What Characterizes Patients Who Switch General Practitioners?

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SUMMARY

In June 2001, the regular general practitioner scheme (Fastlegeordningen) was introduced in Norway. All inhabitants were offered the right to register with a general practitioner (GP) as their regular physician. In the patient-list system, the inhabitants have the right to switch GP up to twice per calendar year. This thesis examines which individual characteristics are associated with the decision to switch GP. The expectation is that the individuals are heterogeneous with regard to their switching behavior. By means of probit regression analysis, this thesis explores how the individuals' probability of switching GP varies by socioeconomic characteristics and the health status of the individual, as well as the GP competition in the municipalities. Findings include a significantly negative effect of age and income level on the probability of switching GP. Findings show that gender, education level, self-assessed health status, and GP capacity at the municipality level are the factors that influence who switch GP.

Key words: patient heterogeneity; switching GP; patient-list

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1. INTRODUCTION

When consumers perceive that the quality of services provided by their current general practitioner (GP) is below the lowest acceptable level, they might decide to leave their current GP. The quality of GP care has a range of clinical aspects such as diagnosis, prescribing, and referral. Non-medical aspects such as accessibility, interpersonal skills and patient engagement are also considered important elements of GP quality. Most individuals leave existing GPs to join other patient-lists for non-medical reasons. Gandhi et al. (1997) performed a qualitative investigation and found that individuals switched GPs without changing addresses mainly because of attitudinal problems (respond of 17 interviews) and distance (response of 24 letters). The most commonly reported reason for switching was distance, long waiting-time for appointments, and a negative experience from a previous visit. The face-to-face interview was one way to further identify the potential reasons for leaving GPs; however, the number of observations was small and the findings might not be representative to predict important attributes in patient and GP relations.

There are a few studies that have examined choices of GP, as reviewed in Scott (2000). Veale et al. (1995) found that individuals were more likely to see more than one GPs if they were younger females who experienced an unhappy consultation at their last visit. Scott and Vick (1998; 1999) performed a discrete choice experiment in their study and found that "being able to talk" was the most important determinant in patient preference. These studies analyzed the individuals' stated preferences with regard to a hypothetical GP and explored what ideal characteristics a perfect GP would have. A disadvantage of the stated preferences experiment is that individuals do not answer the survey with real commitments, and they might behave inconsistently in real-world situations. Another limitation of Scott's study was a low response rate (only 18 percent), which might imply that the sample was non-representative. Dixon et al. (1997) used revealed preferences in their study. They examined individuals who switched GPs without changing their address, and found that individuals are more likely to leave GPs who had shorter opening hours, were located further from the individual's home and had smaller practices. They also found that older individuals were less likely to switch than younger individuals and that women were more likely to switch than men. Lurås (2003) examined the inhabitants' ranking choices of GPs and found that inhabitants were more likely to choose GPs who had the same gender as the inhabitants, smaller age differences relative to the inhabitants, longer patient-lists, and were specialists over non-specialists.

Godager (2012) examined the willingness-to-pay of Oslo inhabitants by calculating travel costs of visiting GPs and found that consumers preferred GPs of the same gender and similar age. GPs with specialist certifications influenced consumers' choice of GP less than gender matching, and female consumers were influenced more by gender matching than males. However, these findings from Godager's paper might not provide a valid description of individuals' preferences in rural areas. Oslo is a densely populated metropolitan city, while most of Norway has a thin population.

Previous studies provided evidence that the GP's interpersonal skills affect the quality of GP services (Crow et al., 2002; Scott & Vick, 1998; Scott & Vick, 1999; and Veale et al., 1995). However, the personality and experience varies among individuals. The characteristics of what contributed to a perfect GP as perceived by a specific individual vary also, and therefore the examination of a perfect GP was impractical. Until now, no existing study empirically examined the individual's heterogeneity related to their switching action.

Studies by Pendleton and Bochner (1980), Waitzkin (1985) and Boulton et al. (1986) suggested that better educated individuals are more active in seeking information. Educational level might be a factor that influences individuals' preference in switching GP.

Ende et al. (1989) found that patients have different preferences depending on the severity of health problems. This thesis perceive that severity of health problems are positively correlated with the switching cost. An implication from a theoretical study by Gravelle and Masiero (2000) and equilibrium strategies developed by Allard et al. (2006) suggested that the switching cost reduced the number of patients who switched GPs. There are two different mechanisms at play, each pulling in opposite directions. On the one hand, poor health increases transaction costs (contributing partially to reducing switching probability); on the other hand, patients with poor health might be more concerned about which practice to be enrolled in compared with a completely healthy person (why switch if never sick?). This latter argument pulls in the direction of more switching for individuals with bad health. Since the theory pulls in both directions, it is important to do empirical research. In this thesis' study, there are two variables, self-assessed health status and chronic condition, can serve to indicate the health problems. The expectation is that chronic disease and health status has significant impact on switching behavior.

Dixon et al. (1997) also found that distance is an important determinant: over 50 percent of inhabitants chose GPs within 1 km from home, and over 85 percent chose GPs within 3 km. We assume GPs are randomly distributed in different municipalities. If a municipality has more GPs with open-lists, there might be more open-list GPs located within an acceptable distance in this municipality. Therefore, one hypothesis is that individuals living in a municipality with more open-list GPs are more likely to switch than individuals living in a municipality with fewer open-list GPs.

The aim of this paper is to examine how individuals respond to the free choice of GP and continuity of GP services since the regular GP scheme has been introduced in Norway; we observe the individuals' decision-making behavior in switching GPs, and explore whether the patient-list system evokes individuals' self-perception as decision-makers; we also investigate the extent to which the individuals' probability of switching GP varies by socioeconomic characteristics and the self-assessed health status of the individual. A probit model is applied to estimate the individual's probability of switching GP. Data from the Norwegian living condition survey is applied. The survey was conducted by Statistics Norway (SSB) in 2008.

We test several hypotheses that originate from both empirical and theoretical studies about the effect of socio-economic characteristics and the health condition of individuals on their satisfaction and preference of GP. Based on the literature reviewed above, five hypotheses were generated:

Hypothesis 1: We expect that older individuals prefer to switch GPs less than young individuals.

Hypothesis 2: We expect that females are more likely to switch GPs than males.

Hypothesis 3: We expect that individuals with higher education prefer to switch GPs more than individuals without higher education.

Hypothesis 4: We expect that individuals with health problems are less likely to switch GPs than individuals without health problems.

Hypothesis 5: We expect that individuals living in a municipality where more GPs have open-lists are more likely to switch GPs than individuals living in a municipality where few GPs have open-lists.

