Can the Health Insurance Reforms stop an increase in medical costs of middle- and old-aged persons in Japan?*

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Abstract: Using two-period panel data from the Nippon Life Insurance Research Institute, this paper tests the hypothesis that an increase in the self-pay ratio of medical expenditures associated with the Japanese health insurance reforms of April 2003 reduced individual medical costs. We find that the increase in the self-pay ratio of medical expenditures has a trivial effect on household medical expenses, implying that a decrease in the quantity demanded for medical services offsets the increase in medical costs. However, according to quantile regression estimates, an increase in the self-pay ratio of medical expenditures has a significantly positive effect on the share of medical costs for relatively high quantile values. This provides corroborating evidence that an increase in the self-pay ratio cannot cut the demand for medical services relatively more for those bearing a higher share of medical costs in household expenditure. An additional finding is that medical services are a necessary good, particularly for those with a relatively high share of medical costs in household expenditure.
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1. Introduction

It is well-known that Japan is one of the world's fastest aging societies and the medical expenses associated with this process are rapidly increasing. According to the 2009 White Paper on Aging Society, early-stage elderly people (65 - 74 years of age) shared 17.3% of the population in 2000 and increased to 20.1%in 2005, and its share is expected 23.1% in 2010.[1] The ratio of medical cost to GDP was 7.1% in 1998 and increased to 8.1% in 2006.[2] Needless to say, it is necessary and pressing to prevent this escalation in medical costs, in particular, for elderly peoples who demand more medical cares, otherwise we suffer the financial collapse of the medical insurance system or any other generation will continue to cover the unprecedented burden of medical expense for them through increases in direct or indirect taxes. This paper estimates Engle curves for medical services in Japan and addresses the containment effects of health insurance reforms taking effect in April 2003 on household medical demand and expenditure, particularly for middle- and old-aged persons who generally require additional medical care and spend more on it. We also consider heterogeneity in the effects of this reform across different groups by medical expenditure and additionally use the Engle curves to consider whether medical services are a luxury or a necessary good.

There are two types of universal health insurance schemes in Japan: an employees' health insurance program and a national health insurance program. Regular employees are usually eligible to join an employees' health insurance program (the program also covers their dependents), while others, including nonregular employees, the self-employed, the nonemployed and the retired, have little choice but to join the national health insurance program. In 2003, the Health Insurance Act was revised in such a way that the self-pay ratio of medical expenditures for regular employees joining an employees' health insurance program was increased, while the ratio for those joining the national health insurance program was unchanged (See Figure 1). To be more specific, the self-pay ratio of medical expenditures for both inpatient and outpatient treatment incurred by employees was raised from 20% to 30%. However, members' dependents incurred the increase only for inpatient treatment, as the rate for outpatient treatment was

[1] It was published by the Japanese Cabinet Office.
http://www8.cao.go.jp/kourei/whitepaper/index-w.html
[2] The source: OECD Health Data, 2002 and 2009.

already at 30%. For those joining the national health insurance program, the self-pay ratio of medical expenditures for both forms of treatment was unchanged and remained at 30%.

Many studies in the literature have addressed price effects in the demand for medical services. As early as 1971, the Rand Corporation and the US Department of Health and Human Services commenced a joint project (the Rand Health Insurance Experiment) that designed and administered natural and randomized experiments in this area in the US. This project artificially produced exogenous variations in health-related policy by randomizing samples, thereby allowing health economists to examine policy effects on the demand for medical services. The experiments suggested that the effect of the provision of health insurance on health-related spending was trivial (Manning et. al. 1987; Newhouse et. al. 1993).[3] Although the Rand Experiment focused on partial-equilibrium analysis, Finkelstein (2007) estimated the general-equilibrium effect of an introduction of Medicare on health spending for the elderly, suggesting that its impact was much larger than the ones obtained from the Rand Experiment.[4] There are more studies suggesting the positive impact of Medicare eligibility on the use of health services (Lichtenberg 2002; Decker 2005;[5] Card. et. al. 2008).

Importantly, despite the lack of suitable data, health economists in Japan have also pursued research into effective policies designed to reduce medical expenditures. For instance, Yoshida and Takagi (2002) estimated the demand for medical services given the 1997 increase in the self-pay ratio of medical expenditures from 10% to 20% for household heads joining the employees' health insurance program. Yoshida and Takagi (2002) concluded that these reforms had no effect on the demand for medical services. However, one limitation of their work was that the data were from only a single company, implying that the sample was not random. To address this shortcoming, Kan and Suzuki (2006) obtained data on 11 insurance associations from the Japanese Ministry of Health,

[3] Zweifel and Manning (2000) and Cutler and Zeckhauser (2000) comprehensively summarized a number of these experiments.
[4] Finkelstein and MaKnight (2008) estimated that the introduction of Medicare induced the elderly to cut copayment for health services by 40% in the top quartile of the copayment distribution, resulting in no impact on elderly mortality.
[5] Decker focused on the effect of Medicare on the demand for health services of breast cancer for women before and after 65 years of age.

Labour, and Welfare and reestimated the effect of the 1997 health insurance reform on the demand for medical services. In addition, they separately examined the policy effects on outpatient and inpatient treatment. In contrast to Yoshida and Takagi (2002), Kan and Suzuki (2006) found the price elasticity of demand for outpatient treatment was significantly negative in a range between –0.05 and –0.06. On this basis, the price elasticity for outpatient treatment exceeded elasticities estimated by Bhattacharya et al. (1996), also using Japanese data. However, the price elasticity of demand for inpatient treatment was insignificant. Later, Yoshida and Ito (2000) calculated the demand for outpatient treatment from the number of practice rezepts and again considered the effect of the 1997 health insurance reforms. They found that a rise in the self-pay ratio of medical expenditures did not affect demand for household heads but did for their dependents. In these circumstances, the increased burden of medical costs would fall on dependents rather than household heads.

Sawano (2000) estimated Engle curves for medical services to investigate the impact of the self-pay system on the demand for outpatient treatment for the elderly. Sawano (2000) concluded that medical services were a necessary good and therefore that a change in the system of elderly care did not affect the demand for elderly care. Yoshida and Kawamura (2009) also focused attention on the elderly care system in a study of physician demand for outpatient treatments. Their finding was that dependents more often visited a physician because the copayment decreased for dependents under the elderly care system, while it remained almost the same for household heads.

The first contribution of this paper is to examine the impact of the 2003 health insurance reform on medical demand. The second is to focus attention on the demand for medical care by middle- and old-aged persons, who usually require relatively more medical care than other age groups, and who now make up a growing share of the Japanese population. We employ a two-period panel data set on the consumption behavior of the middle-aged and older population conducted by the Nippon Life Insurance (NLI) Research Institute. The survey was administered in December 2001 and again in December 2003 and thus spans the implementation date (April 2003) of the revised Health Insurance Act.

The organization of the remainder of the paper is as follows. Section 2 provides the conceptual framework. Section 3 details the data and empirical specifications,

followed by the estimated results in Section 4. The final section provides some concluding remarks.

2. Conceptual Framework

This section develops a simple demand model to examine the effects of an increase in the self-pay ratio of medical expenditures on the demand for medical services and its total cost. We employ the same methodology as Sawano (2000). Let p and $D(p)$ respectively denote the price and demand for a medical service. An individual pays $\tau pD(\tau p)$ for the medical service, where τ represents the self-pay ratio of medical expenditures. An increase in τ then increases but simultaneously decreases the individual cost of the medical service because of the decrease in demand. Which particular effect dominates depends on the price elasticity of the demand curve. Taking the differential of $\tau pD(\tau p)$ with respect to τ yields:

$$\frac{\partial(\tau pD(\tau p))}{\partial \tau} = pD(\tau p)\left[1 + \tau p \frac{D'(\tau p)}{D(\tau p)}\right].$$

The last term indicates the price elasticity of medical service demand. If the demand curve is elastic, an increase in τ decreases the individual expenditure for this medical service. On the other hand, if the demand curve is inelastic, individual expenditure increases. If the elasticity equals one, these opposing effects cancel each other out, and the individual medical expenditure remains unchanged, despite the increase in the self-pay ratio of medical expenditures. Therefore, it is unclear whether an individual employee bears relatively more of the burden of medical bills with the increase in the self-pay ratio of medical expenditures (for both employees and their dependents) from 20% to 30%.

How does the increase in the self-pay ratio of medical expenditures affect the national medical cost $pD(\tau p)$, that is, the sum of out-of-pocket expenditures ($\tau pD(\tau p)$) and health care benefits ($(1-\tau)pD(\tau p)$) incurred by the government? Without doubt, an increase in τ decreases the total medical cost if the price remains constant, and so how much to decrease τ depends ultimately on the price elasticity of demand for medical services. If the demand curve is elastic, total expenditure substantially decreases; in

contrast, if the demand curve is inelastic, the amount of any decrease is trivial.

We estimate Engle curves for medical services to test the effect of an increase in the self-pay ratio of medical expenditures on the demand for medical services. Because our two-period panel data bestrides the implementation date of the Health Insurance Act, we can employ a difference-in-difference (DID) method, allowing for comparison of a treatment group and a control group. Employees who face an increase in the self-pay ratio of medical expenditures belong to the treatment group, while other individuals, for example, the self-employed, the nonemployed, and the retired, belong to the control group. The econometric specification of the Engle curve is given by the first difference structure:

$$\Delta MS_i = \beta_0 + \beta_1 \Delta X_i + \beta_2 \Delta D_i + \beta_3 \Delta T_i D_i + \beta_4 \Delta \log(E_i) + \Delta u_i,$$

where *MS* is the ratio of household medical expenses to total household expenditure, *E* is total expenditure per household member, *T* is a year dummy, *D* is an individual effect indicating to which group the individual belongs, treatment or control group, and *TD* is the cross term of *T* and *D*. Finally, *X* represents a vector of individual characteristics.

