusa, 2005). Their findings, however, are contradictory. Kondo et al. (2009) examined the response of demand for influenza vaccination to its price using panel data from the 2001/2002 to 2004/2005 influenza seasons using data from the survey with 300 individuals randomly selected, and found that the elasticity was nearly zero. They therefore argue that their results question the rationale for subsidies for influenza vaccination. By contrast, Ohkusa (2005), who examined the impact of out-of-pocket expenses for flu vaccination on vaccination rates using data collected in Tokyo and several large cities throughout Japan, found a significant negative correlation between vaccination costs and vaccination rates. Given the conflicting results, the purpose of this paper is to re-evaluate the effect of vaccination subsidies on vaccination rates, using the complete data covering the entire country.

Another motivation of this study is that few studies have examined the impact of vaccination subsidies on influenza outcomes. To our knowledge, no studies to date have evaluated the relationship between vaccination costs, vaccination behavior, and health outcomes simultaneously using regional-level data that covers the entire country. Our analysis focuses on the 2010/2011 influenza season in Japan.

2. Institutional background: influenza vaccination policies in the national immunization program[1]

The current Preventive Vaccination Law identifies the two groups for which vaccination is recommended: those aged 65 years and above, and high-risk individuals between 60 and 64 years old. For the high-risk group for whom influenza vaccination is recommended for, the first tier of local government in Japan, are both financially and logistically responsible for providing vaccinations. The Law permits municipalities to collect only the actual cost of the vaccine from individuals who are vaccinated, provided that their household incomes are above a stipulated threshold. Municipalities rarely receive subsidies from prefectures, the second tier of local government in Japan, or from the central government, for financing the vaccination program.[2] Therefore, the municipalities typically subsidize the cost of vaccination, with budgets allocated for such subsidies, and hence subsidy amount varying across municipalities. We utilize the variation in subsidy amount to examine the impact on vaccination rates as well as on health outcomes. The subsidies are paid either directly to health care providers or as reimbursements provided to individuals after they have been vaccinated, depending on the municipality and the type of healthcare facility that provides the vaccination. However, exact vaccine prices are not publicly available, and municipalities often deduct a fixed sum of the vaccine price and a part of administrative costs as the cost of vaccine. Subsidies can, therefore, be calculated as the difference between the total vaccination cost and the sum deducted. Our analysis focuses on this high-risk population.

For other, non-high risk individuals, influenza vaccination is not covered by their health insurance or government authorities and in general they have to pay out-of-pocket if they wish to get vaccinated. However, in 2010, approximately 11% of municipalities provided subsidies for influenza vaccination even for this group of the population in addition to the high-risk individuals. Furthermore, some employment-based insurance providers reimburse vaccination expenses, although insurance providers are usually not geographically specific. In both cases, the rate of subsidy depends on the policy of the municipality or the insurance provider. As a result, although Japan's health policy, as observed by Shibuya et al. (2011: 73) (Shibuya et al., 2011), in principle "is decided uniformly by the central government and with little discretion from the local governments," there is regional variation in terms of out-of-pocket expenses for influenza vaccination both for the policy's target group determined by the law and for other individuals.

3. Data

Our data on vaccination subsidies, vaccination rates, and control variables was collected at the municipal level,[3] while the data on influenza activity was observed at the health center level. Thus, our primary analysis focused on the large unit, the health center district, by merging all the dataset at the health center district level. For the variables that were collected at the municipal level, we calculated the weighted average of the variable across municipalities covered by each heath center with the population size as the weight. Among the 556 health center districts available, we used 531 observations with no missing values in all the key variables for our analysis.

3.1. Dependent variables

For our dependent variables, we used influenza vaccination rates among the elderly as well as two health outcome measures: influenza alerts and mortality rates. We considered the number of weeks during which an influenza alert was in effect as a proxy measure of the number of influenza patients. We also examined impacts of subsidies on mortality rates, given that the primary purpose of vaccination subsidies for the elderly is to avoid possibly life-threatening complications related to influenza infections for this vulnerable population (CDC, 2014).

3.1.1. Influenza vaccination rate

To calculate influenza vaccination rate, we used data from the "Report on Regional Public Health Services and Health Promotion Services 2013" produced by the Ministry of Health, Labour, and Welfare (MHLW, 2010b). This annual report includes data on the vaccination target population (number of persons) for each of the diseases listed in the Preventive Vaccination Law, and the number

[1] See Horita and Kaji (2008) for a history of influenza vaccination policy in Japan.

[2] However, in the case of low-income individuals, the vaccination is provided free of charge and municipalities are reimbursed by the central government through local allocation tax grants.

[3] The municipal data are organized on the basis of the delineation of municipalities as of March 31, 2010.