This paper proceeds as follows: Section 2 presents the study setting. We introduce the context of the regular general practitioner scheme in Norway, and then we clarify the incentives for GPs and patients who participated in the scheme. Section 3 describes the data from the survey of living conditions that was developed by the Statistics Norway (SSB) in 2008. The empirical specifications and the results of data analysis are presented in Section 4. A conclusion is drawn in Section 5 and the findings of this study are discussed.

2. STUDY SETTING

2.1 Healthcare reform in Norway.

In June 2001, the regular general practitioner scheme (Fastlegeordningen) was introduced in Norway. All inhabitants[1] were offered the right to register with a general practitioner as their regular physician; this new primary care system is managed by the Norwegian Health Economics Administration (HELFO) and organized as a patient-list system.

The regular GP scheme is voluntary for inhabitants. If an inhabitant chooses not to enroll in a patient-list, it is thier responsibility to find a GP who has an appointment available. Moreover, the inhabitant has to pay higher out-of-pocket fees for the consultation. If a patient outside of the regular GP scheme consults a GP, then the patient has to pay 110 NOK[2], in addition to the ordinary consultation fee. This additional fee encourages inhabitants to participate into the patient-list system. Consequently nearly all inhabitants are enrolled in the system. The inhabitant participation in the system was 99.4 percent in June 2001. Participation increased to 99.6 percent in 2008 (Helsedirektoratet, 2008).

In the patient-list system, each GP has a list of inhabitants who have registered with them as a regular patient. Inhabitants have the right to switch GPs up to twice per calendar year by calling the regular GP scheme service line or via an online web service. In addition to the twice a year limit, inhabitants have the right to switch GPs when relocating to a new address or if their regular GP retires or reduces the size of the patient-list. The inhabitant has a right to

[1] The terms “inhabitant”, “consumer”, “individual” and “respondent” are used synonymously throughout this study. “Inhabitant” is used in the context of describing one who has the right to be enrolled in the regular general practitioner scheme, while “patient” is used when describing the doctor-patient relationship. “Consumer” reflects one shopping for services on the GP market. “Individual” is used to describe one who makes decisions in switching GPs, and “respondent” is used to describe one who responds to the survey in our dataset.

[2] In this text we refer to the fee rates in the year 2008.

freely switch to any GP who has the spare capacity, to include a GP in a municipality other than where the inhabitant lives.

GPs indicate the maximum number of inhabitants who can enroll in their patient-lists. The patient-list, which is updated every month, indicates how many places are available. The information of whether a GP is accepting new patients is public information and available on internet.

After switching GPs, the transfer of medical records from the previous GP to the new GP is not processed automatically. The inhabitant needs to pay a fee to the previous GP in order to transfer the record. This payment cannot be recorded on the deductible card (frikortet); rather, inhabitants have to pay it out of pocket.

Prior to the introduction of the regular GP scheme, there was no register tracking which GPs patients visited. Durable doctor-patient relationships were not encouraged. Since the patient-list system was established, a semi-fixed relationship has been established between patients and GPs. The semi-fixed relationship has two aspects: free choice and continuity.

Within the patient-list system, patients are still offered free choice of GP. The free choice consists of three parts. First, there is free choice of regular GP. Patients have the right to decide which GP they prefer to register with. Second, there is free switching. Patients have the right to switch to another GP with an open-list. Third, patients are entitled to acquire a "second opinion." Patients have the right to see other GPs who are not their regular GPs.

One may argue that the continuity of the patient-physician relationship has been enhanced in the patient-list system (Sandvik, 2006). The relationship between the regular GP and patient usually lasts a long time. As a result of repeated transactions, patients become more aware of the quality of the GP's services, and hence the long-term relationship is often regarded as beneficial for patients since patients are poor judges of health care services, not only due to asymmetric information but also because of the peculiarities of healthcare services themselves. The outcome of treatment is not easy to evaluate. For example, GP services for patients with chronic diseases are labeled as "caring" rather than "curing." Good experiences visiting GPs, satisfied health information collection, and happy continuous relations with GPs are of high value to patients.

Although inhabitants can freely quit a registration with their regular GP once they perceive deficient quality of GP services, some factors might dampen the occurrence of GP switching even in this situation. For example, some inhabitants are passively enrolled into the patient-list. Many inhabitants do not register actively with GPs; instead, they are assigned to GPs by health authorities. Many inhabitants know nothing about their regular GPs until they experience an episode of illness and then have to seek GP consultations. Other factors might limit the occurrence of GP switching in cases where the patient is experiencing dissatisfaction with the GP: for example, the patient can believe that the benefit from continuity outweighs the dissatisfaction with the GP. Or there might be transaction costs associated with the switching, and alternative GPs might be experiencing capacity constraints.

Continuity of care gives patients benefits because the GP becomes more familiar with the patient's symptoms, health problems, and medical history, as well as socioeconomic characteristics and preferences. Such information may help GPs with medical decision-making. If the patient enters into a new relationship with another GP, the benefits from continuity of care would become diminished. This aspect is described further by Iversen and Lurås (2011). Their results indicate that learning costs exist in the GP-patient relationship. The new GP needs time to acquire information about the patient; hence, the new GP might not deliver the best performance in the beginning of a relationship.

The act of switching involves several features that might be considered costly for the patients. Patients need to spend time searching for quality information about alternative GPs, yet may still be uncertain about their quality. Patients are exposed to the risk that they may suffer loss due to switching without gaining. Hence some risk-averse patients may be in a lock-in situation with their existing GP even though they are not satisfied because they are uncertain about the cost of switching.

The GPs' option to close the patient-list for new patients limits patients' choices and dampens the competition in the GP market. There must be sufficient open-lists in the market in order to allow new patients to sign up. If no GPs are accepting new patients, it would be impossible for patients to take action. In Norway, it is quite common for GPs to close their lists for new patients. According to the statistic report from the Norwegian Directorate of Health, "In 2008, a total of 33.4 percent of all regular GPs had an open patient-list, i.e. they were available for new persons/patients to sign up. In 2002, after one full year with patient-list system, the proportion of open patient-lists was as high as 47.4 percent." Some GPs have a shorter

patient-list than the maximum patient-list they reported to the authorities (Lurås, 2003). There is also some evidence that GPs who experienced a shortage of patients were more likely to seek part-time jobs in the community health service, even though the wages were lower than in general practice (Godager & Lurås, 2009).

