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Michio Yuda

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Michio Yuda
School of Economics, Chukyo University
101-2, Yagoto-Honmachi, Showa-Ku, Nagoya, 4668666, Japan
E-mail: *yudamich@mecl.chukyo-u.ac.jp*

Abstract

We use two national individual-level claim data sets to examine the strategic behaviors of beneficial patients of the medical assistance system and medical suppliers by investigating the existence of an ex-post moral hazard and physician agency problem in the medical assistance system in Japan. Since social assistance benefits including medical assistance benefits are not randomly assigned but are determined via means testing by the local government, we apply the bias-corrected matching estimator to adjust for the sample selection bias. There are three major findings. First, we find that access regulations for beneficiaries control the ex-post moral hazard for the first-month visit, but have no effect on visits in subsequent months. Second, we find that medical suppliers provide beneficiaries with unnecessary treatments. Third, medical suppliers respond to fee reductions and provide patients with unnecessary treatments in the long term. The results suggest that scrupulous system design that considers incentives for patients and medical suppliers is needed to improve the efficiency of health care systems.

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JEL Classification Number: C21, I13, I18, I38

1. Introduction

Welfare systems guarantee a minimum standard of living and enhance independence by providing assistance benefits to those who are destitute in accordance with their level of need. The level of welfare provided depends on means testing, and eligible beneficiaries are typically provided with income security, employment support, and medical and long-term care financed by taxation. Particularly, health care services are important factor in enabling individuals to maintain and improve their health status, quality of life, and life expectancy. Indeed, Currie et al. (1995), Travis (1999), Baker and Royalty (2000), and Gross and Notowidigdo (2011) find that Medicaid in the USA has contributed to improvements in access to health care services, in health status, and in the quality of life for beneficiaries.

The situation in Japan is slightly different. Medical assistance (MA) has accounted for approximately 50-60% of total welfare expenditure for more than 50 years, representing an approximately 64% greater proportion of public assistance than living assistance does (National Institute of Population and Social Security Research, 2013), so the Japanese government discussed fundamental reform of the MA system (MAS) to overcome these concerns for the first time in a half century[1]. One reason is that surveys by the Ministry of Health, Labour and Welfare (MHLW) in Japan showed that approximately 80% of households that benefit from the Japanese Social Assistance system consist of aged (42.9% in 2012), injured and diseased (21.9%), or disabled persons (11.2%) who have a great need for medical care services.[2] Another reason is

[1] For example, the following reforms are recommended (Cabinet Office, 2011): strengthening the supervision of designated medical facilities, promoting or mandating the use of generic drugs, introducing patient copayment on the promise of the following month's reimbursement, and revoking the designation of medical facilities that provide inappropriate medical care services.

[2] The remaining comprises mothers with children at home (7.7%) and other families (16.2%).

that some beneficial patients and medical suppliers abuse the MAS to receive or provide unnecessary treatments that little improve patient health (Suzuki, 2008; Kobayashi et al., 2010). The background to the latter problems is that MAS patients may be unaware of actual medical costs because they are exempt from premium contributions to health insurance and copayments for medical services received, and typically receive the same treatment as public health insurance (PHI) patients. Thus, MA expenditure for these patients may be higher because they have more frequent hospital visits and are overprescribed drugs.[3] In addition, the system leads some unethical medical suppliers to provide unnecessary treatment and prescription to receive medical fees illegally.[4]

It is very important for the fundamental MAS reform to distinguish these two factors because the former is essential for the poor who needs health care services but the latter is a social loss in the sense that these behaviors contribute little to improving patient health. In the health economics literature, the former problem is known as the ex-post moral hazard (Zweifel and Manning, 2000; Cutler and Zeckhauser, 2000; McGuire, 2012), and the latter as the physician agency problem or the supplier-induced demand (McGiure, 2000; Cutler and Zeckhauser, 2000; Chandra et al., 2012), and there have been numerous studies on these topics. Recently, Chandra et al. (2010) uses data from the Massachusetts' Commonwealth Care program to examine the ex-post moral hazard for low-income individuals by estimating price elasticity of the demand for their medical cares.[5] Based on empirical results according to a regression discontinue design,

[3] An MHLW survey of beneficiaries who were prescribed psychotropic drugs by several medical institutions in one month in 2012 showed that 70.3% of them had inappropriately visited hospital.
[4] The most disastrous affair was the Yamamoto Hospital case in 2009. The director of Yamamoto hospital was arrested for medical billing fraud involving fictitious treatments, professional negligence, and involuntary manslaughter due to irrelevant and unprofessional surgical operations. Kobayashi et al. (2010) have described the case in more detail.
[5] Recent empirical studies on moral hazards have examined the ex-ante moral hazard among the poor (Spenkuck, 2012), the effect of coverage expansion (Almond and Doyle, 2011; Choi, 2012),

their estimates are very similar to those of the RAND health insurance experiment (Manning et al., 1987; Newhouse et al., 1993; Aron et al., 2013), despite tremendous structural changes in the composition of medical care accounts. On the other hand, supplier-induced demand often occurs when a medical supplier faces negative income shocks such as increased competition or health care system reforms. In recent years, this problem may have been caused by health care reforms to control increases in health care expenditure (HCE) due to a rapid population aging and improvements in medical technology.[6] These policy reforms are expected to decrease the profits of medical facilities and physician income[7] because HCE represents compensation for their work. Therefore, some medical suppliers who experience income or profit reductions may provide unnecessary medical services that do not contribute to improving patient health because it is difficult for patients to judge the appropriateness of the medical services they receive. A closely related study was carried out by Yip (1998), who used panel data for physicians in New York and Washington states in 1987 and 1989 to examine

heterogeneity (Lian et al., 2013), the hazard for specific diseases (Koç, 2011; Gustavsen et al., 2011), long- and short-term effects (Bolhaar, et al., 2012), the relationship with health production inefficiency (Bates et al., 2010), and the case of policy reform in Sweden (Trottmann, et al.,2012). In addition, Kan and Suzuki (2010) and Ihori et al. (2011) examined the ex-post moral hazard in Japan. Kan and Suzuki (2010) find that a possible moral hazard for treatment intensity, and Ihori et al. (2011) that ex-post moral hazard behavior following an increase in co-payment rates reduce economic growth.

[6] Recent empirical studies on the agency problem between physicians and patients have examined the effect of fee revision reform (Dafny, 2005; Carlsen et al., 2011), differences in reimbursement systems (Quast et al., 2009; Shafrin, 2010; Melichar, 2009), the choice of reimbursement system (Devlin and Sarma, 2008; Allard et al., 2011), a change in GP payment system (Munkerud, 2012), cesarean delivery (Grant, 2009), and pharmaceuticals or prescriptions (Iizuka, 2007; Iizuka, 2012; Epstein and Johnson, 2012; Liu et al., 2008). Kawai and Maruyama (2000), Suzuki (2005), Nawata et al., (2006), Iizuka (2007, 2012), and Yuda (2013) examined the agency problem associated with fee schedule reforms in Japan and find that medical suppliers have a financial incentive. In addition, Kondo and Shigeoka (2013) find that medical suppliers responded to the massive expansion in health insurance coverage in Japan in 1961, but size of the supply response differed across service types.

[7] In Japan and many European countries, most physicians serve in medical institutions and receive a fixed salary. In other words, they are not independent economic entities but are one of the production inputs for medical institutions. In fact, insurance proceeds are reimbursed to physicians and hospitals as a corporation and not to individual physicians (Hashimoto and Izumida, 2011, p.13).

whether thoracic surgeons responded to Medicare fee cuts by increasing Medicare volume to compensate for income loss and whether this response spilled over to the private sector. The results indicate that physicians whose incomes were reduced the most by Medicare fee cuts performed higher volumes of coronary artery bypass grafting, and they did so in both the Medicare and private markets.

The aim of this study is to examine the strategic behaviors of beneficial patients and medical suppliers under current medical care systems by investigating the existence of an ex-post moral hazard and physician agency problem in the MAS in Japan. Specifically, we compare the demand and supply of health care services for MAS and PHI patients and examine whether the health care demand of MAS patients is greater than that of PHI patients, whether medical suppliers provide more medical treatments to MAS patients than PHI patients, and whether medical suppliers respond to negative income shocks due to reductions in medical fees.

The contributions of this study are as follows. First, we use two nationally representative individual-level claim data sets for 2001‐2007 conducted by the MHLW in Japan and directly compare patient demand and medical supply behaviors for MAS and PHI patients. Second, few studies have used items common to types of claim data for different systems. The one exception is Yip (1998), whose results may be biased due to selection bias because Medicaid eligibility is not randomly assigned. The MA benefits are also not randomly assigned, but there are few opportunities to have experimental circumstances to precisely estimate the effect of the system such as Frinklen et al. (2012). In this study, we apply the bias-corrected matching estimator (BCME) proposed by Abadie and Imbens (2011) to adjust for the sample selection bias of receipt of public assistance benefits. Third, no empirical study using micro data has

examines outpatient demand and supply behaviors for the beneficiaries in Japan. Kumagai (2002) is the only previous study to examine MAS efficiency in Japan using prefecture-level aggregated data, and finds that income transfers from central government to local governments contributed to improving the health status of beneficiaries. In addition, findings for other countries (Currie et al., 1995; Travis, 1999; Baker and Royalty, 2000; Grabowski and Gruber, 2007; Choi, 2011; Garthwaite, 2011; Gross and Notowidigdo, 2011; Finkelstein et al., 2012) may not necessarily be generalizable to the Japanese context, because the Japanese health care system has universal insurance and free access systems. The results of this study have important policy implications for current health insurance and MA systems in Japan, and they are expected to contribute to improving social welfare via redistribution of resource allocations.

The remainder of the paper is organized as follows. Section 2 presents the data used in the analysis and Section 3 describes the econometric methodology. Section 4 details the empirical results and Section 5 provides conclusions.

2. Data

We use two nationally representative individual-level claim data sets for 2001–2007 obtained by the Japanese MHLW: the *Fact-finding Survey on Medical Assistance* (FSMA) and the *Survey of Medical Care Activities in Public Health Insurance* (MAHI). FSMA surveys the situation regarding medical treatment, diseases, injuries, and the dispensing and use of drugs for MAS patients to obtain the basic data needed for administration of the system. Objects are randomly selected from the claim data

reviewed every year in June and stored in welfare offices using an extraction rate of 1:20 for claims for hospital and clinic outpatient treatment. MAHI surveys the situation regarding medical treatment, diseases, injuries, and the dispensing and use of drugs for PHI patients to obtain the basic data needed for administration of the system. Objects are selected using stratified random two-stage sampling, with insurance-covered medical care institutions and pharmacies as the primary sampling unit and detailed statements as the secondary sampling unit. The health insurance organizations selected provide detailed statements in June of every year using sample extraction rates that differ across inpatients and outpatients, the type of insurance, and the attributes of the medical facility. The data set used in this study is composed of items common to both types of claim data.

We extract data for outpatients from the entire sample and then exclude claims for the diagnosis procedure combination/per-diem payment system (DPC/PDPS) because medical facilities receive a fixed payment for these regardless of the volume of treatment provided to patients and because it applies only to acute care in specific hospitals.[8] We also exclude individuals for whom HCE diverges from the sample mean by more than ±2 standard deviations because Lubits and Prihoda (1984), Scitovsky (1984), Werblow et al. (2007), Sato and Fushimi (2009), and Felder et al. (2010) all find that HCE is generally much higher for decedents than for survivors, depending on the date of death.[9]

Moreover, we divide the whole sample into two subsamples according to the

[8] When HCE is mainly reimbursed via a prospective payment system, medical suppliers tend not to provide unnecessary treatments to patients because they would gain more profit by underproviding treatment. However, underprovision of treatment adversely affects patient health.

[9] This is a practical consideration because we can identify decedents from the MAHI but not from the FSMA data.

duration of hospital visits: a first month (FM) sample and a subsequent months (SM) sample. A medical supplier usually checks, diagnoses, and treats a patient at the first visit. According to the patient's health condition, they provide medical treatments after the second visit. Therefore, medical treatments a patient receives and their monthly HCE may differ between FM and SM visits.

Descriptive statistics for the main variables for beneficiaries and enrollments, and the results for mean comparison tests are summarized in Table 1.

<Table 1>

3. Estimation Strategies

3.1 Health Care Demand and Supply

Our concept of health care demand and supply is based on a two-part model. The HCE for individual i in year t (HCE_{it}) is divided into two parts,

$$HCE_{it} = HCE_{D,it} + HCE_{S,it}, \quad (1)$$

where $HCE_{D,it}$ represents visit fees, which is the HCE billed for each visit. Since patients decide when to visit hospital, this expenditure can be regarded as a proxy for health care demand. $HCE_{S,it}$ represents consultation fees, which is defined as the cost of medical treatments provided by a medical supplier to a patient. Since medical suppliers have considerable discretion in providing medical treatments, this expenditure can be regarded as a proxy for health care supply.