We should note that not all individuals belong to the same group during both periods; that is, some employed individuals as of December 2001 became self-employed or retired in December 2003, and vice versa. The coefficient β_2 therefore captures the effect of a change in employment status on household medical expenditures and β_3 is the coefficient for the cross term indicating the policy effect of the increase in the self-pay ratio of medical expenditures. This policy variable allows us to discern the effect of the policy change from any other factors (such as macroeconomic shocks) that commonly affect everyone. Finally, β_4 indicates whether the medical service is a luxury or a necessary good. If the estimated coefficient for β_4 is positive, we can consider medical services as a luxury good, but if β_4 is negative, medical services are a necessary good.

There are two points to keep in mind when the DID method is used. First, it is possible that the policy change is endogenous, in the sense that many employees and their dependents faced with the increase in the self-pay ratio of medical expenditures were encouraged to visit a hospital, even for nonemergency care, before the revised Health Insurance Act took effect. This potentially biases the effects of the legislative change. Second, we must assume that both the treatment and control groups are homogeneous

with respect to any unobservable factors. Otherwise, it is difficult to discern whether any difference in medical service demand between the two groups is attributable to the changing legislation or to the heterogeneity of the groups with respect to the other factors. To control for this, various household characteristics are included in the estimations.

We consider the heterogeneous effects of the revised Health Insurance Act on the demand for medical services using quantile regression methods. We can expect that the adverse effect of this change is greater for those who spend relatively more of their household expenditure on medical services. Note that we do not treat the data as a panel in estimating the quantile regression, rather as repeated cross-sectional observations. This allows us to include an unbalanced panel of data and increase the sample size. To cover any shortcomings of this approach, various characteristics are included to control for the individual effects.

3. Data

The data used in this study are a Japanese micro-level data set, the Survey for Living and Life Design (*kurashi to seikatusekkei nikannsuru chousa*) conducted by the NLI Research Institute.[6] This survey was designed to reveal how middle- and old-aged persons (whose population share is rapidly growing in Japan) transition through life. This survey has been conducted in December every second year since 1997 up until 2003, and samples males born between 1933 and 1947 as per the area sampling method. As of 1997, the respondents are therefore aged between 50 and 64 years. The survey included 1,502 respondents in 1997, 1,034 in 1999, 910 in 2001, and 814 in 2003. As the purpose of the current study is to address whether the Health Insurance Act taking effect in April 2003 is effective in constraining medical expenses, we use the third (2001) and fourth (2003) surveys.

We now explain our means of differentiating between the treatment and the control groups. To do this, it is necessary to identify the employment status of each individual respondent (males) and his spouse (females) because the increase in the self-pay ratio of medical expenditures applies only to those joining an employees' health

[6] A member of the Nippon Life Insurance Company (NISSAY) group.

insurance program, as determined by employment status. Five types of employment status are possible for each individual:

(i) regular employees—those who self-reported that they worked as a regular employee,

(ii) nonregular employees (1)—those who self-reported that they worked as a nonregular worker, and responded that they worked three-quarters of a regular employee's weekly hours of work (30 hours a week) or more,[7]

(iii) nonregular employees (2)—those who self-reported that they worked as a nonregular worker, responded that they worked less than three-quarters of a regular employee's weekly hours of work (30 hours a week), and earned an annual income of over JPY1.3 million if aged under 60 years, or over JPY1.8 million if aged over 60 years,

(iv) nonregular employees (3)—those who self-reported that they worked as a nonregular worker, responded that they worked less than three-quarters of a regular employee's weekly hours of work (30 hours a week), and earned an annual income of less than JPY1.3 million if aged under 60 years, or less than JPY1.8 million if aged over 60 years,

(v) self-employed—those who self-reported that they worked as a self-employed worker, including professionals,

(vi) nonemployed—those who did not report that they worked, including the retired.

We consider nonregular employees (1) as substantially regular employees, the difference being that while regular employees are eligible to receive generous welfare benefits in compensation for compliance of instruction in the course of employment, nonregular employees usually do not participate in a welfare program but can flexibly arrange workplace conditions and working hours.

We should be aware that a nonregular employee (2) earns too much income to be a dependent of his spouse, even though she is a regular employee, and thus has to

[7] When data on the weekly hours of work are missing, but those for the daily hours of work and monthly working days are not, we calculate the average weekly hours of work with the monthly working days divided by 4.3 times the daily hours of work.

participate individually in the national health insurance program. In contrast, a nonregular employee (3) is still eligible to be a dependent of his spouse if she is a regular employee.

Because the dataset does not include comparable information on the employment status of spouses (female), we obtain this using their annual salary or income. Annual income includes salary, pension benefits (public and private), and dividends. We assume a spouse is a regular employee signing up to her own employees' health insurance program if her annual salary exceeds the following amount: JPY2.74 million between 40 and 44 years of age, JPY2.81 million between 45 and 49 years of age, JPY2.90 million between 50 and 54 years of age, JPY2.89 million between 55 and 59 years of age, JPY2.33 million between 60 and 64 years of age, and JPY2.23 million over 65 years of age.[8] These numbers are an average annual salary for middle school graduates for each age range. We employ them as lax threshold points to discern between regular and non-regular employee. Alternatively, we consider a spouse who earns an annual salary of less than the corresponding annual salary as a nonregular employee in the national health insurance program. However, if a spouse's annual income, inclusive of salary, pension benefits and dividends, is less than JPY1.3 million (JPY1.8 million for those more than 60 years of age), and if her husband is a regular employee, she is eligible to be her husband's dependent, and so is partially covered by his employees' health insurance program. In this case, the spouse's self-pay ratio of medical expenditures was 20% for inpatient treatment before the health insurance reform. The drawback of this approach is that we cannot distinguish between whether a spouse who earns her own salary is employed or self-employed.

Table 1 displays the cross-sectional matrix of the types of health insurance for each individual (male) respondent and their spouse (female). There are four groups based on the combination of insurance programs. Group 1 is where both the respondent and his spouse are regular employees (or regular employees of substance), in which case both have incurred the increase in the self-pay ratio of medical expenditures for outpatient and inpatient treatment from 20% to 30%. Group 2 includes regular employees whose spouse is either nonemployed, a nonregular employee or a self-employed (an employer) with

[8] The data are obtained from the 2002 Japanese Wage Census conducted by the Japanese Ministry of Health, Labour and Welfare (MHLW).
(http://www.mhlw.go.jp/toukei/itiran/roudou/chingin/kouzou/z02/index.html)

annual income less than JPY1.3 million (or JPY1.8 million for those aged more than 60 years). They then benefits from coverage of the employees' health insurance program signed up to by their partner. According to the revision of the Health Insurance Act, the self-pay ratio of medical expenditures for regular employees increased from 20% to 30% for both outpatient and inpatient treatment. However, the self-pay ratio for nonregular employees, the self-employed and the nonemployed increased from 20% to 30% but only for inpatient treatment. The self-pay ratio for outpatient treatment remained at 30%.

Group 3 includes regular employees whose spouse is either self-employed or a nonregular employee annually income more than JPY1.3 million (or JPY1.8 million for those over 60 years of age). Neither this nonregular employee nor the employer is eligible to benefit from coverage of the employees' health insurance program signed up to by their partner and so they participate in the national health insurance program. Although the regular employee incurred increases in the burden of medical expenditures for inpatient and outpatient treatment, the burden for either self-employed (an employer) or nonregular employees remained unchanged (at 30% for both treatments). Finally, Group 4 is where both the respondent and his spouse are nonemployed, self-employed, or nonregular employees. Because both are in the national health insurance program, the health insurance reform had no adverse impact on their burden of medical expenditures. We contend that the revision of the Health Insurance Act increased the burden of medical expenditure to the greatest extent in Group 1, followed by Groups 2 and 3, and did not affect the burden of medical expenditure for Group 4.

We consider three cases to distinguish between the treatment and control groups: <Treatment A>, Groups 1 and 2 as the treatment group and Groups 3 and 4 as the control group; <Treatment B>, Groups 1 to 3 as the treatment group and Group 4 as the control group; and <Treatment C>, individual respondents (males) who joined an employees' health insurance program and those signing up for national health insurance.[9] The first two treatments take account of the employment status of (female) spouses in grouping the treatment and control groups, while the last treatment omits the employment status of (female) spouses and defines the two groups only by the (male) individual's insurance program (that is, employment status).

[9] We do not consider the option of distinguishing between Group 1 and the remaining groups, as Group 1 includes few households.

We remove individuals from our sample that are more than 70 years of age because their medical costs are determined under a different medical system for the elderly. In principle, the self-pay ratio of medical expenditures for those aged over 70 remains at 10%, regardless of employment status. For example, a regular employee aged 68 years in 2001 became 70 years of age in 2003 and so automatically has a lower burden of medical costs in 2003 (10% according to Figure 1).

We specify the ratio of household medical expenses to total household expenditure as the dependent variable. Using this variable, we remove outliers from the sample: we define outliers as values of the dependent variable greater than one or more than three standard deviations from the mean. The ratio is then regressed on the logarithm of total household expenditure per household member to estimate the Engle curve. To control for heterogeneity between the two groups, we include individual characteristics, particularly health condition, in the vector of explanatory variables. For instance, the survey subjectively asked the sampled males whether they were healthy, whether their spouse was still living, and if so, whether she was healthy. We also include the number of own family members and the dummy indicating whether a respondent works.

Because our purpose is to compare medical expenses before and after the date of implementation of the health reform, we remove any cross-section observations with data missing in 2001 or 2003 to obtain a balanced panel. The sample size is then 78 households per year when the employment status of spouses is included in grouping the treatment and control groups. However, the sample size substantially increases to 215 per year when the employment status of spouses does not categorize the two groups.[10] Table 2 provides some summary statistics. As shown, the share of medical costs in total household expenditure decreased from 2001 to 2003 when the employment status of spouses is included. However, the difference is minimal when we omit the employment status of spouses.

Table 3 details the distribution of employment status each year. In <Treatment A> and <Treatment B>, where the employment status of spouses is taken into account in grouping, the proportion of those who were nonemployed increased from 26.92% to 28.21% over the period. In contrast, the proportion of regular employees decreased from

[10] The sample size is smaller because there are many missing data on the annual income of employed spouses (female) used to group by employment status.