2.2 Incentives for GPs and patients.

In Norway, the GP remuneration system consists of three kinds: fee-for-service, capitation, and salary[3]. Only 6.68 percent of GPs were employed by municipalities and earned fixed salaries in 2008, hence GPs are mostly self-employed and have an agreement with one or more municipalities to undertake responsibilities for a list of inhabitants. These self-employed GPs receive approximately 30 percent of their income based on capitation and 70 percent from fee-for-service (Godager & Lurås, 2009). Capitation is composed of a flat rate (no risk adjustment) per inhabitant on the patient-list amounting to 357 NOK per inhabitant in 2008, and this amount is paid to GPs by municipalities. The fee-for-service payment is based on "Normaltariffen," a central agreement between the Norwegian Medical Association and the State. For adult patients consulting regular GPs, the out-of-pocket payment is 130 NOK per consultation. For children under the age of 16, the payment is reimbursed by the national insurance administration, HELFO. If the consultation lasts over 20 minutes, the GP can receive an additional payment of 130 NOK from national insurance. The patient does not need to pay out-of-pocket for the additional length of the consultation. If the patient consults a GP who is a specialist in general medicine, the physician receives an additional payment of 70 NOK, of which 40 NOK is paid by HELFO and 30 NOK is paid by the patient.

According to the GP remuneration system, the prices of GP services follow the Normaltariffen, and all consumers are aware of the prices. In the Norwegian GP market, prices of GP services are regulated; therefore, consumers choose GP services on non-price dimensions (Gaynor, 2006). Based on the model of Dorfman and Steiner (1954), the ratio of quality to price should go up if the quality elasticity of demand increases. If the consumers are informed about the price, as Norwegian inhabitants are, then GPs who want to include more inhabitants on their patient-lists can only compete for consumers by means of quality, and this

[3] Pay for performance, an increasingly popular GP payment scheme, has not been introduced in Norway. No performance targets are specified on the contract, and GPs do not earn bonuses if they achieve some pre-specified targets.

can result in an equilibrium with optimal quality (Dranove & Satterthwaite, 1992; Albert Ma 1994).

To illustrate the mechanisms that encourage GPs to be concerned about the quality of care, we may model the GPs decision problem with regard to the optimal size of the patient-list, and the optimal service intensity to provide, similar to Iversen and Lurås (2000) and the paper of Godager et al. (2009). The decision problem can be resolved by maximizing the utility as:

$$\underset{n,s}{Max}\, qn + psn + v(T - tsn) \qquad (1)$$

Such that

$0 < n \le D$

$S_1 \le s \le S_2$

Assuming $v'(T - tsn) > 0 \; and \; v'(T - tsn) < 0$

Where q is the capitation payment per person on the patient-list, n is the number of persons on the patient-list, p is the fee per consultation, s is the volume of consultation services provided by GP per consumer, T is the exogenously total time endowment, t is the exogenously given time use per consultation, and $v(T - tsn)$ is the utility of leisure in monetary terms. All these variables except n and s are assumed to be exogenous to the GP. We only consider the cases where n is positive.

This is a constrained utility function maximization problem involving two constraints: the list size and the intensity of consultation services. In the first constraint, we specify a maximum demand D, which limits the maximum number of consumers that the GP can enroll in the practice. Given the constraint of D, the GP may experience a shortage of patients. A popular GP who wants to have a larger patient-list may enroll more and more consumers until the constraint becomes binding ($n = D$).

The second constraint concerns the intensity of the provision of GP services per consumer. We assume s is limited to a range $[S_1, S_2]$, where $S_1 < S_2$. We may think that the range of the interval $[S_1, S_2]$ describes the range of service intensity that corresponds to medical practice variation that is within medical guidelines. Iversen and Lurås (2000) refer to this range as a grey area, a range where the health effects of the variation in service intensity are not documented to be different from zero[4].

[4] Some authors refer to this area with lack of health effects as “flat of the curve medicine”.

If the constraint $n \leq D$ does not bind, then the GP can choose the optimal number of consumers, and these GPs do not experience a patient shortage. In these cases, the GP tends to enroll more consumers until the marginal utility of including an extra consumer equals zero.

The first-order derivative of U with respect to n is

$$\frac{\partial U}{\partial n} = q + ps + v'(T - tsn)ts = 0 \quad (2)$$

Under the condition (1.2), the first-order derivative of U with respect to s must be negative.

$$\frac{\partial U}{\partial s} = pn + v'(T - tsn)tn < 0 \quad (3)$$

This implies that the GP will choose the lowest level of service S_1 as the optimal value of s.

If the constraint $n \leq D$ binds, and the GP experiences a patient shortage, then the first-order derivative of U with respect to n must be positive at $n = D$. The first-order derivative of U with respect to s must be positive, and the optimal value of s is bigger than S_1. In fact, if D is small, the first-order of derivative of U with respect to s may remain positive at $s = S_2$. In this equilibrium, the GP will enroll D consumers and provide S_2 intensity of service.

The utility function in (1) implies that the total cost of GP service is determined by the component tsn. The GP may keep the total cost constant by reducing s and increasing n. Given q>0, the GP obtains capitation payment as profit by enrolling an extra consumer. If there is no constraint on demand of service, the GP is more likely to enroll more consumers and provide lower intensity of services.

The model implies that the GP may have monetary incentives to enroll more inhabitants, and likewise, to exert effort in order to avoid patient dissatisfaction and potential switching out of the patient-list.

Since the price of service is regulated, GPs can only compete for inhabitants by promoting their quality of services, and patients' switching behavior is therefore likely to be an important factor influencing the quality of services in this market.

The doctor-patient relationship is often regarded as a principle-agency relationship (Arrow, 1963). In this relationship, GPs hold more information about health care and health status than patients who seek advice from GPs. Due to patients' lack of medical knowledge and the absence of an explicit contract between GP and patient, as well as the complexity of monitoring GP action, patients are in a weak position. GPs may induce patients to consume more health care than a patient would prefer if the patient had symmetric information, or less than a patient would prefer in situations where additional effort reduces the GP's utility. The GP's actions may result in over-provision or under-provision of the GP's services. For example, Iversen and Lurås (2000) found that GPs who experienced a shortage of patients provided more services, such as longer and more frequent consultations, and more laboratory tests, to each listed patient than unconstrained GPs who could freely decide on the length of their patient-lists. One may argue that these constrained GPs provided more services than the optimal level; therefore, they could earn a higher income from fee-for-service. The potential inefficiency arising from GPs' actions may magnify to the whole healthcare market since the GPs are considered as gatekeepers to secondary healthcare.