3.2 Controlling for Selection Bias

Public assistance benefits are not randomly assigned but are determined via means testing by the local government. This causes sample selection bias in the parameters when using ordinary econometric methods. As mentioned in Section 1, the MHLW surveys show that approximately 80% of the households have a commensurately greater need for medical care, so their HCE will be greater than that for others. In addition, MAS patients may be provided with more treatment than PHI patients because of the positive correlation between health and income. Therefore, outpatient treatments for such individuals should not be regarded as an ex-post moral hazard and as unnecessary treatments associated with financial incentives for medical suppliers. Indeed, Table 1 shows that most of the mean differences are not statistically significantly zero. Therefore, we need to eliminate this selection bias to accurately estimate the difference in HCE *ceteris paribus* between MAS and PHI patients. We employ the BCME proposed by Abadie and Imbens (2011), which adjusts the difference between matches in accordance with differences for their covariate values.[10] Since Abadie and Imbens (2011) shows that regression-based bias correction can eliminate the (asymptotic) bias from imperfect matches, BCME is appropriate for our analysis.

In this case, $\mu_{MA}(x) = E\{Y(MA) \mid X = x\}$ for MA=0 or 1, where $Y_{J,it} \equiv \ln(HCE_{J,it})$ and $J = D$ or S, and X includes all covariates. BCME also has the advantage of being $N^{1/2}$-consistent and asymptotically normal irrespective of the number of covariates, which adds an additional layer of robustness. However, BCME has a disadvantage in

[10] Instrumental variable estimation is the typical method used to control for selection problems. However, because the information available from the claim data is restricted, it is difficult to find and apply valid instrumental variables.

matching estimators without bias correction in terms of the efficiency of the estimates (Abadie and Imbens, 2006, 2011).

Given the estimated regression functions, we predict the missing potential outcomes as

$$\widetilde{Y}_{it}(0) = \begin{cases} Y_{it} & if \quad MA_{it} = 0 \\ \dfrac{1}{\#J_M(i)} \sum_{l \in J_M(i)} \{Y_{lt} + \hat{\mu}_0(X_{it}) - \hat{\mu}_0(X_{lt})\} & if \quad MA_{it} = 1 \end{cases}$$

and

$$\widetilde{Y}_{it}(1) = \begin{cases} \dfrac{1}{\#J_M(i)} \sum_{l \in J_M(i)} \{Y_{lt} + \hat{\mu}_1(X_{it}) - \hat{\mu}_1(X_{lt})\} & if \quad MA_{it} = 0 \\ Y_{it} & if \quad MA_{it} = 1 \end{cases}.$$

Thus, BCME for the average treatment effect for those treated (ATT) in year t is

$$ATT_t^{BCME} = \frac{1}{N_1} \sum_{i:MA_{it}=1} \left\{ Y_{it} - \widetilde{Y}_{it}(0) \right\}, \tag{2}$$

where N_1 is the number treated and $\#J_M(i)$ is the number of elements of $J_M(i)$, which denotes the set of indices for the match for unit i that are at least as close as the Mth match: $J_M(i) = \{l = 1,2,...,N \mid MA_l = 1 - MA_i, \|X_l - X_i\|_V \le d_M(i)\}$, where $d_M(i)$ is the distance from the covariates for unit i, X_i, to the Mth nearest match with the opposite treatment (Abadie and Imbens, 2011). We use nearest-neighbor Mahalanobis metric matching (Rosenbaum and Rubin, 1983, 1985) with variables for sex, age, primary diseases, type of medical facility, place of residence, and the individual propensity score for MAS assignment.[11] The estimator of the heteroskedasticity constant variance for the

[11] Estimation results for the propensity scores are shown in Table B1 in Appendix B.

population ATT is as follows:

$$\hat{V}^{PATT} = \frac{1}{N_1^2}\sum_{i=1}^{N}\left[W_i \left\{ Y_{it}(1) - \hat{Y}_{it}(0) - \widehat{ATT_t^{BCME}} \right\}^2 + (1-W_{it})\left\{ K_M^2(i) - K_M^{'}(i) \right\} \hat{\sigma}_{W_{it}}^2(X_{it}) \right], \quad (3)$$

where

$$\hat{\sigma}_{W_{it}}^2(X_{it}) = \frac{1}{\# J_M^{'}(i)} \sum_{j \in \{J_M^{'}(i) \cup (i)\}} \left\{ Y_{jt} - \overline{Y}_{J_M^{'}(i) \cup (i)} \right\}^2$$

and

$$\overline{Y}_{J_M^{'}(i) \cup (i)} = \frac{1}{\# J_M^{'}(i) + 1} \sum_{j \in \{J_M^{'}(i) \cup (i)\}} Y_{jt} .$$

We match one observation for a PHI patient per MAS patient (one-to-one matching, $m = 1$) in the same year. We also match four PHI patients per MAS patient (one-to-four matching, $m = 4$) to check its robustness, because Abadie and Imbens (2011) shows that one-to-four matching performs well in terms of the mean-square error in Monte Carlo simulations.

However, because public assistance is assigned on the basis of means testing, there may be much heterogeneity between patients with the same attributes unless we apply the observable variables that local governments use for the assignment. If unobservable variables are correlated with financing and need for treatment, the estimator may be biased. Unfortunately, we cannot completely solve the above analytical problems because the information available from the claim data is very restricted. However, *t*-test results for the equality of means for the two groups show that most of the mean

differences for the matched samples and the pseudo-R^2 values for the equation for MAS assignment using the matched samples are close to 0.[12] These statistical results suggest that the selection bias was removed.

4. Empirical Results

4.1 Visit Fees

The empirical results for visit fees are summarized in Tables 2A and 2B. The FM HCE_D for the raw samples is greater than that for the matched samples in both groups. The FM HCE_D gradually increases up to 2006 and sharply decreases in 2007 for MAS patients, and gradually decreases for PHI patients during this period. Mean differences for the raw samples and ATTs for the matched samples are very similar, and all the ATTs are significantly positive for each year. This indicates that access regulations for MAS patients have a control effect on their ex-post moral hazard.

The SM HCE_D for the matched samples is greater than that for the raw samples in both groups. SM HCE_D for MAS and PHI patients decreases in 2002, increases in 2003, and then gradually decreases again. The maximum SM HCE_D occurs in 2003 for MAS patients and in 2004 for PHI patients. The ATTs are greater than mean differences, and all of them are statistically significantly positive for each year. This is opposite to the FM results, which indicates that an ex-post moral hazard exists due to zero co-payment.

<Table 2A>

[12] See Tables C1 and C2 in Appendix C.

<Table 2B>

4.2 Consultation Fees

The empirical results for consultation fees are summarized in Tables 3A and 3B. The FM mean differences are close to the ATTs in each year. FM HCE_S decreases up to 2003 but gradually increases from 2004. These results indicate that the fee reduction revision in 2002, which was unprecedented in the history of Japanese PHI, contributed in controlling HCE. FM HCE_S especially increases in 2004, when the fee revision was 0%, and in 2007, when the next year of the largest fee reduction occurred. The ATTs are all statistically significantly positive in each year. These results indicate that medical suppliers provided unnecessary treatment to MAS patients during this period.

The SM mean differences are close to the ATTs in each year but are larger than the FM mean differences. HCE_S for MAS and PHI patients decreases up to 2004 and then gently increase; maximum values occurred in 2004. HCE_S for the matched samples is greater than that for the raw samples in both groups. The ATTs are significantly positive in each year, and the differences are greater than the FM ATTs. These results also indicate that medical suppliers provided unnecessary treatment to MAS patients during this period.

<Table 3A>

<Table 3B>

4.3 Medical Services

The empirical results for consultation fees indicate that medical suppliers provide

unnecessary treatments in response to fee reductions. In this section we use the same approach as in the previous subsection to examine whether medical suppliers change their behaviors when providing four medical services that are considered to be largely affected by the medical supplier discretion: medications, procedures and operations, examinations, and diagnostic imaging.[13] For example, unnecessary provision of medications and procedures may badly affect patient health, whereas overprovision of examinations and diagnostic imaging largely has no untoward effects on patient health. Therefore, these analyses have important policy implications for countries that mainly use a fee-for-service reimbursement system. If the ATTs are positive, MAS patients receive more unnecessary treatments than PHI patients.

4.3.1 Medications

Tables 4A and 4B show the results for expenditure on medications. FM HCE decreases in 2002, remains at a similar level up to 2006, and increases in 2007 for MAS patients, and gradually decreases during this period for PHI patients. The ATTs are significantly positive for each year. SM HCE decreases in the years in which fee revisions occurred, but increases in the following years for MAS patients, and remains at a certain level for PHI patients. The ATTs are all significantly positive and the differences are greater than for FM HCE.

<Table 4A>

<Table 4B>

[13] HCE for the following medical practices are available from both the FAMA and MAHI: visit fees, clinical administration fees, home medical care, medications, injections, procedures and operations, examinations, diagnostic imaging, inpatient care, and others.

4.3.2 Examinations

Tables 5A and 5B show the results for expenditure on examinations. FM HCE decreases up to 2004 and increases from 2005 for MAS patients, and decreases up to 2003, then increases up to 2006 and slightly decreases in 2007 for PHI patients. The ATTs are all significantly positive in each year. SM HCE decreases in 2002, remains at a similar level up to 2005, increases in 2006, and decreases in 2007 for MAS patients; it decreases up to 2003, then gradually increases to up 2006 and slightly decreases in 2007 for PHI patients. The ATTs are all significantly positive and the differences are greater than for FM HCE.

<Table 5A>

<Table 5B>

4.3.3 Procedures and Operations

Tables 6A and 6B show the results for expenditure on procedures and operations. FM HCE for MAS patients increases in 2002, decreases in 2003, increases again from 2004 to 2006, and decreases again in 2007. FM HCE for PHI patients decreases up to 2003 but increases from 2004. The ATTs are significantly positive from 2001 to 2006 but significantly negative for 2007. SM HCE for both MAS and PHI patients decreases up to 2004 and increases from 2005. The ATTs are all significantly positive in each year.

<Table 6A>

<Table 6B>

4.3.4 Diagnostic Imaging

Tables 7A and 7B show the results for expenditure on diagnostic imaging. FM HCE for MAS patients increases up to 2005, decreases in 2006, and increases again in 2007. FM HCE for PHI patients remains at the same level up to 2003 and increases from 2004. The increases in 2004 and 2007 in particular are quite large. ATTs are significantly positive for 2002 and 2003 but significantly negative for 2007. SM HCE for MAS patients increases up to 2005 but decreases from 2006. In particular, there is a drastic decrease in 2006. FM HCE for PHI patients gradually increases during this period. Unlike the FM HCE, all the ATTs are significantly negative in each year.

<Table 7A>

<Table 7B>

5. Concluding Remarks

We examine the strategic behaviors of patient beneficiaries and medical suppliers under current medical care systems by investigating the existence of an ex-post moral hazard and the physician agency problem in the MAS in Japan. Specifically, we compared health care demand and supply for MAS and PHI patients and examined whether the health care demand of MAS patients is greater than that of PHI patients, whether medical suppliers provide more medical treatments to MAS patients than to PHI patients, and whether medical suppliers respond to negative income shocks due to reductions in medical fees.

Since social assistance benefits are not randomly assigned but are determined

according to means testing by the local government, estimators obtained using ordinary econometric analyses are biased because of sample selection bias. To adjust for this endogenous problem, we use the BCME proposed by Abadie and Imbens (2011). Using two nationally representative individual-level claim data sets for 2001–2007, we find that FM visit fees are lower for MAS patients than for PHI patients, but SM visit fees are greater for MAS patients than for PHI patients. These results suggest that access regulations for MAS patients have a control effect on their ex-post moral hazard for FM visits but not for SM visits. In other words, an ex-post moral hazard due to zero co-payment exists for SM visits. We also find that consultation fees are greater for MAS patients than for PHI patients for both FM and SM visits. These results suggest that medical suppliers provide unnecessary treatment to MAS patients. In addition, we find that consultation fees for both groups decreased up to 2003 for FM visits and up to 2004 for SM visits and gradually increased thereafter. This indicates that the fee reduction revision in 2002, which was unprecedented in the history of Japanese PHI, contributed in controlling HCE. However, HCE increases thereafter indicate the existence of inducement. Finally, we find that HCE for medication, examinations, and procedures and operations is greater for MAS patients than for PHI patient, and that costs for diagnostic imaging are greater for PHI patients than for MAS patients for SM visits.

The results suggest that scrupulous system design that considers incentives for patients and medical suppliers is needed to improve the efficiency of health care systems. Specifically, introduction of a co-payment system for MAS patients for SM visits is a good way to improve MAS efficiency. By doing so, there is a possibility of the large HCE ex post facto incurred by decreasing the number of hospital visits due to the introduction of the copayment. On the other hand, because MAS patients avoid

co-payment and visit medical institutions after their health conditions get worse by introducing patient's copayment on the promise of the following month's reimbursement, which is currently being discussed by the Japanese government. In addition, a change in medical fee schedule for MAS beneficiaries from fees for service to a prospective payment system could be effective in preventing medical suppliers from providing unnecessary treatments.[14] Moreover, it should be discussed to reform fee schedule system that considers medical supplier's financial incentives. The results indicate that it is difficult to control for HCE in the future because fee reduction revisions have only a short-term effects.

