Regional Equalization and Stabilization in the Japanese System of National Health Insurance*

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Abstract

In this study, after introducing the Japanese system of the National Health Insurance (NHI), I quantify the effects of transfers within the NHI system on the nexus between NHI medical benefits (which reflect aggregate health care demand within a municipality) and NHI premiums (which reflect the fiscal burden on the insured in a municipality). In particular, I examine (i) how transfers equalize revenue requirements on the insured among municipalities, and (ii) how they tame volatility in regional medical demand.

1. Introduction

The Japanese system of public health insurance is administered by multiple insurers, which are broadly grouped into employment-based and residence-based insurance. The National Health Insurance (NHI) is the residence-based public health insurance in Japan where municipalities, as its insurers, cover those who are excluded from employment-based insurance. The NHI may be comparable to the pre-1992 regional sickness funds in Germany or to the pre-2000 health insurance societies for the self-employed in Korea, both of which are categorized as following the “traditional” German model (Hwang 2008). However, the German sickness funds became “competitive” in 1992, where the insured can choose among different sickness funds, and the number of the funds was reduced from 269 in 1993 to 17 in 1999 (Bärninghausen and Sauerborn 2002). Meanwhile, Korea transformed its multi-payer system into a single-payer system in 1999 (Kwon 2003, Jeong and Ryu 2012). Thus, the NHI in Japan is arguably the only non-competitive multiple payer system that exists among OECD countries today.

Hussey and Anderson (2003) argue that a multi-payer system has disadvantages over a single-payer system, in that the former tends to be less effective in collecting revenues, controlling costs, and subsidizing health care for the poor. More importantly, it is less effective in pooling health risks. According to the law of large numbers, health risks, which are unpredictable at the individual level, tend to be more predictable as the group size becomes larger. Since the NHI currently consists of more than 1,700 municipalities as its insurers with small average enrollments, it cannot effectively spread health risks without

* This study substantively reformulates the analysis by Hayashi and Honma (2012) and offers new analysis based on the updated data that were not exploited by the latter study.
any inter-municipal transfers. In addition, the municipal NHI enrolls a riskier population than the other type of public health insurance, which is employment-based, enrols. To counteract such disadvantages, the NHI has layers of transfers that involve multiple levels of government as well as different groups of public health insurance. Such transfers are arguably expected to equalize the municipal capacity to cope with different levels of regional health demands. At the same time, they are also expected to stabilize changes in revenue requirements that correspond to volatile changes in medical demand which are often expected in small size municipalities.

The aim of this study is twofold. First, I introduce and describe the rather complicated system of public health insurance in Japan, with emphasis on the NHI. Second, I try to quantify the effects of fiscal transfers on the nexus between NHI medical benefits (which reflect aggregate health care demand in a municipality) and NHI premiums (which reflect the fiscal burden on the insured in a municipality). In particular, I examine (i) how transfers equalize revenue requirements on the insured among municipalities, and (ii) how they tame volatility in regional medical demand within a municipality.

Both equalization and stabilization through interregional transfers have been a focus of empirical studies in fiscal federalism (e.g., Mélitz and Zumer 2002). The current study is, however, different from the previous literature. While the existing studies focus on the nexus between gross income and consumption, I examine the links between regional health demands and premium revenues: shocks occur to NHI medical benefits, and the target to be smoothed or equalized is NHI premiums. “Stabilization” here involves providing municipalities with a more stable flow of revenue, and preventing large changes in premium collections that are imposed on local residents. Even if such fiscal transfers are effective in smoothing changes in the local burden, however, they may not necessarily be so in equalizing the level of the burden. If there is a large disparity among health demands across municipalities, there may also be a large disparity among the fiscal burden that local residents have to pay. Therefore, I also examine the role of fiscal transfers (as well as other measures) in rectifying such disparities. Note that I use “stabilization” instead of “risk sharing,” and “equalization” in place of “redistribution” because a substantive portion of the transfer payments are financed from outside the NHI system. In other words, neither risk-sharing nor redistribution is complete within the system. We could only refer to risk sharing or equalization when regional risk-sharing as well as redistribution concerns all the insured who are enrolled not only in the NHI but also in the other public health care programs.