The free choices of GPs provides incentives for GPs to consider patients' benefits and compete for patients. Hirschman (1970) claimed that patients would "vote with their feet" for a better quality of GP service, and GPs would compete for patients by offering higher quality of services. Based on this theory, free switching may promote quality of services and improve patient satisfaction. It is expected that GPs would provider better services to patients under this competitive context. A study by Pike (2012) has supported this argument. In his study, GPs tended to provide higher quality of health care in high GP density areas than areas with few competitors. The consumers who perceived a deficient quality of care after experiencing a GP's service may demonstrate their dissatisfaction with the GP by "voting with their feet" and leaving the current GP in order to register with another. GPs might perceive their customers' leaving on their own initiative as an indirect criticism of the GP's services and take actions to influence this dissatisfaction. Findings in the study of Iversen and Lurås (2011) support this view, since GPs with a shorter patient-list (considered an indicator of the deficient quality of the GP) face a higher flow of patients switching both in and out of the patient-list. In a study of factors influencing patient satisfaction, Lurås (2007) found that an influx of patients to a GP's practice was associated with satisfaction with the GP. The results of Lurås's study indicated that inhabitants listed with a GP who experienced patient shortages

were less satisfied with the GP's interpersonal skills, the GP's medical skills, the GP's referral practices, and also the consultation lengths of their appointments.

3. DESCRIPTION OF THE DATA

In 2008, SSB randomly sampled 10,000 inhabitants aged 16 and older to represent the Norwegian population. By postal questionnaire, SSB asked the respondents whether they had switched their GPs during the previous 12 months. Respondents who had switched their GPs were asked to indicate whether they switched on their own initiative. Three options were presented to respondents who had switched GPs: 1) voluntary switch; 2) were assigned to a new GP; or 3) none of the above. The response rate was 64.83 percent with 6483 inhabitants responded to the survey. According to the survey data[5], 10.95 percent (708 respondents) stated that they had switched GPs, with 3.73 percent (241 respondents) of those stating that they had switched on their own initiative (Figure 1). Comparing the numbers reported by previous studies, our switching proportions are greater than the 1.5 percent that was reported in England by Dixon et al. (1997), and also greater than the 1 percent that was reported in Denmark by Bjerrum and Sorensen (1992). Inversen and Lurås (2011) applied the data from the Norwegian patient-list system developed by the National Insurance Administration (NAV) and reported that approximately 3 percent of people on an average list switched their GPs annually.

Respondents reported their self-assessed health status on a five level Likert scale: very-good-health, good-health, fair-health, bad-health, and very-bad-health. The number of respondents with very-bad-health only accounted for 0.93 percent. Therefore, we combined the categories very-bad-health and bad-health to form a larger group called BADHEALTH, and used this as an explanatory variable. After combining, the number of respondents in the BADHEALTH group accounted for 6 percent of respondents. The respondents with very good health who comprised the second largest group (36 percent of respondents) were chosen as a reference group in our probit model. Therefore, three dummy variables with regard to health status were included in our model: GOODHEALTH, FAIRHEALTH, and BADHEALTH.

Respondents who had an education over 15 years were considered to have "high education", or otherwise were not. We generated a dummy variable HIGHEDUCATION, which takes the

[5] A Stata 11.2 mac version is applied to conduct data analysis.

value 1 if the respondent had high education. In our dataset, income was measured by Norwegian currency NOK, and it ranged from -0.96 million to 0.96 million. The median income was 0.3 million. Income over 0.3 million was considered high income. Another dummy variable was generated, HIGHINCOME, which takes the value 1 if the respondent earns more than 0.3 million NOK annually.

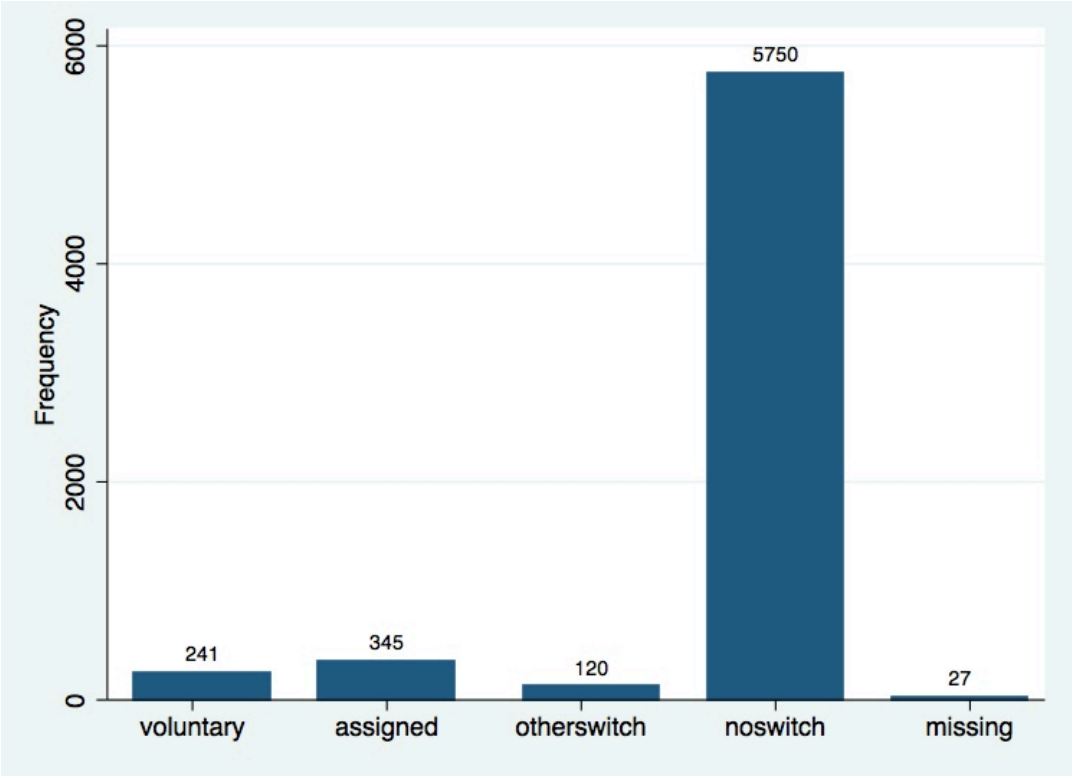

Figure 1 Histogram of respondents switched GPs or not

Based on the literature review in section 1.3, some characteristics are highly relevant to a patient's leaving their GP and a patient's preference of GP choice. Age and gender (Kerssens, 1987; Scott &Vick, 1998; Dixon et al., 1997; Lurås, 2003; Fang, 2004); education level (Pendleton & Bochner, 1980; Waitzkin, 1985; Boulton et al., 1986); severity of health problem (Ende et al., 1989) and GP capacity (Iversen & Lurås, 2011) are the presumptive influential factors.