Our study has some limitations. First, we cannot investigate how these moral hazards affect social welfare as Kumagai (2002) did because proxy variables for health outcomes are not available from the medical claim data. Second, the data do not include information on many individual patient attributes, such as complicating and past illnesses, lifestyle habits, family income and assets, and family structure, or on the characteristics of medical institutions, such as management agency, hospital scale, and diagnosis and treatment departments. Third, although we use nationally representative claim data, the surveys are only conducted at a certain time each year. Therefore, we have no information about long-term medical provision to patients. Thus, we can only compare monthly costs and not episode-unit inpatient costs. These limitations may lead to bias due to omitted variables and thus inconsistent parameters in the empirical models, and may also affect the sensitivity of the matching to adjust for selection bias. Further studies using more comprehensive data sets for medical care systems for the poor should be carried out in the future.

[14] In this case, considerations to prevent underprovision of medical treatment by medical suppliers would be required. See footnote 8.

Appendix A. Overview of the Japanese Health Care System

This appendix briefly discusses health care systems in Japan.[15] The PHI system in Japan, which has provided universal coverage since 1961, consists of the following three broad categories for historical reasons: the Health Insurance system for employees and their dependents; the Long-life Health Care System for those aged 75 or over;[16] and the Japanese National Health Insurance system, which is mostly insured by each municipality. At the end of March 2012, there were approximately 3500 insurers covering 99.2% of the Japanese population. The remaining population is covered by the MAS, which is part of the social assistance system.

HCE for medical treatments provided to PHI patients is reimbursed according to a nationally uniform fee schedule. Regardless of physician age, experience, position, and skill or individual patient attributes, the same medical fees are reimbursed to medical suppliers who provide the same treatments. Medical fees are revised biyearly by the Central Social Insurance Medical Council, which comprises insurer, physician, and intellectual representatives. The global revision rate for all services and drug prices is officially determined by reference to both macro- and microeconomic indicators;[17] however, revisions of the fee schedule in Japan are based on policy decisions and economic situations rather than objective evidence. In the 2000s, medical fees were

[15] Ikegami et al. (2011), Hashimoto et al. (2011), and Shibuya et al. (2011) describe in detail changes, recent problems, and prospects for the PHI system in Japan.

[16] The Elderly Health Care System provided for individuals aged 70 or over from February 1983 to March 2007.

[17] Macroeconomic indicators include trends for economic growth, inflation, and wages. Microeconomic indicators are based on the financial status of medical facilities reported in the latest Survey on Economic Conditions in Health Care conducted by the MHLW.

reduced by 1.30% in 2002, 0.00% in 2004, and 1.36% in 2006.[18]

The MAS in Japan provides medical services to beneficiaries of the social assistance system to ensure good health. Beneficiaries do not pay contributions or co-payments but can receive the same treatments as PHI patients. However, the Public Assistance Act imposes several access regulations: beneficiaries must attend a welfare office to obtain medical care and drug tickets before visiting designated medical facilities. Their HCE is fully financed by public expenses, and medical fees reimbursed for treatments provided to MAS beneficiaries are the same as for PHI patients.

These system comparisons are summarized in Table A1.

<Table A1>

Appendix B. Estimating Propensity Scores

Since social assistance benefits are not randomly assigned but are determined by the local government, estimates obtained using ordinary econometric methods are biased because of selection bias. To adjust for this selection bias, we apply nearest-neighbor Mahalanobis metric matching (Rosenbaum and Rubin, 1983, 1985) using the variables sex, age, primary disease, type of medical facility, place of residence, and individual propensity score for the beneficiaries. To obtain the propensity score, we estimate the equation

$$MA_{it}^{*} = \gamma_0 + \sum_{j=1}^{J} \gamma_j \cdot x_{jit} + u_{it} \qquad \text{(A1)},$$

[18] The other major revision of the fee schedule was the introduction and spread of DPC/PDPS in 2003 for acute care in hospitals that fulfill the requirements.

where x includes individual attributes, institutional factors, and supply factors. Individual attributes include sex, age, and the primary disease dummy variables based on the International Classification of Diseases (ICD)-10 codes. The proxy variables for institutional factors include dummy variables for patients aged 15 and under and for those aged 65 and over. In recent years, every prefectural government and many municipal governments have subsidized the copayment for patients aged 15 and under as a countermeasure to the declining birth rate in Japan. The demand for inpatient care for this group of patients thus differs from that for other age groups because these subsidies greatly reduce the price of medical care (Bessho, 2012). However, patients aged 65 and over have also been insured under the public long-term care insurance (LTCI) scheme since April 2000.[19] Thus, the demand for and supply of inpatient care for the elderly may differ from those for the young (Tamiya et al., 2011). The remaining supply factors include a hospital dummy variable that captures differences in practice styles across hospitals and clinics associated with the number of medical staff and the quality of medical facilities. In addition, since the information available from the claim data sets is restrictive, we conveniently match an observation for enrollment to a beneficiary who seems to have a similar health condition. In practice, x also includes interaction terms between age and the dummy variables for primary diseases. Tables B1 and B2 show the estimation results for (A1).

<Table B1>

<Table B2>

[19] However, owing to data limitations, we cannot identify individuals who are certified by the LTCI and who receive long-term care assistance.

Appendix C. *t*-Test Results for the Equality of Means between the Two Groups

Tables C1 and C2 show *t*-test results for the equality of means between the two groups for the matched samples. The mean differences are still statistically significant in the matched samples. In general, these results imply that the selection bias has not been completely removed, but we find that most of the mean differences for the matched samples are close to zero. The differences are statistically significant because the standard errors are extremely small since the number of observations for each sample is quite large. In addition, Tables C1 and C2 show that the pseudo-R^2 value calculated by estimating (A1) with matched samples ranges from 0.003 to 0.005. This implies that independent variables in (A1) do not have sufficient explanatory power for the assignment of social assistance benefits. Therefore, selection bias in this study was statistically removed by sample matching.

<Table C1>

<Table C2>

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Table 1 Descriptive Statistics

A: First month

Patients	Medical Assistance system			Public Health Insurance			Mean Difference test	
	N	Mean	SD	N	Mean	SD	Difference	SE
Health care expenditures (thousand yen)								
Visit fees	93768	328.659	227.810	567970	362.488	163.627	-33.829**	0.775
Consultation fees	93768	927.714	1156.179	567970	672.349	879.215	255.365**	3.952
Individual attributes								
Female	93768	0.569	0.495	567970	0.579	0.494	-0.009**	0.002
Age	93768	46.345	25.507	567970	41.046	26.472	5.299**	0.090
Primary diseases								
Certain infectious and parasitic diseases	93768	0.059	0.235	567970	0.087	0.283	-0.029**	0.001
Neoplasms	93768	0.032	0.177	567970	0.030	0.171	0.002**	0.001
Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism	93768	0.003	0.052	567970	0.003	0.052	0.000	0.000
Endocrine, nutritional and metabolic diseases	93768	0.040	0.195	567970	0.018	0.134	0.021**	0.001
Mental and behavioral disorders	93768	0.038	0.191	567970	0.022	0.147	0.016**	0.001
Diseases of the nervous system	93768	0.019	0.137	567970	0.011	0.106	0.008**	0.000
Diseases of the eye and adnexa	93768	0.104	0.305	567970	0.092	0.289	0.012**	0.001
Diseases of the ear and mastoid process	93768	0.030	0.170	567970	0.025	0.156	0.005**	0.001
Diseases of the circulatory system	93768	0.072	0.259	567970	0.032	0.177	0.040**	0.001
Diseases of the respiratory system	93768	0.205	0.404	567970	0.242	0.429	-0.037**	0.001
Diseases of the digestive system	93768	0.056	0.230	567970	0.035	0.185	0.020**	0.001
Diseases of the skin and subcutaneous tissue	93768	0.083	0.275	567970	0.142	0.349	-0.059**	0.001
Diseases of the musculoskeletal system and connective tissue	93768	0.123	0.328	567970	0.081	0.273	0.041**	0.001

Diseases of the genitourinary system	93768	0.034	0.180	567970	0.088	0.283	0.041**	0.001
Pregnancy, childbirth and the puerperium	93768	0.001	0.036	567970	0.004	0.061	-0.002**	0.000
Certain conditions originating in the perinatal period	93768	0.000	0.016	567970	0.000	0.013	0.000	0.000
Congenital malformations, deformations and chromosomal abnormalities	93768	0.001	0.034	567970	0.001	0.032	0.000	0.000
Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	93768	0.024	0.152	567970	0.021	0.142	0.003**	0.001
Injury, poisoning and certain other consequences of external causes	93768	0.077	0.267	567970	0.064	0.244	0.014**	0.001
Institutional factors								
Compulsory education	93768	0.212	0.409	567970	0.234	0.423	-0.021**	0.001
Insured by the Long-term care insurance	93768	0.305	0.460	567970	0.252	0.434	0.053**	0.002
Medical Supply characteristics								
Hospital	93768	0.426	0.495	567970	0.191	0.393	0.235**	0.002
Number of observations by year								
2001			11316			89301		
2002			9668			85840		
2003			10411			82971		
2004			10437			77512		
2005			11434			78500		
2006			12174			81287		
2007			28328			72559		

Notes: (1) ** and * represent statistical significance at the 1 and 5 percent levels, respectively.

(2) HCEs adjusted to 2005 prices (¥1000 = US$9.10 = €7.31 in 2005).

B: Subsequent months

Patients	Medical Assistance system			Public Health Insurance			Mean Difference test	
	N	Mean	SD	N	Mean	SD	Difference	SE
Health care expenditures (thousand yen)								
Visit fees	306063	257.819	297.735	1501786	196.199	197.974	61.620**	0.562
Consultation fees	306063	1268.365	1441.765	1501786	1000.426	1200.651	267.939**	2.784
Individual attributes								
Female	306063	0.583	0.493	1501786	0.587	0.492	-0.004**	0.001
Age	306063	63.101	16.525	1501786	64.118	20.426	-1.017**	0.034
Primary diseases								
Certain infectious and parasitic diseases	306063	0.030	0.170	1501786	0.027	0.163	0.003**	0.000
Neoplasms	306063	0.033	0.180	1501786	0.043	0.204	-0.010**	0.000
Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism	306063	0.003	0.052	1501786	0.004	0.060	-0.001**	0.000
Endocrine, nutritional and metabolic diseases	306063	0.128	0.334	1501786	0.091	0.287	0.037**	0.001
Mental and behavioral disorders	306063	0.060	0.237	1501786	0.108	0.310	-0.048**	0.000
Diseases of the nervous system	306063	0.032	0.175	1501786	0.028	0.164	0.004**	0.000
Diseases of the eye and adnexa	306063	0.085	0.279	1501786	0.080	0.272	0.005**	0.001
Diseases of the ear and mastoid process	306063	0.011	0.105	1501786	0.011	0.104	0.000	0.000
Diseases of the circulatory system	306063	0.246	0.431	1501786	0.237	0.425	0.009**	0.001
Diseases of the respiratory system	306063	0.069	0.253	1501786	0.057	0.231	0.012**	0.000
Diseases of the digestive system	306063	0.081	0.273	1501786	0.054	0.225	0.027**	0.001
Diseases of the skin and subcutaneous tissue	306063	0.031	0.173	1501786	0.052	0.221	-0.021**	0.000
Diseases of the musculoskeletal system and connective tissue	306063	0.141	0.348	1501786	0.093	0.291	0.047**	0.001
Diseases of the genitourinary system	306063	0.025	0.156	1501786	0.087	0.282	-0.062**	0.000

Pregnancy, childbirth and the puerperium	306063	0.000	0.012	1501786	0.003	0.058	-0.003**	0.000
Certain conditions originating in the perinatal period	306063	0.000	0.009	1501786	0.000	0.016	0.000**	0.000
Congenital malformations, deformations and chromosomal abnormalities	306063	0.002	0.041	1501786	0.002	0.041	0.000	0.000
Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	306063	0.007	0.086	1501786	0.009	0.094	-0.002**	0.000
Injury, poisoning and certain other consequences of external causes	306063	0.017	0.127	1501786	0.015	0.120	0.002**	0.000
Institutional factors								
Compulsory education	306063	0.028	0.164	1501786	0.039	0.195	-0.012**	0.000
Insured by the Long-term care insurance	306063	0.542	0.498	1501786	0.619	0.486	-0.077**	0.001
Medical Supply characteristics								
Hospital	306063	0.499	0.500	1501786	0.354	0.478	0.144**	0.001
Number of observations by year								
2001		34145				216097		
2002		40605				211254		
2003		44123				204347		
2004		47768				211144		
2005		49887				221290		
2006		51474				229451		
2007		38061				208203		

Notes: (1) ** and * represent statistical significance at the 1 and 5 percent levels, respectively.

(2) HCEs adjusted to 2005 prices (¥1000 = US$9.10 = €7.31 in 2005).