The structure of this paper is as follows. After describing the institutional background of the Japanese public health insurance (Section 2), I explicate some institutional details about the NHI system, as well as the issues that the system faces (Section 3). Then, I analyze the equalizing as well as smoothing effects within the NHI system, and discuss the results (Section 4). Finally, I conclude the study (Section 5).
2. Public Health Insurance in Japan

2.1. Health Care Service Provision

Public health insurance in Japan covers medical services and prescribed drugs as standardized by law. Except for some special medical treatments, the coverage is quite broad. Any person of comparable characteristics can receive standardized medical services and drugs prescribed by doctors at identical prices (co-payments), regardless of the type of public health insurance they belong to. There are no differences in the co-payments or coverage for medical services, whether they are provided by clinics or hospitals, both private and public. Patients are free to choose any medical service providers regardless of location, facility type or other factors such as having referral or not.1 The same applies to prescribed drugs sold by pharmacies. In standard cases, the public health insurance covers 70 percent of medical costs (i.e., co-payments are 30 percent). There are special reductions in co-payments for specific groups, with 10 percent for those aged 70 and older with incomes below a given level, and 20 percent for children younger than 6 years old. In addition, there are ceilings on co-payments for catastrophic expenditures: the threshold for monthly co-payments is tiered into three stages according to household income, and a one-percent co-payment is levied for the amount above the threshold.

In most cases, providers are paid for medical services and drugs they provide (i.e., retrospective payment).2 The central government sets the fee schedules for medical treatments and medicines that public insurance covers. According to the fee schedule, the providers collect co-payments directly from their patients, and obtain reimbursements from the insurers as residual medical costs. Every month, the providers submit the claims for the costs of patient care in the previous month to obtain reimbursements. The fee schedules are examined every two years, and revised as necessary. Insurance benefits as the reimbursements to the medical providers are financed by premiums and taxes. When all the insurance programs are combined, premiums, taxes, and co-payments covered 48.5, 38.1, and 12.7 percent of the total medical expenditures in 2010.

2.2. Public Health Insurance

Table 1 summarizes the system of public health insurance in Japan.3 The system consists of two schemes which cover different groups of households. The first is an occupation-based scheme called the Employees’ Health Insurance (EHI). The EHI is a

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1 However, patients pay an additional fee if they choose to receive medical services at designated, usually large-scale, hospitals without a referral issued by a non-designated clinic or hospital.
2 The 2006 reform introduced package payment for the medical treatment of the elderly with the hope of limiting the number of longer hospital stays. For a complete picture of the Japanese health care system, see Tatara and Okamoto (2009).
3 For a more complete picture of the Japanese social protection system, see Hayashi (2010).
generic term for multiple health insurance programs that cover employees and their dependents. Each program is managed by work-place based associations formed by employers and employees in private firms with five or more employees. The premiums for the EHI differ among the programs. They are levied as a fixed percent of employees' entire annual earnings that is paid equally by employers and their employees. There are four types of EHI programs. First, the EHI programs for employees of large firms and their families are called Association-managed Health Insurance (AMHI). A single firm with more than 700 employees is eligible to establish an AMHI. Multiple firms can also form an association if their combined number of employees exceeds 3000. Second, the Japan Health Insurance Association (JHIA) manages an EHI program for employees (and their families) not covered by AMHI programs. Third, the JHIA also manages the Seamen’s Insurance, which covers mariners and their family members with benefits in the event of sickness, injury, childbirth, death and unemployment. Lastly the Mutual Aid Association (MAA) manages EHI programs for national government employees, local government employees and employees at private educational institutions (schools and universities). Such three programs are respectively called the National Government Employees’ Mutual Aid Association, the Local Government Employees’ Mutual Aid Association and the Private School Teachers and Employees’ Mutual Aid Association.

The other is the NHI, which is residence-based. In the NHI, municipalities are the insurers which cover residents who are excluded from the EHI. The system is therefore residual by construction. The insured typically include the self-employed, farmers, retirees, the unemployed, small firms’ employee, and their dependents. The premiums for the NHI differ among municipalities and are based on personal income, household assets, and the number of family members. Individuals with specific occupations (such doctors, dentists, and lawyers) in the same prefecture can opt out of the municipal NHI programs to form an NHI Association to manage their public insurance programs.

