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Socioeconomic Status and Physicians' Treatment Decisions*

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Abstract

This paper aims at shedding light on the social gradient by studying the relationship between socioeconomic status (SES) and provision of health care. Using administrative data on services provided by General Practitioners (GPs) in Norway over a five year period (2008-12), we analyse the quantity, composition and value of services provided by the GPs according to patients' SES measured by education, income or ethnicity. Our data allow us to control for a wide set of patient and GP characteristics. To account for (unobserved) heterogeneity, we limit the sample to patients with a specific disease, diabetes type 2, and estimate a model with GP fixed effects. Our results show that patients with low SES visit the GPs more often, but the value of services provided per visit is lower. The composition of services varies with SES, where patients with low education and African or Asian ethnicity receive more medical tests but shorter consultations, whereas patients with low income receive both shorter consultations and fewer tests. Thus, our results show that GPs differentiate services according to SES, but give no clear evidence for a social gradient in health care provision.

Keywords: Socio-economic status, Primary care; General Practitioners

JEL Classification: I11; I14; I18

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1 Introduction

Richer, better-educated people live longer than poorer, less-educated people. Lower mortality and morbidity is associated with almost any positive indicator of socioeconomic status (SES); a relationship that is usually referred to as *the social gradient*. While the positive relationship between SES and health is well established, the mechanisms behind this relationship are less well understood.[1] In order to explain the social gradient, many studies have focused on differences in individual behaviour (e.g., smoking, drinking) or environmental exposure either in physicial sense (e.g., pollution, workplace conditions) or in social sense (e.g., residence area, family conditions) related to SES.[2] In this paper, we focus on a third potential source for the positive association between SES and health, which has received less attention in the literature on SES, namely *health care provision*.

Health care provision may have a decisive impact on the distribution of health in the society. Since the medical treatment directly influences individuals' health through the extent to which their health is restored, it may be a prime source for differences in health across individuals. Obviously, if physicians offer less (or worse) medical treatment to patients with low SES, then the provision of health care is likely to reinforce health inequalities in the population. On the contrary, if patients with low SES receive more (or better) care, then health care provision may contribute to reducing the social gradient. In addition, access to health care may vary according to patients' SES and thus have an impact on the distribution of health across individuals. Since policy makers to a large extent design the financing scheme and regulate the provision of health care, knowledge about how medical care is allocated according to patients' SES is of great policy relevance.

We investigate the relationship between SES and health care provision by studying physicians' provision of medical services to patients that differ in SES. Having an administrative dataset with detailed information about all services provided by General Practitioners (GPs) in Norway, we analyse the quantity, the composition, and the value of health care provided by the GPs to their patients. SES is measured by patients' educational level, income level, and ethnicity (i.e., African or Asian). Our data cover a five year period from 2008 to 2012, and

[1] See, for instance, the extensive literature review by Cutler et al. (2008), or the study by Adams et al. (2003) on the causal paths between health, wealth, and education.

[2] See, for instance, the studies by Borg and Kristensen (2000), Contoyannis and Jones (2004), Balia and Jones (2008).

include patient and GP identifiers, which allow us to control for a wide set of patient and GP characteristics. When estimating the effect of SES on the provision of health care, it is highly important to also control for unobserved patient and GP heterogeneity that may influence the GP's provision of care. For instance, patients with low SES tend to have poorer health than others, and may therefore receive more medical care from their GP simply due to illness severity. In order to reduce unobserved patient heterogeneity, we restrict our sample to patients with a specific diagnosis, namely diabetes type 2. This is a highly common disease in the population that is treated by more than 90 percent of the GPs in our sample. To account for GP heterogeneity that may influence the provision of medical care, we estimate a model with GP fixed effects that control for time invariant characteristics, such as treatment skills, degree of altruism, geographical location, etc.[3]

Based on this empirical approach, we find mixed results regarding the provision of health care according to patients' SES. On one hand, the GPs have more frequent visits from patients with low SES. On the other hand, the GPs' total income per visit is lower for patients with low SES, which suggests they receive less services measured in terms of value. These results hold irrespective of whether SES is measured by patients' education, income or ethnicity. Considering the composition of services, we find that patients with low education tend to receive more medical tests but shorter consultations (fewer prolonged consultations). The same pattern is present regarding ethnicity. However, patients with low income receive both shorter consultations and fewer medical tests. Thus, our results show that GPs differentiate their medical treatment according to patients SES, but provide no clear evidence for a social gradient in the overall health care provision.