15.38% to 11.54% over the same period. Nonregular employees (1) that we consider as regular employees of substance accounted for 26.92% of the sample in 2001, and this decreased markedly to 21.79% in 2003. More than one-quarter of the sampled males were self-employed in 2001, while about one-third of men became self-employed in 2003. As one would expect, the proportion of employees decreased over the sample period, while the proportion of nonemployed increased. Similarly, spouses engaging in nonregular work were more likely to reduce working hours or to be nonemployed during both periods. When we ignore the employment status of spouses in grouping (<Treatment C>), the proportions of regular and nonregular employees (1) decrease, while that of nonemployed increases. We then again confirm that older males are less likely to work.

Table 4 displays a transition matrix of employment status from 2001 to 2003. In <Treatment A> and <Treatment B>, the majority of males maintained their employment status in 2001 and 2003. For example, 75% of regular employees remained regularly employed and only 8.33% became nonemployed, while 71.43% of nonregular employees (1) maintained their employment status from 2001 to 2003 and only 4.76% became nonemployed. However, we can also see that employees gradually reduced their work burden from regular employment to nonregular employment or retirement (or nonemployment). In a similar manner, spouses engaging in regular work also reduced their working hours or retired as they became older while some nonregular spouses increased their work burden. We observe similar results with <Treatment C>.

Table 5 provides the transition matrices of those incurring an increase in the self-pay ratio of medical expenditures across the three treatments. As shown in <Treatment A>, 71.79% of males are not subject to the increase in the self-pay ratio from 20% to 30%. As most are middle- or old-aged, they are less likely to have regular employment, and are therefore exempt from the health insurance reform. When we group individual males according to <Treatment B>, 56.41% did not incur any additional burden from the increase in the self-pay ratio of medical expenditures. In <Treatment C>, 38.60% of men joined an employee's insurance program and therefore had to pay the additional costs of medical services after the health reform took effect.

4. Results

Table 6 presents the estimates of the Engle curve for the policy effect on medical expenses, estimating the fixed-effect model with the balance panel data.[11] Columns [1] and [4] provide the results when individual males are grouped according to <Treatment A>, followed by columns [2] and [5] for <Treatment B>, and columns [3] and [6] for <Treatment C>. The key outcome is that the coefficient on the policy parameter (insurance type × year) is statistically insignificant in all columns, implying that the increase in the self-pay ratio of medical expenditures did not increase the share of household expenditures spent on medical services. We contend this is because while the increase in the self-pay ratio of medical expenditures increased the price of medical services, it simultaneously lowered the quantity demanded of medical services. Our estimated results suggest that these opposing effects cancel each other out, thereby leaving household medical services costs unchanged. In addition, this provides corroborating evidence that the price elasticity of demand of medical services is relatively moderate, implying that the increase in the self-pay ratio of medical expenditures only moderately increases national medical costs (that is, the sum of the cost incurred by an individual household and the health care benefits incurred by the Japanese government). One possible reason why this effect is so trivial is that the surveyed date of 2003 was so close to the implementation of the reform that it had not yet become effective. It is then necessary to attempt to capture the lasting effect of this reform.

Considering the other factors determining medical costs, the coefficient for total expenditure per household member is negative at the 1% level of significance in all columns. This confirms that medical services are a necessary good, as in Sawano (2000). The year dummy is negative, although only significant at the 10% level in columns [1] and [2]. The family number has a negative effect on medical costs at the 5% level of significance in columns [4] to [6]. This could be because while an individual male and his spouse are usually both middle- or old-aged, we also expect that other family members are younger and healthier, and so would rather direct expenditure to consumption other than health care. As family size increases, therefore, the share of medical costs in total expenditures declines. Finally, own-health negatively affects the ratio of medical expenditures at the 5% level of significance according to column [6]; but contrary to our

[11] The same results are obtained in estimating the first-difference equation and the fixed effect model with the balanced panel data.

predictions, the own-health of the spouse increases the share of medical expenditure, but only at the 10% level of significance in column [4].

Table 7 provides the estimated results for the subsample of persons aged over 61 years in 2001. We anticipate that the increase in the self-pay ratio of medical expenditures seriously raises the burden of medical expenses for those aged over 61 years because they typically require more medical care than those aged less than 60 years. However, contrary to our expectations, the results are similar to those in Table 6; that is, the health insurance reform did not significantly affect the burden of household costs for medical services for males aged more than 61 years. This again suggests that the health insurance reform had only a minor effect on medical expenditure. Nonetheless, while limiting our sample to those aged more than 61 years, the coefficient on total expenditure per household member is still negative, implying that medical services are again a necessary good. We also find that the coefficient is larger in magnitude for those over 61 years than for the unrestricted sample shown in Table 6. Consequently, medical services are more strongly a necessary good for those over 61 years of age.

Table 8 presents the estimates of quantile regressions for the 11 quantile values {0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 0.95, 0.99}. We estimate the standard errors with the bootstrap method with 20 resamples. Column [1] shows the result when individual males are grouped according to <Treatment A>, followed by column [2] for <Treatment B>, and column [3] for <Treatment C>. In column [1], the coefficient on the policy parameter (insurance type × year) remains insignificant for all of the quantile values. In column [2], however, the coefficients on the policy parameter are significantly positive for quantile values q = 0.95 and 0.99, and the magnitudes of these coefficients are larger than for the remaining quantile values. That is, while a rise in the self-pay ratio of medical expenditure increases the price of medical services, it simultaneously decreases the quantity demanded, thereby lowering the household cost of medical services. For higher quantile values, the former effect dominates the latter, implying that this particular health insurance reform cannot cut the demand for medical services more sharply for males with a higher burden of medical costs in total household expenditure.

Similar to column [1], the coefficient on the policy parameter remains insignificant in column [3], regardless of the quantile value. The observed policy impact on the demand for medical services then substantially varies by the manner of grouping

the treatment and control groups. The coefficient on total expenditure per household remains significantly negative for any quantile value, regardless of the type of treatment. This is consistent with the estimates in Table 6. The magnitude of the estimated coefficient also increases almost systematically with the quantile value. This again implies that medical services are more strongly a necessary good for households with a higher share of medical costs in total household expenditure.

In Table 9, we include additional individual characteristics in the quantile regressions. While the significance of the policy parameter is reduced for q = 0.95 in column [2], its coefficient remains significantly positive for the 0.99 quantile. The coefficients on the number of family members, own-health, and spouse's own-health are significantly negative for many quantile values in all columns. As discussed, family members other than the sample male and his spouse are usually younger and healthier, so the increase in the family size lowers the ratio of medical costs to total household expenditure. Needless to say, a healthy male and his spouse do not spend much on medical services. The coefficient for work is significantly positive for many quantile values. That is, if a middle- or old-aged male works too much, he requires more medical care to maintain his health condition.

Table 10 presents the estimates of the quantile regressions when the sample data are limited to male household heads aged more than 61 years. As shown, the coefficient on the policy parameter is insignificant for any quantile value (except q = 0.95 in column [3]), and its significance is even reduced for q = 0.95 and 0.99 in column [2]. According to column [1], the coefficient on insurance (or employment) type is negative at the 1-5% level of significance for the quantile values of q = 0.95 and 0.99. This implies that the ratio of medical costs to total household expenditure differs by employment type; that is, those who signed up an employees' health insurance program were healthier and thus spent less on medical services than those joining the national health insurance program. The coefficient on total expenditure per household remains significantly negative for each quantile value in all columns. This implies that medical services are a necessary good for males aged more than 61 years.

Table 11 includes the addition of various individual characteristics, again limiting the data to those males aged over 61 years. Similar to Table 10, the coefficient on the policy parameter remains insignificant for almost all quantile values. However, the

coefficient on total expenditure per household is still significant at the 1% level of significance for each quantile value in all columns. In addition, as in Table 9, the coefficients on family size and own-health are significantly negative for many quantile values.

5. Concluding Remarks

Using a panel of two-period data gathered by the NLI Research Institute, this paper explored the hypothesis that the increase in the self-pay ratio of medical expenditures associated with health insurance reform taking effect in Japan in April 2003 cut household medical costs. We focused our attention on the consumption of medical services for middle- and old-aged persons whose population share in Japan has been rapidly growing in recent years. We estimated Engle curves for medical services and employed the difference-in-difference method, dividing our sample into a treatment group whose self-pay ratio of medical expenditures increased from 20% to 30%, and a control group where the self-pay ratio remained unchanged. In addition, we estimated quantile regressions to consider any heterogeneity in the effect of this legislative change across different groups by medical expenditure.

Our main finding is that the increase in the self-pay ratio had a trivial effect on household medical expenses. This result implies that a decrease in the quantity demanded of medical services through the price rise offsets the increase in the medical costs incurred by an individual through the price rise. Moreover, the price elasticity of demand for medical services by the middle- and old-aged is close to one. We therefore can conclude only a modest decrease in national medical costs as summed by individual household medical costs and the health care benefits provided by the Japanese government. We obtained similar results when limiting our sample data to persons aged over 61 years. However, the effect of the health insurance reform differs when using quantile regression estimation. Here, the increase in the self-pay ratio of medical expenditures increases the share of medical costs in total household expenditure significantly for relatively high quantile values. This provides further evidence that it is difficult to cut the demand for medical services by persons with a high share of medical costs in total household expenditure with an increased burden of medical expenses.

We also found that per household expenditure had a significantly negative effect on medical costs, implying (as expected) that medical services are a necessary good. After confining the sample data to persons aged over 61 years, this coefficient becomes larger in absolute terms. Accordingly, medical services are more strongly a necessary good for those requiring more medical care. We verify these results using the estimates of the quantile regressions, and confirm that the coefficient on household expenditure per household member increases in absolute terms with the quantile value. This suggests that medical services are more strongly a necessary good for individuals from households where the share of medical expenditure in total household expenditure is higher.

Our plans for this line of research involve the capture of the long-term effect, if any, of the 2003 health insurance reform. One possible reason why the reform effect we found is somewhat trivial is that the 2003 survey date is so close to the date of implementation. Accordingly, the reform may not yet have time to be effective. Capturing any lasting effect of this reform is then a crucial task.