The elderly (those aged 65 or above) are managed differently. Previously, the EHI covered dependent elderly whose family members were enrolled in the EHI. The NHI covered the other types of the elderly. With medical costs for the elderly rapidly increasing, however, the central government set up the Elderly Health Care Service (EHCS) in 1983. While keeping the elderly within the existing public health insurance to collect their premiums as before, the EHCS additionally financed half of the medical costs for those aged 70 and above (or aged 65-69 if they are bed-ridden or disabled) from the central taxes (20 percent), prefectural taxes (5 percent), and municipal taxes (5 percent) as fiscal transfers from different levels of government. It financed the other half from a cost-sharing scheme among all the public health insurance programs, along with said co-payments paid

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4 The JHIA insurance was formerly called the Government-managed Health Insurance (GMHI) and administered by the (now-defunct) Social Insurance Agency. In October 2008, the GMHI was revamped into the JHIA insurance which is managed by the JHIA, a new independent administrative agency whose functions are defined by national law.
by the elderly. In 2002, the co-payment rate for the high-income elderly (70 and above) was raised from 10 to 20 percent. In 2006, the rate for the rich elderly was again increased to 30 percent in 2006. Finally in 2006, the rate for those aged 70-74 was increased from 10 to 20 percent.

In April 2008, the Health Care Service for the Old-Old (HCSOO) replaced the EHCS for those aged 75 and above (called “old-old”). A large-area union which consists of all municipalities within a prefecture manages the HCSOO with premiums that differ among prefectures. The old-old pay 10 percent co-payments, while 30 percent is still applied to the high-income elderly. The HCSOO finances medical costs from premiums (10 percent), a cost-sharing scheme among public health insurance programs (40 percent), national taxes (100/3 percent), prefectural taxes (25/3 percent), and municipal taxes (25/3 percent). At the same time, the Health Care Service for the Young-Old (HCSYO) started covering those aged 65-69 (called “young-old”). However, it virtually follows the EHCS scheme. As before, the young old continue to pay premiums for their public health insurance programs while municipalities finance medical costs with taxes and cost sharing among the insurers. In other words, the 2008 reform has effectively separated the old-old from the then-existing EHCS and the NHI.

Table 1. Public Health Insurance in Japan

<table>
<thead>
<tr>
<th>Institutional Type</th>
<th>Insurer/Managing Organization</th>
<th>Coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employees’ Health Insurance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>JHIA-managed</td>
<td>Japan Health Insurance Association (1)</td>
<td>35 million</td>
</tr>
<tr>
<td>Association-managed</td>
<td>Employees’ health insurance associations (1,473)</td>
<td>30 million</td>
</tr>
<tr>
<td>Seamen’s Health Insurance</td>
<td>Japan Health Insurance Association (1)</td>
<td>1.4 million</td>
</tr>
<tr>
<td>Mutual Aid Association</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Central Government Employees</td>
<td>Mutual aid associations (21)</td>
<td></td>
</tr>
<tr>
<td>Local Government Employees</td>
<td>Mutual aid associations (54)</td>
<td></td>
</tr>
<tr>
<td>Private School Teachers &amp; Employees</td>
<td>Private School Teachers and Employees Association</td>
<td></td>
</tr>
<tr>
<td>National Health Insurance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Municipalities (1,723)</td>
<td></td>
<td>36 million</td>
</tr>
<tr>
<td>National Health Insurance Associations (165)</td>
<td></td>
<td>34 million</td>
</tr>
<tr>
<td>Health Care Service for the Old-Old</td>
<td>Prefecture-wise large area unions (47)</td>
<td>14 million</td>
</tr>
</tbody>
</table>

Note: The figures are as of March 31, 2010.

Sources: Documents provided by the Ministry of Internal Affairs and Communication.
3. The National Health Insurance

3.1. Brief History

While Mutual Aid Associations had already started to cover some of the population of public-sector employees from 1905, public health insurance for the private sector started with the EHI in 1927. Built on the German model, the EHI covered those employed in private businesses. Programs for those employed by large firms (with more than 300 employees) are managed by company-based associations and those for small firms are managed by the government, respectively. The EHI initially covered only blue-collared workers in businesses with ten or more employees, who made up only 3.2 percent of the population. The coverage was expanded to firms with five or more employees in 1934, to white-collar workers in 1937, and finally to the dependents of employees in 1941.

