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The Impacts of the Billing System on Healthcare Utilization: The Case of Thai Civil Servant Medical Benefit Scheme

by

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The Impacts of the Billing System on Healthcare Utilization: the Case of Thai Civil Servant Medical Benefit Scheme

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Abstract

While a large number of health insurance studies find that an increase in cost-sharing reduces healthcare demand, little has looked at the effect of a policy change operating through a non-price channel. This paper examines how a billing process can affect healthcare utilization given no change in price. Specifically, we look at the launch of the Direct Billing Payment program (DBP) to the Thai Civil Servant Medical Benefit Scheme. In the past, although the outpatient care is essentially free, its beneficiaries must pay at the point of services and get their money reimbursed later. The DBP allows the hospitals to charge the government directly. Using patient-level panel data from a large regional hospital, we find that the new billing system affects utilization through multiple channels. First, it increases the number of outpatient visits. Second, for each visit, the treatment costs and the share of prescription drug charge are higher. These impacts are found to be persistent over time, although less so in the case of visits. In addition, our analysis suggests that the likely cash constrained patients increase their utilization more proportionally.

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1. Introduction

The Civil Servant Medical Benefits Scheme (CSMBS) is a comprehensive health insurance in Thailand covering current and retired civil servants and their families. It is a fringe benefit to compensate for low public salary. The scheme is tax-financed and is essentially free for their beneficiaries (no premium or cost-sharing). However, prior to 2003, CSMBS outpatients were required to pay their fees at the time of treatment and submitted claims to get their money reimbursed. While there is no risk of not receiving the reimbursement, some argue that the procedure may hinder cash-constrained beneficiaries from seeking necessary care.

Toward the end of 2003, the government gradually implemented the Direct Billing Payment program (DBP) in which the healthcare providers directly bill the government for outpatient charges incurred by CSMBS patients. Patients who enroll in the DBP no longer need to pay any fee upon their visits. After the implementation, outpatient cost of the CSMBS between 2004 and 2008, sharply increased to a yearly average of 28% compared with a yearly average of 16% during the period 1989-2003 (Panpiemras *et al.*, 2013).

While the impacts of the DBP is of interest to a wide range of stakeholders, existing studies on the DBP do not attempt to find precise causal effects on utilization or address the distributional issue. In fact, we are not aware of any health insurance study looking at effects of a policy change operating through such pure non-price mechanism. The policy change resulted by the DBP does not resemble any cost-sharing method discussed in the health literature. It is, however, more similar to a replacement of mail-in rebates by instant discounts where the net price and consumers' expected wealth remain unchanged.

This study investigates the role of the billing process on healthcare utilization using patient-level panel data from a large public regional hospital in Thailand. Our contribution is two-fold. First, we aim to shed some light on the extent to which the increase in the outpatient cost was accounted by the DBP. Second, we contribute to the health insurance literature by addressing the effect of a non-price mechanism on care-seeking behaviors.

Existing studies on the consequences of the DBP generally report only before-and-after differences in utilization, measured by average outpatient expenditure and prescription drug expenditure per capita (*e.g.*, Pongchareonsuk and Pattanaprateep, 2009; Dilokthornsakul *et al.*, 2010). Our study differs from these studies in several dimensions.

First, instead of looking at expenditure, we decompose the utilization into the number of visits and charge per visit. This allows us to examine whether the impacts channel through frequency (the number of visits) or treatment intensity (charge per visit). Second, we examine whether the effect persists over time. Third, we investigate whether the DBP affects potentially cash-constrained patients differently. Finally, with the patient-level panel data, we can control for the time trends as well as unobserved heterogeneity across patients (*e.g.*, satisfaction from past visits, unobserved travel cost).

Our result shows that the launch of DBP leads to a significant increase in the utilization. *Ceteris paribus*, we find that the number of outpatient visits increases among the enrolled patients. Conditional on visit, the treatment intensity (measured by charge per visit) and the share of prescription drug charge from total charge also increase. While the magnitudes of the effects are moderate, they are quite persistent. In addition, the likely cash constrained patients are found to increase their utilization more proportionally.

The next section provides the background of the health insurance system in Thailand and the existing literature. Sections 3 and 4 explain the data and empirical models used. The results are presented in Section 5. The last section provides conclusion and discussion.

2. Background and previous studies

2.1 The Thai Civil Servant Medical Benefit Scheme

The health system in Thailand consists of three main public schemes: 1) the Social Security Scheme (SSS), which covers about 15% of the population and provides care to formal sector workers; 2) the Civil Servant Medical Benefit Scheme (CSMBS), which covers about 8% of the population and provides care for civil servants, both in-service and retirees, and their dependents (a spouse, parents, and up to three children under the age of 20); and 3) the Universal Coverage Scheme (UCS), which provides care for those who are not covered by the SSS and CSMBS (Sriratanaban, 2002). Almost all of the remaining population (approximately 75%) are covered by the UCS, with only a small fraction either remain uninsured or covered by private health insurance.

Although cares provided from the 3 schemes are free, treatments covered under each scheme and their payment systems differ. The UCS and SSS are operated under the prospective payment system (PPS), in which their healthcare providers are reimbursed based on fixed payment rates according to the Diagnosis Related Group (DRG) for inpatients and capitation for outpatients. In contrast, the CSMBS providers were paid based on the fee-for-service (FFS) reimbursement. There was no effective cost containment measure prior to the 2000s.

CSMBS's benefits include outpatient and inpatient services, emergency services, and drug expenses at public hospitals, but exclude cosmetic surgery. Their beneficiaries are considered living in a higher socioeconomic status, compared to beneficiaries of the other two schemes. The average expenditure per CSMBS patient has been much higher than those of UCS and SSS.[4] This is not surprising given its FFS scheme and the largest proportion of the beneficiaries age over 60.[5]

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[4] In 2011, the average expenditures per patient for UCS, SSS, and CSMBS were 2,278 baht (USD 67), 2,280 baht (USD 67), and 14,239 baht (USD 419), respectively (Lindelow *et al.*, 2012).

[5] The theory predicts that under FFS, for-profit providers will tend to over-treat their patients to maximize income (see Ellis and McGuire, 1993; Ellis, 1998; and Lindrooth *et al.*, 2007). While most CSMBS providers

Two important CSMBS policy changes occurred in the 2000s. One was a cost containment measure where the government gradually shifted the inpatient payment system from the FFS to PPS scheme. This started in 2002 and was fully in effect in 2007. The other change moved in the opposite direction. To ensure that cash-constrained beneficiaries received the needed care, the government introduced the Direct Billing Payment program (DBP) in November 2003 for outpatient care. This DBP is the focus of our paper.

Before the DBP, CSMBS beneficiaries must pay the full amount of outpatient fees upfront and submit claims through their affiliated government unit for reimbursement. Although the reimbursement process is straight-forward, it could put a real burden on some low-income parents of civil servants or retirees. For these beneficiaries, their receipts were needed to be sent through their children or their pre-retired affiliated units. The DBP replaced this old billing system by having the hospitals charge the government directly.

The program was phased-in over a period of 4 years. During the first two years, only 25 large hospitals out of more than 1,000 public hospitals were selected to participate, and only patients with certain costly chronic diseases (e.g., diabetes, myocardial infarction) were eligible to enroll. These patients were given a high priority as it is crucial for them to receive care on a regular basis to prevent further complications. The program was in full effect in 2007, when all public hospitals accepted DBP enrollments and all CSMBS beneficiaries may enroll.