Table 2 Estimation Results for the Visit Fees

A: First month

Patients			MAS		PHI		Differences	
Year	Sample	N	Mean	SD	Mean	SD	and ATTs	SE
2001	Raw	100617	5.648	0.682	5.850	0.362	-0.202**	(0.007)
	m=1	32708	5.802	0.613	5.917	0.393	-0.195**	[0.007]
	m=4	62827	5.718	0.660	5.878	0.381	-0.196**	[0.007]
2002	Raw	95508	5.657	0.658	5.836	0.345	-0.179**	(0.007)
	m=1	28731	5.823	0.546	5.889	0.371	-0.164**	[0.007]
	m=4	54197	5.730	0.620	5.855	0.356	-0.167**	[0.007]
2003	Raw	93382	5.680	0.638	5.821	0.330	-0.141**	(0.006)
	m=1	31803	5.831	0.518	5.874	0.362	-0.143**	[0.007]
	m=4	58694	5.747	0.596	5.848	0.352	-0.141**	[0.007]
2004	Raw	87949	5.715	0.582	5.826	0.335	-0.112**	(0.006)
	m=1	26257	5.811	0.502	5.866	0.362	-0.129**	[0.007]
	m=4	54066	5.752	0.557	5.856	0.358	-0.130**	[0.006]
2005	Raw	89934	5.720	0.565	5.830	0.339	-0.110**	(0.005)
	m=1	28267	5.818	0.489	5.870	0.365	-0.127**	[0.007]
	m=4	59148	5.757	0.541	5.859	0.361	-0.128**	[0.006]
2006	Raw	93461	5.676	0.579	5.806	0.326	-0.129**	(0.005)
	m=1	30480	5.782	0.507	5.844	0.352	-0.118**	[0.006]
	m=4	63165	5.716	0.555	5.816	0.348	-0.121**	[0.006]
2007	Raw	100887	5.361	0.752	5.806	0.318	-0.445**	(0.005)
	m=1	54444	5.483	0.716	5.815	0.339	-0.425**	[0.005]
	m=4	134226	5.399	0.742	5.796	0.333	-0.426**	[0.005]

Notes: (1) ** and * represent statistical significance at the 1 and 5 percent levels, respectively.

(2) The heteroskedasticity-constant variance of the population ATTs are shown in square brackets.

B: Subsequent months

Patients			MAS		PHI		Differences	
Year	Sample	N	Mean	SD	Mean	SD	and ATTs	SE
2001	Raw	250242	5.297	0.852	5.132	0.700	0.165**	(0.005)
	m=1	219230	5.325	0.844	5.129	0.730	0.194**	[0.005]
	m=4	284286	5.313	0.847	5.115	0.728	0.198**	[0.005]
2002	Raw	251859	5.167	0.798	5.057	0.642	0.110**	(0.004)
	m=1	264408	5.250	0.779	5.066	0.663	0.160**	[0.004]
	m=4	340147	5.219	0.785	5.042	0.663	0.163**	[0.004]
2003	Raw	248470	5.174	0.793	5.079	0.633	0.095**	(0.004)
	m=1	274049	5.308	0.770	5.117	0.667	0.170**	[0.004]
	m=4	357957	5.259	0.781	5.075	0.667	0.174**	[0.004]
2004	Raw	258912	5.191	0.806	5.009	0.651	0.181**	(0.004)
	m=1	285024	5.319	0.792	5.072	0.678	0.237**	[0.004]
	m=4	378691	5.272	0.801	5.029	0.679	0.238**	[0.004]
2005	Raw	271177	5.170	0.804	4.984	0.646	0.186**	(0.004)
	m=1	298864	5.296	0.794	5.054	0.676	0.243**	[0.004]
	m=4	395254	5.252	0.800	5.010	0.674	0.242**	[0.004]
2006	Raw	280925	5.133	0.807	4.947	0.662	0.185**	(0.004)
	m=1	323019	5.276	0.805	5.029	0.686	0.242**	[0.004]
	m=4	419968	5.228	0.809	4.984	0.685	0.241**	[0.004]
2007	Raw	246264	5.119	0.787	4.929	0.648	0.190**	(0.004)
	m=1	237794	5.262	0.772	5.021	0.666	0.236**	[0.005]
	m=4	309698	5.213	0.780	4.975	0.665	0.237**	[0.004]

Notes: (1) ** and * represent statistical significance at the 1 and 5 percent levels, respectively.

(2) The heteroskedasticity-constant variance of the population ATTs are shown in square brackets.

Table 3 Estimation Results for the Consultation Fees

A: First month

Patients			MAS		PHI		Differences	
Year	Sample	N	Mean	SD	Mean	SD	and ATTs	SE
2001	Raw	100617	6.290	1.189	5.952	1.093	0.337**	(0.012)
	m=1	32708	5.895	1.135	5.729	1.084	0.157**	[0.015]
	m=4	62827	6.124	1.185	5.966	1.145	0.153**	[0.013]
2002	Raw	95508	6.161	1.189	5.879	1.113	0.282**	(0.013)
	m=1	28731	5.737	1.157	5.583	1.095	0.138**	[0.016]
	m=4	54197	5.979	1.197	5.830	1.164	0.143**	[0.013]
2003	Raw	93382	6.139	1.201	5.880	1.093	0.258**	(0.012)
	m=1	31803	5.726	1.129	5.565	1.067	0.140**	[0.016]
	m=4	58694	5.961	1.190	5.812	1.140	0.138**	[0.013]
2004	Raw	87949	6.127	1.196	5.894	1.110	0.233**	(0.012)
	m=1	26257	5.770	1.157	5.654	1.125	0.092**	[0.016]
	m=4	54066	5.993	1.198	5.889	1.176	0.097**	[0.014]
2005	Raw	89934	6.145	1.203	5.916	1.124	0.228**	(0.012)
	m=1	28267	5.794	1.166	5.673	1.128	0.109**	[0.016]
	m=4	59148	6.013	1.203	5.910	1.176	0.103**	[0.013]
2006	Raw	93461	6.162	1.186	5.900	1.120	0.262**	(0.011)
	m=1	30480	5.788	1.157	5.677	1.124	0.109**	[0.015]
	m=4	36266	6.052	1.195	5.932	1.152	0.099**	[0.013]
2007	Raw	100887	6.244	1.197	5.895	1.155	0.349**	(0.008)
	m=1	54444	6.028	1.191	5.914	1.213	0.032*	[0.013]
	m=4	134226	6.177	1.201	6.127	1.220	0.026*	[0.011]

Notes: (1) ** and * represent statistical significance at the 1 and 5 percent levels, respectively.

(2) The heteroskedasticity-constant variance of the population ATTs are shown in square brackets.

B: Subsequent months

Patients			MAS		PHI		Differences	
Year	Sample	N	Mean	SD	Mean	SD	and ATTs	SE
2001	Raw	250242	6.753	1.136	6.498	1.107	0.256**	(0.007)
	m=1	219230	6.839	1.099	6.594	1.072	0.265**	[0.008]
	m=4	284286	6.809	1.114	6.552	1.090	0.275**	[0.007]
2002	Raw	251859	6.585	1.188	6.384	1.139	0.201**	(0.006)
	m=1	264408	6.751	1.123	6.472	1.109	0.261**	[0.008]
	m=4	340147	6.691	1.152	6.421	1.130	0.259**	[0.007]
2003	Raw	248470	6.565	1.198	6.325	1.117	0.240**	(0.006)
	m=1	274052	6.698	1.121	6.420	1.074	0.257**	[0.008]
	m=4	357957	6.650	1.153	6.381	1.100	0.256**	[0.007]
2004	Raw	258912	6.500	1.182	6.287	1.113	0.213**	(0.006)
	m=1	285024	6.630	1.085	6.398	1.060	0.233**	[0.008]
	m=4	378691	6.578	1.125	6.352	1.094	0.229**	[0.007]
2005	Raw	271177	6.509	1.192	6.316	1.117	0.193**	(0.006)
	m=1	298864	6.655	1.103	6.428	1.064	0.225**	[0.008]
	m=4	395254	6.599	1.138	6.377	1.099	0.220**	[0.007]
2006	Raw	280925	6.502	1.180	6.335	1.110	0.167**	(0.006)
	m=1	323019	6.662	1.076	6.459	1.041	0.200**	[0.007]
	m=4	419968	6.608	1.117	6.405	1.081	0.198**	[0.007]
2007	Raw	246264	6.567	1.163	6.312	1.119	0.256**	(0.006)
	m=1	237794	6.684	1.051	6.446	1.034	0.243**	[0.008]
	m=4	309698	6.643	1.094	6.402	1.073	0.247**	[0.008]

Notes: (1) ** and * represent statistical significance at the 1 and 5 percent levels, respectively.

(2) The heteroskedasticity-constant variance of the population ATTs are shown in square brackets.

Table 4 Estimation Results for Medical Services: Medications

A: First month

Patients			MAS		PHI		Differences	
Year	Sample	N	Mean	SD	Mean	SD	and ATTs	SE
2001	Raw	79411	5.613	0.962	5.040	0.717	0.573**	(0.014)
	m=1	15388	5.563	0.855	5.091	0.709	0.531**	[0.017]
	m=4	28899	5.588	0.917	5.073	0.722	0.552**	[0.015]
2002	Raw	74629	5.356	0.876	4.906	0.718	0.450**	(0.014)
	m=1	11591	5.379	0.780	4.936	0.695	0.431**	[0.018]
	m=4	21876	5.362	0.835	4.916	0.706	0.445**	[0.016]
2003	Raw	71643	5.367	0.845	4.907	0.722	0.459**	(0.014)
	m=1	12871	5.404	0.754	4.907	0.684	0.455**	[0.017]
	m=4	22938	5.382	0.805	4.906	0.705	0.462**	[0.015]
2004	Raw	66185	5.294	0.848	4.847	0.709	0.446**	(0.014)
	m=1	9245	5.280	0.764	4.851	0.685	0.415**	[0.018]
	m=4	18879	5.292	0.816	4.846	0.692	0.442**	[0.016]
2005	Raw	66844	5.315	0.880	4.852	0.720	0.462**	(0.014)
	m=1	9471	5.272	0.815	4.865	0.704	0.450**	[0.018]
	m=4	20042	5.297	0.855	4.861	0.716	0.453**	[0.016]
2006	Raw	69573	5.314	0.905	4.828	0.707	0.486**	(0.015)
	m=1	10017	5.303	0.824	4.821	0.680	0.485**	[0.018]
	m=4	20625	5.303	0.883	4.834	0.703	0.474**	[0.016]
2007	Raw	66054	5.770	1.069	4.785	0.692	0.985**	(0.012)
	m=1	15474	5.663	1.004	4.822	0.717	0.914**	[0.016]
	m=4	39246	5.735	1.052	4.842	0.743	0.915**	[0.014]

Notes: (1) ** and * represent statistical significance at the 1 and 5 percent levels, respectively.

(2) The heteroskedasticity-constant variance of the population ATTs are shown in square brackets.

B: Subsequent months

Patients			MAS		PHI		Differences	
Year	Sample	N	Mean	SD	Mean	SD	and ATTs	SE
2001	Raw	201158	6.558	1.066	5.664	1.059	0.894**	(0.009)
	m=1	89668	6.624	1.072	5.763	1.091	0.851*	[0.010]
	m=4	124079	6.598	1.071	5.735	1.081	0.856**	[0.009]
2002	Raw	196889	6.453	1.055	5.471	1.091	0.982**	(0.008)
	m=1	96571	6.563	1.051	5.546	1.118	0.992**	[0.010]
	m=4	130957	6.518	1.052	5.514	1.108	0.988**	[0.009]
2003	Raw	202392	6.489	1.064	5.433	1.085	1.055**	(0.008)
	m=1	106306	6.565	1.066	5.522	1.095	1.061**	[0.011]
	m=4	140632	6.538	1.067	5.491	1.097	1.051**	[0.010]
2004	Raw	207849	6.436	1.041	5.347	1.057	1.089**	(0.008)
	m=1	105778	6.500	1.020	5.501	1.078	1.059**	[0.010]
	m=4	141357	6.477	1.029	5.451	1.080	1.067**	[0.009]
2005	Raw	216322	6.499	1.045	5.348	1.082	1.150**	(0.008)
	m=1	107160	6.586	1.018	5.539	1.094	1.105**	[0.010]
	m=4	142292	6.548	1.033	5.483	1.097	1.107**	[0.009]
2006	Raw	222579	6.484	1.047	5.362	1.078	1.122**	(0.008)
	m=1	108372	6.599	0.995	5.554	1.081	1.110**	[0.010]
	m=4	141840	6.557	1.014	5.490	1.087	1.113**	[0.009]
2007	Raw	197656	6.625	1.021	5.308	1.067	1.317**	(0.009)
	m=1	77157	6.670	0.977	5.491	1.061	1.272**	[0.012]
	m=4	101510	6.651	0.994	5.436	1.066	1.280**	[0.011]

Notes: (1) ** and * represent statistical significance at the 1 and 5 percent levels, respectively.

(2) The heteroskedasticity-constant variance of the population ATTs are shown in square brackets.