To develop economic intuition for the empirical findings regarding the composition of services, we consider a simple theory model with a GP that offers two types of treatment (medical testing and consultation) to patients who derive utility from the health gains generated by the treatment. Assuming that the efficiency of consultation increases with the patient's SES (due to, for instance, communication skills), our theory model confirms that it is optimal for the GP to offer more medical testing but shorter consultation to patients with lower SES if the following conditions are fulfilled. First, the GP has to be (partially) altruistic taking into account the patient's utility gain from medical treatment. If the GP is purely profit-motivated,

[3] For instance, Grytten and Sørensen (2003) report findings that show substantial variation between GPs in their service provision. This illustrates the importance of controlling for (observed and unobserved) GP characteristics.

then she will offer the same treatment irrespective of the patient's SES. Second, the two types of treatment are substitutable or independent in the health production function. If consultation and medical testing are strongly complementary in the health production function, then patients with higher SES receive both longer consultations and more medical tests. Our results indicate that consultation and medical tests are substitutes when measuring SES by education or ethnicity, which seems plausible as communication skill are likely to be correlated with these measures.

The literature on socioeconomic status and health is vast (see, e.g., Cutler et al., 2008). However, our study relates to the part of this literature that focuses on the provision of health care. One strand of literature focuses on utilisation and access to health care. For instance, Roos et al. (2005) find that poor people in urban areas in Canada with ambulatory care sensitive (ACS) conditions have both more physician visits and hospitalisation related to ambulatory care. Dunlop et al. (2000) using national survey data find, after adjusting for differences in health need, that Canadians with lower incomes and fewer years of schooling visit GPs at a higher rate but specialist at a lower rate than those with moderate or high incomes and higher levels of education attained. Moreover, Kapur et al. (2004) examine the effects of SES on medical care expenditures in two US Medicare managed care plans, and find that education, income, and wealth all affected medical care expenditures, although the effects of these variables differed across expenditure categories.[4]

Another strand focuses on inequity in health care utilisation. This literature analyses the distribution of GP and specialist visits separately. The key concept is inequity — i.e., inequalities remaining after adjusting for needs for health care. Therefore, all available (survey) information on patient need is included as controls. In comparative studies, differences are detected between countries with different health care systems, but in most developed countries, specialist visits is distributed in favour of high-income individuals while GP visits are more equitably distributed (Van Doorslaer and Masseria, 2004; Bago d'Uva and Jones, 2009; Devaux, 2013). This also holds for Norway (Grasdal and Monstad, 2011).[5]

The key contributions of our paper to the existing literature are the following. First, we use public register data with detailed information about the medical services provided by the

[4]There are also recent studies on the relationship between SES and waiting times, as a measure of access to health care; see, e.g., Kaarboe and Carlsen (2014), Monstad et al. (2014).

[5]There are also some related papers focusing on GPs provision of care to diabetes patients; see Iezzi et al. (2014) and Scott et al. (2009). While these papers are mainly concerned with the effect of financing schemes on the provision of care, they also report findings on differences in the distribution of services across patients.

GPs to their patients, as well as information on patient and GP characteristics. The existing literature is mainly based on survey data where this information is self-reported by the patient and/or the GP. Second, the register data contains information over time with GP and patient identifiers, which enables the use of panel data methods, including GP fixed effects to control for (unobserved) time-invariant heterogeneity. Having access to monthly data with information on the medical services provided by the GPs, gives more time variation than one usually gets with survey data. Third, our data cover virtually all patients and GPs in Norway, and are thus highly representative for the population. Finally, we offer a theoretical explanation for the GP's provision of health care according to patients' SES.

The rest of the paper is organised as follows. In Section 2 we present our theory model and analysis of physician incentives. In Section 3 we describe the data and present descriptive statistics. In Section 4 we set out the empirical model, and in Section 5 we report our results. Finally, in Section 6 we offer some concluding remarks.