2.2 Previous studies

There exists a large literature on health insurance focusing on how changes in prices, operating through changes in a variety of cost-sharing methods, affect healthcare utilization. Empirical research provides evidences that are generally consistent with the law of demand, i.e. *ceteris paribus,* the level of cost-sharing and healthcare demand are inversely related. The

are not-for-profit public hospitals and doctors are paid by a fixed salary, there is an anecdote that some hospitals over-treat the CSMBS patients to compensate their loss from the other two PPS schemes. And doctors may over prescribe because they receive commission from pharmaceutical companies.

classic RAND health insurance experiment (Manning *et al.*, 1987) found that an increase in co-payment reduces the number of outpatient visits, inpatient expenses and total medical expenses. The last measure was found most responsive to the price change.

Subsequent studies reported similar results. An increase in cost-sharing is found to decrease outpatient visits both among public (Chandra *et al.*, 2010; Winkelmann, 2004 and 2006) and private (Chiappori *et al.*, 1998 and Brot-Goldberg, 2017) insurance beneficiaries. Many also found negative impacts on prescription drug expenditure (Rudholm, 2005; Granlund, 2009). Studies on whether the impacts of cost-sharing differ by income level yielded mixed results (Kiil and Houlberg, 2014). Most studies found that when the level of cost-sharing increases, the use of physician services is reduced more among the poor (*e.g.*, Beck, 1974; Lostao *et al.*, 2007).[6]

While there is mounting evidence on the effects of cost-sharing operating through price mechanisms, evidence regarding non-price mechanisms is limited. One study, Epp *et al.* (2000), did compare healthcare utilization under two different billing systems. However, the fact that the two systems also have different copayment rates makes it impossible to identify the pure effect of the billing process.

Although the DBP does not resemble any change of a health insurance policy discussed earlier, it is analogous to a replacement of mail-in rebates by instant discounts. Given the net price and consumers' expected wealth remain unchanged, both economic and psychology theories predict that consumers would prefer the instant discount. Consumers' high discount rate (Pyone and Isen, 2011), cash-constraint, and costs associated with the rebate process (Gilpatric, 2009; Tat and Schwepker, 1998) are possible underlying reasons. The Prospect Theory (Kahneman and Tversky, 1979) also explains that due to framing effects, an instant discount is likely to be perceived as a gain, but not a rebate of the same amount. Empirical

[6] See also Cherkin *et al.* (1992); Elofsson *et al.* (1998); Kim *et al.* (2005) and Lee *et al.* (2017).

evidences confirm the prediction across settings (Epley *et al.*, 2006; Revelt and Train, 1998; Wasi and Carson, 2013). Applying the same rationale, we could expect patients, not only those with cash constraint, to seek more care after the DBP was introduced.

Only a few studies have investigated impacts of the DBP. Pongchareonsuk and Pattanaprateep (2009) reported that although drug expenditure was increasing both before and after the DBP, the increasing rate was higher after the DBP started. Similarly, Dilokthornsakul *et al.* (2010) found that expenditure on prescription drugs was more than doubled post DBP. Some other studies only analyze the CSMBS expenditure the launch of DBP (*e.g.*, Siamwalla *et al.*, 2011; Limwattananon *et al.*, 2010). None of these studies attempt to carefully tease out the effects of the DBP nor decompose the expenditure into visits and treatment intensity.

3. Data

We are fortunate to obtain a comprehensive patient-level database from a large Thai public hospital outside the Bangkok Metropolitan Area. It is one of 25 pilot hospitals selected to participate in the DBP since it launched. For our research question, there are two main advantages of using administrative data over a household survey, which typically asks respondents about their healthcare utilization retrospectively. First, it is relatively free from self-report errors and biases. Second, charges at the hospital are observed even if patients do not pay out of their pocket.[7]

For this hospital, the DBP was rolled out in two phases starting from June 2004. During the first phase, CSMBS patients who were eligible to enroll must meet two criteria. First, the patient must have been diagnosed with at least one of the four chronic diseases—i.e. diabetes, hypertension, myocardial infarction, or cerebrovascular diseases. Second, the patient was

[7]Another attractive feature of the data from a large regional hospital is that there is no substitute hospital for the patients. The other nearest hospital is still further away and is much smaller in its capacities.

frequently treated at the hospital in the past 9 months.[8] The second phase started in October 2006 where any CSMBS patient may enroll in the program. Our paper focuses on the first phase of the DBP as chronic patients are the main targeted group of the program.

The data files we obtained from the hospital are its actual administrative records containing data on every patient' general information, outpatient daily visits, diagnostics (ICD10 coded), total charge of each visit and charges by types. The total charge (or cost per visit) here is what the hospital either collects from the patient or bills the government. The patient information includes age, gender, address, occupation, and type of health insurance used. Like a typical administrative record, our dataset does not contain socio-economic variables such as education and income.

We focus on three healthcare utilization measures: number of outpatient visits, charge per visit, and the proportion of prescription drug charge to total charge. The last measure is of interest because the drug expenditure has been considered the main driver of the rising expenditure after the introduction of the DBP (see Section 2.2). Although the daily administrative records permit us to construct visits and charge per visit for any chosen time interval (e.g. daily, weekly, annually), we define ours to be 6-month long. This is based on physicians' suggestion that 6-month should be an appropriate time-unit for analyses of chronic patients' hospital visits.[9]

The empirical analysis in this study spreads from June 2003 to May 2008. This gives us ten 6-month periods, covering both before and after the launch of the DBP in June 2004. During this period, about 53,000 patients—approximately 10% of total patients at the outpatient department—were covered by CSMBS. To ensure the comparability of our sample, we use auxiliary information to further screen the records as follows.

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[8] Specifically, the patient must have been receiving treatment in the hospital for at least three consecutive months, and the last visit must have occurred within the last 6 months before s/he can enroll in the program.
[9]Using visits per day or per month would contain many time periods with no visit and hence zero payment.

First, patients being referred from another hospital are excluded since their visit decisions are often influenced by doctors from other hospitals. Second, because we aim to study the extent to which the DBP affects behavior of regular patients (not whether it draws new patients), only patients being diagnosed with one of the four chronic diseases during November 2002-May 2003 are selected. This leaves us with 3,348 CSMBS patients. Third, we further drop patients who enrolled in the second phase where any CSMBS beneficiaries could enroll. Lastly, the patients who did not visit the hospital at all between May 2007 and Dec 2011 are excluded as they likely have died or moved out of the area. The final number of observations is 14,620 and among them 13,677 have a positive number of visits (1,462 unique patients).

Figure 1 depicts the distribution of the average number of outpatient visits per (6-month) period before and after program enrollment. The distribution of the average visits after enrollment clearly shifts to the right although the peaks remain around 3-5 visits. The proportion of periods with no visit significantly reduces from 11.6% to 1.3% after enrollment, while the average number of outpatient visits per period increases from 4.6 to 5.7 times after enrollment (see Table 1).

The distribution of charge per visit (conditional on having a visit) is shown in Figure 2. For an individual with more than one visit in a 6-month period, charge per visit is his/her average charge per visit during that interval. The distributions of the charge, both before and after enrollment, exhibit long tails. The proportion of charge per visit that are higher than 8,000 baht (high charge) increases from 2% to 6.6%, while the proportion of charge per visit that are less than 1,000 baht (low charge) decreases from 49% to 32% after enrollment.

Figure 3 plots the distribution of share of prescription drug charge from the total charge. Like the case of visits and charge per visit, the distribution shifts to the right after enrollment. The fraction of observations with 85-100% drug charge becomes much higher after enrollment.

