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Measuring the impact of Japanese local public hospital reform on national medical expenditure via panel data regression

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ABSTRACT

Local public hospitals (LPH) in Japan were established to secure equal accessibility and to improve quality for the health care system by providing policy-based medical services. Difficulties faced by the LPHs challenged the equal accessibility of the health care system and the improvement of their financial situation. We try to investigate the impact of LPH burden on the health care system and attempt to repair the problems confronting LPHs in order to attain the higher health care quality based upon the technology innovation. Panel data regression is used to analyze the effect of proportion of LPH beds and an indicator of LPH burden on hospital personnel numbers and also on estimated national medical expenditure (ENME) using the data from 2005 to 2010 for 47 prefectures in Japan. Hospital personnel, a major supply-side indicator, increased more in prefectures shouldering smaller burden of LPH beds. Prefectural ENME, an important demand-side indicator composing of medical expenditure based on the location of medical facilities, tends to decrease with increasing prefectural LPH burden. The results indicate that patients in the prefectures carrying more LPH burden tend to seek health care in the prefectures bearing less LPH burden during the research period. These imbalances substantially increase after the LPH reform.

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1. Introduction

Finance strategy and delivery system are two major essential aspects for improving the health care quality and its system in Japan. The success of Japanese health care system is considered as a result of an appropriate balance of these two aspects (Hashimoto et al., 2011; Ikegami et al., 2011; Shibuya et al., 2011). Namely, Japanese hospitals have been struggling to deliver qualified care while dealing with financial challenges. On the one hand, the publicly financed universal health coverage has been established since 1961 (Ikegami et al., 2011). In 2011, the whole population was covered by 5 major health insurance schemes and approximately 3500 insurers which share the same co-payment structure (MHLW, 2013). All prices of medicine, devices and medical care services are tightly regulated by the government using a nationwide unified fee schedule. All providers, both private and public, deliver the same services at the same prices under the fee schedule. Furthermore, the high-cost medical care program was established to mitigate the medial cost burden of household when its expenditure exceeds certain limit (KEMPOREN, 2013). This system guarantees all residents have access to necessary and adequate medical services (Jeong and Hurst, 2001; Jones, 2009) Budget constraints for patients are substantially reduced when they look for health care.

On the other hand, the Local Public Hospitals (LPH) were constituted to ensure that health care could be equally delivered to residents in need. In Japan, the private sector dominates the health care system, accounting for >80% of hospitals and 70% of beds nationwide. The nature of the private sector leads private medical facilities to pursue "profit" rather than public functions (Jones, 2009; Zhang and Oyama, 2016). The Japanese government considers LPH system as an important countermeasure against increasing regional disparity in health resources by providing the government subsidized policy-based medical services (PBMS). The PBMS includes high-tech medical care, emergency services, health care in less densely populated and remote areas and other non-profitable medical care services, services which private medical facilities are either unwilling or unable to provide. The LPHs have been playing an important role such as promoting technology innovation and more advanced technologies in order to attain higher health care quality for the system.

During the first decade of the 21st century, the soundness of the Japanese health care system was challenged by the recession of economy (Takeda, 1995) and a number of problems in the LPH system high operating costs, huge debt, unfavorable management and substantial brain drain (Matsuda, 2008). Some local governments had to reorganize, downsize or even close LPHs to reduce their financial burden. This situation aggravated regional imbalances in health care resources and impaired equal access of the health care system. In late 2007, a LPH reform was implemented by the Ministry of Internal Affairs and Communications (MIC). From technological viewpoints we can say

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that the LPH reform has been an LPH innovation. Multiple measures were included in the reform, aiming to tackle not only the management problems of LPHs but also imbalances in health care resources.

Many studies have investigated policy impact on management and efficiency of LPHs (Besstremyannaya, 2011, 2012; Kawaguchi et al., 2014; Matsuda, 2008). The effect of LPH burden on the health care system, however, is largely neglected. This study primarily examines the LPH burden on supply and demand in local health care system in Japan, using proxy variables such as proportion of LPH beds given as an indicator to measure LPH burden for local governments, hospital personnel given as an important supply-side factor of health care systems, and national medical expenditure given as a major demand-side factor, using data from 2005 to 2010 for 47 prefectures of Japan. Administrative divisions of Japan consist of 47 prefectures, in which the national capital Tokyo and two metropolitan prefectures Kyoto and Osaka are included.

2. The LPH system and national medical expenditure in Japan

2.1. The LPH system

LPHs, a type of Local Public Enterprise (LPE) owned by local governments or Local Independent Administrative Corporations (LIAC) (Tanaka, 2010), are established to secure necessary and adequate health care for all residents across the nation. The LIAC was established by local governments to carry out projects related to public benefits based on the Local Independent Administrative Corporations Law. Legal status of the LIAC makes it more independent of local governments. According to the 2011 data from the Ministry of Health, Labour and Welfare (MHLW), only 11% of all hospitals and 13% of all beds nationwide were operated by LPHs that year. The LPHs, however, engaged intensively in different types of PBMS. For example, LPHs accounted for 67.8% of designated hospitals serving remote areas, 40.9% of emergency centers, and 39.6% of regional perinatal medical centers. These PBMSs are usually subsidized by central and local governments.