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Table 1: Cross-sectional matrix of health insurance types

Employment Status wife husband		over JPY X* million for annual salary (regular employee)	JPY 1.3** (annual income) ～X* million (annual salary) (nonregular employee)	less than JPY 1.3** million (annual inome) (nonregular employee+nonemployed)	bereaved
regular employee	husband	employee's insurance	employee's insurance	employee's insurance	employee's insurace
	wife	employee's insurance	national insurance	employee's insurance (dependent)	
non-regular employee (1)	husband	employee's insurance	employee's insurance	employee's insurance	employee's insurace
	wife	employee's insurance	national insurance	employee's insurance (dependent)	
non-regular employee (2)	husband	national insurance	national insurance	national insurance	national insurance
	wife	employee's insurance	national insurance	national insurance	
non-regular employee (3)	husband	employee's insurance (dependent)	national insurance	national insurance	national insurance
	wife	employee's insurance	national insurance	national insurance	
self-employed	husband	national insurance	national insurance	national insurance	national insurance
	wife	employee's insurance	national insurance	national insurance	
non-employed	husband	employee's insurance (dependent)	national insurance	national insurance	national insurance
	wife	employee's insurance	national insurance	national insurance	

Group 1 Both incurred increases in the self-pay ratio of medical expenditures for outpatient and hospital treatments from 20% to 30%.

Group 2 the % of medical expenditures for the regular employee was raised from 20% to 30% for both outpatient and hospital treatments, but the % for the spouse (non-regular employee or the non-employee) was raised from 20% to 30% only for hospital treatments.

Group 3 The regular employee incurred increases in the burden of medical expenditures for both hospital and outpatient treatments, the burden born by the spouse (non-regular employee or the employer) had remained unchanged

Group 4 The revision of the health insurance act had no adverse impact on the burden of medical expenditures.

husband

regular employee those who self-reported that they worked as a regular employee

non-regular employee (1) those who self-reported that they worked as a non-regular worker, and responded that they worked three quarters of regular employees' weekly hours of work, 30 hours a week or more.

non-regular employee (2) those who self-reported that they worked as a non-regular worker, responded that they worked less than three quarters of regular employees' weekly hours of work (30 hours a week), and earned an annual income of over JPY 1.3 million if aged under 60 years or over JPY1.8 million if aged over 60 years

non-regular employee (3) those who self-reported that they worked as a non-regular worker, responded that they worked less than three quarters of regular employees' weekly hours of work (30 hours a week), and earned an annual income of less than JPY 1.3 million if aged under 60 years or less than JPY1.8 million if aged over 60 years

self-employed those who self-reported that they worked as a self-employed worker, including professionals

non-employed those who did not reported that they worked, including the retired

* JPY2.74 million (40 - 44 yrs of age), JPY2.81 million (45 - 49 yrs of age), JPY2.90 million (50 - 54 yrs of age) JPY2.89 million between (55 - 59 yrs of age), JPY2.33 million (60 - 64 yrs of age), and JPY2.23 million (over 65 yrs of age)

** JPY1.8 million for wives more than 60 years of age

Table 2: Summary Statistics

(1) Samples without employment status of spouses are excluded. <Treatments A & B>

2001 Variable	Obs	Mean	Std. Dev.	Min	Max
medical cost/expenditure	78	0.097	0.108	0.006	0.500
ln(per expenditure)	78	4.355	0.535	3.219	5.695
# of family	78	2.782	1.124	1	7
health (=1)	78	0.808	0.397	0	1
work (=1)	78	0.731	0.446	0	1
spouse (=1)	78	0.923	0.268	0	1
spouse's health (=1)	78	0.769	0.424	0	1
group 1	78	0.064	0.247	0	1
group 2	78	0.231	0.424	0	1
group 3	78	0.192	0.397	0	1
group 4	78	0.513	0.503	0	1

2003 Variable	Obs	Mean	Std. Dev.	Min	Max
medical cost/expenditure	78	0.091	0.096	0.008	0.600
ln(per expenditure)	78	4.327	0.616	2.108	5.520
# of family	78	2.833	1.167	1	7
health (=1)	78	0.782	0.416	0	1
work (=1)	78	0.718	0.453	0	1
spouse (=1)	78	0.923	0.268	0	1
spouse's health (=1)	78	0.744	0.439	0	1
group 1	78	0.026	0.159	0	1
group 2	78	0.256	0.439	0	1
group 3	78	0.154	0.363	0	1
group 4	78	0.564	0.499	0	1

Because many data on employment status of spouses are missing, the sample size is smaller.
The employment status of spouses is categorized by their annual income or earnings.

(2) Samples without employment status of spouses are included. <Treatment C>

2001 Variable	Obs	Mean	Std. Dev.	Min	Max
medical cost/expenditure	215	0.109	0.134	0.005	0.818
ln(per expenditure)	215	4.258	0.672	1.273	5.858
# of family	215	2.991	1.211	1	7
health (=1)	215	0.781	0.414	0	1
work (=1)	215	0.721	0.450	0	1
spouse (=1)	215	0.972	0.165	0	1
spouse's health (=1)	215	0.809	0.394	0	1
employee's insurance (=1)	215	0.447	0.498	0	1

2003 Variable	Obs	Mean	Std. Dev.	Min	Max
medical cost/expenditure	215	0.110	0.126	0.006	0.667
ln(per expenditure)	215	4.292	0.596	2.108	5.520
# of family	215	2.981	1.260	1	7
health (=1)	215	0.772	0.420	0	1
work (=1)	215	0.674	0.470	0	1
spouse (=1)	215	0.967	0.178	0	1
spouse's health (=1)	215	0.800	0.401	0	1
employee's insurance (=1)	215	0.386	0.488	0	1

The employment status of spouses is categorized by their annual income or earnings.

Table 3: Distribution of Employment Status

(1) Samples without employment status of spouses are excluded. <Treatments A & B>

Male	2001			2003		
	Freq.	Percent	Cum.	Freq.	Percent	Cum.
regular	12	15.38	15.38	9	11.54	11.54
non-regular (1)	21	26.92	42.3	17	21.79	33.33
non-regular (2)	1	1.28	43.58	1	1.28	34.61
non-regular (3)	1	1.28	44.86	3	3.85	38.46
self-employed	22	28.21	73.07	26	33.33	71.79
non-employed	21	26.92	100	22	28.21	100
Total	78	100		78	100	

Spouse (female)	2001			2003		
	Freq.	Percent	Cum.	Freq.	Percent	Cum.
regular	9	12.5	12.5	9	12.5	12.5
nonregular (over JPY1.3 million)	20	27.78	40.28	18	25	37.5
nonregular (less JPY1.3 million)+nonemployed	43	59.72	100	45	62.5	100
Total	72	100		72	100	

The employment status of spouses is categorized by their annual income or earnings.

(2) Samples without employment status of spouses are included. <Treatment C>

Male	2001			2003	
	Freq.	Percent	Cum.	Percent	Cum.
regular	35	16.28	16.28	26	12.09	12.09
non-regular (1)	61	28.37	44.65	57	26.51	38.6
non-regular (2)	2	0.93	45.58	1	0.47	39.07
non-regular (3)	4	1.86	47.44	8	3.72	42.79
self employed	53	24.65	72.09	53	24.65	67.44
non-employed	60	27.91	100	70	32.56	100
Total	215	100		215	100	

The employment status of spouses is categorized by their annual income or earnings.

Table 4: Transitions of Employment Status

(1) Samples without employment status of spouses are excluded. <Treatments A & B>

Male 2003 / 2001	regular	non-regular (1)	non-regular (2)	non-regular (3)	self-employed	non-employed	Total
regular	9	1	0	1	0	1	12
	75.00	8.33	0.00	8.33	0.00	8.33	100.00
non-regular (1)	0	15	1	1	3	1	21
	0.00	71.43	4.76	4.76	14.29	4.76	100.00
non-regular (2)	0	1	0	0	0	0	1
	0.00	100.00	0.00	0.00	0.00	0.00	100.00
non-regular (3)	0	0	0	1	0	0	1
	0.00	0.00	0.00	100.00	0.00	0.00	100.00
self-employed	0	0	0	0	22	0	22
	0.00	0.00	0.00	0.00	100.00	0.00	100.00
non-employed	0	0	0	0	1	20	21
	0.00	0.00	0.00	0.00	4.76	95.24	100.00
Total	9	17	1	3	26	22	78
	11.54	21.79	1.28	3.85	33.33	28.21	100.00

Spouse 2003 / 2001	regular	qusi-regular	part	Total
regular	7	1	1	9
	77.78	11.11	11.11	100.00
nonregular (over JPY1.3 million)	0	13	7	20
	0.00	65.00	35.00	100.00
nonregular (less JPY 1.3 million)	2	4	37	43
+ non-employed	4.65	9.30	86.05	100.00
Total	9	18	45	72
	12.50	25.00	62.50	100.00

The employment status of spouses is categorized by their annual income or earnings.

(2) Samples without employment status of spouses are included. <Treatment C>

Male 2003 / 2001	regular	non-regular (1)	non-regular (2)	non-regular (3)	self-employed	non-employed	Total
regular	25	7	0	1	1	1	35
	71.43	20.00	0.00	2.86	2.86	2.86	100.00
non-regular (1)	0	43	1	4	4	9	61
	0.00	70.49	1.64	6.56	6.56	14.75	100.00
non-regular (2)	0	2	0	0	0	0	2
	0.00	100.00	0.00	0.00	0.00	0.00	100.00
non-regular (3)	0	3	0	1	0	0	4
	0.00	75.00	0.00	25.00	0.00	0.00	100.00
self-employed	0	1	0	1	45	6	53
	0.00	1.89	0.00	1.89	84.91	11.32	100.00
non-employed	1	1	0	1	3	54	60
	1.67	1.67	0.00	1.67	5.00	90.00	100.00
Total	26	57	1	8	53	70	215
	12.09	26.51	0.47	3.72	24.65	32.56	100.00

The employment status of spouses is categorized by their annual income or earnings.

Table 5: Transitions of medical Insurance Programs

<Treatment A>

2001 \ 2003	0	1	Total
0	50	5	55
	90.91	9.09	100.00
1	6	17	23
	26.09	73.91	100.00
Total	56	22	78
	71.79	28.21	100.00

group 1 and 2 = 1, group 3 and 4 = 0
We assume that group 1 and 2 are adversely affected by the revision of the health insurance act.