Table 5 Estimation Results for Medical Services: Examinations

A: First month

Patients			MAS		PHI		Differences	
Year	Sample	N	Mean	SD	Mean	SD	and ATTs	SE
2001	Raw	33782	4.622	1.512	4.368	1.298	0.254**	(0.026)
	m=1	5756	4.509	1.482	4.256	1.377	0.257**	[0.034]
	m=4	16142	4.594	1.507	4.346	1.400	0.243**	[0.029]
2002	Raw	30783	4.482	1.502	4.342	1.301	0.140**	(0.029)
	m=1	4791	4.370	1.455	4.171	1.380	0.168**	[0.038]
	m=4	13316	4.454	1.493	4.254	1.401	0.193**	[0.032]
2003	Raw	30163	4.459	1.506	4.298	1.285	0.161**	(0.027)
	m=1	5155	4.374	1.439	4.151	1.378	0.183**	[0.038]
	m=4	14819	4.439	1.486	4.246	1.435	0.182**	[0.032]
2004	Raw	28978	4.421	1.451	4.357	1.241	0.064*	(0.027)
	m=1	4889	4.364	1.397	4.260	1.323	0.081*	[0.038]
	m=4	14404	4.407	1.438	4.306	1.367	0.096**	[0.033]
2005	Raw	29704	4.453	1.424	4.388	1.272	0.065**	(0.025)
	m=1	5463	4.450	1.366	4.338	1.332	0.068*	[0.034]
	m=4	15912	4.445	1.409	4.329	1.365	0.112**	[0.029]
2006	Raw	29080	4.501	1.440	4.398	1.279	0.104**	(0.025)
	m=1	5780	4.443	1.390	4.330	1.356	0.115**	[0.034]
	m=4	17106	4.489	1.427	4.339	1.392	0.149**	[0.029]
2007	Raw	29062	4.696	1.429	4.384	1.263	0.312**	(0.019)
	m=1	10305	4.696	1.403	4.283	1.324	0.385**	[0.029]
	m=4	32739	4.700	1.424	4.280	1.341	0.414**	[0.026]

Notes: (1) ** and * represent statistical significance at the 1 and 5 percent levels, respectively.

(2) The heteroskedasticity-constant variance of the population ATTs are shown in square brackets.

B: Subsequent months

Patients			MAS		PHI		Differences	
Year	Sample	N	Mean	SD	Mean	SD	and ATTs	SE
2001	Raw	41720	4.967	1.372	4.659	1.316	0.307**	(0.018)
	m=1	15691	4.850	1.317	4.558	1.277	0.276**	[0.025]
	m=4	33298	4.927	1.355	4.618	1.320	0.314**	[0.021]
2002	Raw	37815	4.777	1.374	4.540	1.296	0.237**	(0.018)
	m=1	16131	4.598	1.297	4.328	1.243	0.292**	[0.025]
	m=4	36481	4.719	1.348	4.437	1.312	0.290**	[0.021]
2003	Raw	37099	4.794	1.367	4.516	1.281	0.278**	(0.017)
	m=1	17051	4.574	1.304	4.294	1.202	0.313**	[0.025]
	m=4	39794	4.730	1.353	4.407	1.300	0.331**	[0.021]
2004	Raw	40376	4.772	1.343	4.561	1.267	0.211**	(0.016)
	m=1	19356	4.652	1.260	4.369	1.221	0.300**	[0.024]
	m=4	43875	4.739	1.321	4.441	1.303	0.301**	[0.021]
2005	Raw	40082	4.783	1.327	4.572	1.265	0.211**	(0.016)
	m=1	19835	4.680	1.259	4.387	1.227	0.306**	[0.024]
	m=4	44879	4.756	1.305	4.427	1.293	0.336**	[0.020]
2006	Raw	41318	4.890	1.353	4.636	1.283	0.254**	(0.015)
	m=1	21873	4.853	1.297	4.542	1.248	0.321**	[0.023]
	m=4	48695	4.882	1.337	4.541	1.317	0.348**	[0.020]
2007	Raw	34440	4.866	1.309	4.629	1.296	0.237**	(0.018)
	m=1	14658	4.816	1.269	4.484	1.240	0.372**	[0.027]
	m=4	32334	4.859	1.297	4.508	1.318	0.357**	[0.023]

Notes: (1) ** and * represent statistical significance at the 1 and 5 percent levels, respectively.

(2) The heteroskedasticity-constant variance of the population ATTs are shown in square brackets.

Table 6 Estimation Results for Medical Services: Procedures and Operations

A: First month

Patients			MAS		PHI		Differences	
Year	Sample	N	Mean	SD	Mean	SD	and ATTs	SE
2001	Raw	42013	6.053	1.198	5.858	1.205	0.195**	(0.019)
	m=1	6685	5.975	1.191	5.905	1.249	0.064*	[0.026]
	m=4	20347	6.033	1.199	5.941	1.292	0.091**	[0.022]
2002	Raw	39327	6.101	1.170	5.861	1.193	0.240**	(0.019)
	m=1	6090	6.028	1.164	5.850	1.233	0.170**	[0.026]
	m=4	18118	6.086	1.168	5.920	1.244	0.164**	[0.022]
2003	Raw	39782	6.077	1.170	5.832	1.177	0.244**	(0.019)
	m=1	6725	5.986	1.168	5.845	1.200	0.171**	[0.026]
	m=4	19509	6.056	1.171	5.877	1.245	0.175**	[0.022]
2004	Raw	37559	6.063	1.133	5.867	1.142	0.196**	(0.018)
	m=1	6886	5.995	1.105	5.887	1.161	0.103**	[0.026]
	m=4	19821	6.041	1.131	5.920	1.209	0.124**	[0.022]
2005	Raw	37443	6.102	1.135	5.854	1.177	0.248**	(0.017)
	m=1	7272	6.045	1.120	5.867	1.199	0.178**	[0.025]
	m=4	22199	6.086	1.129	5.927	1.225	0.154**	[0.021]
2006	Raw	38759	6.160	0.992	5.956	1.031	0.203**	(0.015)
	m=1	7675	6.111	0.965	5.998	1.021	0.098**	[0.021]
	m=4	23316	6.148	0.985	6.052	1.048	0.092**	[0.018]
2007	Raw	40914	6.112	0.955	5.958	1.067	0.153**	(0.011)
	m=1	14972	6.072	0.936	6.096	1.053	-0.057**	[0.018]
	m=4	47326	6.102	0.951	6.146	1.068	-0.052**	[0.015]

Notes: (1) ** and * represent statistical significance at the 1 and 5 percent levels, respectively.

(2) The heteroskedasticity-constant variance of the population ATTs are shown in square brackets.

B: Subsequent months

Patients			MAS		PHI		Differences	
Year	Sample	N	Mean	SD	Mean	SD	and ATTs	SE
2001	Raw	84596	6.084	0.966	5.880	1.047	0.204**	(0.010)
	m=1	36031	6.061	0.880	5.991	0.914	0.082**	[0.013]
	m=4	66637	6.072	0.936	6.004	0.983	0.072**	[0.011]
2002	Raw	84802	6.072	0.957	5.872	1.020	0.200**	(0.009)
	m=1	41807	6.076	0.870	5.975	0.891	0.091**	[0.012]
	m=4	76934	6.068	0.928	5.983	0.959	0.081**	[0.010]
2003	Raw	88768	6.095	0.949	5.825	1.026	0.269**	(0.008)
	m=1	51075	6.072	0.872	5.959	0.904	0.120**	[0.011]
	m=4	92571	6.081	0.923	5.963	0.964	0.120**	[0.010]
2004	Raw	89901	6.052	0.007	5.809	0.004	0.243**	(0.008)
	m=1	52092	6.037	0.861	5.915	0.916	0.104**	[0.011]
	m=4	96831	6.040	0.908	5.943	0.955	0.095**	[0.009]
2005	Raw	92630	6.080	0.932	5.844	1.032	0.236**	(0.008)
	m=1	51794	6.074	0.844	5.956	0.935	0.102**	[0.011]
	m=4	99742	6.074	0.907	5.974	0.979	0.097**	[0.009]
2006	Raw	97739	6.101	0.853	5.881	0.967	0.220**	(0.007)
	m=1	56031	6.092	0.819	5.984	0.864	0.078**	[0.010]
	m=4	105335	6.098	0.841	6.008	0.892	0.077**	[0.008]
2007	Raw	86505	6.134	0.827	5.894	0.957	0.240**	(0.008)
	m=1	42965	6.101	0.808	6.013	0.855	0.062**	[0.010]
	m=4	80573	6.122	0.819	6.048	0.867	0.063**	[0.009]

Notes: (1) ** and * represent statistical significance at the 1 and 5 percent levels, respectively.

(2) The heteroskedasticity-constant variance of the population ATTs are shown in square brackets.

Table 7 Estimation Results for Medical Services: Diagnostic Imaging

A: First month

Patients			MAS		PHI		Differences	
Year	Sample	N	Mean	SD	Mean	SD	and ATTs	SE
2001	Raw	18002	6.247	0.942	6.145	0.927	0.102**	(0.019)
	m=1	3468	6.251	0.928	6.217	0.937	0.029	[0.026]
	m=4	11788	6.249	0.939	6.252	0.951	-0.004	[0.022]
2002	Raw	16902	6.282	0.901	6.153	0.884	0.129**	(0.019)
	m=1	3201	6.305	0.893	6.233	0.903	0.043	[0.025]
	m=4	10998	6.282	0.896	6.249	0.914	0.030	[0.021]
2003	Raw	16265	6.329	0.885	6.144	0.894	0.184**	(0.018)
	m=1	3485	6.301	0.870	6.220	0.870	0.084**	[0.024]
	m=4	11881	6.323	0.882	6.240	0.889	0.082**	[0.020]
2004	Raw	15967	6.349	0.900	6.214	0.895	0.135**	(0.018)
	m=1	3501	6.336	0.885	6.317	0.888	0.026	[0.025]
	m=4	12229	6.343	0.897	6.330	0.897	0.015	[0.021]
2005	Raw	17714	6.369	0.886	6.237	0.892	0.132**	(0.018)
	m=1	3872	6.343	0.863	6.332	0.874	0.006	[0.024]
	m=4	13173	6.366	0.884	6.382	0.897	-0.019	[0.020]
2006	Raw	18233	6.354	0.894	6.242	0.893	0.112**	(0.017)
	m=1	4075	6.334	0.884	6.320	0.877	-0.005	[0.024]
	m=4	13989	6.347	0.890	6.366	0.903	-0.023	[0.020]
2007	Raw	19425	6.382	0.906	6.323	0.928	0.059**	(0.015)
	m=1	6420	6.362	0.891	6.444	0.959	-0.082**	[0.022]
	m=4	21946	6.378	0.903	6.475	0.951	-0.098**	[0.019]

Notes: (1) ** and * represent statistical significance at the 1 and 5 percent levels, respectively.

(2) The heteroskedasticity-constant variance of the population ATTs are shown in square brackets.

B: Subsequent months

Patients			MAS		PHI		Differences	
Year	Sample	N	Mean	SD	Mean	SD	and ATTs	SE
2001	Raw	18030	6.088	0.974	6.182	1.031	-0.094**	(0.020)
	m=1	4280	6.110	0.993	6.196	1.022	-0.090**	[0.028]
	m=4	13399	6.093	0.976	6.197	1.026	-0.106**	[0.023]
2002	Raw	18004	6.147	0.959	6.225	0.997	-0.078**	(0.018)
	m=1	5410	6.143	0.945	6.272	1.000	-0.109**	[0.026]
	m=4	16658	6.148	0.956	6.246	1.008	-0.092**	[0.021]
2003	Raw	17301	6.179	0.956	6.211	0.999	-0.031	(0.017)
	m=1	6139	6.200	0.959	6.258	1.006	-0.052*	[0.023]
	m=4	19273	6.184	0.957	6.231	0.999	-0.049*	[0.020]
2004	Raw	16984	6.204	0.942	6.246	0.992	-0.042*	(0.017)
	m=1	5980	6.217	0.953	6.304	1.006	-0.083**	[0.024]
	m=4	19046	6.204	0.943	6.291	0.989	-0.084**	[0.020]
2005	Raw	18920	6.222	0.932	6.300	0.987	-0.079**	(0.016)
	m=1	6536	6.230	0.941	6.329	0.990	-0.087**	[0.022]
	m=4	20810	6.225	0.935	6.323	0.977	-0.096**	[0.018]
2006	Raw	19660	6.168	0.935	6.268	1.004	-0.099**	(0.016)
	m=1	6356	6.176	0.929	6.343	1.006	-0.148**	[0.023]
	m=4	20672	6.170	0.937	6.335	1.005	-0.162**	[0.019]
2007	Raw	17110	6.164	0.913	6.325	1.003	-0.161**	(0.018)
	m=1	4490	6.165	0.917	6.341	1.016	-0.153**	[0.026]
	m=4	14384	6.161	0.911	6.349	1.010	-0.179**	[0.022]

Notes: (1) ** and * represent statistical significance at the 1 and 5 percent levels, respectively.

(2) The heteroskedasticity-constant variance of the population ATTs are shown in square brackets.

Table A1 Comparison of the medical assistance and public health insurance systems in Japan

	Medical assistance system	Public health insurance
Financial source	Public funds (100%)	Premiums, copayments, and public funds
Copayment rate	0%	10% for those aged 75 and over[(1)], 20% for preschool children and those aged between 70 and 74[(2)], and 30% for all other enrollees[(3)]
Patient access control	Patient must obtain authorization for medical care and drug tickets	None (free-access system)
Coverage	As for public health insurance	In-kind (90%) and cash benefit (10%)
Medical supply	Designated medical facilities under the *Public Assistance Act*	Designated medical facilities under the *Health Insurance Act* and the *National Health Insurance Act*.
Medical fee schedule[(4)]	As for public health insurance	Nationally uniform medical fee schedule
Review of claims	Municipalities or local welfare offices	The Social Insurance Medical Fee Payment Foundation and the Federation of National Health Insurance Organizations.