2 Model

Consider a patient that visits a physician for medical treatment. The patient derives utility $U(b)$ from the health gain from treatment, b, where $U(\cdot)$ is increasing and strictly concave. The physician offers two types of medical treatment; consultation and medical testing.[6] We assume that the health gain from treatment is given by a health production function $b(q, \tau)$, where q is the quality-adjusted quantity of medical consultation and τ is the quantity of medical testing. The health gain from treatment is increasing in both treatment types ($b_q > 0$, $b_\tau > 0$), but at a decreasing rate ($b_{qq} < 0$, $b_{\tau\tau} < 0$). However, consultation and medical testing may be complements ($b_{q\tau} > 0$), substitutes ($b_{q\tau} < 0$) or independent services ($b_{q\tau} = 0$) in health production. For example, if longer consultation improves the accuracy of medical diagnosing, fewer tests might be needed. In this case consultation and medical testing are substitutes. On the other hand, if the quality of the consultation is improved by medical testing, then it is likely that the two medical treatments are complements. Finally, we assume that the quality-adjusted quantity of medical consultation depends on two factors: the length of the consultation, c, and the socioeconomic status (SES) of the patient, θ. Our key assumption is that a patient

[6] The physician can of course also refer the patient to a specialist or a hospital, but here we focus on medical treatment provided by a primary care physician.

with higher SES is better able to communicate the full details of his disease symptoms to the physician, thereby increasing the quality of the consultation for a given consultation length.[7] For simplicity, we assume that these two factors interact multiplicatively, such that $q = \theta c$.

By defining $u(c, \tau; \theta) := U(b(q, \tau))$, where $q = \theta c$, it is straightforward to show that $u_c = U_b b_q \theta > 0$, $u_\tau = U_b b_\tau > 0$, $u_{cc} = \left(U_{bb} b_q^2 + U_b b_{qq}\right) \theta^2 < 0$ and $u_{\tau\tau} = U_{bb} b_\tau^2 + U_b b_{\tau\tau} < 0$. Less straightforward, and more interesting, are the second-order cross partial derivatives of u with respect to c, τ and θ, which are given as follows:

$$u_{c\tau} = \frac{\theta}{c} u_{\tau\theta} = \left(U_{bb} b_\tau b_q + U_b b_{q\tau}\right) \theta, \tag{1}$$

$$u_{c\theta} = \left(U_{bb} b_q^2 + U_b b_{qq}\right) q + U_b b_q = \frac{1}{\theta} \left(u_{cc} c + u_c\right). \tag{2}$$

From (1) we see that a sufficient condition for consultation length and medical testing to be substitutes in the patient's utility function (i.e., $u_{c\tau} < 0$) is that q and τ are substitutes in the health production function (i.e., $b_{q\tau} < 0$). In this case, higher SES will reduce the marginal utility of medical testing. Notice that $b_{q\tau} < 0$ is a sufficient but not necessary condition for this result. Since higher SES increases (all else equal) the health gain through higher quality of consultation, the marginal utility of medical testing is reduced also if $b_{q\tau}$ is either zero of positive (but sufficiently small), as long as U is strictly concave in b.

The sign of (2) is also ambiguous, because of two counteracting effects. On the one hand, since higher SES increases the quality, and thereby the health gain, of a given consultation length, this contributes to reducing the marginal utility of longer consultations whenever U or b is strictly concave. On the other hand, higher SES also makes consultations more productive, which contributes to increasing the marginal utility of consultation length. The first effect dominates the second if u is sufficiently concave in c. More precisely, $u_{c\theta} > (<)\, 0$ if $\Phi < (>)\, 1$, where $\Phi := \frac{-u_{cc} c}{u_c}$ measures the relative degree of concavity of u with respect to c.[8]

In line with standard assumptions in the literature on physician behaviour, our physician is assumed to be partly altruistic and care about both patient utility and her own income (or

[7] In addition, a higher-educated patient might also be able to better understand the physician's diagnosis and possible consequences.