<Treatment B>

2001 \ 2003	0	1	Total
0	39	1	40
	97.5	2.5	100.00
1	5	33	38
	13.16	86.84	100.00
Total	44	34	78
	56.41	43.59	100.00

group 1, 2 and 3 = 1, group 4 = 0
We assume that group 1, 2 and 3 are adversely affected by the revision of the health insurance act.

<Treatment C>

2001 \ 2003	0	1	Total
0	111	8	119
	93.28	6.72	100.0
1	21	75	96
	21.88	78.13	100.0
Total	132	83	215
	61.40	38.60	100.00

employee's insurance program = 1
national insurance program = 0

Table 6: Estimated Results

	dependent value: medical cost/expenditure					
independent	A	B	C	A	B	C
variables	[1]	[2]	[3]	[4]	[5]	[6]
ln(per expenditure)	-0.114 ***	-0.119 ***	-0.127 ***	-0.130 ***	-0.134 ***	-0.138 ***
	(0.030)	(0.031)	(0.020)	(0.032)	(0.031)	(0.019)
year (2003=1)	-0.023 *	-0.027 *	0.001	-0.017	-0.021	0.002
	(0.012)	(0.015)	(0.014)	(0.012)	(0.014)	(0.014)
insurance status	-0.033	-0.010	0.016	-0.009	-0.001	0.035
	(0.030)	(0.027)	(0.020)	(0.028)	(0.024)	(0.021)
insurance status×year	0.046	0.038	0.012	0.037	0.033	0.007
	(0.033)	(0.025)	(0.020)	(0.033)	(0.022)	(0.019)
# of family				-0.040 **	-0.041 **	-0.027 **
				(0.019)	(0.017)	(0.014)
health (=1)				-0.026	-0.027	-0.053 **
				(0.039)	(0.038)	(0.026)
work (=1)				0.025	0.018	-0.037
				(0.047)	(0.040)	(0.028)
spouse's health				0.057 *	0.055	
				(0.032)	(0.033)	
costant	0.605 ***	0.620 ***	0.641 ***	0.736 ***	0.761 ***	0.830 ***
	(0.128)	(0.132)	(0.083)	(0.183)	(0.170)	(0.106)
Number of obs	156	156	430	156	156	430
F value	5.36	4.18	11.45	3.90	3.53	8.76
Prob > F	0.001	0.004	0.000	0.001	0.002	0.000
R2	0.077	0.079	0.147	0.073	0.077	0.216

Number is parentheses indicate standard errors. *** 1% significant, ** 5% significant, * 10% significant

[1] and [4]: the insurance status =1 if an individual household belongs to either group 1or 2, but otherwise 0. <Treatment A>

[2] and [5]: the insurance status =1 if an individual household belongs to either group 1, 2 or 3 but otherwise 0. <Treatment B>

[3] and [6]: the insurance status =1 if an individual man belongs to the employee's insurance program, but otherwise 0. <Treatment C>

Note that there are a few husbands who lost their wife, so the spouse dummy was dropped in [4] and [5].

The fixed-effect model is estimated using the balanced panel data.

Table 7: Estimated results (over 61 years of age)

	dependent value: medical cost/expenditure					
independent	A	B	C	A	B	C
variables	[1]	[2]	[3]	[4]	[5]	[6]
ln(per expenditure)	-0.143 ***	-0.145 ***	-0.143 ***	-0.157 ***	-0.158 ***	-0.146 ***
	(0.032)	(0.033)	(0.024)	(0.031)	(0.032)	(0.026)
year (2003=1)	-0.028 *	-0.027	-0.008	-0.023	-0.023	-0.006
	(0.015)	(0.018)	(0.015)	(0.015)	(0.018)	(0.015)
insurance status	-0.015	0.012	0.024	0.016	0.023	0.027
	(0.035)	(0.024)	(0.020)	(0.027)	(0.024)	(0.020)
insurance status×year	0.021	0.015	0.023	0.013	0.013	0.020
	(0.036)	(0.029)	(0.026)	(0.038)	(0.027)	(0.026)
# of family				-0.044 *	-0.041 *	-0.011
				(0.025)	(0.023)	(0.016)
health (=1)				-0.020	-0.020	-0.036
				(0.061)	(0.060)	(0.039)
work (=1)				0.019	0.013	-0.001
				(0.042)	(0.040)	(0.021)
spouse's health				0.025	0.025	
				(0.046)	(0.045)	
costant	0.722 ***	0.725 ***	0.717 ***	0.878 ***	0.872 ***	0.786 ***
	(0.136)	(0.140)	(0.101)	(0.177)	(0.175)	(0.130)
Number of obs	100	100	276	100	100	276
F value	6.73	7.50	9.30	4.71	5.79	6.14
Prob > F	0.000	0.000	0.000	0.000	0.000	0.000
R2	0.115	0.117	0.197	0.145	0.152	0.231

Number is parentheses indicate standard errors. *** 1% significant, ** 5% significant, * 10% significant

[1] and [4]: the insurance status =1 if an individual household belongs to either group 1or 2, but otherwise 0. <Treatment A>

[2] and [5]: the insurance status =1 if an individual household belongs to either group 1, 2 or 3 but otherwise 0. <Treatment B>

[3] and [6]: the insurance status =1 if an individual man belongs to the employee's insurance program, but otherwise 0. <Treatment C>

Note that there are a few husbands who lost their wife, so the spouse dummy was dropped in [4] and [5].

The fixed-effect model is estimated using the balanced panel data.

Table 8: Quantile Regression Results

		[1]A	Bootstrap		[2]B	Bootstrap		[3]C	Bootstrap	
	med_rate	Coef.	Std. Err.		Coef.	Std. Err.		Coef.	Std. Err.	
q10	ln(per expenditure)	-0.011	(0.004)	**	-0.011	(0.003)	***	-0.014	(0.003)	***
	year	0.003	(0.005)		0.003	(0.004)		0.002	(0.004)	
	insurance status	0.000	(0.004)		0.000	(0.004)		-0.002	(0.003)	
	insurance status×year	-0.004	(0.007)		-0.001	(0.006)		-0.001	(0.003)	
q20	ln(per expenditure)	-0.016	(0.003)	***	-0.017	(0.003)	***	-0.022	(0.003)	***
	year	0.002	(0.003)		0.003	(0.004)		0.002	(0.004)	
	insurance status	-0.003	(0.005)		-0.001	(0.004)		-0.005	(0.003)	*
	insurance status×year	0.003	(0.005)		0.002	(0.005)		0.004	(0.005)	
q30	ln(per expenditure)	-0.020	(0.004)	***	-0.020	(0.004)	***	-0.025	(0.003)	***
	year	0.007	(0.005)		0.006	(0.007)		0.005	(0.005)	
	insurance status	-0.003	(0.006)		0.001	(0.006)		-0.004	(0.004)	
	insurance status×year	0.001	(0.008)		0.000	(0.010)		0.001	(0.005)	
q40	ln(per expenditure)	-0.023	(0.003)	***	-0.024	(0.006)	***	-0.029	(0.004)	***
	year	0.005	(0.007)		0.002	(0.010)		0.007	(0.007)	
	insurance status	-0.008	(0.006)		-0.004	(0.009)		-0.006	(0.006)	
	insurance status×year	0.002	(0.008)		0.008	(0.011)		-0.001	(0.010)	
q50	ln(per expenditure)	-0.033	(0.006)	***	-0.031	(0.008)	***	-0.038	(0.005)	***
	year	-0.002	(0.011)		0.000	(0.010)		0.000	(0.006)	
	insurance status	-0.015	(0.010)		-0.005	(0.009)		-0.007	(0.005)	
	insurance status×year	0.010	(0.013)		0.009	(0.012)		0.001	(0.007)	
q60	ln(per expenditure)	-0.040	(0.009)	***	-0.042	(0.010)	***	-0.046	(0.007)	***
	year	0.005	(0.011)		0.003	(0.011)		0.001	(0.007)	
	insurance status	-0.015	(0.011)		-0.006	(0.011)		-0.013	(0.009)	
	insurance status×year	0.007	(0.014)		0.007	(0.015)		0.008	(0.012)	
q70	ln(per expenditure)	-0.044	(0.010)	***	-0.048	(0.012)	***	-0.061	(0.010)	***
	year	0.014	(0.016)		0.012	(0.017)		-0.003	(0.012)	
	insurance status	-0.017	(0.017)		0.000	(0.019)		-0.026	(0.011)	**
	insurance status×year	-0.003	(0.026)		0.011	(0.023)		0.021	(0.019)	
q80	ln(per expenditure)	-0.057	(0.017)	***	-0.054	(0.021)	***	-0.087	(0.014)	***
	year	0.016	(0.034)		0.010	(0.028)		-0.026	(0.022)	
	insurance status	-0.021	(0.037)		-0.022	(0.035)		-0.041	(0.026)	
	insurance status×year	0.002	(0.044)		0.033	(0.041)		0.034	(0.030)	
q90	ln(per expenditure)	-0.104	(0.031)	***	-0.101	(0.031)	***	-0.117	(0.023)	***
	year	-0.003	(0.075)		-0.041	(0.060)		-0.032	(0.046)	
	insurance status	-0.036	(0.077)		-0.021	(0.061)		-0.088	(0.041)	**
	insurance status×year	0.011	(0.095)		0.075	(0.088)		0.083	(0.057)	
q95	ln(per expenditure)	-0.142	(0.045)	***	-0.117	(0.033)	***	-0.155	(0.033)	***
	year	-0.062	(0.092)		-0.093	(0.084)		0.028	(0.072)	
	insurance status	-0.100	(0.089)		-0.100	(0.082)		-0.092	(0.075)	
	insurance status×year	0.105	(0.174)		0.259	(0.149)	*	0.128	(0.120)	
q99	ln(per expenditure)	-0.119	(0.050)	**	-0.160	(0.035)	***	-0.151	(0.082)	*
	year	0.099	(0.157)		-0.060	(0.042)		-0.087	(0.138)	
	insurance status	-0.167	(0.053)	***	0.039	(0.094)		-0.136	(0.151)	
	insurance status×year	0.176	(0.219)		0.274	(0.164)	*	0.258	(0.166)	
	Number of obs	392			392			733		
	.10 Pseudo R2	0.032			0.031			0.042		
	.20 Pseudo R2	0.043			0.043			0.049		
	.30 Pseudo R2	0.047			0.047			0.052		
	.40 Pseudo R2	0.059			0.056			0.056		
	.50 Pseudo R2	0.060			0.057			0.060		
	.60 Pseudo R2	0.059			0.053			0.064		
	.70 Pseudo R2	0.059			0.057			0.073		
	.80 Pseudo R2	0.062			0.061			0.094		
	.90 Pseudo R2	0.086			0.087			0.147		
	.95 Pseudo R2	0.122			0.145			0.180		
	.99 Pseudo R2	0.207			0.288			0.123		