While it had existed since 1938, the current form of the NHI was introduced in 1959, and an amendment to the National Health Insurance Act mandated that all municipalities join the NHI by April 1961. With this reform, the NHI covered those who are excluded from any other forms of public health insurance, which attained universal coverage by public health insurance, at least nominally. Municipalities finance the NHI benefits from (i) premiums, (ii) savings in the special account, and (iii) transfers from their general accounts and the upper levels of government, in addition to those from cost-sharing schemes. The NHI premiums are based on a schedule that varies according to annual household income, household assets, and the number of household members. Usually, the premiums are partially or completely exempted for low-income households. Municipalities are free to set their own schedules, which result in different premium schedules across municipalities. In addition, many municipalities change their schedules almost every year. In principle, they set the premium schedules so that revenues balance expenditures in the NHI special account on annual basis.

3.2. Transfer Payments

Layers of transfer schemes help municipalities manage their NHI. First, there are transfers from the general budget of the national government. The Medical Benefit Subsidy matches a proportion of the combined amount of (i) the NHI medical benefits with the exclusion of some specified items, and (ii) the contributions to the NCSOO, the NCSYO and the LTCI. The matching rate has been 32 percent since 2012, after its reductions from 40 to 36 percent in 2005 and to 34 percent in 2006. In addition, the Catastrophic Expense Subsidy matches 25 percent of municipal contributions to the Catastrophic Expense Sharing (CES), a cost-sharing program for catastrophic expenses. Furthermore, the Health Promotion Subsidy shares one third of the costs of municipal health promotion programs. Lastly, the Adjustment Grant addresses the fiscal disparities among municipalities.

Second, prefectural governments also support municipalities as the central government
does. The major components of the prefectural transfers parallel their central counterparts. The Prefectural Catastrophic Expense Subsidy matches 25 percent of municipal contributions to the CES; the Prefectural Health Promotion Subsidy bears one third of municipal health promotion expenditures; and the Prefectural Adjustment Grant, introduced at the prefectural level in 2005, addresses disparities among municipalities within a prefecture.

Third, there are two types of cost sharing schemes. One type consists of two programs among municipalities that operate within a prefecture. Grants from the CESP cover medical costs in excess of ¥800,000 per receipt for the insured aged below 65. The grants from the Fiscal Stabilization Program compensate medical expenditures between ¥300,000 and ¥800,000 per receipt. These two are funded by contributions from municipalities within a prefecture. The other consists of two nation-wide cost-sharing schemes to which all the insurers in the country are required to contribute. The Medical Expense Grant for the Young-Old, i.e., a transfer from the cost sharing scheme in the HCSYO, subsidizes the benefits paid for by those aged 65-74. Since the NHI provides medical benefits to those aged 65-74, transfers that municipalities receive from the HCSYO usually exceed municipal contributions to the scheme. In addition, the Medical Expense Grant is financed from contributions from EHI insurers to cover the retired who used to be enrolled in the EHI but are now covered by the NHI.5

Lastly, municipalities make intra-municipal transfers from their general accounts. Such transfers consist of two types. The first are institutionalized intra-municipal transfers to the NHI account. Their major components consist of those which (i) compensate revenue losses due to premium relief and/or exemptions for the poor, (ii) match 50 percent of a part of medical benefits in excess of the standardized benefits that municipalities cannot contain even with possible cost-reduction measures, and (iii) cover increases in benefit payments in special circumstances that municipalities cannot control. The Local Allocation Tax (LAT), the largest general transfer to localities in Japan, allows for the funds of these intra-municipal transfers: the LAT grants compensate the expenditure in the general account for these intra-municipal transfers. The second are discretionary intra-municipal transfers which are intra-municipal transfers other than institutionalized counterparts. Since the premium schedules do not balance the NHI budget, such intra-municipal transfers arguably function as ex-post transfers that fill deficits in the NHI accounts when other types of funding are not available.

3.3. Fiscal Disparities and Instabilities in the NHI

Despite these layers of fiscal transfers to help municipal NHI programs, large disparities exist among municipalities. The characteristics of the insured by the NHI have

5 Note that there is another inter-institution cost sharing scheme for the HSCO0 contributed by every insurer in the public insurance system, including the municipal NHIs.
changed (and are changing) unfavorably against their insurers. The NHI typically covers the self-employed, farmers, employees of smaller firms, retirees, and the unemployed. As seen in Table 2, while the self-employed and farmers occupied about 70 percent in 1960s, their recent shares are less than 20 percent. Those who are out of the labor market in the NHI increased from 9.4 percent in 1962 to 40.8 percent in 2010. This is partly due to aging in the country, which has increased the number of retirees who are yet to be covered by the HCSOO. Furthermore, changing employment practices in the past two decades have increased the number of the involuntarily unemployed or the low-income labor force to more than 40 percent (note that the latest share was reduced from the 2000 level due to the introduction of the HCSOO in 2008).