Although the average treatment intensity is seen to rise after the patients enrolled in the DBP, medical inflation and changes in medical practice could also explain this pattern.[10]

Although eligible patients were allowed to register for the DBP since June 2004, not everyone enrolled in the first few months. Most of the sample who enrolled did so during the first 6 months. However, some eligible patients never register to the program even though they visited the hospital regularly.[11] It is plausible that those who are sicker and/or face more expensive treatment would select themselves into the program sooner.

Table 1 reports changes in the three utilization measures by the date patients enrolled in the program. On average, patients who were the quickest to enroll in the program do have a higher level of outpatient care utilization than other groups. There is no clear pattern when comparing those registering between December 2004 and May 2006 (columns 3-5). Patients who enrolled after June 2006 and those who never enroll, however, have lower number of visits and charge per visit on average. It is notable that the average number of visits, charge per visit, and the share of prescription drug charge increase after enrollment for all groups.

Table 2 reports the average characteristics of the sample tabulated by their enrollment dates. Those who enrolled in the last period are slightly older, while those who never enroll are slightly younger. Patients who live closer to the hospital (being in the same district) tend to enroll sooner. For occupations, those who never enroll are more likely to be the civil servants' dependents rather than the civil servants themselves. Looking at diagnostic records, hypertension is the most prevalent diseases among the enrollees. Diabetes is more common among those who enrolled in the first year. There is no clear pattern regarding other illnesses except that disorder of lipoprotein metabolism (excess lipids in the blood) and upper respiratory infection are slightly less common among those enrolling very late or never enroll.

[10] WHO reports that between 2000 and 2010, Thailand's current health expenditure per Capita went from US$62 to US$172 (Global Health Expenditure Database, http://apps.who.int/nha/database/Select/Indicators/en).
[11] This might be because they did not know about the DBP or were satisfied with the current billing approach.

4. Empirical specifications

Our measures of healthcare utilization are (1) the number of outpatient visits; (2) charge per visit; and (3) the share of prescription drugs charge to total charge. For each utilization measure, we estimate two models: without- and with individual-specific fixed-effects. While the former uses time-invariant individual characteristics and the patient's enrollment date to capture heterogeneity across patients, the latter models the heterogeneity as unobserved. Both specifications include time dummies and illnesses.

For the number of outpatient visits (which is a positive integer), we employ the Poisson and Poisson fixed effects models. Each observed outcome y_{it} (the number of total visits of individual *i* in period *t*) is drawn from a Poisson distribution with parameter μ_{it}. The probability that we observe $y_{it} = j$ is given by

$$f(y_{it}|\mu_{it}) = \frac{e^{-\mu_{it}}\mu_{it}^{y_{it}}}{y_{it}!},$$

where j = 0, 1,2,…; *i=1,…,n ; t=1,…,10.*

The expected number of visits per period is μ_{it}, which can be specified to be a function of covariates as follows:

$$E\left[y_{it}\middle|\alpha, \gamma_t, D_{it}, X, Z\right] = \mu_{it} = exp(\alpha + \gamma_t + \beta D_{it} + X_{it}\delta + Z_i\lambda), \qquad (1)$$

where α is an intercept. γ_t is a set time-specific dummies, capturing what commonly cause changes in *y* at period *t* even in the absence of the DBP. D_{it} is a dummy variable equaling one if individual *i* enrolls in the DBP during period *t*. X_{it} is a vector of observed covariates which vary across individuals and time periods such as illnesses. Once an individual is diagnosed with a chronic illness, s/he will be coded as having that chronic illness in all the subsequent periods.

Z_i is a vector of time-invariant individual characteristics (gender, occupation, residential location, and registration date).[12]

For the fixed effects specification, the Poisson distribution is assumed to have a conditional mean of the form:

$$E[y_{it}|\alpha_i, \gamma_t, D_{it}, X_{it}] = \mu_{it} = \alpha_i exp(\gamma_t + \beta D_{it} + X_{it}\delta) \qquad (2)$$

where α_i is the individual-specific fixed effects which captures both observed (Z_i) and unobserved (η_i) heterogeneity across individuals. Examples of unobserved factors (η_i) that can be accounted for through (α_i) include travel costs, the severity of illness(es), and satisfaction from past visits.

For the analysis of charge per visit, we apply the below the log-linear specification as the distribution is left-truncated at zero and exhibits a long tail.

$$\ln cost_{it} = \alpha_i + \gamma_t + \beta D_{it} + X_{it}\delta + \varepsilon_{it} \ , \qquad (3)$$

where *i=1,…,n ; t=1,…,10.* The parameter α_i is $\alpha_i = \alpha + Z_i\lambda$ for the model without fixed effects, and $\alpha_i = \alpha + Z_i\lambda + \eta_i$ for the model with individual-specific fixed effects. Empirical specifications for the share of prescription drug charge are analogous to (3) except that we use a linear form instead of the log-linear.

5. Results

5.1 Main results

Table 3 reports the average effects of the Direct Billing Payment program (DBP) on the number of outpatient visits, charge per visit, and the share of the prescription drug charge. The first two columns show the effects on the number of outpatient visits. These are the average marginal

[12] Although occupation and residential location could change over time, we treat them as fixed because there is not much change in the data. The hospital may fail to update the records.

effects from the Poisson regressions.[13] The estimated effect from the model using observed characteristics to control for patients' heterogeneity is +.86 times per 6-month. The fixed effects model yields a slightly larger estimate at +.9 times. The latter also fits the sample better (the likelihood improves from -35407 to -30372), suggesting that the enrollment dates alone can only partially capture individual's unobserved heterogeneity.

The full results are reported in the appendix Table A1, but we summarize the impact of some selected covariates here. With a few exceptions, most observed time-invariant characteristics do not have statistically significant effects. Living close to the hospital and being a female do significantly increase the likelihood of hospital visits. Among diagnostic records, therapy and rehabilitation, injuries, cancer, and follow-up cares have the largest impacts. This should not be surprising given the nature of these illnesses and usual medical practices.

Columns 3 and 4 report the result from the charge per visit regressions. Since the regressions are in the log-linear form, the coefficient of D_{it} can be interpreted as a percentage change. Recall from Table 1 that the simple before-and-after difference gives a sizable increase of 86% in the average charge per visit (growing from 1,491 to 2,776 baht). The regressions, however, indicate that the increase is mostly attributed to the time trend. The estimated impacts of the DBP on the charge per visit are only 7.6% and 9.9% in the model without and with fixed effects, respectively. The magnitude of the estimates of the time effects is very large, reaching +65-72% in the last 18 months of the study period.

The results of the effects on the share of prescription drug charge are presented in the last two columns. Similar to the charge per visit, the estimated impacts of DBP after controlling for other factors are much smaller than the simple difference (+1.6%-2.4% vs. +10%). The time trends capture around 4-5% of the increase in the share during the last year of the study

[13]The average marginal effects are calculated by evaluating the marginal effects at each observation's characteristics, and then taking the average across all observations.

period. Medical inflation, general changes in medical practice, and/or a change in how CSMBS patients are treated could contribute to the upward trends.

Overall, we find that the DBP significantly increases healthcare utilization through both extensive (visits) and intensive (charge per visit) margins. While the rise in the number of visits is not surprising, the increase in the charge per visit and the share of drug charge raise some concerns. It suggests that for each visit, patients may seek more treatment and get more prescribed drugs (or more expensive drugs). It is difficult to judge from the data whether additional treatments and prescriptions are necessary or wasteful.

On the one hand, the program would be considered welfare improvement if the increase in the charge per visit come from under-treated patients. For instance, those need regular medication for stable long-term conditions can now get a longer duration prescription and come less often. On the other hand, if the extra treatment or prescription– regardless of being sought by the patients or induced by the doctors-- is unnecessary, the program's benefit would have to be discounted by its efficiency loss.