Number is parentheses indicate standard errors. *** 1% significant, ** 5% significant, * 10% significant

[1]: the insurance status =1 if an individual household belongs to either group 1or 2, but otherwise 0. <Treatment A>

[2]: the insurance status =1 if an individual household belongs to either group 1, 2 or 3 but otherwise 0.<Treatment B>

[3]: the insurance status =1 if an individual man belongs to the employee's insurance program, but otherwise 0. <Treatment C>

Table 9: Quantile Regression Results

	med_rate	[1] A Coef.	Bootstrap Std. Err.		[2] B Coef.	Bootstrap Std. Err.		[3] C Coef.	Bootstrap Std. Err.	
q10	ln(per expenditure)	-0.020	(0.003)	***	-0.019	(0.005)	***	-0.023	(0.002)	***
	# of family	-0.006	(0.001)	***	-0.005	(0.002)	***	-0.007	(0.001)	***
	health (=1)	-0.008	(0.004)	**	-0.008	(0.004)	*	-0.007	(0.004)	*
	work (=1)	0.007	(0.004)		0.007	(0.004)	*	0.006	(0.003)	**
	spouse (=1)	0.003	(0.009)		0.006	(0.008)				
	spouse's health (=1)	-0.003	(0.005)		-0.007	(0.006)				
	year	0.005	(0.004)		0.000	(0.004)		0.002	(0.002)	
	insurance status	0.000	(0.004)		-0.003	(0.004)		-0.002	(0.003)	
	insurance status×year	-0.006	(0.005)		0.003	(0.006)		-0.001	(0.002)	
q20	ln(per expenditure)	-0.028	(0.004)	***	-0.028	(0.005)	***	-0.032	(0.003)	***
	# of family	-0.010	(0.002)	***	-0.010	(0.002)	***	-0.010	(0.001)	***
	health (=1)	-0.008	(0.005)	*	-0.011	(0.006)	**	-0.016	(0.003)	***
	work (=1)	0.016	(0.005)	***	0.017	(0.004)	***	0.009	(0.004)	**
	spouse (=1)	0.008	(0.009)		0.007	(0.011)				
	spouse's health (=1)	-0.006	(0.008)		-0.003	(0.007)				
	year	0.004	(0.004)		0.002	(0.005)		0.003	(0.003)	
	insurance status	-0.004	(0.005)		-0.006	(0.005)		-0.003	(0.005)	
	insurance status×year	0.000	(0.009)		0.007	(0.007)		0.008	(0.006)	
q30	ln(per expenditure)	-0.030	(0.004)	***	-0.032	(0.006)	***	-0.039	(0.003)	***
	# of family	-0.011	(0.002)	***	-0.011	(0.003)	***	-0.013	(0.002)	***
	health (=1)	-0.013	(0.005)	**	-0.013	(0.005)	***	-0.014	(0.005)	***
	work (=1)	0.020	(0.004)	***	0.020	(0.004)	***	0.009	(0.004)	**
	spouse (=1)	0.005	(0.015)		0.009	(0.019)				
	spouse's health (=1)	-0.015	(0.014)		-0.016	(0.013)				
	year	0.007	(0.003)	**	0.006	(0.006)		0.001	(0.005)	
	insurance status	-0.002	(0.005)		-0.002	(0.006)		-0.003	(0.005)	
	insurance status×year	-0.002	(0.008)		0.000	(0.009)		0.005	(0.006)	
q40	ln(per expenditure)	-0.039	(0.005)	***	-0.038	(0.007)	***	-0.048	(0.003)	***
	# of family	-0.013	(0.002)	***	-0.013	(0.004)	***	-0.015	(0.002)	***
	health (=1)	-0.014	(0.005)	***	-0.013	(0.008)	*	-0.022	(0.006)	***
	work (=1)	0.022	(0.006)	***	0.018	(0.006)	***	0.006	(0.005)	
	spouse (=1)	0.018	(0.015)		0.019	(0.021)				
	spouse's health (=1)	-0.029	(0.013)	**	-0.030	(0.013)	**			
	year	0.003	(0.005)		-0.002	(0.006)		-0.003	(0.005)	
	insurance status	-0.004	(0.004)		-0.004	(0.005)		-0.004	(0.004)	
	insurance status×year	-0.001	(0.005)		0.008	(0.010)		0.006	(0.005)	
q50	ln(per expenditure)	-0.042	(0.006)	***	-0.042	(0.009)	***	-0.057	(0.004)	***
	# of family	-0.011	(0.003)	***	-0.012	(0.004)	***	-0.018	(0.002)	***
	health (=1)	-0.017	(0.008)	**	-0.014	(0.009)		-0.024	(0.006)	***
	work (=1)	0.026	(0.007)	***	0.020	(0.008)	**	0.004	(0.007)	
	spouse (=1)	0.000	(0.024)		0.010	(0.019)				
	spouse's health (=1)	-0.032	(0.015)	**	-0.035	(0.012)	***			
	year	0.009	(0.007)		0.003	(0.008)		-0.001	(0.007)	
	insurance status	-0.008	(0.006)		-0.007	(0.005)		-0.008	(0.006)	
	insurance status×year	-0.008	(0.010)		0.008	(0.014)		0.012	(0.009)	
q60	ln(per expenditure)	-0.048	(0.008)	***	-0.051	(0.009)	***	-0.068	(0.006)	***
	# of family	-0.010	(0.004)	**	-0.012	(0.005)	**	-0.021	(0.003)	***
	health (=1)	-0.017	(0.017)		-0.021	(0.016)		-0.021	(0.009)	**
	work (=1)	0.019	(0.008)	**	0.020	(0.009)	**	0.004	(0.007)	
	spouse (=1)	0.026	(0.029)		0.025	(0.027)				
	spouse's health (=1)	-0.051	(0.021)	**	-0.055	(0.016)	***			
	year	0.007	(0.006)		0.009	(0.009)		-0.001	(0.007)	
	insurance status	-0.016	(0.007)	**	-0.007	(0.007)		-0.009	(0.008)	
	insurance status×year	-0.004	(0.013)		0.022	(0.017)		0.017	(0.010)	

Continued

q70	ln(per expenditure)	-0.053	(0.010) ***	-0.056	(0.008) ***	-0.085	(0.008) ***
	# of family	-0.008	(0.004) *	-0.008	(0.004) *	-0.024	(0.003) ***
	health (=1)	-0.040	(0.010) ***	-0.038	(0.023)	-0.031	(0.010) ***
	work (=1)	0.027	(0.011) **	0.019	(0.009) **	0.009	(0.013)
	spouse (=1)	0.056	(0.033) *	0.051	(0.037)		
	spouse's health (=1)	-0.081	(0.020) ***	-0.080	(0.030) ***		
	year	0.008	(0.008)	0.004	(0.010)	0.000	(0.009)
	insurance status	-0.026	(0.013) **	-0.008	(0.007)	-0.008	(0.011)
	insurance status×year	0.020	(0.017)	0.021	(0.015)	0.009	(0.015)
q80	ln(per expenditure)	-0.065	(0.020) ***	-0.075	(0.016) ***	-0.104	(0.011) ***
	# of family	-0.011	(0.006) **	-0.009	(0.005) *	-0.030	(0.005) ***
	health (=1)	-0.046	(0.019) **	-0.051	(0.031) *	-0.041	(0.019) **
	work (=1)	0.041	(0.016) **	0.022	(0.014)	0.025	(0.019)
	spouse (=1)	0.085	(0.051) *	0.096	(0.039) **		
	spouse's health (=1)	-0.133	(0.045) ***	-0.150	(0.044) ***		
	year	0.009	(0.012)	-0.005	(0.012)	-0.008	(0.023)
	insurance status	-0.020	(0.027)	-0.001	(0.018)	-0.022	(0.023)
	insurance status×year	0.005	(0.029)	0.028	(0.029)	0.021	(0.027)
q90	ln(per expenditure)	-0.109	(0.030) ***	-0.114	(0.023) ***	-0.150	(0.026) ***
	# of family	-0.018	(0.015)	-0.015	(0.012)	-0.027	(0.013) **
	health (=1)	-0.092	(0.064)	-0.084	(0.066)	-0.034	(0.066)
	work (=1)	0.070	(0.024) ***	0.040	(0.025)	0.022	(0.067)
	spouse (=1)	0.207	(0.092) **	0.176	(0.080) **		
	spouse's health (=1)	-0.233	(0.069) ***	-0.232	(0.045) ***		
	year	0.024	(0.029)	0.002	(0.025)	-0.038	(0.048)
	insurance status	-0.003	(0.052)	0.026	(0.044)	-0.070	(0.056)
	insurance status×year	-0.001	(0.071)	0.033	(0.081)	0.067	(0.060)
q95	ln(per expenditure)	-0.132	(0.031) ***	-0.145	(0.025) ***	-0.162	(0.036) ***
	# of family	-0.014	(0.014)	-0.013	(0.013)	-0.033	(0.023)
	health (=1)	-0.203	(0.070) ***	-0.158	(0.048) ***	-0.090	(0.073)
	work (=1)	0.113	(0.038) ***	0.108	(0.046) **	-0.010	(0.076)
	spouse (=1)	0.179	(0.078) **	0.202	(0.072) ***		
	spouse's health (=1)	-0.214	(0.066) ***	-0.208	(0.042) ***		
	year	-0.010	(0.051)	-0.049	(0.055)	-0.024	(0.083)
	insurance status	-0.044	(0.070)	-0.053	(0.066)	-0.150	(0.079) *
	insurance status×year	0.120	(0.112)	0.107	(0.069)	0.170	(0.104)
q99	ln(per expenditure)	-0.129	(0.054) **	-0.192	(0.045) ***	-0.105	(0.058) *
	# of family	-0.001	(0.034)	-0.007	(0.028)	-0.019	(0.023)
	health (=1)	-0.082	(0.090)	0.014	(0.089)	-0.129	(0.084)
	work (=1)	0.137	(0.076) *	0.078	(0.090)	-0.123	(0.103)
	spouse (=1)	0.078	(0.100)	0.152	(0.099)		
	spouse's health (=1)	-0.102	(0.076)	-0.156	(0.075) **		
	year	0.141	(0.161)	-0.019	(0.073)	0.064	(0.070)
	insurance status	-0.179	(0.083) **	-0.078	(0.096)	-0.039	(0.082)
	insurance status×year	0.125	(0.239)	0.370	(0.167) **	0.220	(0.135)
	Number of obs	385		385		721	
	.10 Pseudo R2	0.076		0.073		0.077	
	.20 Pseudo R2	0.085		0.085		0.083	
	.30 Pseudo R2	0.094		0.093		0.093	
	.40 Pseudo R2	0.107		0.106		0.102	
	.50 Pseudo R2	0.113		0.109		0.106	
	.60 Pseudo R2	0.111		0.108		0.111	
	.70 Pseudo R2	0.131		0.132		0.126	
	.80 Pseudo R2	0.155		0.155		0.140	
	.90 Pseudo R2	0.193		0.200		0.161	
	.95 Pseudo R2	0.265		0.271		0.195	
	.99 Pseudo R2	0.295		0.367		0.217	