Notes: (1) 30% for the persons aged 75 and over with more than a certain income.

(2) Due to the preferential measure, 10% for those aged between 70 and 74 since April 2008. In addition, 30% for the persons aged 75 and over with more than a certain income.

(3) When the patient's copayment is too high, the difference between the total monthly copayment and the upper limit, depending on the insured person's age and income level, is repaid by the *high-cost medical treatment system*.

(4) The fee schedule is reviewed biannually by the Central Social Insurance Medical Council, consisting of insurer, physician and intellectual representatives. Regardless of physician age, experience, position, and skill or individual patient attributes, the medical fees reimbursed for treatment are identical for MAS and PHI patients.

(5) Adapted from Suzuki (2008).

Table B1 Estimating propensity scores: First month

Year	2001	2002	2003	2004	2005	2006	2007
	Coef./ (SE)	Coef./ (SE)	Coef./ (SE)	Coef./ (SE)	Coef./ (SE)	Coef./ (SE)	Coef./ (SE)
Female	0.039**	0.051**	0.056**	0.063**	0.048**	0.066**	0.007
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.009)
Age	0.034**	0.039**	0.024**	0.040**	0.037**	0.030**	0.021**
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.003)
Age (squared)	0.004	-0.019*	0.006	-0.019*	-0.018*	-0.001	0.045**
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.007)	(0.007)
Age (cubed)	-0.029**	-0.017**	-0.028**	-0.016**	-0.017**	-0.027**	-0.067**
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.004)
Certain infectious and parasitic diseases	0.110	-0.101	-0.079	-0.090	-0.184*	0.042	0.103
	(0.092)	(0.093)	(0.093)	(0.092)	(0.085)	(0.083)	(0.081)
Neoplasms	-0.285*	-0.423**	-0.494**	-0.595**	-0.782**	-0.182	-0.450**
	(0.140)	(0.144)	(0.145)	(0.144)	(0.141)	(0.130)	(0.117)
Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism	-0.018	-0.079	0.060	-0.235	-0.289	0.531*	-0.060
	(0.231)	(0.257)	(0.266)	(0.307)	(0.287)	(0.250)	(0.236)
Endocrine, nutritional and metabolic diseases	-0.141	-0.110	-0.610**	-0.303*	-0.338*	-0.016	0.254*
	(0.135)	(0.135)	(0.153)	(0.143)	(0.138)	(0.132)	(0.108)
Mental and behavioral disorders	0.888**	0.747**	0.837**	0.589**	0.221	0.316**	1.279**
	(0.130)	(0.133)	(0.125)	(0.122)	(0.113)	(0.109)	(0.092)
Diseases of the nervous system	0.485**	0.386*	0.338*	0.097	-0.012	0.215	0.629**

	(0.160)	(0.158)	(0.167)	(0.160)	(0.155)	(0.147)	(0.116)
Diseases of the eye and adnexa	0.016	-0.004	0.107	0.088	-0.138	0.244**	0.254**
	(0.092)	(0.091)	(0.090)	(0.091)	(0.085)	(0.082)	(0.080)
Diseases of the ear and mastoid process	0.457**	0.359**	0.357**	0.400**	-0.056	0.387**	0.745**
	(0.104)	(0.104)	(0.104)	(0.106)	(0.098)	(0.095)	(0.094)
Diseases of the circulatory system	0.054	-0.118	0.025	-0.173	-0.305*	0.095	0.158
	(0.133)	(0.134)	(0.137)	(0.135)	(0.125)	(0.122)	(0.105)
Diseases of the respiratory system	0.161	0.123	0.158	0.124	0.020	0.248**	0.433**
	(0.087)	(0.086)	(0.085)	(0.087)	(0.080)	(0.077)	(0.076)
Diseases of the digestive system	0.140	0.107	0.147	0.152	-0.090	0.169	0.331**
	(0.106)	(0.107)	(0.108)	(0.107)	(0.102)	(0.100)	(0.093)
Diseases of the skin and subcutaneous tissue	0.037	0.011	0.105	-0.115	-0.264**	-0.009	0.201*
	(0.092)	(0.091)	(0.090)	(0.090)	(0.084)	(0.082)	(0.079)
Diseases of the musculoskeletal system and connective tissue	0.323**	0.098	0.262**	0.157	-0.062	0.361**	0.557**
	(0.101)	(0.102)	(0.100)	(0.101)	(0.094)	(0.091)	(0.085)
Diseases of the genitourinary system	-0.340**	-0.227*	-0.410**	-0.285**	-0.387**	-0.214*	-0.179
	(0.111)	(0.109)	(0.109)	(0.110)	(0.104)	(0.101)	(0.094)
Pregnancy, childbirth and the puerperium	2.229**	0.614	0.766	0.831	1.475*	0.450	1.133
	(0.812)	(0.597)	(0.611)	(0.562)	(0.743)	(0.584)	(0.608)
Certain conditions originating in the perinatal period	0.084	0.350	0.372	0.003	-0.069	0.478	1.106**
	(0.425)	(0.339)	(0.491)	(0.403)	(0.440)	(0.370)	(0.392)
Congenital malformations, deformations and chromosomal abnormalities	0.524	0.066	0.052	-0.493	-0.382	-0.458	-0.042

	(0.298)	(0.254)	(0.308)	(0.257)	(0.297)	(0.276)	(0.226)
Injury, poisoning and certain other consequences of external causes	0.225*	0.025	0.118	-0.016	-0.127	0.110	0.189*
	(0.093)	(0.092)	(0.092)	(0.092)	(0.085)	(0.083)	(0.081)
Compulsory education	0.873**	0.906**	0.708**	0.988**	0.933**	0.785**	0.807**
	(0.037)	(0.037)	(0.037)	(0.038)	(0.037)	(0.036)	(0.033)
Insured by the Long-term care insurance	-0.087**	-0.004	0.002	0.011	0.068*	0.150**	0.129**
	(0.027)	(0.030)	(0.029)	(0.029)	(0.028)	(0.027)	(0.021)
Hospital	0.421**	0.522**	0.688**	0.695**	0.639**	0.593**	0.628**
	(0.012)	(0.013)	(0.013)	(0.014)	(0.013)	(0.013)	(0.010)
Constant	-2.706**	-2.537**	-2.161**	-2.576**	-2.149**	-2.250**	-2.143**
	(0.115)	(0.113)	(0.114)	(0.115)	(0.108)	(0.104)	(0.098)
N	100617	95508	93382	87949	89934	93461	100887
Log likelihood	-30686.335	-27009.602	-28052.681	-27318.664	-29343.342	-31152.264	-48701.815
Pseudo R2	0.133	0.137	0.141	0.147	0.143	0.138	0.187
LR test (coefs=0) chi2(88)	9389.34**	8590.28**	9190.27**	9436.820**	9826.67**	10011.11**	22389.05**
Wald test (excluded var.) chi2(17)	180.85**	192.06**	192.42**	175.69**	156.76**	112.28**	566.57**
Propensity Score							
Mean	0.112	0.101	0.111	0.119	0.127	0.130	0.281
SD	0.101	0.097	0.105	0.112	0.116	0.115	0.208

Notes: (1) ** and * represent statistical significance at the 1 and 5 percent levels, respectively.

(2) All equations include local fixed effects and interaction terms between age and disease dummy variables.

Table B2 Estimating propensity scores: Subsequent months

Year	2001	2002	2003	2004	2005	2006	2007
	Coef./ (SE)	Coef./ (SE)	Coef./ (SE)	Coef./ (SE)	Coef./ (SE)	Coef./ (SE)	Coef./ (SE)
Female	0.044**	0.043**	0.025**	0.039**	0.025**	0.022**	0.036**
	(0.007)	(0.007)	(0.007)	(0.006)	(0.006)	(0.006)	(0.007)
Age	0.043**	0.062**	0.046**	0.055**	0.062**	0.076**	0.064**
	(0.005)	(0.005)	(0.005)	(0.004)	(0.004)	(0.004)	(0.005)
Age (squared)	-0.009	-0.040**	-0.009	-0.026**	-0.035**	-0.069**	-0.036**
	(0.009)	(0.008)	(0.008)	(0.008)	(0.007)	(0.007)	(0.009)
Age (cubed)	-0.032**	-0.015**	-0.032**	-0.025**	-0.022**	0.000	-0.024**
	(0.005)	(0.005)	(0.005)	(0.004)	(0.004)	(0.004)	(0.005)
Certain infectious and parasitic diseases	-0.447**	-0.040	0.139	-0.220	-0.267*	0.060	-0.317*
	(0.129)	(0.135)	(0.136)	(0.124)	(0.104)	(0.113)	(0.143)
Neoplasms	-0.422**	-0.037	-0.063	-0.495**	-0.593**	-0.264*	-0.448**
	(0.140)	(0.144)	(0.144)	(0.133)	(0.115)	(0.122)	(0.148)
Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism	-0.764**	0.109	-0.024	-0.372	-0.337	-0.389*	0.107
	(0.199)	(0.193)	(0.191)	(0.191)	(0.180)	(0.187)	(0.211)
Endocrine, nutritional and metabolic diseases	-0.107	0.367**	0.508**	0.181	0.103	0.179	0.236
	(0.122)	(0.128)	(0.129)	(0.119)	(0.100)	(0.108)	(0.131)
Mental and behavioral disorders	0.018	0.585**	0.626**	0.061	-0.075	-0.034	0.023
	(0.121)	(0.126)	(0.127)	(0.116)	(0.095)	(0.103)	(0.127)
Diseases of the nervous system	0.233	0.678**	0.538**	0.103	-0.074	0.186	0.292*

	(0.126)	(0.131)	(0.134)	(0.123)	(0.103)	(0.110)	(0.133)
Diseases of the eye and adnexa	-0.427**	0.180	0.142	-0.067	-0.128	-0.009	-0.401**
	(0.122)	(0.127)	(0.129)	(0.119)	(0.098)	(0.107)	(0.133)
Diseases of the ear and mastoid process	0.053	0.517**	0.633**	0.343*	0.265*	0.471**	0.182
	(0.144)	(0.147)	(0.145)	(0.138)	(0.117)	(0.125)	(0.167)
Diseases of the circulatory system	-0.486**	-0.062	-0.026	-0.362**	-0.461**	-0.348**	-0.353**
	(0.121)	(0.127)	(0.128)	(0.118)	(0.098)	(0.107)	(0.130)
Diseases of the respiratory system	-0.074	0.564**	0.565**	0.397**	0.222*	0.456**	0.312*
	(0.115)	(0.121)	(0.123)	(0.113)	(0.092)	(0.102)	(0.126)
Diseases of the digestive system	0.078	0.565**	0.551**	0.340**	0.171	0.322**	0.225
	(0.124)	(0.129)	(0.130)	(0.121)	(0.101)	(0.110)	(0.135)
Diseases of the skin and subcutaneous tissue	-0.238*	0.269*	0.225	-0.128	-0.207*	0.019	-0.218
	(0.120)	(0.125)	(0.127)	(0.116)	(0.095)	(0.105)	(0.131)
Diseases of the musculoskeletal system and connective tissue	0.353**	0.840**	0.809**	0.679**	0.461**	0.678**	0.383**
	(0.121)	(0.127)	(0.129)	(0.118)	(0.098)	(0.107)	(0.132)
Diseases of the genitourinary system	-0.809**	-0.118	-0.254	-0.319*	-0.538**	-0.239*	-0.390**
	(0.132)	(0.135)	(0.136)	(0.127)	(0.108)	(0.115)	(0.141)
Pregnancy, childbirth and the puerperium	-4.613**	-0.530	-1.645	-1.458	0.579	1.192	1.916
	(1.720)	(0.955)	(0.987)	(0.924)	(1.035)	(0.738)	(1.386)
Certain conditions originating in the perinatal period	-0.071	-0.130	0.332	-0.135	0.048	-0.301	0.115
	(0.324)	(0.461)	(0.315)	(0.335)	(0.223)	(0.293)	(0.255)
Congenital malformations, deformations and chromosomal abnormalities	0.365*	0.499**	0.394*	0.042	-0.362*	-0.049	-0.049

	(0.180)	(0.180)	(0.172)	(0.159)	(0.146)	(0.146)	(0.172)
Injury, poisoning and certain other consequences of external causes	-0.424**	0.286*	0.490**	0.081	-0.213	0.049	-0.257
	(0.139)	(0.137)	(0.138)	(0.129)	(0.110)	(0.117)	(0.151)
Compulsory education	0.825**	0.950**	0.804**	0.964**	1.042**	1.069**	1.064**
	(0.053)	(0.048)	(0.047)	(0.046)	(0.044)	(0.042)	(0.057)
Insured by the Long-term care insurance	-0.210**	-0.181**	-0.132**	-0.106**	-0.065**	0.016	0.019
	(0.014)	(0.013)	(0.013)	(0.013)	(0.012)	(0.012)	(0.014)
Hospital	0.236**	0.286**	0.371**	0.411**	0.395**	0.369**	0.364**
	(0.007)	(0.007)	(0.007)	(0.006)	(0.006)	(0.006)	(0.007)
Constant	-2.378**	-2.765**	-2.448**	-2.528**	-2.407**	-2.877**	-2.970**
	(0.139)	(0.143)	(0.143)	(0.134)	(0.114)	(0.120)	(0.152)
N	250242	251859	248470	258912	271177	280925	246264
Log likelihood	-89796.707	-98920.085	-102880.620	-107815.46	-112379.000	-117917.670	-92261.246
Pseudo R2	0.099	0.111	0.115	0.129	0.132	0.119	0.130
LR test (coefs=0) chi2(88)	19830.77**	24646.68**	26658.66**	31962.290**	34136.01**	31749.5**	27524.21**
Wald test (excluded var.) chi2(17)	299.37**	405.87**	452.33**	535.44**	512.1**	460.13**	513.93**
Propensity Score							
Mean	0.136	0.161	0.178	0.185	0.184	0.183	0.155
SD	0.097	0.115	0.124	0.135	0.136	0.129	0.122

Notes: (1) ** and * represent statistical significance at the 1 and 5 percent levels, respectively.