The changing composition of NHI subscribers implies that the insured in the NHI program will be riskier and poorer than those in the EHI program. More unhealthy (riskier) subscribers will lead to increases in medical needs. As subscribers become poorer, there would be a decline in premium collections due to premium exemptions. Furthermore, many municipalities are too small to pool risk. For example, a half of municipalities have less than 7,800 enrollments, and a quarter of them have less than 3,100. In such municipalities, expensive medical treatments on a small number of patients may fiscally destabilize the NHI finances. In addition, the uneven spatial distribution of the poor and the unhealthy will lead to an uneven distribution of NHI premiums and expenditures, as we will see below.

Table 2. Trends in the Composition of Municipal NHI Subscribers

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Aged 65-74 (%)</td>
<td>4.8</td>
<td>5.0</td>
<td>12.4</td>
<td>17.5</td>
<td>24.1</td>
<td>29.7</td>
<td>29.6</td>
</tr>
<tr>
<td>Farmers (%)</td>
<td>44.7</td>
<td>42.1</td>
<td>13.5</td>
<td>9.0</td>
<td>5.5</td>
<td>4.4</td>
<td>3.1</td>
</tr>
<tr>
<td>Self-employed (%)</td>
<td>24.2</td>
<td>25.4</td>
<td>30.1</td>
<td>24.7</td>
<td>18.3</td>
<td>14.9</td>
<td>15.5</td>
</tr>
<tr>
<td>Employees (%)</td>
<td>13.9</td>
<td>19.5</td>
<td>28.7</td>
<td>23.6</td>
<td>24.1</td>
<td>24.0</td>
<td>35.3</td>
</tr>
<tr>
<td>No jobs (%)</td>
<td>9.4</td>
<td>6.6</td>
<td>23.7</td>
<td>38.1</td>
<td>49.5</td>
<td>53.8</td>
<td>40.8</td>
</tr>
<tr>
<td>Others (%)</td>
<td>7.8</td>
<td>6.4</td>
<td>4.1</td>
<td>2.3</td>
<td>2.6</td>
<td>2.8</td>
<td>5.2</td>
</tr>
<tr>
<td>Households with no income (%)</td>
<td>8.0*</td>
<td>n.a.</td>
<td>15.1</td>
<td>20.8</td>
<td>25.4</td>
<td>27.1</td>
<td>25.6</td>
</tr>
</tbody>
</table>

Note: * indicates the data for 1961.
Sources: Report on the State of the National Health Insurance (relevant years)

4. Equalization and Stabilization Effects

The analysis below examines how fiscal disparity and instability among the insurers in the NHI system are accommodated (or not accommodated), using the data from the NHI special accounts for all the municipalities during fiscal years 2002-2010. In particular,
what follows examines how fiscal disparities and instabilities in medical benefits have been tamed through changes in transfers and other fiscal measures by using the identity derived from the municipal NHI account:

\[
\text{Medical benefits} = \text{Premiums + Transfers + \left( \text{Other net Revenues} + \text{Inter-temporal Adjustments} \right)}
\]

(1)

In the identity above, “transfers” includes all transfers at the central, prefectural, and intra-municipal levels; (iii) “inter-temporal adjustments” consists of “provisions from reserves,” “debt issues” and “surpluses” net of “addition to reserves” and “debt-service payments”; and (iv) “other net revenues” equals the remaining miscellaneous revenues minus the remaining miscellaneous expenditures. All the variables are on a per subscriber basis.

The effects of these four items should change over the years in the 2000s since, as summarized in Table 3, there were a series of changes in fiscal measures for the NHI in the 2000s. Table 4 shows the shares of the four items among medical benefits from FY 2002-2010, aggregated over all municipalities. The premiums and transfers (net) together share almost all proportions. However, their values have changed over time. As time passed, while the share of premiums decreased from 50 percent to 25 percent, the share of transfers increased from 46 percent to 75 percent. In addition, the share of inter-temporal adjustment also decreased from five percent to one percent. These are apparently due to the institutional changes in the 2000s.