[8] If, for example, u is logarithmic in c, the two effects cancel each other out and $\Phi = 1$, implying $u_{c\theta} = 0$.

profits). More specifically, the physician payoff function is assumed to be given by

$$\pi = \alpha u(c, \tau; \theta) + p_c c + p_\tau \tau - G(c, \tau), \tag{3}$$

where $\alpha \in (0,1)$ is the physician's degree of altruism towards the patient, p_c is the fee (price) received per unit of consultation time and p_τ is the fee received per unit of medical testing. The physician's costs of medical treatment are given by a convex function $G(\cdot)$, where $G(0) = 0$, $G_c > 0$, $G_\tau > 0$, $G_{cc} \geq 0$, $G_{\tau\tau} \geq 0$. Interpreting the costs of consultation and testing as time costs, it also makes sense to assume that $G_{c\tau} > 0$.

We assume that the physician observes the patient's SES when selecting the optimal mix of medical treatment. In this case the optimal medical treatment for a patient with SES θ equates marginal benefit with marginal cost along each treatment dimension, as indicated by the following first-order conditions:[9]

$$\frac{\partial \pi}{\partial c} = \alpha u_c + p_c - G_c = 0, \tag{4}$$

$$\frac{\partial \pi}{\partial \tau} = \alpha u_\tau + p_\tau - G_\tau = 0. \tag{5}$$

The effect of SES on the optimally chosen treatment mix is found by totally differentiating (4)-(5) and applying the Implicit Function Theorem, yielding:

$$\frac{\partial c^*}{\partial \theta} = -\frac{1}{\Delta}\begin{vmatrix} \frac{\partial^2 \pi}{\partial \theta \partial c} & \frac{\partial^2 \pi}{\partial c \partial \tau} \\ \frac{\partial^2 \pi}{\partial \theta \partial \tau} & \frac{\partial^2 \pi}{\partial \tau^2} \end{vmatrix} = -\frac{1}{\Delta}\left[\alpha u_{c\theta}\left(\alpha u_{\tau\tau} - G_{\tau\tau}\right) - \alpha u_{\tau\theta}\left(\alpha u_{c\tau} - G_{c\tau}\right)\right], \tag{6}$$

$$\frac{\partial \tau^*}{\partial \theta} = -\frac{1}{\Delta}\begin{vmatrix} \frac{\partial^2 \pi}{\partial c^2} & \frac{\partial^2 \pi}{\partial \theta \partial c} \\ \frac{\partial^2 \pi}{\partial c \partial \tau} & \frac{\partial^2 \pi}{\partial \theta \partial \tau} \end{vmatrix} = -\frac{1}{\Delta}\left[\alpha u_{\tau\theta}\left(\alpha u_{cc} - G_{cc}\right) - \alpha u_{c\theta}\left(\alpha u_{c\tau} - G_{c\tau}\right)\right], \tag{7}$$

[9] The second-order conditions are given by

$$\alpha u_{cc} - G_{cc} < 0,$$

$$\alpha u_{\tau\tau} - G_{\tau\tau} < 0$$

and

$$\left(\alpha u_{cc} - G_{cc}\right)\left(\alpha u_{\tau\tau} - G_{\tau\tau}\right) - \left(\alpha u_{c\tau} - G_{c\tau}\right)^2 > 0,$$

which we assume to be all satisfied.

where

$$\Delta := \begin{vmatrix} \frac{\partial^2 \pi}{\partial c^2} & \frac{\partial^2 \pi}{\partial c \partial \tau} \\ \frac{\partial^2 \pi}{\partial \tau \partial c} & \frac{\partial^2 \pi}{\partial \tau^2} \end{vmatrix} = (\alpha u_{cc} - G_{cc})(\alpha u_{\tau\tau} - G_{\tau\tau}) - (\alpha u_{c\tau} - G_{c\tau})^2 > 0.$$

The following proposition presents a pair of precisely defined sufficient conditions for which the signs of (6) and (7) are unambiguous:

Proposition 1 *Suppose that* $b_{q\tau} \leq 0$ *and* $\Phi \leq 1$. *In this case higher SES leads to longer consultations and a lower quantity of medical testing.*