(2) All equations include local fixed effects and interaction terms between age and disease dummy variables.

Table C1 *t*-Test Results for the Equality of Means between the Two Groups: First month

Year	2001		2002		2003		2004		2005		2006		2007	
Matching	m=1	m=4	m=1	m=4	m=1	m=4	m=1	m=4	m=1	m=4	m=1	m=4	m=1	m=4
Female	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Age	0.008	-0.032**	-0.007	-0.018	-0.013*	-0.052**	-0.034**	-0.092**	-0.035**	-0.093**	-0.036**	-0.092**	-0.011	-0.034**
	(0.006)	(0.009)	(0.007)	(0.010)	(0.006)	(0.010)	(0.008)	(0.011)	(0.007)	(0.010)	(0.007)	(0.010)	(0.006)	(0.007)
Certain infectious and parasitic diseases	0.000	0.001*	0.000	0.000	0.000	-0.001**	-0.002**	-0.004**	-0.001**	-0.003**	-0.001**	-0.003**	-0.001**	-0.002**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Neoplasms	0.000	0.000	0.001*	0.002**	0.000	0.002**	0.002**	0.005**	0.002**	0.004**	0.002**	0.004**	0.001**	0.003**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism	-0.001**	-0.001**	-0.001**	-0.001**	0.000**	-0.001**	-0.001**	-0.001**	0.000**	-0.001**	-0.001**	-0.001**	-0.001**	-0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Endocrine, nutritional and metabolic diseases	0.001**	0.001**	0.000	-0.002**	0.000	-0.001**	-0.001**	-0.003**	0.000	-0.003**	-0.001**	-0.003**	-0.001**	-0.004**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Mental and behavioral disorders	0.000	-0.002**	0.000	-0.002**	0.000	0.000	0.001**	0.001*	0.000	0.001	0.001**	0.003**	0.001**	0.003**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

Diseases of the nervous system	-0.002**	-0.004**	-0.001**	-0.002**	-0.001**	-0.002**	-0.001	-0.001*	-0.001	-0.001**	-0.001	-0.002**	0.000	-0.001**
	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Diseases of the eye and adnexa	0.003**	0.006**	0.003**	0.007**	0.002**	0.006**	0.003**	0.005**	0.001**	0.002**	0.001	0.003**	0.002**	0.004**
	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.000)
Diseases of the ear and mastoid process	-0.001**	-0.003**	-0.002**	-0.005**	-0.002**	-0.004**	-0.004**	-0.009**	-0.002**	-0.004**	-0.002**	-0.006**	-0.002**	-0.005**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.000)
Diseases of the circulatory system	-0.001**	-0.001**	-0.001	-0.002**	-0.001**	-0.003**	0.002**	0.002**	0.001**	0.002**	0.000	0.002**	0.000	-0.002**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.000)
Diseases of the respiratory system	0.003**	0.010**	0.005**	0.014**	0.004**	0.014**	0.004**	0.017**	0.004**	0.014**	0.006**	0.014**	0.003**	0.010**
	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)
Diseases of the digestive system	-0.001**	-0.006**	-0.003**	-0.006**	-0.002**	-0.008**	-0.004**	-0.010**	-0.003**	-0.009**	-0.005**	-0.009**	-0.002**	-0.005**
	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.000)
Diseases of the skin and subcutaneous tissue	0.000*	-0.002**	0.000	-0.002**	0.000	-0.002**	0.000	-0.001*	0.000	-0.002**	0.000	-0.002**	-0.001**	-0.002**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Diseases of the musculoskeletal system and connective tissue	0.001**	0.003**	0.000	0.002**	0.000	0.003**	0.000	0.002**	0.001*	0.002**	0.001*	0.001**	0.001**	0.004**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Diseases of the genitourinary system	0.000**	-0.001**	0.000*	-0.002**	0.000	-0.002**	0.000	-0.002**	0.000*	-0.001**	0.000	-0.001**	0.000	-0.002**

	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pregnancy, childbirth and the puerperium	0.000	0.000**	0.000	0.000**	0.000	0.000**	0.000	0.000	0.000	0.000**	0.000	0.000	0.000**	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Certain conditions originating in the perinatal period	0.000	0.000**	0.000	0.000**	0.000*	0.000**	0.000	0.000	0.000	0.000**	0.000*	0.000**	0.000**	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Congenital malformations, deformations and chromosomal abnormalities	0.000**	0.000**	0.000	-0.001**	0.000*	0.000**	0.000**	-0.001**	0.000**	-0.001**	0.000**	-0.001**	0.000**	-0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	-0.001**	-0.004**	-0.001**	-0.003**	0.000	-0.002**	-0.002**	-0.005**	-0.003**	-0.007**	0.000	-0.001**	0.000**	-0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
Injury, poisoning and certain other consequences of external causes	0.001**	0.005**	0.001**	0.004**	0.001**	0.002**	0.003**	0.006**	0.003**	0.008**	0.001	0.002**	0.001**	0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
Hospital	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000**	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

Prefecture														
Hokkaido	0.000	0.001**	0.000*	0.000*	0.000	0.000	0.000	-0.001**	0.000	-0.001**	0.000*	0.001*	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Aomori	-0.001**	-0.003**	0.000	-0.002**	0.000	-0.002**	0.000	-0.001	0.000	-0.001**	-0.001**	-0.002**	0.000	-0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Iwate	0.000	0.000	0.000	0.000	0.000	0.000*	0.000	-0.001**	0.000	-0.001**	0.000	0.000	0.000*	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Miyagi	0.000	0.001**	0.000	0.001**	0.000	0.001*	0.001**	0.002**	0.001**	0.003**	0.000	0.001**	0.001**	0.002**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Akita	0.000	0.000	-0.001**	-0.002**	0.000	-0.001**	-0.001	0.000	-0.001*	-0.001**	-0.001**	-0.001**	-0.001**	-0.002**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Yamagata	0.000*	0.000	0.000*	0.000	0.000	0.000	0.000*	0.001**	0.000	0.000	0.000	0.000*	0.000	0.000*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Fukushima	0.000	-0.001*	0.000	0.000	0.000	0.001*	0.000	0.001*	0.000	0.001*	0.000	-0.001*	0.000	-0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ibaraki	0.001*	0.001**	0.000	0.001**	0.000	0.001*	0.001**	0.001**	0.001*	0.002**	0.000	0.001**	0.000*	0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Tochigi	-0.001**	-0.002**	0.000*	-0.001**	0.000	-0.001**	0.000**	-0.001**	-0.001**	-0.001**	0.001**	0.001**	-0.001**	-0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Gunma	-0.001**	-0.001**	0.000	0.000*	0.000*	0.000*	0.000	0.000	0.000	0.000	0.000*	-0.001**	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Saitama	0.002**	0.005**	0.001**	0.005**	0.000	-0.001*	0.000	0.000	0.001**	0.002**	0.000	0.002**	0.000	-0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Chiba	0.001*	0.001**	0.000	0.000	0.001**	0.003**	0.001	0.002**	0.000	-0.002**	0.000	-0.001**	0.002**	0.007**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Tokyo	0.000*	0.000	0.000	0.000	0.002**	0.007**	0.000	0.000	-0.001**	-0.003**	0.000	-0.001	0.001**	0.002**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Kanagawa	-0.001**	-0.001*	-0.001*	-0.001*	-0.003**	-0.007**	0.000	0.000	0.001*	0.004**	0.000	0.000	-0.001**	-0.002**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

Niigata	0.000**	-0.002**	0.000*	-0.001**	0.000	0.000*	0.000**	-0.001**	0.000	-0.001**	0.000	-0.001**	-0.001**	-0.002**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Toyama	0.000*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000*	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ishikawa	0.000	0.000	0.000	0.000**	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Fukui	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Yamanashi	0.000	0.000**	0.000	0.000	0.000	0.000	0.000**	-0.001**	0.000*	-0.001**	0.000	0.000	-0.001**	-0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Nagano	0.001**	0.001**	0.000	0.000	0.000	0.001**	0.000	0.001**	0.000	0.000	0.000**	0.000*	0.001**	0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Gifu	0.000	0.000	0.000**	0.000	0.000	0.000	0.000	-0.001**	0.000	0.001**	-0.001**	-0.001**	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Shizuoka	0.000	-0.001**	0.000*	0.001**	0.000	0.001**	0.000	0.001*	0.000**	0.001**	0.000	0.000	0.000	0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Aichi	0.000	0.000	0.001*	0.001**	0.001**	0.003**	0.000	0.002**	0.000	0.001*	0.001**	0.003**	0.001**	0.002**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Mie	0.000	0.001	0.000	0.000	0.000	-0.001**	-0.001*	-0.001**	0.000	0.001*	0.000	-0.001**	0.000	-0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Shiga	0.000	0.000	-0.001**	-0.002**	-0.001**	-0.002**	0.000	0.000	-0.001**	-0.002**	0.000	-0.001**	-0.001*	-0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Kyoto	-0.002**	-0.004**	-0.002**	-0.008**	-0.001**	-0.004**	-0.003**	-0.006**	-0.003**	-0.008**	-0.002**	-0.005**	-0.007**	-0.011**
	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)
Osaka	0.002**	0.005**	0.002**	0.008**	0.001**	0.003**	0.003**	0.007**	0.002**	0.007**	-0.001*	-0.001**	0.007**	0.011**
	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)
Hyogo	0.003**	0.004**	0.002**	0.004**	0.003**	0.007**	0.003**	0.004**	0.002**	0.005**	0.003**	0.008**	0.002**	0.002**
	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.000)
Nara	-0.002**	-0.005**	-0.002**	-0.004**	-0.001**	-0.003**	-0.003**	-0.004**	-0.001**	-0.004**	0.000	-0.002**	-0.002**	-0.002**

	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Wakayama	0.000	-0.001**	0.000	-0.001**	-0.001**	-0.003**	0.000	-0.001*	-0.001**	-0.002**	0.000	0.000	0.000	-0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Tottori	0.000	0.000	0.000	0.000	0.000**	-0.001**	0.000	-0.001**	0.000	0.000	0.000	-0.001**	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Shimane	0.000	0.000	0.000	0.000	0.000	0.000	0.000*	0.000*	0.000	0.000	0.000	0.000	0.000**	-0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Okayama	-0.001**	-0.003**	0.000	-0.001**	0.000	-0.001*	-0.001	-0.002**	0.000	-0.001	0.000	0.000	-0.001*	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Hiroshima	0.002**	0.004**	0.001**	0.005**	0.000	0.003**	0.001**	0.003**	0.001**	0.004**	0.001*	0.004**	0.003**	0.004**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)
Yamaguchi	0.000	0.001**	-0.001**	-0.003**	0.001	0.001**	0.000	0.000	0.001**	0.001*	0.000	0.001	0.000	-0.001*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Tokushima	0.000	0.001*	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	-0.001*	-0.002**	-0.001**	-0.002**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Kagawa	-0.001*	-0.001**	0.000	0.000	-0.001**	-0.002**	0.000	0.000	-0.001**	-0.002**	0.000	0.000	0.000	-0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ehime	0.000	-0.002**	0.000	-0.001*	-0.001**	-0.002**	0.000	-0.002**	-0.001**	-0.002**	0.000**	-0.001**	0.001**	0.002**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Kochi	-0.002**	-0.005**	-0.002**	-0.002**	-0.003**	-0.004**	-0.002**	-0.004**	-0.002**	-0.003**	-0.001**	-0.003**	-0.003**	-0.005**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Fukuoka	0.002**	0.004**	0.002**	0.004**	0.003**	0.006**	0.003**	0.007**	0.003**	0.005**	0.001	0.002**	0.003**	0.006**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
Saga	-0.001**	-0.001**	0.000	0.000	0.000	0.000	-0.001**	-0.002**	0.000	0.000	0.000	0.000	0.000*	-0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Nagasaki	0.000	0.000	0.000*	-0.001**	0.000	-0.002**	-0.001**	-0.001**	-0.001**	-0.001**	0.001**	0.001**	-0.002**	-0.002**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Kumamoto	0.001**	0.002**	0.000*	0.000	0.000	0.001**	0.001**	0.002**	0.001*	0.001**	0.000	0.000	0.001**	0.002**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

Oita	0.000	-0.001	0.000	0.000	0.001**	0.001**	0.000	0.000	0.000	0.001	-0.001*	-0.002**	0.001**	0.002**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Miyazaki	0.000	0.001**	0.001*	0.001**	0.000	0.001**	0.000	0.000	0.000	0.001**	0.001	0.001**	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Kagoshima	0.001*	0.001**	0.000	0.001**	0.000	0.000	0.001*	0.001*	0.001**	0.001	0.000	0.001*	0.001**	0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Okinawa	0.000*	-0.002**	-0.001**	-0.002**	-0.001**	-0.003**	-0.001**	-0.002**	-0.001**	-0.003**	0.000*	-0.002**	-0.001**	-0.004**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pseudo R-squared for estimating equation (A1)	0.001	0.003	0.001	0.002	0.001	0.003	0.001	0.003	0.001	0.003	0.000	0.002	0.002	0.003

Notes: (1) ** and * represent statistical significance at the 1 and 5 percent levels, respectively.