Our dataset includes variables such as age, gender, income level, education level, and health status to describe the heterogeneity of decision makers, as well as variables describing the GP capacity as an indicator of competition in the GP market. We found that age, health status, and

chronic disease were correlated with each other. We also found that income was correlated with gender, high education, chronic disease, and health status; see Table 7 in Appendix for the correlation values. Our models do not include any interaction term as explanatory variable due to the relatively small number of voluntarily switching individuals. The following ten explanatory variables are included in our analysis (see Table 1).

Table 1 Definition of explanatory variables.

Variable name	Definition
AGE	Age of individual (December 2008).
FEMALE	FEMALE=1 if individual was a female.
HIGHEDUCATION	Education level of individual. HIGHEDU=1 if individual had more than 15 years of education.
HIGHINCOME	Income level of individual. HIGHINCOME=1 if individual earned more than median income.
GOODHEALTH	Health status of individual. GOODHEALTH=1 if individual reported self-assessed health status as "good health" according to five level Likert scale.
FAIRHEALTH	Health status of individual. FAIRHEALTH=1 if individual reported self-assessed health status as "fair health" according to five level Likert scale.
BADHEALTH	Health status of individual. BADHEALTH=1 if individual reported self-assessed health status as "bad health" or "very bad health" according to five level Likert scale.
CHRONIC	Chronic condition of individual. CHRONIC=1 if individual had a chronic disease.
GPCAPACITY	Number of GP with open-list in each municipality.
OPENPERTENTH	Number of GP with open-list per 10,000 inhabitants in each municipality. The OPENPERTENTH is given by $OPENPERTENTH_j = GPCAPACITY_j / (N_j / 10000)$, where N_j was the number of inhabitant in municipality j.

Following Godager et al. (2012), we included two variables to measure the level of GP competition in the municipalities: GPCAPACITY and OPENPERTENTH. GPCAPACITY is the number of GPs with open-lists in each municipality. When GPCAPACITY is high, the individual has a large menu of GPs to choose from if the individual decides to switch GPs. Since GPCAPACITY is likely to be large simply due to the size of the municipality, we also used a normalized version of the GPCAPACITY variable, denoted by OPENPERTENTH.

OPENPERTENTH indicates the number of GPs with open-lists per ten thousand inhabitants in each municipality. These two variables are strongly correlated, and they can only be included one by one in regressions.

Table 2 Descriptive statistics

	SWITCH N=708 (10.96% of respondents)	VOLUNTARY SWITCH N=241 (3.73% of respondents)	All responders N=6483		
Continuous variable	Mean (St. dev.)	Mean (St. dev.)	Mean (St. dev.)	Min	Max
AGE	41.89 (17.92)	37.46 (15.89)	46.48 (18.22)	15	97
Dummy variables	Mean (Count)	Mean (Count)	Mean (Count)		
FEMALE	0.55 (392)	0.62 (150)	0.51 (3304)		
HIGHEDUCATION	0.28 (201)	0.38 (92)	0.31 (1895)		
VERYGOODHEALTH	0.32 (229)	0.30 (72)	0.36 (2362)		
GOODHEALTH	0.47 (335)	0.49 (119)	0.44 (2874)		
FAIRHEALTH	0.13 (89)	0.12 (30)	0.13 (842)		
BADHEALTH	0.08 (55)	0.08 (20)	0.06 (392)		
HIGHINCOME	0.41 (292)	0.41 (98)	0.52 (3348)		
CHRONIC	0.42 (295)	0.41 (99)	0.40 (2603)		
GP competition	Mean (St. dev.)	Mean (St. dev.)	Mean (St. dev.)	Min	Max
GPCAPACITY	37.01(68.53)	57.06 (82.45)	37.69 (66.16)	0	213
OPENPERTENTH	4.36 (3.56)	3.84 (2.44)	3.88 (2.72)	0	24.30

Table 2 presents the descriptive statistics of the respondents. We observed the respondents who switched their GPs and respondents who switched their GPs on their own initiative separately over nine explanatory variables. In the second column, we present a description of the respondents who switched their GPs; in the third column, we give a description of the respondents who switched their GPs voluntarily; and in the forth column, we give a description of the whole sample.

4. EMPIRICAL SPECIFICATION

Our study investigates why some individuals switch their GPs while others do not. This binary response is an “either-or” case: “either” an individual switched their GP “or” the

individual did not switch. The observed choice of switching decision is the dependent variable in our model. The dependent variable is specified to take the value 1 if the individual chooses to switch GP, and the value 0 if the individual chooses not to switch. The linear probability model estimated by means of ordinary least squares (OLS) is not used in this study because it is well know that the assumptions of OLS models are violated in situations of discrete choice. The reason for this is that probability by definition takes values within the interval [0, 1]. Therefore, a discrete choice model with a binary dependent variable is more appropriate to observe an individual's binary responses. We apply a probit model in this study.

A probit model is derived from the study of Maddala (1986). Our observed variable is SWITCH, which takes the value 1 if an individual switches her GP, and takes the value 0 otherwise.

$$SWTICH_i = \begin{cases} =1 \, if \, the \, individual \, switches \, GP \\ =0 \, if \, the \, individual \, does \, not \, switch \, GP \end{cases}$$

We denote by $SWITCH_i^*$ the individual's latent propensity to switch GP. $SWITCH_i^*$ is defined by the regression relationship:

$$SWITCH_i^* = \beta' x_i + \varepsilon_i \qquad \varepsilon_i \sim IN(0, \sigma^2) \tag{4}$$

where ε_i is a independent and normally distributed random error component, and $\beta' x_i$ is equal to the conditional expectation $E(SWITCH_i^* \mid x_i)$.

In practice, $SWITCH_i^*$ is unobservable. We observe a dummy variable $SWITCH_i$ which is defined by

$$\begin{aligned} SWITCH_i &= 1 \quad if \; SWITCH_i^* > 0 \\ SWITCH_i &= 0 \quad otherwise \end{aligned} \tag{5}$$

From the relations (2.3) and (2.4), we have

$$\begin{aligned} Prob(SWITH_i = 1) &= Prob(\varepsilon > -\beta' x_{ni}) \\ &= 1 - F(-\beta' x_{ni}) \end{aligned} \tag{6}$$

where F is the cumulative distribution function.