Another set of interesting questions is that whether the impact persists over time, and whether it distributes evenly or unevenly among the insured beneficiaries. We investigate these heterogeneities in the next two subsections.

5.2 Do the effects persist over time?

To see whether the DBP effects persist over time, we start with some plots. Figure 4 shows the average visits over time, separating the sample by their enrollment dates. Note that "time" is not a calendar year, but is a time period specifically defined for each group, based on their enrollment dates. Specifically, t is the period that the patients first registered to the program. $t-1$ and $t-2$ denotes the six-month period and the 7-12 month period before the enrollment date, respectively. $t+1$ denotes the 7-12 months after the enrollment date, and so on. Consistent with Table 1, for all groups, the average number of visits clearly shifts up after enrollment, and the biggest jump occurs during first 6 months.

Figure 5 and Figure 6 plot the average charge per visit and the share of prescription drug charge pre- and post- enrollment. Unlike the average visits depicted in Figure 4, both charge per visit and the share of drug charge exhibit positive time trends even before the patients enrolled. The trends are observed for all groups even for those who never enroll.

Empirically, we extend the fixed effect models by replacing D_{it} with a set of post-enrollment time dummies. For example, equation (2) is modified as

$$lncost_{it} = \alpha_i + \gamma_t + \sum_{j=0}^{3} \beta_j I(d_{ij} = j) + \beta_4 I(d_{ij} \geq 4) + X_{it}\delta + \varepsilon_{it} \quad ,$$
$$i=1,\ldots,n\ ;\ \ t=1,\ldots,10;\ j=0,1,\ldots,4 \qquad (4)$$

where d_{ij} denotes the indicator specifically defined for each individual *i* so that $d_{ij} = 0$ for the period in which individual *i* first registered to the DBP. $d_{ij} = 1, 2, 3$ for each of the three subsequent 6-month intervals respectively. Because not many patients are observed after two years into the program, we let $d_{ij} = 4$ captures the effect from the second year after enrollment onwards. The coefficients $\beta_j's$ measure the impact at each interval relative to the excluded pre-enrollment period.

The results are reported in Table 4.[14] For the number of outpatient visits, the estimated impact after controlling for other covariates still mimics the pattern shown in Figure 4. The effect is strongest in the first period at +1.43 times per 6-month. It later drops but is still positive, around .6-.8 times. A couple of reasons could explain this pattern. First, once the program freed up cash-constraint, patients might visit the hospital very often during the first few months to seek treatments they did not consider important earlier, *e.g.*, dental routine or health check-up. Second, it is possible that the hospital had reached its capacity and been

[14]The full regression results are available upon request.

overcrowded. As a result, after the first few visits, some patients were unsatisfied and decided to visit the hospital only when necessary.

For the charge per visit and the share of prescription drug charge, the effect of the DBP is not statistically different from zero during the first 6-month period. After that, however, their estimated impacts go up by 15-20% and 2.5-3.8%, respectively. It is unclear why the physicians had not provided more treatment or prescribed more drugs from the beginning. One possible explanation is a change in the patient mix. During the initial period of each enrollment wave, there was a mix of patients with relatively more and less serious illnesses. After six months into the program, the ones that continued to visit were those with more serious illness requiring more expensive treatment. As a result, the impact started to pick up from the second period onwards. The magnitudes of the effects remain similar for the following periods. This could be because the government started auditing more claims after some report of corrupted cases.[15]

5.3 Do "low utilization" patients increase their healthcare demand more proportionally?

Another natural question one could ask is whether the patients whom the program intends to help get help. Identifying the patients who are cash constrained from the data is not straightforward because their wealth is not observed. Assuming patients with infrequent visits prior to enrollment are cash constrained seems inappropriate as those who do not visit may not be sick. We propose the following two alternative methods to classify patients based on their illnesses and healthcare utilization prior to enrollment.

Method I: The patients are classified based on whether they have higher or lower visit (and higher or lower charge per visit) than the average patients with the same illnesses before enrollment. To predict the average visits for people with the same set of illnesses, we first apply

[15] There was some report that some CSMBS beneficiaries went to multiple hospitals to get free medicine beyond what they really needed and then re-sold the medicine in the market.

the Poisson model to regress the number of visits on illnesses using the before enrollment observations only. The residuals are calculated by subtracting the predicted value from the actual number of visits. Observations with negative (positive) residual can be interpreted as those with lower (higher) visits than the average patients with the same illnesses.[16]

The patient with higher or lower charge per visit is identified through a similar procedure using the residuals from the charge per visit regression. Based on the sign of their residuals, we classify the patients into 4 groups: (1) "lower visit, lower charge" (2) "lower visit, higher charge" (3) "higher visit, lower charge" and (4) "higher visit, higher charge".

The patients in the first (last) group are most (least) likely the ones facing the cash constraint problem. The second and third groups are more ambiguous but possibly include cash-constrained patients. For example, those who miss some appointments due to too expensive treatment could be in the "lower visit, higher charge" group. The patients with long-term stable conditions who come so often because long duration prescription in one visit is not affordable could be in the "higher visit, lower charge" group.

Method II: The patients are classified based on whether their total outpatient charges are higher or lower than that of other patients with the same illnesses prior to enrollment. The idea is similar to the first method but here we regress log of total charge (visits x charge per visit) on illnesses and obtain the residuals. The patients are then grouped by the quartile of their residuals. Those in the lowest (highest) quartiles have the lowest (highest) total charge as compared to the average patients with the same illnesses. We conjecture that the patients in the lower part of the residual distribution are more likely to be the ones with cash constraint.

For both classification methods, the empirical model is extended by interacting the dummies of patient types with D_{it} in equations (2) and (3). The results are reported in Table 5. Overall, the results suggest that the DBP does help low utilization patients more proportionally.

[16] Because most patients have multiple records prior to enrollment, we average the residuals for each patient.

For the first method (top panel), while the number of visits from the “lower visit” patients significantly increase by more than 2 times per 6 months, the effects on the two “higher visit” groups are not statistically significant. For the two “lower charge” groups, the effects on the charge per visit is significantly large at +30%. We hypothesize that if the “higher visit, lower charge” group were the cash-constrained patients who visit too often for a short-duration prescription, the impact on their visit would be negative. We find no such evidence.

For the second method (the bottom panel of Table 5), the DBP leads to the highest increase in the number of visits, charge per visit and the share of drug charge among the lowest quartile group. The magnitudes of the effects reduce monotonically as we move to the upper quartile group (conditional on illnesses). Consistent with findings obtained from Method I, the DBP was found to benefit those who need more help more proportionately.

6. Conclusion and Discussion

This paper highlights the fact that the billing process can play a significant role in boosting healthcare utilization even the price (co-payment rate) remains unchanged. A large number of studies have shown that an increase in cost-sharing effectively reduces healthcare demand but little has looked at the billing process. Using outpatient data from a large regional hospital in Thailand, we find that when the care is free, requiring consumers to pay first and get their money reimbursed later impacts their care-seeking behaviors significantly.

The launch of the Direct Billing Payment program, which allows the hospitals to charge the insurer directly, affects healthcare utilization through multiple channels. First, it induces the enrolled outpatients to visit more often. Second, for each visit, the treatment costs and the share of prescription drug charge are higher. Our estimates, however, are moderate. Both the charge per visit and the share of prescription drug charge had been on their rising trends even before the DBP was in place.