Number is parentheses indicate standard errors. *** 1% significant, ** 5% significant, * 10% significant

[1]: the insurance status =1 if an individual household belongs to either group 1or 2, but otherwise 0. <Treatment A>

[2]: the insurance status =1 if an individual household belongs to either group 1, 2 or 3 but otherwise 0.<Treatment B>

[3]: the insurance status =1 if an individual man belongs to the employee's insurance program, but otherwise 0. <Treatment C>

Table 10: Quantile Regression Results (Over 61 year of age)

		[1] A	Bootstrap		[2] B	Bootstrap		[3] C	Bootstrap	
	med_rate	Coef.	Std. Err.		Coef.	Std. Err.		Coef.	Std. Err.	
q10	ln(per expenditure)	-0.013	(0.003)	***	-0.013	(0.005)	***	-0.016	(0.003)	***
	year	0.003	(0.005)		0.004	(0.004)		0.000	(0.003)	
	insurance status	-0.007	(0.007)		-0.002	(0.006)		-0.003	(0.004)	
	insurance status×year	0.003	(0.008)		0.000	(0.009)		0.001	(0.005)	
q20	ln(per expenditure)	-0.020	(0.004)	***	-0.021	(0.003)	***	-0.023	(0.002)	***
	year	0.003	(0.004)		0.002	(0.004)		0.001	(0.004)	
	insurance status	-0.004	(0.005)		-0.004	(0.005)		-0.002	(0.004)	
	insurance status×year	0.007	(0.010)		0.007	(0.007)		0.002	(0.008)	
q30	ln(per expenditure)	-0.022	(0.004)	***	-0.021	(0.004)	***	-0.027	(0.003)	***
	year	0.009	(0.005)	*	0.007	(0.005)		0.001	(0.005)	
	insurance status	-0.003	(0.005)		-0.001	(0.009)		0.005	(0.006)	
	insurance status×year	-0.003	(0.009)		0.006	(0.011)		-0.002	(0.008)	
q40	ln(per expenditure)	-0.025	(0.006)	***	-0.029	(0.008)	***	-0.032	(0.004)	***
	year	0.006	(0.005)		0.005	(0.007)		0.004	(0.007)	
	insurance status	-0.003	(0.008)		0.004	(0.011)		0.005	(0.005)	
	insurance status×year	0.000	(0.010)		0.000	(0.011)		-0.005	(0.009)	
q50	ln(per expenditure)	-0.031	(0.008)	***	-0.033	(0.010)	***	-0.043	(0.008)	***
	year	0.002	(0.007)		0.003	(0.010)		-0.002	(0.008)	
	insurance status	-0.005	(0.008)		0.002	(0.009)		-0.004	(0.008)	
	insurance status×year	0.000	(0.014)		0.006	(0.013)		0.005	(0.010)	
q60	ln(per expenditure)	-0.042	(0.010)	***	-0.040	(0.010)	***	-0.048	(0.009)	***
	year	0.002	(0.008)		0.001	(0.010)		-0.001	(0.015)	
	insurance status	-0.010	(0.006)		-0.004	(0.011)		-0.010	(0.015)	
	insurance status×year	0.002	(0.013)		0.009	(0.019)		0.008	(0.017)	
q70	ln(per expenditure)	-0.045	(0.016)	***	-0.042	(0.010)	***	-0.065	(0.011)	***
	year	0.012	(0.018)		0.008	(0.014)		-0.016	(0.020)	
	insurance status	-0.017	(0.019)		-0.009	(0.017)		-0.026	(0.021)	
	insurance status×year	-0.001	(0.022)		0.023	(0.028)		0.035	(0.028)	
q80	ln(per expenditure)	-0.062	(0.030)	**	-0.055	(0.016)	***	-0.091	(0.016)	***
	year	0.005	(0.029)		-0.006	(0.030)		-0.023	(0.031)	
	insurance status	-0.044	(0.039)		-0.021	(0.060)		-0.034	(0.028)	
	insurance status×year	0.025	(0.042)		0.032	(0.066)		0.026	(0.035)	
q90	ln(per expenditure)	-0.101	(0.037)	***	-0.099	(0.034)	***	-0.124	(0.021)	***
	year	-0.014	(0.053)		-0.042	(0.033)		-0.029	(0.046)	
	insurance status	-0.057	(0.055)		-0.018	(0.066)		-0.065	(0.040)	
	insurance status×year	-0.022	(0.113)		0.055	(0.143)		0.083	(0.057)	
q95	ln(per expenditure)	-0.150	(0.042)	***	-0.117	(0.044)	***	-0.167	(0.030)	***
	year	-0.110	(0.061)	*	-0.101	(0.082)		0.015	(0.054)	
	insurance status	-0.157	(0.080)	**	-0.081	(0.116)		-0.084	(0.059)	
	insurance status×year	0.139	(0.137)		0.248	(0.185)		0.149	(0.089)	*
q99	ln(per expenditure)	-0.119	(0.056)	**	-0.152	(0.051)	***	-0.116	(0.065)	*
	year	0.001	(0.071)		-0.069	(0.061)		-0.102	(0.103)	
	insurance status	-0.200	(0.069)	***	0.032	(0.096)		-0.204	(0.154)	
	insurance status×year	0.164	(0.167)		0.135	(0.145)		0.203	(0.173)	
	Number of obs	275			275			503		
	.10 Pseudo R2	0.049			0.045			0.053		
	.20 Pseudo R2	0.056			0.056			0.059		
	.30 Pseudo R2	0.054			0.054			0.059		
	.40 Pseudo R2	0.060			0.061			0.060		
	.50 Pseudo R2	0.061			0.062			0.065		
	.60 Pseudo R2	0.058			0.055			0.066		
	.70 Pseudo R2	0.059			0.055			0.078		
	.80 Pseudo R2	0.075			0.069			0.108		
	.90 Pseudo R2	0.118			0.102			0.165		
	.95 Pseudo R2	0.175			0.175			0.195		
	.99 Pseudo R2	0.268			0.329			0.098		

Number is parentheses indicate standard errors. *** 1% significant, ** 5% significant, * 10% significant

[1]: the insurance status =1 if an individual household belongs to either group 1or 2, but otherwise 0. <Treatment A>

[2]: the insurance status =1 if an individual household belongs to either group 1, 2 or 3 but otherwise 0.<Treatment B>

[3]: the insurance status =1 if an individual man belongs to the employee's insurance program, but otherwise 0. <Treatment C>

Note that bootstraping does not converge in [3] eve for 1,000 resamples.

Table 11: Quantile Regression Results (Over 61 years of age)