The $\beta' x_i$ may, to some extent, include the transaction costs and learning costs involved in the individuals' switching decision (Iversen & Lurås, 2011; Gravelle & Masiero, 2000). For

expample, better-educated individuals are more active in seeking information (Pendleton & Bochner, 1980; Waitzkin, 1985; Boulton et al., 1986). Transaction costs, such as performing a search, and information costs may be lower for better-educated individuals. However, transaction costs may be higher for individuals with higher income levels because searching and collecting information invests time, and we expect that individuals earning more salary value their time as more expensive. Individuals with chronic diseases may face more learning costs if they switch GPs. Initially, new GPs will be less informed about the diseased patient than their previous GP. Although the patients can pay an out-of-pocket fee to transfer their medical records, the transfer does cost and incurs a significant delay. In addition, medical records are imperfect substitutes for GPs to learn about their patients. GPs need time and further personal contact to learn about other aspects of patients in order to provide them better quality of services. One may argue that individuals in bad health will benefit more from GP switching, compared to those in good health, and those who never need GP consultations. Because of this, it is important to include the random error ε_i in the regression. The interacting characteristics of the GP with the characteristics of each individual may influence the individual's choice of switching; however, the interacting characteristics of the GP have not been observed in our dataset. For example, we do not have data on age matching, gender matching, etc. In addition, the collected information cannot fully explain the heterogeneity of individuals.

5. RESULTS

To estimate the impact of observable characteristics on the probability of switching GP, we applied the probit model specified in Section 4, and used the explanatory variables that we described in Section 3 to build models. Taking account of the sample size and relatively small number of switching individuals, it is important to build parsimonious models. Only 241 individuals reported that they switched their GPs voluntarily. Due to the fact that the explanatory variables GPCAPACITY and OPENPERTENTH are strongly correlated, we include only one at one time in two different models. We built two models to estimate effects of the respondents' characteristics on their voluntary switching behavior. The Model A shown in Table 3 includes explanatory variable GPCAPACITY, while the Model B shown in Table 4 includes explanatory the variable OPENPERTENTH. We fit both these two models under different assumptions: first assuming no unobservable heterogeneity at the municipality level,

and then we fit a random effects probit regression allowing for unobservable heterogeneity at the municipality level. Thereafter, we get four columns of estimations in each table: two columns for probit regression and the other two columns for random-effects probit regression. By means of likelihood ratio tests, we found evidence indicating that unobservable heterogeneity was present; indicating that a random effects specification is appropriate. As shown in the bottom of the tables, the low pseudo R^2 is to be expected since most discrete choice models in the literature have a poor fit due to the inherent randomness in the individual's decision making (Hill, 2012). In the following we discuss the results of the Model A and Model B from the random-effects probit regressions.

As can be seen in two tables, the results of regression analysis of respondents who switch their GPs on their own desire are broadly similar across different models. All estimated coefficients are statistically significant except the estimated coefficients on CHRONIC and OPENPERTENTH. Age is predicted to have a negative impact on voluntary switching, suggesting that compared to older respondents, young people were more likely to switch their GPs on their own initiative.

The estimation on FEMALE is positive, suggesting that females preferred to switch their GPs voluntarily more than males.

Respondents' education level also influenced their switching. Highly educated respondents had a stronger desire to switch their GPs compared to those without high education.

With regard to the respondents' self-assessed health status, the category of respondents in very good health is specified as the reference category. Compared to those in very good health, respondents in good, fair and bad health preferred to switch their GPs more on their own initiative.

We also found that respondents' income influenced their decision on switching. Those with salaries higher than 0.3 million NOK per year switched their GPs less compared to those earning below median income.

Table 3 Results from probit regression analysis for voluntary switching

(Model A: GPCAPACITY included)

	Probit Regression		Random-effects probit Regression	
Variables	Coefficients	Marginal effect	Coefficients	Marginal effect
AGE	-0.0165**	-0.0011**	-0.0165**	-0.0011**
	(0.0021)	(0.0001)	(0.0021)	(0.0001)
FEMALE	0.1431*	0.0092*	0.1432*	0.0092*
	(0.0656)	(0.0042)	(0.0657)	(0.0042)
HIGHEDUCATION	0.2642**	0.0169**	0.2642**	0.0169**
	(0.0715)	(0.0045)	(0.0722)	(0.0046)
GOODHEALTH	0.2043**	0.0131**	0.2044**	0.0131**
	(0.0744)	(0.0047)	(0.0744)	(0.0047)
FAIRHEALTH	0.2640*	0.0169*	0.2641*	0.0169*
	(0.1127)	(0.0072)	(0.1135)	(0.0072)
BADHEALTH	0.5220**	0.0334**	0.0522**	0.0334**
	(0.1404)	(0.0089)	(0.1407)	(0.0089)
CHRONIC	0.0559	0.0036	0.0559	0.0036
	(0.0723)	(0.0046)	(0.0729)	(0.0047)
HIGHINCOME	-0.1525*	-0.0098*	-0.1526*	-0.0098*
	(0.0707)	(0.0045)	(0.0718)	(0.0046)
GPCAPACITY	0.0018**	0.0001**	0.0018**	0.0001**
	(0.0004)	(0.0000)	(0.0004)	(0.0000)
Cons.	-1.4570**		-1.4570**	
	(0.1057)		(0.1043)	
Log likelihood	-877.0054		-	
Chi2(7)	137.09		122.24	
Prob>chi2	0.0000		0.0000	
Pseudo R2	0.0725		-	
No. Observation	6063		6063	
No. Obs. Per Group			Min: 1	
			Avg: 35.0	
			Max: 695	

* The estimated parameter is significantly different from zero at the five percent level in a two-tailed test.
** The estimated parameter is significantly different from zero at the one percent level in a two-tailed test.

Table 4 Results from probit regression analysis for voluntary switching

(Model B: OPENPERTENTH included)

	Probit Regression		Random-effects probit Regression	
Variables	Coefficients	Marginal effect	Coefficients	Marginal effect
AGE	-0.0170**	-0.0011**	-0.0170**	-0.0011**
	(0.0021)	(0.0001)	(0.0022)	(0.0001)
FEMALE	0.1472*	0.0096*	0.1520*	0.0094*
	(0.0654)	(0.0043)	(0.0670)	(0.0041)
HIGHEDUCATION	0.3147**	0.0206**	0.2928**	0.0181**
	(0.0703)	(0.0045)	(0.0731)	(0.0046)
GOODHEALTH	0.1962**	0.0128**	0.2020**	0.0125**
	(0.0740)	(0.0048)	(0.0758)	(0.0047)
FAIRHEALTH	0.2639*	0.0173*	0.2671*	0.0165*
	(0.1121)	(0.0073)	(0.1154)	(0.0071)
BADHEALTH	0.5023**	0.0329**	0.5086**	0.0315**
	(0.1402)	(0.0091)	(0.1433)	(0.0088)
CHRONIC	0.0526	-0.0034	0.0524	0.0032
	(0.0719)	(0.0047)	(0.0742)	(0.0046)
HIGHINCOME	-0.1490*	0.0098*	-0.1495*	-0.0093*
	(0.0705)	(0.0046)	(0.0731)	(0.0045)
OPENPERTENTH	0.0061	0.0004	0.0063	0.0004
	(0.0120)	(0.0008)	(0.0131)	(0.0008)
Cons.	-1.3887**		-1.4184**	
	(0.1119)		(0.1182)	
Log likelihood	-886.3273		-	
Chi2(7)	118.45		95.85	
Prob>chi2	0.0000		0.0000	
Pseudo R2	0.0626		-	
No. Observation	6063		6063	
No. Obs. Per Group			Min: 1	
			Avg: 35.0	
			Max: 695	

* The estimated parameter is significantly different from zero at the five percent level in a two-tailed test.
** The estimated parameter is significantly different from zero at the one percent level in a two-tailed test.