(2) Upper values are mean differences and their standard errors are shown in parentheses.

Table C2 *t*-Test Results for the Equality of Means between the Two Groups: Subsequent months

Year	2001		2002		2003		2004		2005		2006		2007	
Matching	m=1	m=4	m=1	m=4	m=1	m=4	m=1	m=4	m=1	m=4	m=1	m=4	m=1	m=4
Female	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Age	0.002*	0.016**	0.001	-0.001	0.003**	0.009**	0.001	0.007**	-0.001	0.002	-0.002**	-0.004*	-0.002	-0.002
	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)
Certain infectious and parasitic diseases	0.000	0.000**	0.000	0.000**	0.000**	-0.001**	0.000	-0.001**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Neoplasms	0.000	0.000**	0.000**	0.001**	0.000**	0.001**	0.000**	0.001**	0.000**	0.001**	0.000**	0.001**	0.000**	0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism	0.000**	-0.001**	0.000**	-0.001**	0.000**	-0.001**	0.000**	-0.001**	0.000**	-0.001**	0.000**	-0.001**	0.000**	-0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Endocrine, nutritional and metabolic diseases	0.000**	0.001**	0.000**	0.000**	0.000**	0.000	0.000	0.000	0.000**	0.000	0.000**	0.000**	0.000	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Mental and behavioral disorders	0.000**	0.001**	0.000	0.000**	0.000*	0.001**	0.000**	0.001**	0.000	0.000**	0.000	0.001**	0.000*	0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

Diseases of the nervous system	0.000**	-0.001**	0.000*	-0.001**	0.000	-0.001**	0.000	0.000**	0.000*	0.000	0.000	0.000	0.000	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Diseases of the eye and adnexa	0.000**	0.001**	0.000**	0.001**	0.000**	0.001**	0.000**	0.001**	0.000**	0.001**	0.000**	0.001**	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Diseases of the ear and mastoid process	0.000**	-0.002**	-0.001**	-0.003**	-0.001**	-0.004**	-0.001**	-0.003**	0.000**	-0.003**	-0.001**	-0.003**	-0.001**	-0.003**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Diseases of the circulatory system	0.000*	0.002**	0.000**	0.003**	0.000**	0.003**	0.000**	0.003**	0.000**	0.003**	0.000**	0.002**	0.000**	0.005**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Diseases of the respiratory system	0.000**	0.000	0.000*	-0.001**	0.000**	0.000	0.000*	-0.001**	0.000*	0.000**	0.000	-0.001**	0.000**	-0.002**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Diseases of the digestive system	0.000**	0.000	0.000	0.000**	0.000**	0.000**	0.000	0.001**	0.000	0.001**	0.000	0.000**	0.000*	0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Diseases of the skin and subcutaneous tissue	0.000	0.000**	0.000**	0.000**	0.000	0.000**	0.000*	-0.001**	0.000**	0.000**	0.000	0.000	0.000*	-0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Diseases of the musculoskeletal system and connective tissue	0.000**	0.000**	0.000**	0.000**	0.000	0.000**	0.000	0.000	0.000	0.000	0.000	0.000**	0.000	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Diseases of the genitourinary system	0.000	0.000**	0.000	0.000*	0.000	0.000*	0.000	0.000	0.000	0.000	0.000	0.000**	0.000	0.000**

	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pregnancy, childbirth and the puerperium	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000*	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Certain conditions originating in the perinatal period	0.000	0.000	0.000	0.000	0.000	0.000	0.000*	0.000	0.000	0.000*	0.000	0.000	0.000	0.000*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Congenital malformations, deformations and chromosomal abnormalities	0.000**	0.000**	0.000**	-0.001**	0.000**	0.000**	0.000**	-0.001**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	0.000	0.000**	0.000	0.000*	0.000	0.000*	0.000	0.000	0.000**	0.000**	0.000	0.000**	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Injury, poisoning and certain other consequences of external causes	0.000**	0.001**	0.000**	0.000**	0.000**	0.000**	0.000**	0.001**	0.000**	0.001**	0.000**	0.000**	0.000*	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Hospital	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

Prefecture														
Hokkaido	0.000**	0.001**	0.000**	0.001**	0.000	0.000**	0.000	0.000**	0.000	0.000	0.000	0.000**	0.000**	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Aomori	0.000**	-0.002**	0.000*	0.000**	0.000*	-0.001**	0.000**	0.000	0.000	0.000**	0.000**	0.000**	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Iwate	0.000*	0.000**	0.000*	0.000*	0.000**	-0.001**	0.000	0.000**	0.000**	0.000**	0.000	0.000**	0.000	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Miyagi	0.000	0.000	0.000**	0.001**	0.000**	0.001**	0.000	0.000	0.000**	0.001**	0.000**	0.001**	0.000**	0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Akita	0.000	0.000**	0.000**	-0.002**	0.000	0.000**	0.000	0.000	0.000	0.000*	0.000**	0.000**	0.000*	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Yamagata	0.000**	0.000**	0.000	0.000**	0.000**	-0.001**	0.000*	0.000**	0.000**	0.000**	0.000**	0.000**	0.000	0.000*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Fukushima	0.000**	0.000**	0.000**	0.000**	0.000*	0.000	0.000	0.000	0.000	0.000**	0.000**	-0.001**	0.000	0.000*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ibaraki	0.000**	0.001**	0.000	0.000**	0.000**	0.001**	0.000	0.001**	0.000**	0.001**	0.000	0.001**	0.000**	0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Tochigi	0.000**	0.000**	0.000	0.000	0.000	0.000**	0.000	0.000	0.000*	-0.001**	0.000**	0.001**	0.000**	-0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Gunma	0.000**	-0.001**	0.000	0.000	0.000*	0.000*	0.000	0.000	0.000	0.000	0.000*	0.000**	0.000*	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Saitama	0.000**	0.002**	0.000**	0.001**	0.000	0.000*	0.000	0.000	0.000**	0.000**	0.000**	0.000	0.000*	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Chiba	0.000**	0.000**	0.000*	0.000**	0.000	0.000**	0.000	-0.001**	0.000**	-0.001**	0.000**	-0.001**	0.000**	0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Tokyo	0.001**	0.003**	0.000**	0.003**	0.000**	0.003**	0.000	0.000**	0.000**	0.000**	0.000	0.000**	0.000**	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Kanagawa	-0.001**	-0.003**	0.000**	-0.003**	0.000**	-0.003**	0.000**	0.000	0.000**	0.002**	0.000**	0.001**	0.000**	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

Niigata	0.000**	-0.001**	0.000**	0.000**	0.000	0.000*	0.000*	0.000**	0.000**	0.000	0.000*	0.000**	0.000**	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Toyama	0.000**	0.000**	0.000*	0.000	0.000	0.000	0.000	0.000*	0.000	0.000	0.000	0.000	0.000**	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ishikawa	0.000**	0.001**	0.000	0.000*	0.000**	0.000**	0.000	0.000	0.000**	0.000**	0.000	0.000**	0.000**	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Fukui	0.000	0.000	0.000	0.000	0.000**	0.000**	0.000*	0.000**	0.000	0.000**	0.000*	0.000**	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Yamanashi	0.000**	-0.001**	0.000	0.000*	0.000**	0.000**	0.000**	-0.001**	0.000**	0.000**	0.000**	-0.001**	0.000*	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Nagano	0.000	0.000	0.000	0.000	0.000	0.000*	0.000**	0.000**	0.000*	0.000**	0.000*	0.000**	0.000	0.000*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Gifu	0.000**	0.001**	0.000**	-0.001**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	-0.001**	0.000	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Shizuoka	0.000	0.000**	0.000	0.000**	0.000**	0.000**	0.000*	0.000**	0.000	0.000	0.000**	0.000**	0.000	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Aichi	0.000**	0.001**	0.000**	0.002**	0.000**	0.001**	0.000**	0.002**	0.000**	0.002**	0.001**	0.003**	0.001**	0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Mie	0.000**	-0.001**	0.000	0.000	0.000	0.000**	0.000**	-0.001**	0.000*	-0.001**	0.000**	-0.001**	0.000**	-0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Shiga	0.000**	-0.001**	0.000*	-0.001**	0.000**	-0.001**	0.000	0.000**	0.000**	-0.001**	0.000**	-0.001**	0.000**	-0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Kyoto	0.000**	-0.003**	0.000**	-0.001**	0.000*	-0.001**	0.000**	-0.003**	-0.001**	-0.004**	0.000**	-0.003**	0.000	-0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Osaka	0.002**	0.008**	0.000**	0.001**	0.000	0.000**	0.000**	0.003**	0.001**	0.004**	0.000**	0.003**	0.000*	0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Hyogo	0.000	0.000	0.001**	0.003**	0.001**	0.004**	0.001**	0.004**	0.001**	0.005**	0.000**	0.001**	0.000**	0.002**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Nara	-0.002**	-0.005**	-0.001**	-0.002**	-0.001**	-0.002**	-0.001**	-0.003**	-0.001**	-0.005**	0.000*	0.000*	0.000**	-0.002**

	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Wakayama	0.000**	-0.001**	0.000**	0.000**	0.000**	-0.001**	0.000**	-0.001**	0.000	0.000**	0.000**	-0.001**	0.000	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Tottori	0.000	0.000	0.000*	0.000**	0.000**	-0.001**	0.000**	-0.001**	0.000**	-0.001**	0.000**	-0.001**	0.000**	-0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Shimane	0.000	0.000*	0.000	0.000	0.000**	0.000**	0.000**	-0.001**	0.000	0.000*	0.000*	0.000**	0.000	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Okayama	0.000	0.000*	0.000	0.000**	0.000	0.000**	0.000	0.000	0.000*	0.000	0.000**	0.000**	0.000**	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Hiroshima	0.000	0.001**	0.000**	0.001**	0.000**	0.002**	0.001**	0.002**	0.000**	0.002**	0.000**	0.002**	0.000**	0.002**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Yamaguchi	0.000**	0.000	0.000	-0.001**	0.000*	0.001**	0.000	0.000	0.000	0.000**	0.000	0.000	0.000*	-0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Tokushima	0.000	0.000**	0.000**	0.000**	0.000**	-0.001**	0.000**	-0.001**	0.000	0.000	0.000**	-0.001**	0.000**	-0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Kagawa	0.000*	0.000**	0.000	-0.001**	0.000**	-0.001**	0.000	0.000	0.000*	0.000**	0.000	0.000**	0.000**	-0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ehime	0.000*	0.000	0.000**	0.001**	0.000**	0.000	0.000	0.000*	0.000	-0.001**	0.000	0.000*	0.000**	0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Kochi	0.000**	-0.004**	-0.001**	-0.002**	-0.002**	-0.004**	-0.001**	-0.004**	-0.001**	-0.003**	-0.001**	-0.004**	-0.001**	-0.003**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Fukuoka	0.001**	0.004**	0.001**	0.004**	0.002**	0.005**	0.002**	0.005**	0.001**	0.003**	0.001**	0.004**	0.001**	0.004**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Saga	0.000**	-0.001**	0.000**	0.000**	0.000*	0.000**	0.000	0.000**	0.000	0.000*	0.000	0.000**	0.000*	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Nagasaki	0.000**	-0.001**	0.000**	-0.001**	0.000**	-0.001**	0.000**	-0.001**	0.000	0.000	0.000	0.000**	0.000**	-0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Kumamoto	0.000**	0.001**	0.000**	0.001**	0.000	0.000	0.000*	0.001**	0.000*	0.000**	0.000	0.000*	0.000*	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

Oita	0.000	0.000*	0.000	0.000	0.000**	0.001**	0.000**	0.000**	0.000	0.000	0.000**	-0.001**	0.000*	0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Miyazaki	0.000*	0.001**	0.000**	-0.001**	0.000	0.000**	0.000	0.000**	0.000**	-0.001**	0.000**	-0.001**	0.000	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Kagoshima	0.000	0.001**	0.000**	0.001**	0.000	0.000**	0.000**	0.001**	0.000**	0.001**	0.000**	0.002**	0.000**	0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Okinawa	0.000**	-0.001**	0.000**	-0.001**	0.000**	-0.001**	0.000**	-0.001**	0.000**	-0.001**	0.000**	-0.001**	0.000**	-0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pseudo R-squared for estimating equation (A1)	0.000	0.002	0.000	0.001	0.000	0.001	0.000	0.001	0.000	0.001	0.000	0.001	0.000	0.001

Notes: (1) ** and * represent statistical significance at the 1 and 5 percent levels, respectively.

(2) Upper values are mean differences and their standard errors are shown in parentheses.