We also find that although the number of outpatient visits increases sharply during the first few months after enrollment, the effects in the subsequent periods are smaller. In contrast, the impacts on the charge per visit and the share of prescription drug charge rise more gradually and are more persistent. Our analysis on the heterogeneous effect across patients brings the policymakers some good news. The results suggest that the likely cash-constraint patients increase their healthcare demand more proportionally. While removing cash constraint is clearly responsible for the rise in demand, we believe that several other factors such as high discount rate and perception about the billing process also contribute to the responses seen.

Understanding how people respond to policy changes in the past is a crucial step in making better and more informed policies in the future. Our study attempts to move toward that direction, but some limitations remain. First, this article by no means serves as a comprehensive policy evaluation of the DBP because it is based on utilization of chronic patients in one large regional hospital only. Hopefully, future research could try to generalize the results. Second, while we find that the billing process can play a significant role, one should keep in mind that the medical care in the scheme considered here is free. If the level of cost-sharing is not zero, we would expect the impact of the DBP to be smaller.

Lastly, our analysis on the behavior of the "likely cash-constraint" patients relies on the assumption that these patients and others with the same observed illnesses are identical, but cash-constraint limits them from seeking more care. Further investigating this issue could be a fruitful research direction. For example, if physicians could help identify patients who received inadequate healthcare, the analysis can directly focus on their behavior changes.

Thailand, like many countries, while trying to promote more health equity, still grabbles on how to control the rising healthcare expenditure. Medical inflation, advanced medical sciences and the aging population will put more pressure on the CSMBS which covers a growing proportion of elderly. More recently, the Thai government has started discouraging the use of drugs outside the National Essential Medicines List and improving its monitoring system to promptly audit suspicious claims. Although these measures are helpful, the Moral Hazard behavior remains important concern because the healthcare is still free. Demand-side and supply-side cost sharing tools which have proved to be more effective in other countries should be seriously considered.

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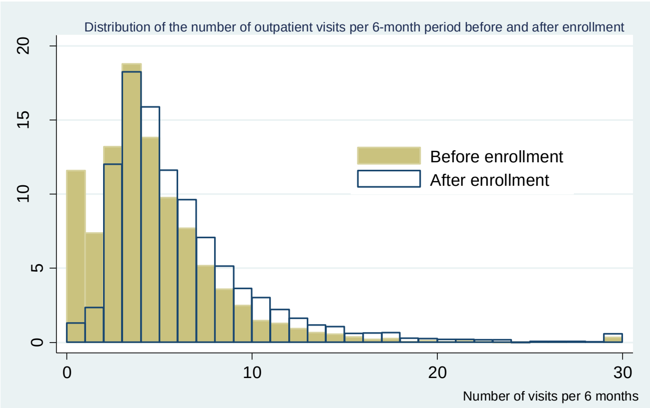
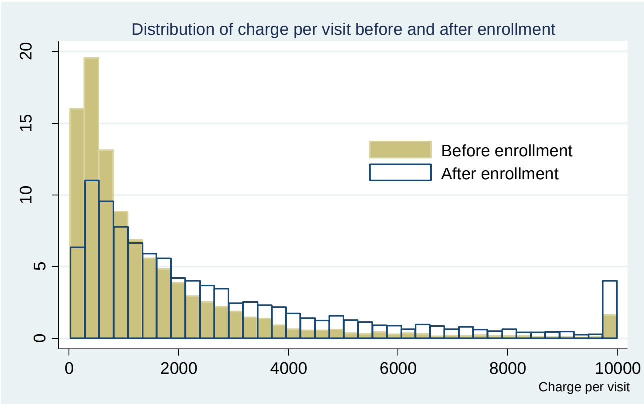
Figure 1: Distribution of the Number of Outpatient Visits per 6-month period



Note: The last bin includes those with number of outpatient visits 30 times or greater.

Figure 2: Distribution of Outpatient Charge Per Visit



Note: The last bin includes those with charge per visit 10,000 baht or greater.

Figure 3: Share of Prescription Drug Charge from Total Charge

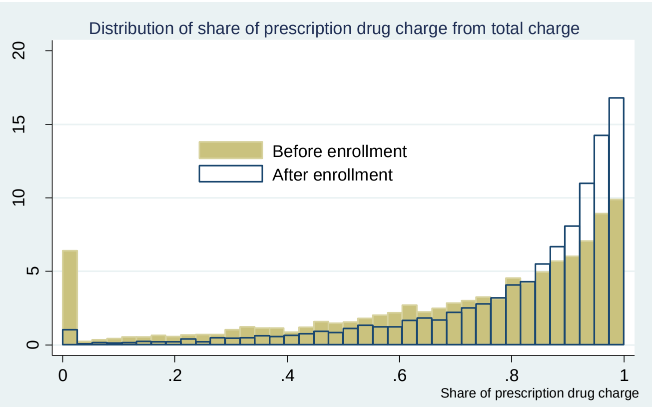
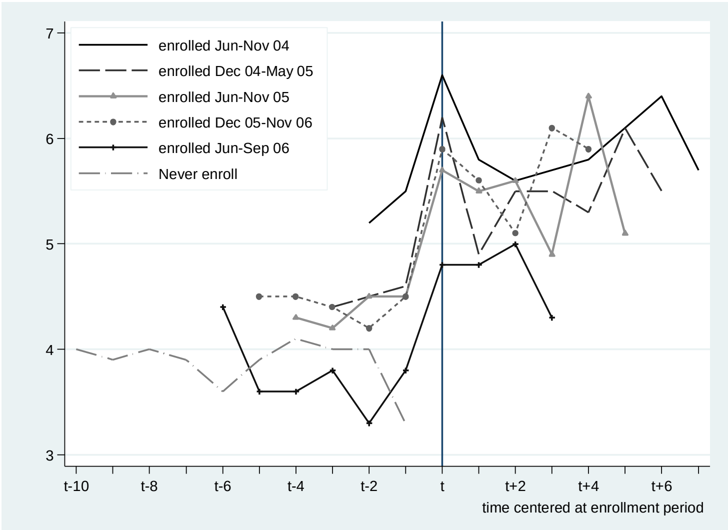
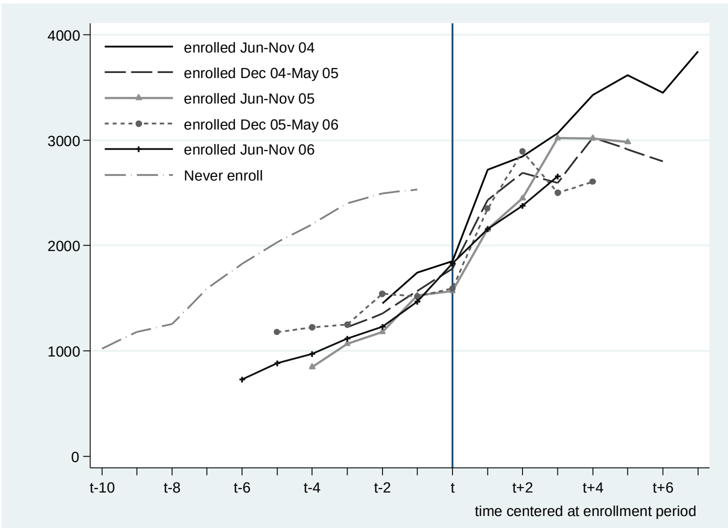


Figure 4: Average Number of Outpatient Visits Pre- and Post-Enrollment by Patients' Enrollment Dates