### Table 3. Major Institutional Changes in the NHI System during the 2000s

<table>
<thead>
<tr>
<th>FY 2000</th>
<th>Municipalities started to levy premiums for the Long-term Care Insurance (LTCI) through their NHI accounts and transfer the proceeds to their LTCI accounts.</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY 2002</td>
<td>The matching rate of the Catastrophic Expense Subsidy (CES) has changed to 25%. Co-payments for the insured aged less than 3 years increased to 20% and those for the elderly aged 75 or older to 10%. The Ministry of Health, Labour and Welfare (MHLW) changed the medical fee system.</td>
</tr>
<tr>
<td>FY 2003</td>
<td>The ceiling on catastrophic medical expenses to which both central and prefectural CES applied was reduced from JPN¥800,000 to JPN¥700,000, resulting in a decrease in CES transfers.</td>
</tr>
<tr>
<td>FY 2004</td>
<td>The MHLW changed the medical fee system.</td>
</tr>
<tr>
<td>FY 2005</td>
<td>The matching rate of the Medical Benefit Subsidy decreased from 40% to 36%. The aggregate coverage of the Adjustment Grant was reduced from 10% to 9%. The Prefectural Adjustment Grants was introduced. The matching rate of a prefectural grant for one type of municipal transfer to the NHI special account was increased from 25% to 75%.</td>
</tr>
</tbody>
</table>

Source: Author’s descriptions based on various government documents.
Table 3. Major Institutional Changes in the NHI System in the 2000s (continued)

| FY 2006 | The central matching rate for Medical Benefit Subsidy decreased from 36% to 34%. The matching rate for the Prefectural Adjustment Grant increased from 5% to 7%. The medical benefits for hospital stays and meals were reduced. The co-payments for the high-income elderly increased from 20% to 30%. The Prefectural Cost Sharing Program was set up for catastrophic medical expenses that are more than JPN¥300,000. The MHLW changed the medical fee system. |
| FY 2008 | Those aged 75 years and above who had been enrolled in the NHI became covered by the HCSOO, virtually separating them from the NHI. An equalizing scheme for medical expenses of those aged between 65 and 75 years in among social insurance schemes (including both the NHI and EHI) was introduced. The MHLW changed the medical fee system. |

Source: Author’s descriptions based on various government documents.

Table 4. Shares of Items in the National Health Insurance (NHI) Special Accounts

<table>
<thead>
<tr>
<th></th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Premiums</td>
<td>49.8%</td>
<td>55.2%</td>
<td>48.2%</td>
<td>45.6%</td>
<td>43.1%</td>
<td>42.5%</td>
<td>40.8%</td>
<td>25.8%</td>
<td>24.7%</td>
<td></td>
</tr>
<tr>
<td>Transfers (net)</td>
<td>46.0%</td>
<td>40.7%</td>
<td>48.1%</td>
<td>52.0%</td>
<td>54.6%</td>
<td>56.4%</td>
<td>58.1%</td>
<td>73.9%</td>
<td>74.7%</td>
<td></td>
</tr>
<tr>
<td>Inter-temporal adjustment</td>
<td>5.1%</td>
<td>4.8%</td>
<td>3.8%</td>
<td>2.5%</td>
<td>2.6%</td>
<td>1.8%</td>
<td>1.9%</td>
<td>0.7%</td>
<td>1.0%</td>
<td></td>
</tr>
<tr>
<td>Other revenues (net)</td>
<td>-0.9%</td>
<td>-0.7%</td>
<td>-0.1%</td>
<td>-0.1%</td>
<td>-0.3%</td>
<td>-0.7%</td>
<td>-0.8%</td>
<td>-0.4%</td>
<td>-0.3%</td>
<td></td>
</tr>
</tbody>
</table>

Sources: Report on the State of the National Health Insurance (relevant years)

4.1. Equalization

There are large variations in benefits and premiums among municipal NHI programs. We might think that such variations are due to the tendency for the premium to be larger in a municipality where the benefit is larger. However, as seen in Figure 1, there is no clear positive correlation between the two variables. Rather, we could draw a negative fit between the two. Figure 2 shows the maximum, average and minimum values of the benefits and premiums, both on a per subscriber basis, from FY2001 to FY2010. As the figure shows, all of these values have tended to increase during the 2000s, with a sudden jump for the average and maximum values in 2008. On the other hand, the premiums remained relatively stable during the period.
Figure 1. Correlation between Premiums and Benefits (per subscriber Yen/Year)