The proof of the Proposition follows from a straightforward inspection of (6) and (7). It is worth stressing that the two conditions given in the Proposition are sufficient but not necessary. To see this, consider the special case of $b_{q\tau} = 0$ and $\Phi = 1$. As long as patient utility is strictly concave in health, higher SES is still associated with longer consultations and fewer test. Higher SES directly increases the health gain by increasing the value of a given medical consultation, which reduces the marginal utility of medical testing and the physician optimally chooses a lower number of tests. This dampens the initial health gain, and therefore increases the marginal utility of consultation length, which is correspondingly increased. Thus, higher SES implies a substitution away from medical testing and towards longer consultations.[10] This substitution effect is reinforced if consultation and testing are substitutes in the health production function (i.e., $b_{q\tau} < 0$), and it is even further reinforced if $\Phi < 1$, which implies that higher SES directly induces the physician to increase the length of the consultation because of higher 'consultation productivity' (i.e., $u_{c\theta} > 0$).

The above Proposition defines a regime where higher SES leads to longer consultations and fewer tests. This is obviously not the only possible regime. For example, even if consultation and testing are substitutes in the health production function ($b_{q\tau} < 0$), the results might be completely reversed (i.e., $\partial c^*/\partial\theta < 0$ and $\partial\tau^*/\partial\theta > 0$) if Φ is sufficiently large (above 1). If $u_{c\theta} < 0$, higher SES directly gives the physician an incentive to reduce the length of the consultation. If this effect is sufficiently strong it will outweigh the other effects and lead to a substitution away from consultation length and towards more medical testing.

Finally, higher SES might not involve substitution between consultation and medical testing. A possible outcome is that patients with higher SES receive both longer consultations and

[10] By continuity, such a substitution also appears for a set of parameter values in the neighbourhood of $b_{q\tau} = 0$ and $\Phi = 1$, including parameters that yield $b_{q\tau} > 0$ and $\Phi > 1$.

more tests. In our model, this is a possible outcome if consultation and testing are strongly complementary in the health production function, such that $b_{q\tau} > 0$ and sufficiently large to ensure $u_{\tau\theta} > 0$ and $\alpha u_{c\tau} > G_{c\tau}$. If, in addition, $\Phi \leq 1$ (implying $u_{c\theta} \geq 0$), patients with higher SES will unambiguously receive better treatment, in the form of longer consultations and more medical testing.

3 Institutional background

Norway has a National Health Service (NHS) system mainly financed through general taxation. The provision of primary health care is mainly the responsibility of municipalities. In order to provide services to patients within the NHS, General Practitioners (GPs) need a contract with a municipality. The number of GPs within each municipality is regulated by the Norwegian Directorate of Health based on demographic measures. Currently, there are more than 4000 public GPs (called "fastleger" in Norwegian) that have a contract with the municipalities.

Notably, almost 95 percent of the GPs in Norway are self-employed with their own practise.[11] Thus, the GPs' income are basically equivalent to the surpluses (or deficits) they obtain from providing medical treatment to patients. However, prices cannot be set by the individual GP, but are set by the government or in negotiations between the government and the medical association. In Norway, GPs receive third-party payments that are a combination of capitation and fee-for-service. The capitation part is paid by the municipalities as a flat payment (about NOK 400 per year) per individual on the GPs' list. The fee-for-service part is paid by the National Insurance Scheme and based on a wide set of services provided by the GP, including consultation, laboratory tests, medical procedures, etc. In addition, the GPs collect copayments from patients for the consultation and various services that are provided during the consultation.

All individuals in Norway have the right to be listed with a public GP in their municipality of residence. Individuals can switch GP (at most twice per calender year) within the municipality.[12] The GPs can decide the size of their list, but are required to have at least 500 patients and not more than 2500 patients. If a GP's list is full (closed), then the GP can potentially turn down new patients. However, if the list is not full (open), then the GPs will be automatically assigned new patients that apply for being listed with them.

[11] The residual five percent of the GPs are publicly employed with regular salary contracts paid by the municipalities.

[12] Of course, if individuals move to another municipality they are also allowed to switch GP across municipalities.