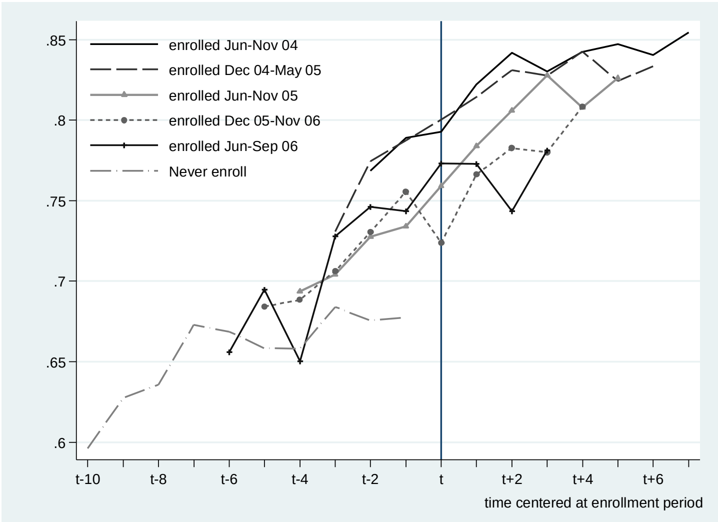
Note: t denotes the period where the patients enrolled to the DBP. t+1 denotes the next 6-month window following the enrollment, and t-1, t-2 denote the periods before enrollment and so on. For patients who "never enroll", t-10 to t-1 simply represent the 6-month calendar intervals during the study period.

Figure 5: Average Charge Per Visit Pre- and Post-Enrollment by Patients' Enrollment Dates



Note: t denotes the period where the patients enrolled to the DBP. t+1 denotes the next 6-month window following the enrollment, and t-1, t-2 denote the periods before enrollment and so on. For patients who "never enroll", t-10 to t-1 simply represent the 6-month calendar intervals during the study period.

Figure 6: Average Share of Prescription Drug Charge Pre- and Post-Enrollment by Patients' Enrollment Dates



Note: t denotes the period where the patients enrolled to the DBP. t+1 denotes the next 6-month window following the enrollment, and t-1, t-2 denote the periods before enrollment and so on. For patients who "never enroll", t-10 to t-1 simply represent the 6-month calendar intervals during the study period.

Table 1: Measures of Healthcare Utilization by Patients' Enrollment Dates

		Patients separated by date enrolled in the Direct Billing program					
	All	**Jun-Nov 04**	**Dec 04-May 05**	**Jun-Nov 05**	**Dec 05-May 06**	**Jun-Sep 06**	**Never**
No. of patients	**1462**	529	138	165	183	50	397
Average number of outpatient visits per 6-month							
before enrollment	**4.6**	5.3	4.5	4.4	4.4	3.8	3.9
after enrollment	**5.7**	5.9	5.6	5.5	5.7	4.7	
Average charge per visit (baht)							
before enrollment	**1491**	1586	1373	1142	1322	1001	1689
after enrollment	**2776**	3107	2610	2494	2373	2131	
Share of prescription drug charge							
before enrollment	**71%**	78%	76%	70%	71%	67%	62%
after enrollment	**81%**	83%	82%	80%	76%	74%	

Table 2: Average Sample Characteristics by Enrollment Date

	Patients separated by date enrolled in the Direct Billing program					
	Jun-Nov 04	**Dec 04-May 05**	**Jun-Nov 05**	**Dec 05-May 06**	**Jun-Sep 06**	**Never**
Age	64	65	66	64	67	62
1 if female	0.55	0.55	0.56	0.54	0.60	0.62
Same district as the hospital	0.67	0.51	0.61	0.54	0.44	0.45
Different district but same province as the hospital	0.27	0.41	0.31	0.38	0.44	0.45
Different province	0.05	0.09	0.08	0.08	0.12	0.10
Public servant	0.21	0.15	0.22	0.24	0.12	0.11
Public retiree	0.14	0.18	0.21	0.21	0.16	0.05
Other professional	0.07	0.09	0.09	0.06	0.04	0.15
Other blue collars	0.12	0.16	0.10	0.13	0.16	0.23
Army	0.07	0.06	0.05	0.05	0.06	0.01
Not working	0.35	0.33	0.30	0.28	0.44	0.42
Diabetes mellitus	0.58	0.60	0.47	0.47	0.41	0.47
Hypertension	0.84	0.85	0.88	0.84	0.91	0.78
Circulatory system/heart diseases except hypertension	0.31	0.27	0.24	0.23	0.30	0.26
Cerebrovascular diseases	0.13	0.09	0.13	0.10	0.11	0.12
Renal failure/care involving dialysis	0.04	0.05	0.03	0.04	0.00	0.05
Malignant neoplasms/cancer	0.02	0.01	0.04	0.03	0.05	0.03
Disorders of lipoprotein metabolism and other lipidaemias	0.12	0.11	0.10	0.10	0.07	0.07
Diseases of pulp and periapical tissues/gingivitis diseases	0.06	0.05	0.05	0.05	0.03	0.02
Chronic lower respiratory diseases (including Asthma)	0.13	0.15	0.14	0.19	0.11	0.13
Acute cold and other upper respiratory infections	0.08	0.07	0.07	0.08	0.04	0.04
Other muscle and joint pains	0.06	0.06	0.07	0.05	0.04	0.03
General examinations and investigations	0.04	0.03	0.03	0.03	0.04	0.02
Special examinations and investigations	0.03	0.03	0.02	0.02	0.02	0.02
Follow-up examination, Follow-up care	0.07	0.07	0.06	0.06	0.05	0.05

Table 3: Main Regression Results (Average Effects of the DBP)

	Outpatient visits		Charge per visit		Share of prescription drug charge	
	No Fixed effects	**Fixed effects**	**No Fixed effects**	**Fixed effects**	**No Fixed effects**	**Fixed effects**
1 if enroll	0.855**	0.908**	0.076*	0.099**	0.016*	0.024**
	(0.132)	(0.129)	(0.031)	(0.030)	(0.007)	(0.007)
Time dummies (omitted Jun - Nov 03)						
Dec 03 - May 04	-0.067	-0.071	0.127**	0.141**	0.017*	0.017**
	(0.093)	(0.091)	(0.021)	(0.019)	(0.007)	(0.006)
Jun04 - Nov 04	-0.173	-0.201	0.152**	0.160**	0.019*	0.016*
	(0.112)	(0.114)	(0.028)	(0.026)	(0.008)	(0.007)
Dec 04- May 05	-0.627**	-0.649**	0.360**	0.379**	0.039**	0.038**
	(0.145)	(0.144)	(0.031)	(0.029)	(0.008)	(0.008)
Jun 05 - Nov 05	-0.957**	-0.995**	0.399**	0.430**	0.049**	0.045**
	(0.159)	(0.161)	(0.034)	(0.032)	(0.009)	(0.009)
Dec 05 - May 06	-0.737**	-0.78**	0.426**	0.476**	0.034**	0.036**
	(0.172)	(0.173)	(0.038)	(0.036)	(0.010)	(0.009)
Jun 06 - Nov 06	-0.91**	-0.892**	0.539**	0.596**	0.047**	0.049**
	(0.173)	(0.172)	(0.039)	(0.037)	(0.010)	(0.009)
Dec 06 - May 07	-0.854**	-0.94**	0.644**	0.715**	0.054**	0.059**
	(0.178)	(0.18)	(0.041)	(0.038)	(0.010)	(0.010)
Jun 07 - Nov 07	-0.572**	-0.661**	0.573**	0.664**	0.044**	0.050**
	(0.19)	(0.199)	(0.042)	(0.040)	(0.010)	(0.010)
Dec 07 - May 08	-1.125**	-1.221**	0.600**	0.720**	0.050**	0.060**
	(0.173)	(0.18)	(0.044)	(0.041)	(0.010)	(0.010)
Number of observations	14620	14620	13677	13677	13677	13677

Note: The models without fixed effects include dummies for the date enrolled in the program and demographic variables. The models with fixed effects do not include these time-invariant characteristics. All models are controlled for observed illnesses. The numbers in parentheses are standard errors, clustered at the patient level. ** and * denotes 1% and 5% statistically significance, respectively.