Figure 2. Maximum and Minimum Values of per Subscriber Benefits and Premiums

The kernel distributions for the two variables for FY2001-2010 in Figures 3a and 3b confirm these trends for the benefits and premiums. The per-subscriber benefits started to spread quite drastically after FY2008 also with a large increase in the average, while the distribution of the per subscriber premiums tended to move downward without major
changes in their spreads. FY2008 was the year when the HCSOO was introduced. Its introduction removed those aged 75 or older from the NHI. The figures show that this change increased the municipal per subscriber benefits on average and made their values spread more than before. This, then, implies that those aged 75 or older were an equalizing factor for the NHI benefits among municipalities.

Figure 3a. Distribution of NHI Benefits per Subscriber: 2001-2010 (Yen/Year)

Figure 3b. Distribution of the NHI Premiums per Subscriber: 2001-2010 (Yen/Year)
The change in the distribution of the benefits in FY2008 is also seen as changes in Gini coefficients. Figure 4 shows the Gini coefficients for the premiums and benefits. The coefficients indicate more inequality in the premiums than the benefits. During the 2000s, the degree of equality among municipal average premiums tends to increase gradually over the period with a slight jump in FY2008. On the other hand, the degree of equality in the benefits slowly declined, with a large jump in FY2008. Given these values, it is interesting to note that inequality in medical needs (benefits) are aggravated when their values are translated into the premiums with eq.(1). In other words, the transfers and the inter-temporal adjustments, which are supposed to contribute to the equality of premium payments, in fact contributed to aggravating inequality among the municipalities.

4.2. Stabilization

Let \( b_{it} \) be the “risk” variable, or per-subscriber NHI medical benefits, of municipality \( i \) in year \( t \). The accounting identity allows us to decompose \( b_{it} \) into the four elements as

\[
b_{it} = x_{1, it} + x_{2, it} + x_{3, it} + r_{it}
\]

(2)

where \( x_1 \) is transfers, \( x_2 \) is other net revenues, \( x_3 \) is inter-temporal adjustments, and \( r_{it} \) is per-subscriber premiums (the “target” variable) to be smoothed. Eq.(2) allows us to decompose the variance of \( y_{it} \) into index of the degree of an element of \( \{ x_{1, it}, x_{2, it}, x_{3, it}, r_{it} \} \) in buffering \( r_{it} \) from shocks in \( b_{it} \) as follows. First, we difference eq.(2) as

\[
\Delta b_{it} = \Delta x_{1, it} + \Delta x_{2, it} + \Delta x_{3, it} + \Delta r_{it}
\]

which yields the deviations from expectations.
\[ \Delta b_{it} - E(\Delta b_{it}) = \sum_{j=1}^{J-1}[\Delta x_{j,it} - E(\Delta x_{j,it})] + [\Delta r_{it} - E(\Delta r_{it})]. \]

Multiplying this expression with \([\Delta b_{it} - E(\Delta b_{it})]\) and taking the expectation of the resulting products result in

\[ 1 - \beta_r = \sum_{j=1}^{3} \beta_j \]

(3)

where \(\beta_r = \text{cov}(\Delta b_{it}, \Delta r_{it})/\text{var}(\Delta b_{it})\) and \(\beta_j = \text{cov}(\Delta b_{it}, \Delta x_{j,it})/\text{var}(\Delta b_{it})\). The value of \((1 - \beta_j)\) measures a stabilization effect which is further decomposed into \(\beta_j\) for \(j = 1, 2,\) and \(3\). Eq.(3) is analogous to Asdrubali et al. (1996) who decompose growth rates (or log-difference), rather than level-difference here, of the targeted variable. As Hayashi (2012) notes, while the decomposition by Asdrubali et al. (1996) alters the value of \(\beta_j\) when the order of \(\{x_{1,it}, x_{2,it}, x_{3,it}\}\) is different, the value of \(\beta_j\) in (3) is independent of the order of \(x_{it}\).

The three ratios of the covariance between \(\Delta b_{it}\) and \(\Delta x_{j,it}\) to the variance of \(\Delta b_{it}\) thus decomposes the stabilization effect \(1 - \beta\). Since the NHI finances changed almost every year, as explained, such covariance would change over time. As such, a cross section of differenced data for each year in the 2000s is used to calculate the covariance. Table 5 lists the annual sample statistics for the differenced variables.