Local governments faced both a huge deficit from LPHs and a problem persisting for a number of years and worsening since 2000. In 2008, local governments were required to publicize their financial indicators based on consolidated accounting statements with LPEs including LPHs. Some local governments with large deficit from LPHs would face the risk of financial failure, which would necessitate direct control by the MIC. In late 2007, the MIC launched the LPH reform as a measure to deal with problems in LPH management and with increasing regional disparities in health care resources.

To improve the management of LPHs, the guideline of the reform required first, all local governments should monitor and publicize key performance indicators of their LPHs; second, local governments should initiate the organizational reform for LPHs. The daily management of LPHs was outsourced, a designated manager system was introduced and corporatization given by a transfer from LPE-owned to LIAC-owned or privatization of LPHs was performed by some local governments. To secure equal accessibility while retaining the balance of financial burden on local governments, the guideline stipulated that local health care systems should be reorganized by concentrating beds in well-functioned "magnet hospitals" and building "satellite clinics" to improve the quality of care and to secure health care for remote regions. The guideline also stipulated that LPHs whose occupancy rate was <70% in the three most recent years should reduce the number of beds or be downsized to clinics (MIC, 2007).

The number of total beds decreased from about 1,631,000 to 1,593,000 during the period from 2005 to 2010. The percentage of LPH beds is defined to be the percentage of LPH beds to total number of beds in Japanese hospitals and also it can be a quantitative indicator of LPH burden of local governments. The average percentage of LPH beds for all prefectures in Japan decreased from 18.09% to 17.53% during the above period. The percentage of LPHs operating with a surplus increased from 25.5% in 2006 to 52.3% in 2010, and annual deficits sharply decreased from >190 billion yen to minus 5.6 billion yen (surplus) during the same period (MIC, 2010).

Though financial performance and efficiency of LPHs improved after the reform, some scholars argue that the effect of the reform might have been driven by significant government subsidies and that those effects disappeared with the subsequent decrease in government subsidies (Kawaguchi et al., 2014). Concerns also arose about compromised accessibility of health care system after the reform (Matsuda, 2008).

2.2. National medical expenditure in Japan

Prices of medicine, devices and medical care services in Japan are controlled by the government using a national unified fee schedule. The government could adjust national medical expenditure (NME) by weighing economic and political factors and expected demands by means of a biennial revision of the fee schedule (Jones, 2009; Shibuya et al., 2011). As shown in Fig. 1, prices under the fee schedule were reduced in four consecutive revisions since 2000. Subsequently, revision rates started to increase in 2008 (the revision rate for medical service prices was increased this year). The revisions had a great impact on NME. For example, the annual NME growth rate increased to >3.0% in the period from 2009 to 2011 compared to <2% at the beginning of the 2000's. The proportion of NME in the GDP increased from 6.0% in 2000 to 8.2% in 2011 (MHLW, 2013).

When referring to the term NME in the Japanese setting, caution is required, since the statistic Total Health Expenditure (THE) used among OECD countries is often translated as *Kokumin Iryohi*, which means national medical expenditure. However, these two statistics are different. NME refers to total medical payment, including co-payment, for services covered by the health insurance schemes, which are tracked by the unified national payment system, while THE includes not only payments for items covered by the health insurance but also expenditures for items not covered such as OTC drugs, medical check-ups and some dental services.

The difference in scope between NME and health insurance coverage is shown in Fig. 2. The costs in the area inside the bold line are paid by health insurance. Some health costs such as those related to accidents are not covered by health insurance but are still considered part of NME, while maternity and childbirth expenses are covered by health insurance but are not considered part of NME.

The MHLW publishes estimated NME (ENME) and settled NME (SNME) annually. Prefectural ENME is composed of medical expenditure on the basis of medical facility location, while prefectural SNME is medical expenditure based on the patient place of residence and is estimated every three year by the MHLW. There is one further difference between SNME and ENME: SNME includes medical expenditure covered by accident insurance, medical expenditure for some items not covered by health insurance and transportation fees.

3. Panel data regression model analyses for national medical expenditure

3.1. Data and variables

We use a sampling panel data covering 47 prefectures in Japan from 2005 to 2010. The data were compiled from reports and surveys of the MHLW and MIC. The sources and definitions of variables are shown in Table 1 below.

The *STAFF* and *BED* in this study only refer to those in hospitals which are defined as medical facilities with 20 or more beds. We use *ENME* as a proxy variable of prefectural medical expenditure, and deflate the monetary variables, *ENME* and *INCOME*, using the consumer price index with that for 2010 set as 100 (see Fig. 3). In

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