As can be seen from the results, we observed a significant effect from GP capacity, which is indicated by the number of GPs with open patient-lists in the municipalities. Responders living in municipalities with more GPs with open patient-lists were more likely to switch their GPs on their own initiative.

The marginal effects are broadly similar across different models. With respect to the interpretation of marginal effects, the probability of a female switching her GP voluntarily was approximately 9 percent higher than a male, given that all other variables are held constant at their means. High education increased the probability of voluntary switching by approximately 2 percent, given all else held constant at their means. The probability of an individual in bad (fair/good) health switching her GP at her own desire was approximately 3 percent (2 percent/1 percent) higher than an individual in very good health, given all else constant at their means. High income decreased the probability of voluntary switching by approximately 1 percent, given all else held constant at their means.

5.1 Robustness checks

In Model A and Model B, we estimate the probability of switching GP voluntarily. To conduct a robustness check, we estimate two other probit models, Model C and Model D, by replacing the dependent variables in Model A and Model B. In Model C and Model D, we estimate the probability of switching GP all together, including also switching that was not performed voluntarily. We investigate all respondents who switched their GP, not only those who switched their GP voluntarily. See Table 5 and Table 6 in the Appendix for the results from these probit regressions. Compared with the results in Table 3 and Table 4, we observe that the estimated coefficients of FEMALE and HIGHEDUCATION are not significant in either Model C or Model D, while they were significant in both Model A and Model B. An intuitive explanation behind the results might be that there was more noise in general switching events than in voluntary switching events. The reason might be that many of switching events in these circumstances are due to reasons completely random to the individual, such as GP retirement or a GP who closed down the practice.

In the results from fixed effects probit analysis, we have found that the coefficient of OPENPERTENTH in the Model D is significant and coefficient of GPCAPACITY in the Model A is also significant; otherwise the estimated coefficients become insignificant if we

exchange the variables GPCAPACITY and OPENPERTENTH in the models (after exchanging, we have the Model B and Model C). This might be because the assumption of the independency of observations is violated. By definition, OPENPERTENTH and GPCAPACITY are two variables indicating the GP competition in different municipalities. Respondents living in the same municipality make their switching decisions while operating in the same market environment, and hence there might be unobservable heterogeneity not captured by the explanatory variables. To address this problem, we may apply a random-effects probit model. Comparing results from probit model with results from random-effects probit model, the estimated coefficient of GPCAPACITY becomes significant when we apply a random-effects probit model instead of a probit model. However, the estimated coefficient of OPENPERTENTH in the Model B is still not statistically significant.

To check whether our results are sensitive to the measurement of GP capacity, we estimated models including different measure of GP capacity: GPCAPACITY and OPENPERTENTH. Since GPCAPACITY is likely to be large simply due to the size of the municipality, we use OPENPERTENTH to remove the effect of municipality size on the GP capacity. The estimated coefficient of GPCAPACITY is significant, while the estimated coefficient of OPENPERTENTH is not significant. This implies that the results are sensitive to the measure of GP competition in the market.

6. DISCUSSION AND CONCLUSIONS

This study has examined how the probability of individuals' switching their GP is influenced by individuals' observable characteristics. The results from our empirical analysis indicate that the individuals' age and gender influence their decisions on GP switching. The individuals are more likely to switch their GP on their own initiative if they are female and younger. The results are consistent with our prior expectations (Hypothesis 1 & 2 in Section 1). Our findings are also in accordance with the literature on patients' choices of GP: Veale et al. (1995) found that female and younger Australian were more likely to see more than one GP if they had more visits, and Dixon et al. (1997) found that females and younger individuals were more likely to transfer out of practice without change of their addresses.

The level of education also influenced the switching. We have found that individuals with high education prefer to switch more, while individuals without high income tend to switch less. This is consistent with our expectations (Hypothesis 3). Our findings may be related to the fact that better educated individuals are more active in seeking information (Pendleton & Bochner,1980; Waitzkin, 1985; and Boulton et al., 1986). These individuals might perceive the searching and information costs as lower since they are more used to searching for, and processing information.

We have observed individuals with high income were less likely to switch their GP. The potential reason is that they might evaluate their time as more expensive since they earn a better salary.

Our results indicated that health status of individuals had significant effects on their' switching behavior. Compare to extremely healthy individuals, those in fair and poor health switched their GP more. The interpretations of marginal effects show that the probability of voluntary switching was higher for individuals with poorer health status. This implies that the less healthy the individuals are, the more likely they will switch their GPs voluntarily. The finding is opposite to our expectation (Hypothesis 4). Our finding may provide evidences to understand the balance between transaction cost and switching benefit. There is no literature empirically examining how individual's health status influenc them to leave their GP. Some theoretical studies (Gravelle & Masiero's, 2000; Allard et al. 2006) claim that the switching costs may dampen the effect of GP competition and reduce the number of patients who switched their GP. Some may argue that poor health will increase the switching cost since people in poor health may have difficulties to search information, or they might benefit more from continuity of care since their medical records are imperfect substitutes for a new GP to learn more about the patients. Others may argue that people with poor health will benefit more from the switching since healthy people may not need to visit a GP at all. The results from this study imply that benefits from switching outweigh transaction costs for individuals in poor health. It seems that individuals in poor health gain more benefits from switching, and this benefits compensate for the transaction costs from time spent searching and learning. Therefore our findings present the indication that less healthy individuals were more likely to switch.