The results are summarized as follows. First, the varying values of the coefficients over the years corroborate the fact that the institutional aspects of the NHI system have changed almost every year. Such changes are salient for most of the items in FY 2008 when those aged 75 years and above were separated from the NHI to the HCSOO. In addition, all the public health insurers (including municipalities) started to contribute funds to the medical benefits paid by the HCSOO. It is thus quite plausible that these major institutional changes caused the large changes in FY2008 in Figure 5a. In addition, dropping the values for FY2008 may allow us to see the actual trends of the changes in the longer term. Since these values are constructed with differenced data, the policy change in FY2008 plausibly affects only the values in that year. To uncover long-term trends, Figure 5b drops the values for FY2008. Indeed, the figure more saliently shows the changing effects of the transfers throughout the 2000s: the transfers are gradually decreasing their roles, after hitting their highest values in FY2005.

Second, the stabilizing effect (3) is found to be very large, as the share of the premiums is very small throughout the period. The values are negative except in FY2003, FY2008 and FY2010. While these negative values imply over-smoothing, the values are small enough, as the value in FY2008 (3.8 percent) is the largest throughout the period. It can thus be argued that the buffering effects on the premiums of changes in medical demands were almost perfect during the period.
Third, the transfer payments most contribute to stabilization, as the combined effect of central, prefectural, and intra-municipal transfers along with those from inter-institutional and within-prefectural cost-sharing schemes. As mentioned, except in FY2008, their effects decreased over time, after hitting a peak in FY2003. On the other hand, the effects of the other two items were relatively small. The inter-temporal adjustments exhibit a coefficient value as high as 10 percent, except in the first two periods and in FY2008. The contributions of the other revenues (net) recorded at least 10 percent during the period except FY2008.
5. Concluding Remarks

This study has measured the degree of equalization, as well as stabilization, in the Japanese NHI. It found that changes in premiums are being almost perfectly smoothed and that the system of transfers in the NHI is playing a major role. Despite the fact Japan is the only country that still maintains a non-competitive multiple payer system, which may plausibly have a number of disadvantages, this result should imply that the role of fiscal transfers is great enough to allow such a multiple payer system to survive. However, it was also found that average municipal premium levels are hardly being equalized among municipalities, and are even being aggravated. This, then, suggests that the transfer system is contributing very little or even obstructing the equalizing of premiums imposed on local residents.

References

## Appendix: Sample Statistics

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<tbody>
<tr>
<td><strong>Medical benefits</strong></td>
<td>-12,566, 9,157, -67,578, 61,405</td>
<td>16,828, 9,055, -76,423, 100,984</td>
<td>8,906, 8,503, -69,898, 70,307</td>
<td>11,767, 8,643, -44,593, 96,532</td>
<td>7,380, 8,486, -61,807, 120,043</td>
<td>14,971, 9,585, -48,303, 149,326</td>
<td>65,391, 25,757, -4,162, 233,781</td>
<td>6,480, 13,545, -140,391, 88,851</td>
<td>11,134, 13,927, -84,094, 230,396</td>
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<td><strong>Inter-temporal adjustment</strong></td>
<td>336, 10,560, -78,204, 87,906</td>
<td>2,472, 10,601, -63,356, 105,144</td>
<td>-1,479, 10,633, -79,788, 102,723</td>
<td>899, 9,030, -56,725, 66,902</td>
<td>-174, 9,289, -259,269, 178,213</td>
<td>-728, 12,323, -359,995, 172,218</td>
<td>-2,070, 10,416, -146,640, 94,041</td>
<td>2,991, 11,294, -58,354, 166,553</td>
<td>-121, 3,428, -12,836, 22,934</td>
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<tr>
<td><strong>Other revenues (net)</strong></td>
<td>526, 9,762, -132,899, 301,573</td>
<td>919, 8,851, -184,465, 132,110</td>
<td>402, 3,928, -39,567, 31,954</td>
<td>639, 3,571, -19,290, 20,332</td>
<td>1,479, 3,428, -12,836, 22,934</td>
<td>1,664, 2,793, -13,285, 19,095</td>
<td>-172, 10,125, -61,033, 359,255</td>
<td>56, 6,530, -41,262, 139,936</td>
<td>-1,213, 7,854, -63,543, 143,648</td>
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Notes: All variables are differenced, measured in JPN¥, and in per subscriber terms.