	med_rate	[1] A Coef.	Bootstrap Std. Err.		[2] B Coef.	Bootstrap Std. Err.		[3] C Coef.	Bootstrap Std. Err.	
q10	ln(per expenditure)	-0.020	(0.006)	***	-0.022	(0.006)	***	-0.026	(0.005)	***
	# of family	-0.005	(0.002)	***	-0.006	(0.003)	**	-0.008	(0.002)	***
	health (=1)	-0.009	(0.003)	***	-0.008	(0.004)	*	-0.012	(0.003)	***
	work (=1)	0.009	(0.003)	***	0.008	(0.005)		0.008	(0.003)	**
	spouse (=1)	0.006	(0.008)		0.007	(0.015)				
	spouse's health (=1)	-0.010	(0.004)	***	-0.009	(0.004)	**			
	year	0.001	(0.003)		0.000	(0.003)		0.001	(0.002)	
	insurance status	-0.005	(0.008)		-0.006	(0.004)	*	-0.005	(0.005)	
	insurance status×year	0.002	(0.011)		0.009	(0.006)		0.002	(0.007)	
q20	ln(per expenditure)	-0.030	(0.005)	***	-0.031	(0.007)	***	-0.034	(0.003)	***
	# of family	-0.010	(0.003)	***	-0.009	(0.004)	**	-0.009	(0.002)	***
	health (=1)	-0.012	(0.004)	***	-0.012	(0.005)	**	-0.014	(0.004)	***
	work (=1)	0.018	(0.006)	***	0.013	(0.006)	**	0.008	(0.004)	*
	spouse (=1)	0.000	(0.013)		-0.002	(0.015)				
	spouse's health (=1)	-0.005	(0.010)		-0.004	(0.006)				
	year	0.004	(0.003)		0.003	(0.004)		0.004	(0.004)	
	insurance status	-0.007	(0.006)		-0.003	(0.007)		0.001	(0.007)	
	insurance status×year	0.004	(0.009)		0.007	(0.006)		0.007	(0.006)	
q30	ln(per expenditure)	-0.036	(0.007)	***	-0.037	(0.007)	***	-0.043	(0.003)	***
	# of family	-0.013	(0.003)	***	-0.013	(0.004)	***	-0.014	(0.001)	***
	health (=1)	-0.013	(0.004)	***	-0.012	(0.007)	*	-0.013	(0.005)	***
	work (=1)	0.021	(0.006)	***	0.019	(0.006)	***	0.011	(0.004)	***
	spouse (=1)	0.010	(0.015)		0.010	(0.018)				
	spouse's health (=1)	-0.014	(0.014)		-0.014	(0.011)				
	year	0.006	(0.006)		0.005	(0.004)		-0.003	(0.005)	
	insurance status	0.002	(0.009)		0.004	(0.008)		-0.001	(0.007)	
	insurance status×year	-0.003	(0.011)		-0.004	(0.008)		0.004	(0.007)	
q40	ln(per expenditure)	-0.039	(0.009)	***	-0.041	(0.007)	***	-0.052	(0.004)	***
	# of family	-0.013	(0.004)	***	-0.014	(0.005)	***	-0.016	(0.002)	***
	health (=1)	-0.019	(0.006)	***	-0.016	(0.008)	*	-0.023	(0.007)	***
	work (=1)	0.021	(0.006)	***	0.017	(0.006)	***	0.006	(0.004)	
	spouse (=1)	0.010	(0.015)		0.018	(0.025)				
	spouse's health (=1)	-0.019	(0.012)		-0.021	(0.012)	*			
	year	0.003	(0.007)		0.000	(0.007)		-0.004	(0.005)	
	insurance status	-0.003	(0.007)		-0.002	(0.008)		-0.002	(0.005)	
	insurance status×year	-0.001	(0.013)		0.002	(0.011)		0.006	(0.007)	
q50	ln(per expenditure)	-0.049	(0.011)	***	-0.048	(0.010)	***	-0.059	(0.005)	***
	# of family	-0.015	(0.004)	***	-0.016	(0.006)	***	-0.018	(0.002)	***
	health (=1)	-0.020	(0.011)	*	-0.020	(0.013)		-0.027	(0.006)	***
	work (=1)	0.023	(0.006)	***	0.018	(0.007)	**	0.001	(0.005)	
	spouse (=1)	0.017	(0.019)		0.013	(0.031)				
	spouse's health (=1)	-0.026	(0.019)		-0.027	(0.018)				
	year	0.007	(0.007)		0.004	(0.005)		-0.001	(0.005)	
	insurance status	-0.006	(0.008)		-0.002	(0.008)		-0.004	(0.007)	
	insurance status×year	-0.005	(0.018)		0.009	(0.012)		0.011	(0.010)	
q60	ln(per expenditure)	-0.050	(0.013)	***	-0.060	(0.010)	***	-0.075	(0.006)	***
	# of family	-0.015	(0.005)	***	-0.019	(0.007)	***	-0.022	(0.002)	***
	health (=1)	-0.044	(0.019)	**	-0.046	(0.016)	***	-0.023	(0.007)	***
	work (=1)	0.020	(0.008)	**	0.013	(0.011)		0.001	(0.008)	
	spouse (=1)	0.017	(0.024)		0.013	(0.034)				
	spouse's health (=1)	-0.043	(0.018)	**	-0.042	(0.022)	*			
	year	0.011	(0.009)		0.001	(0.007)		0.000	(0.007)	
	insurance status	-0.007	(0.008)		0.003	(0.012)		-0.011	(0.010)	
	insurance status×year	-0.009	(0.022)		0.025	(0.015)	*	0.023	(0.013)	*

Continued

q70	ln(per expenditure)	-0.060	(0.010) ***	-0.063	(0.011) ***	-0.099	(0.008) ***
	# of family	-0.015	(0.004) ***	-0.014	(0.006) **	-0.032	(0.004) ***
	health (=1)	-0.048	(0.017) ***	-0.048	(0.018) **	-0.028	(0.007) ***
	work (=1)	0.016	(0.011)	0.005	(0.011)	0.003	(0.008)
	spouse (=1)	0.023	(0.042)	0.008	(0.046)		
	spouse's health (=1)	-0.043	(0.036)	-0.044	(0.027) *		
	year	0.010	(0.010)	0.003	(0.011)	-0.002	(0.008)
	insurance status	-0.013	(0.012)	0.001	(0.014)	-0.008	(0.013)
	insurance status×year	0.015	(0.017)	0.029	(0.016) *	0.012	(0.013)
q80	ln(per expenditure)	-0.070	(0.020) ***	-0.077	(0.022) ***	-0.127	(0.016) ***
	# of family	-0.011	(0.007) *	-0.017	(0.008) **	-0.035	(0.009) ***
	health (=1)	-0.048	(0.024) *	-0.055	(0.021) **	-0.028	(0.015) *
	work (=1)	0.039	(0.018) **	0.015	(0.022)	0.012	(0.027)
	spouse (=1)	0.037	(0.084)	0.045	(0.069)		
	spouse's health (=1)	-0.078	(0.076)	-0.085	(0.058)		
	year	0.006	(0.015)	-0.003	(0.019)	-0.018	(0.014)
	insurance status	-0.037	(0.032)	0.014	(0.032)	-0.018	(0.028)
	insurance status×year	0.021	(0.031)	0.015	(0.038)	0.022	(0.021)
q90	ln(per expenditure)	-0.149	(0.025) ***	-0.133	(0.033) ***	-0.149	(0.029) ***
	# of family	-0.018	(0.005) ***	-0.016	(0.009) *	-0.035	(0.021) *
	health (=1)	-0.076	(0.040) *	-0.092	(0.045) **	-0.012	(0.039)
	work (=1)	0.060	(0.019) ***	0.039	(0.028)	0.022	(0.040)
	spouse (=1)	0.211	(0.099) **	0.184	(0.097) *		
	spouse's health (=1)	-0.271	(0.066) ***	-0.260	(0.070) ***		
	year	0.008	(0.023)	0.010	(0.030)	-0.029	(0.040)
	insurance status	-0.023	(0.043)	0.017	(0.036)	-0.055	(0.038)
	insurance status×year	0.003	(0.061)	0.011	(0.065)	0.072	(0.066)
q95	ln(per expenditure)	-0.143	(0.025) ***	-0.162	(0.041) ***	-0.167	(0.043) ***
	# of family	-0.013	(0.014)	-0.016	(0.011)	-0.034	(0.026)
	health (=1)	-0.158	(0.071) **	-0.162	(0.055) ***	-0.071	(0.079)
	work (=1)	0.109	(0.039) ***	0.050	(0.036)	-0.003	(0.086)
	spouse (=1)	0.196	(0.083) **	0.197	(0.062) ***		
	spouse's health (=1)	-0.234	(0.041) ***	-0.254	(0.056) ***		
	year	-0.003	(0.045)	-0.018	(0.039)	-0.001	(0.053)
	insurance status	-0.038	(0.074)	0.021	(0.057)	-0.134	(0.091)
	insurance status×year	0.094	(0.140)	0.054	(0.081)	0.165	(0.078) **
q99	ln(per expenditure)	-0.254	(0.052) ***	-0.278	(0.061) ***	-0.126	(0.036) ***
	# of family	-0.045	(0.023) **	-0.036	(0.018) *	-0.085	(0.031) ***
	health (=1)	-0.156	(0.101)	-0.111	(0.064) *	-0.169	(0.091) *
	work (=1)	0.077	(0.043) *	0.026	(0.064)	-0.038	(0.073)
	spouse (=1)	0.185	(0.076) **	0.048	(0.075)		
	spouse's health (=1)	-0.289	(0.054) ***	-0.266	(0.057) ***		
	year	0.018	(0.059)	-0.083	(0.063)	0.022	(0.073)
	insurance status	0.077	(0.068)	0.111	(0.063) *	-0.130	(0.084)
	insurance status×year	-0.009	(0.169)	0.035	(0.104)	-0.019	(0.115)
	Number of obs	271		271		494	
	.10 Pseudo R2	0.095		0.095		0.082	
	.20 Pseudo R2	0.098		0.099		0.092	
	.30 Pseudo R2	0.106		0.107		0.099	
	.40 Pseudo R2	0.117		0.116		0.106	
	.50 Pseudo R2	0.123		0.119		0.111	
	.60 Pseudo R2	0.123		0.128		0.121	
	.70 Pseudo R2	0.147		0.154		0.144	
	.80 Pseudo R2	0.177		0.183		0.161	
	.90 Pseudo R2	0.257		0.261		0.185	
	.95 Pseudo R2	0.351		0.359		0.203	
	.99 Pseudo R2	0.472		0.484		0.217	

Number is parentheses indicate standard errors. *** 1% significant, ** 5% significant, * 10% significant

[1]: the insurance status =1 if an individual household belongs to either group 1or 2, but otherwise 0. <Treatment A>

[2]: the insurance status =1 if an individual household belongs to either group 1, 2 or 3 but otherwise 0.<Treatment B>

[3]: the insurance status =1 if an individual man belongs to the employee's insurance program, but otherwise 0. <Treatment C>

Figure 1: Overview of The 2003 Health Insurance Reform in Japan

Before the 2003 health insurance reform

<table>
<tr><td>Over 70 years of age</td><td colspan="3">10%</td></tr>
<tr><td>0 - 69 years of age</td><td>insured person
20%</td><td>dependent
outpatient
30%
inpatient
20%</td><td>30%</td></tr>
<tr><td></td><td colspan="2">employees' health insurance</td><td>national health insurance</td></tr>
</table>

⇒

After the 2003 health insurance reform

<table>
<tr><td>Over 70 years of age</td><td colspan="2">10%</td></tr>
<tr><td>3 - 69 years of age</td><td colspan="2">30%</td></tr>
<tr><td>0 - 2 years of age</td><td colspan="2">20%</td></tr>
<tr><td></td><td>employees' health insurance</td><td>national health insurance</td></tr>
</table>