Table 4: The Persistency of the DBP Impacts Post-enrollment

	The number of Outpatient visits	Charge per visit	Share of prescription drug charge
Time elapsed since enrollment			
0-6 months	1.428**	-0.047	0.013
	(0.135)	(0.030)	(0.007)
7-12 months	0.645**	0.191**	0.028**
	(0.169)	(0.032)	(0.008)
13-18 months	0.724**	0.207**	0.038**
	(0.205)	(0.037)	(0.009)
19-24 months	0.721**	0.191**	0.033**
	(0.255)	(0.043)	(0.010)
25 months+	0.813**	0.154**	0.025*
	(0.251)	(0.049)	(0.010)
Time dummies	Yes	Yes	Yes
Fixed effects	Yes	Yes	Yes
Time enrollment	No	No	No
Demographic variables	No	No	No
Number of observations	14620	13677	13677

Note: The presented estimates are from the fixed effect models which also control for observed illnesses. The numbers in parentheses are standard errors, clustered at the patient level. ** and * denotes 1% and 5% statistically significance, respectively.

Table 5: Differences in the Effects of the DBP by Utilization Prior to Enrollment

Method 1: Patients' classification based on residuals of visit and charge per visit models	**Outpatient visits**	**Charge per visit**	**Share of prescription drug charge**
Compared to average patients with same illnesses			
Lower visit, lower charge	2.514**	0.3336**	0.076**
	(0.228)	(0.050)	(0.012)
Lower visit, higher charge	2.23**	-0.2169**	-0.024*
	(0.361)	(0.053)	(0.010)
Higher visit, lower charge	0.323	0.2760**	0.060**
	(0.176)	(0.046)	(0.011)
Higher visit, higher charge	0.271	-0.0691	-0.023**
	(0.184)	(0.038)	(0.008)

Method 2: Patients' classification based on residuals of the total charge model	**Outpatient visits**	**Charge per visit**	**Share of prescription drug charge**
Total charge compared to average patients with same illnesses			
Lowest (1st quartile)	2.359**	0.3513**	0.074**
	(0.254)	(0.052)	(0.013)
Low (2nd quartile)	0.915**	0.2495**	0.064**
	(0.203)	(0.048)	(0.011)
High (3rd quartile)	0.718**	0.0102	-0.001
	(0.212)	(0.043)	(0.009)
Highest (4th quartile)	0.427*	-0.2030**	-0.037**
	(0.213)	(0.042)	(0.008)

Note: The presented estimates are from the fixed effect models which also control for observed illnesses. The numbers in parentheses are standard errors, clustered at the patient level. ** and * denotes 1% and 5% statistically significance, respectively.

Appendix: Table A1 (Full regression results)

	Outpatient visits		Charge per visit		Share of prescription drug charge	
	No Fixed effects	**Fixed effects**	**No Fixed effects**	**Fixed effects**	**No Fixed effects**	**Fixed effects**
1 if enroll	0.855**	0.908**	0.076*	0.099**	0.016*	0.024**
	(0.132)	(0.129)	(0.031)	(0.030)	(0.007)	(0.007)
Time dummies (omitted Jun 03 - Nov 03)						
Dec 03- May 04	-0.067	-0.071	0.127**	0.141**	0.017*	0.017**
	(0.093)	(0.091)	(0.021)	(0.019)	(0.007)	(0.006)
Jun 04 - Nov 04	-0.173	-0.201	0.152**	0.160**	0.019*	0.016*
	(0.112)	(0.114)	(0.028)	(0.026)	(0.008)	(0.007)
Dec 04- May 05	-0.627**	-0.649**	0.360**	0.379**	0.039**	0.038**
	(0.145)	(0.144)	(0.031)	(0.029)	(0.008)	(0.008)
Jun 05 - Nov 05	-0.957**	-0.995**	0.399**	0.430**	0.049**	0.045**
	(0.159)	(0.161)	(0.034)	(0.032)	(0.009)	(0.009)
Dec 05- May 06	-0.737**	-0.78**	0.426**	0.476**	0.034**	0.036**
	(0.172)	(0.173)	(0.038)	(0.036)	(0.010)	(0.009)
Jun 06 - Nov 06	-0.91**	-0.892**	0.539**	0.596**	0.047**	0.049**
	(0.173)	(0.172)	(0.039)	(0.037)	(0.010)	(0.009)
Dec 06- May 07	-0.854**	-0.94**	0.644**	0.715**	0.054**	0.059**
	(0.178)	(0.18)	(0.041)	(0.038)	(0.010)	(0.010)
Jun 07 - Nov 07	-0.572**	-0.661**	0.573**	0.664**	0.044**	0.050**
	(0.19)	(0.199)	(0.042)	(0.040)	(0.010)	(0.010)
Dec 07- May 08	-1.125**	-1.221**	0.600**	0.720**	0.050**	0.060**
	(0.173)	(0.18)	(0.044)	(0.041)	(0.010)	(0.010)
Date enrolled to DBP (omitted Jun - Nov 04)						
Dec 04-May 05	-0.085		-0.206**		-0.018	
	(0.146)		(0.076)		(0.013)	
Jun-Nov 05	-0.253		-0.386**		-0.057**	
	(0.165)		(0.071)		(0.013)	
Dec 05-May 06	-0.112		-0.417**		-0.071**	
	(0.189)		(0.070)		(0.014)	
Jun-Sep 06	-0.626**		-0.619**		-0.101**	
	(0.237)		(0.103)		(0.023)	
Never enroll	-0.442**		-0.479**		-0.152**	
	(0.167)		(0.062)		(0.016)	
Age	-0.02		0.01		0.00	
	(0.061)		(0.016)		(0.004)	
Age squared	-0.00001		-0.000003		0.00003	
	(0.0005)		(0.0001)		(0.0000)	
Residential location (omitted different province)						
Same district as the hospital	0.767**		-0.270**		-0.038*	
	(0.205)		(0.086)		(0.017)	
Different district, same province	0.242		-0.176*		-0.025	
	(0.228)		(0.088)		(0.017)	
1 if female	0.375**		0.02		0.0001	
	(0.109)		(0.053)		(0.011)	

Table A1 (continued)