Our findings support prior expectation (Hypothesis 5) that the competition in the GP market influences the respondent's switching behavior. If there were more GPs with open-lists in the

municipality, it would be easier for respondents to switch due to a larger menu of available GPs. It is impossible for respondent to switch to another GP if none of the GPs in the market are accepting new patients. We note however that the results with regard to the impact of GP competition appear to be sensitive to which measure of GP competition one applies. One might therefore argue that more research on this topic is necessary in order to reach better understanding of these mechanisms.

There are some limitations in our study. Previous research argues that individuals who switched GPs without changing addresses did so mainly because of their GP's attitudinal problem (Gandhi et al., 1997) and unhappy experiences from their last consultation (Veale et al., 1995). This highlights the importance of collection information about the past experiences in visiting GP. Individuals revise their estimate of the quality of their GP based on the experiences from consultations. There are many indicators, such as length of consultation, waiting-time, and referral (Vick & Scott, 1997 and 1998) can be used to quantify the patient satisfaction. Unfortunately our dataset limits us to observe from this aspect. This may only be possible through gathering first hand data (for example by questionnaire) to explore the switching in more depth.

There is evidence suggesting that individuals' switching behavior is not random. The individuals who switched their GP resemble themselves on observable characteristics. This has important implications for the demand of GP services. The population structure varies among municipalities with respect to age, gender, income and education. Consequently, the switching behavior and demand for vacant GP places on the list also varies.

The individuals' characteristics have presented a picture of the individual preferring to switch her GP. When using the picture (characteristics of the individual) to predict the switching probability of an underlying population, one issue is that there were relatively small number of respondents switched GP voluntarily. It would be valuable to conduct further research by doing an empirical study based on a comprehensive register data that constitute a representative sample of the entire population in Norway.

7. APPENDIX

Table 5 Results from probit regression analysis for switching

(Model C: GPCAPACITY included)

	Probit Regression		Random-effects probit Regression	
Variables	Coefficients	Marginal effect	Coefficients	Marginal effect
AGE	-0.0101**	-0.0018**	-0.0097**	-0.0019**
	(0.0013)	(0.0002)	(0.0012)	(0.0003)
FEMALE	0.0310	0.0055	0.0397	0.0079
	(0.0454)	(0.0080)	(0.0426)	(0.0085)
HIGHEDUCATION	0.0854	0.0151	0.1022*	0.0205*
	(0.0516)	(0.0091)	(0.0483)	(0.0097)
GOODHEALTH	0.1366**	0.0242**	0.1248**	0.0250**
	(0.0512)	(0.0090)	(0.0481)	(0.0096)
FAIRHEALTH	0.1302	0.0230	0.1094	0.0219
	(0.0778)	(0.0138)	(0.0737)	(0.0148)
BADHEALTH	0.3189**	0.0564**	0.2750**	0.0550**
	(0.1000)	(0.0176)	(0.0958)	(0.0192)
CHRONIC	0.0247	0.0044	0.1319	0.0064
	(0.0504)	(0.0089)	(0.0475)	(0.0095)
HIGHINCOME	-0.1994**	-0.0353**	-0.01660**	-0.0332**
	(0.0487)	(0.0086)	(0.0461)	(0.0093)
GPCAPACITY	-0.0002	-0.0000	0.0013*	0.0003*
	(0.0003)	(0.0001)	(0.0006)	(0.0001)
Cons.	-0.8335**		-0.8249**	
	(0.0730)		(0.0741)	
Log likelihood	-2004.5974		-	
Chi2(7)	100.58		100.87	
Prob>chi2	0.0000		0.0000	
Pseudo R2	0.0245		-	
No. Observation	6065		6065	
No. Obs. Per Group			Min: 1	
			Avg: 34.9	
			Max: 695	

* The estimated parameter is significantly different from zero at the five percent level in a two-tailed test.
** The estimated parameter is significantly different from zero at the one percent level in a two-tailed test.

Table 6 Results from probit regression analysis for switching

(Model 5: OPENPERTENTH included)

	Probit Regression		Random-effects probit Regression	
Variables	Coefficients	Marginal effect	Coefficients	Marginal effect
AGE	-0.0106**	-0.0019**	-0.0105**	-0.0019**
	(0.0013)	(0.0002)	(0.0013)	(0.0023)
FEMALE	0.0361	0.0063	0.0416	0.0075
	(0.0456)	(0.0080)	(0.0448)	(0.0081)
HIGHEDUCATION	0.0931*	0.0163*	0.1082*	0.0196*
	(0.0512)	(0.0090)	(0.0509)	(0.0092)
GOODHEALTH	0.1325**	0.0232**	0.1316**	0.0238**
	(0.0514)	(0.0090)	(0.0507)	(0.0092)
FAIRHEALTH	0.1286	0.0225	0.1225	0.0221
	(0781)	(0.0137)	(0.7607)	(0.0140)
BADHEALTH	0.3100**	0.0543**	0.2982**	0.0539**
	(0.1003)	(0.0176)	(0.0996)	(0.0180)
CHRONIC	0.0295	0.0052	0.0341	0.0062
	(0.0505)	(0.0089)	(0.0501)	(0.0090)
HIGHINCOME	-0.1893**	-0.0331**	-0.1769**	-0.0320**
	(0.0489)	(0.0086)	(0.0485)	(0.0087)
OPENPERTEN	0.0382**	0.0067**	0.0376**	0.0068**
	(0.0074)	(0.0013)	(0.0084)	(0.0015)
Cons.	-0.9817**		-0.9735**	
	(0.0772)		(0.0816)	
Log likelihood	-1991.6811		-	
Chi2(7)	126.41		115.36	
Prob>chi2	0.0000		0.0000	
Pseudo R2	0.0308		-	
No. Observation	6065		6065	
No. Obs. Per Group			Min: 1	
			Avg: 34.9	
			Max: 695	

* The estimated parameter is significantly different from zero at the five percent level in a two-tailed test.
** The estimated parameter is significantly different from zero at the one percent level in a two-tailed test.

Table 7 linear relationships of independent variables

Corr. Value	AGE	FEMALE	HIGHEDU	GOOD	FAIR	BAD	CHRONIC	HIGHINC
AGE	1.000							
FEMALE	0.0107	1.0000						
HIGHEDUCATE	-0.0398	0.0408	1.0000					
GOODHEALTH	-0.0109	-0.0199	0.0434	1.0000				
FAIRHEALTH	0.1521	0.0420	-0.1113	-0.3484	1.0000			
BADHEALTH	0.1514	0.0233	-0.0741	-0.2276	-0.1001	1.0000		
CHRONIC	0.2322	0.0541	-0.0799	0.0091	0.2704	0.2726	1.0000	
HIGHINCOME	0.0341	-0.2316	0.3231	0.0114	-0.1255	-0.1202	-0.1244	1.0000

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