	Outpatient visits		Charge per visit		Share of prescription drug charge	
	No Fixed effects	Fixed effects	No Fixed effects	Fixed effects	No Fixed effects	Fixed effects
Occupation (omitted not working)						
Public servant	-0.141		0.240**		0.026	
	(0.158)		(0.072)		(0.016)	
Public retiree	0.161		0.083		-0.008	
	(0.169)		(0.076)		(0.015)	
Other professional	-0.547**		0.151		0.040*	
	(0.163)		(0.081)		(0.017)	
Other blue collars	-0.147		-0.085		0.008	
	(0.162)		(0.067)		(0.015)	
Army	-0.208		0.247*		0.050*	
	(0.211)		(0.113)		(0.020)	
Illnesses						
Diabetes mellitus	0.666**	0.58**	0.382**	0.128*	0.024*	0.009
	(0.104)	(0.217)	(0.044)	(0.056)	(0.010)	(0.012)
Hypertension	0.575**	0.729**	0.223**	0.123*	0.063**	0.031**
	(0.117)	(0.186)	(0.059)	(0.052)	(0.013)	(0.012)
Circulatory system or	0.517**	1.047**	0.311**	0.211**	0.036**	0.048**
heart diseases	(0.125)	(0.27)	(0.050)	(0.069)	(0.010)	(0.014)
Cerebrovascular diseases	0.492**	0.852**	0.288**	0.386**	0.044**	0.035*
	(0.161)	(0.295)	(0.067)	(0.102)	(0.014)	(0.016)
Renal failure or	2.151**	0.66	0.505**	0.237**	0.022	0.029
care involving dialysis	(0.663)	(0.376)	(0.087)	(0.085)	(0.015)	(0.017)
Rheumatoid arthritis	1.156*	1.036*	0.309*	-0.149	0.062**	-0.025
	(0.483)	(0.514)	(0.127)	(0.096)	(0.019)	(0.021)
Diarrhea and	1.129**	0.659**	-0.247**	-0.098*	-0.025	-0.004
gastroenteritis	(0.257)	(0.149)	(0.060)	(0.039)	(0.015)	(0.010)
Other infectious diseases	0.994**	0.808**	-0.108	-0.087	0.008	-0.001
	(0.311)	(0.207)	(0.063)	(0.051)	(0.018)	(0.015)
Malignant neoplasms	1.428**	1.458**	0.082	0.009	-0.034	-0.003
or cancer	(0.411)	(0.504)	(0.129)	(0.104)	(0.022)	(0.026)
Disorders of metabolism	0.349**	0.351**	0.130**	0.051*	-0.001	-0.001
lipoprotein & lipidaemias	(0.105)	(0.093)	(0.039)	(0.021)	(0.009)	(0.005)
Endocrine, nutritional	0.879**	0.599**	-0.028	-0.014	-0.040*	-0.027*
& metabolic diseases	(0.25)	(0.216)	(0.075)	(0.048)	(0.019)	(0.013)
Parkinson disease	-0.018	0.732	0.743**	0.208	0.052	0.014
	(0.265)	(0.449)	(0.138)	(0.173)	(0.033)	(0.025)
Migraine or other	0.769*	0.849**	-0.367**	-0.154**	-0.034*	-0.016
headache syndromes	(0.34)	(0.309)	(0.087)	(0.056)	(0.017)	(0.014)
Other diseases of	1.057*	0.479	0.146	-0.08	-0.012	-0.024
the nervous system	(0.461)	(0.255)	(0.090)	(0.043)	(0.021)	(0.012)
Mental and behaviors	1.689**	1.336**	0.12	0.089	0.058**	0.035**
disorders	(0.358)	(0.399)	(0.075)	(0.055)	(0.022)	(0.011)
Dental caries	0.803**	0.555**	0.111	0.024	-0.047**	-0.048**
	(0.214)	(0.17)	(0.069)	(0.037)	(0.016)	(0.012)

Table A1 (continued)

	Outpatient visits		Charge per visit		Share of prescription drug charge	
	No Fixed effects	Fixed effects	No Fixed effects	Fixed effects	No Fixed effects	Fixed effects
Diseases of pulp & periapical	1.262**	1.039**	-0.218**	-0.132**	-0.069**	-0.060**
tissues/gingivitis diseases	(0.19)	(0.137)	(0.048)	(0.028)	(0.012)	(0.008)
Other oral diseases	0.924**	1.106**	-0.188**	-0.094*	-0.095**	-0.068**
	(0.249)	(0.189)	(0.064)	(0.038)	(0.017)	(0.013)
Functional dyspepsia	1.306**	1.012**	-0.120*	-0.026	-0.031*	-0.018*
Disorders of stomach	(0.233)	(0.158)	(0.058)	(0.038)	(0.014)	(0.009)
Disorders of esophagus	1.162**	0.829**	-0.06	-0.029	-0.048*	-0.013
	(0.198)	(0.15)	(0.062)	(0.040)	(0.019)	(0.010)
Cataract	0.929**	0.726**	-0.203**	-0.131**	-0.037**	-0.020*
	(0.183)	(0.15)	(0.051)	(0.035)	(0.012)	(0.009)
Glaucoma	1.069**	0.924**	0.228**	0.164	0.060**	0.022
	(0.204)	(0.323)	(0.079)	(0.113)	(0.015)	(0.022)
Other disorders of eyes	1.149**	0.937**	-0.221**	-0.138**	-0.016	0.009
and ears	(0.299)	(0.233)	(0.081)	(0.050)	(0.020)	(0.014)
Acute cold and other URIs	1.301**	0.66**	-0.149**	-0.109**	0.013	-0.005
	(0.148)	(0.127)	(0.038)	(0.023)	(0.009)	(0.006)
Chronic lower respiratory	0.867**	0.665**	0.034	-0.024	0.017	-0.004
diseases	(0.139)	(0.196)	(0.059)	(0.054)	(0.012)	(0.011)
Gout	0.484*	0.718	0.044	0.186*	-0.001	0.032
	(0.197)	(0.386)	(0.074)	(0.091)	(0.015)	(0.023)
Arthrosis	0.899**	0.628**	0.211**	0.145**	0.056**	0.045**
	(0.142)	(0.171)	(0.047)	(0.028)	(0.009)	(0.007)
Spondylosis or osteoarthritis	0.476	0.853**	0.270**	0.175**	0.025	0.006
	(0.284)	(0.223)	(0.064)	(0.047)	(0.015)	(0.011)
Dorsalgia	1.142**	0.636**	0.1	0.066	0.040**	0.021*
	(0.208)	(0.181)	(0.052)	(0.038)	(0.011)	(0.008)
Other soft tissue disorders	1.54**	1.179**	-0.102*	-0.048	0.008	0.006
	(0.28)	(0.225)	(0.049)	(0.035)	(0.012)	(0.008)
Other muscle and joint pains	0.839**	0.479**	-0.005	0.026	0.026**	0.012*
	(0.173)	(0.123)	(0.038)	(0.024)	(0.009)	(0.006)
Hyperplassia of prostate	2.017**	0.965**	0.526**	0.195**	0.108**	0.046**
	(0.251)	(0.253)	(0.068)	(0.053)	(0.013)	(0.014)
Dizziness and giddiness	1.058**	0.999**	-0.315**	-0.118**	-0.041**	-0.014
	(0.207)	(0.15)	(0.049)	(0.027)	(0.013)	(0.008)
Injuries (wounds,	1.836**	1.753**	-0.239	-0.036	-0.061	-0.006
fractures, dislocation)	(0.683)	(0.411)	(0.139)	(0.085)	(0.037)	(0.024)
Injuries from accidents,	-0.086	-0.4	-0.045	-0.041	0.034	0.013
external factors	(0.488)	(0.302)	(0.147)	(0.091)	(0.036)	(0.025)
General examinations	0.838**	0.513**	-0.049	-0.058	-0.02	-0.025**
and investigations	(0.156)	(0.128)	(0.044)	(0.030)	(0.012)	(0.008)
Special examinations	1.35**	1.149**	0.019	-0.054	-0.079**	-0.080**
and investigations	(0.253)	(0.183)	(0.050)	(0.031)	(0.014)	(0.010)
Follow-up examination &	1.885**	1.575**	-0.064	-0.074**	-0.023*	-0.029**
Follow-up care	(0.181)	(0.161)	(0.040)	(0.027)	(0.010)	(0.007)
Therapy and Rehabilitation	3.766**	2.636**	-0.06	-0.155**	-0.085**	-0.087**
	(0.495)	(0.348)	(0.058)	(0.043)	(0.016)	(0.011)