4 Data

4.1 Data sources and variables

In order to study whether GPs offer different services to patients with different SES, we use administrative registry data from several sources. From Statistics Norway we have obtained information about patient characteristics, including education, income, ethnicity, etc. Data on GP characteristics are found in the Regular GP database[13] and include information on GP age, gender, specialisation, and patient list information. Finally, from the KUHR register, which is established to settle fee-for-service payments to GPs from the National Insurance Scheme, we obtain information on the services provided by the GPs.[14] This register records every GP service that generates a fee, and thus enables us to observe the number of patient visits, the patients' diagnosis (i.e., ICPC-code), and the mix of services provided to each patient, such as medical tests, prolonged consultations, etc. Importantly, these data include patient and GP identifiers, which enable us to merge information about services provided by GPs to individual patient and GP characteristics.

The data cover all GPs and virtually all GP consultations in Norway.[15] When analysing provision of health care, a main issue is to control for unobserved heterogeneity in illness severity, which may generate differences in medical treatment among patients. A common way to deal with this issue is to focus on a specific group of patients with the same diagnosis. In this paper we select a sample consisting of patients diagnosed with diabetes type II (ICPC-code T90) during the five-year period 2008-2012. These patients may have visited the GP for other reasons than diabetes, so we restrict the consultations analysed to those where diabetes is recorded as the main diagnosis, which gives us in total 1,327,461 consultations. The reasons for selecting patient with diabetes type II are two-fold. First, this is a very common disease, which implies that almost every GP treat this type of patients. In our sample more than 90 percent of the GPs are represented. Second, diabetes type II is a chronic disease that is almost exclusively treated in primary care.[16] Thus, the GP is the main provider of health care and therefore of crucial importance for this patient group. In addition, there is less concern about sample selection

[13] See http://www.nsd.uib.no/velferd/fastlege/.

[14] KUHR (Kontroll og utbetaling av helserefusjon) is a public register administrated by the Norwegian Health Administration (HELFO), which is a subordinate of the Directorate of Health.

[15] Reimbursement claims are almost exclusively sent electronically. Claims sent on paper are not included in the registry data, but amounted to merely 1 percent of all claims in 2011 (www.ssb.no/helse/statistikker).

[16] This is according the national medical guidelines see www.helsedirektoratet.no.

related to some patients (for instance, patients with high SES) demanding specialist care to treat their diabetes.

From this rich data set we generate dependent variables of the services provided by the GPs. Two dummy variables reflect tests used to monitor the condition: (i) a test showing the average plasma glucose concentration over a period of 6-8 weeks (*HbA1c*) and (ii) a blood glucose test to check the current state (*BloodSugar*). Moreover, we construct a variable *LongCons* which is an indicator for whether the consultation exceeds 20 minutes, a so-called prolonged consultation. In addition, we also generate a variable *TotalFee*, which is the GPs' total income (in NOK) per consultation, including both the social insurance fee-for-service payment and patients' co-payments.

The explanatory variable of prime interest is patients' SES, which is captured by education, income, and ethnicity. Education is categorised in three levels; individuals with completed compulsory schooling (*Edu1*), completed upper secondary education (*Edu2)*, and completed higher education (*Edu3*). Since younger patients may still be in education when observed, we restrict the sample to patients aged 25 and above at the time of consultation. The majority of patients are above 65 years of age. Changes in the educational system over time are taken into account, so that the education indicators roughly reflect an individual's education level relative to his/her cohort. *Income* measures individuals' total income, including labour income, capital income, and pensions. Finally, we categorise individuals according to ethnicity into three broad groups; African, Asian, and others.[17]

When analysing the provision of health care to patients with different SES, it is important to control for patient and GP characteristics that may influence the choice of medical treatment. Regarding patient characteristics, we control for age (*PatAge*), gender (*PatMale*), and include two indicators for co-diagnosis; one for the patient having a heart problem (*CoMoHeart*) and one for him/her having some other co-diagnosis (*CoMoOther*). We also include *VisitsT90* and *OtherVisits* representing the patients' number of visits per year related to diabetes and other diagnosis, respectively. Finally, we include information about the number of enlisted patients by the GPs (*GPtotalnoPat*) and whether the GP is a specialist in general medicine or not

[17] Ethnicity is based on the country of birth over three generations.

(*Specialist*). A description of all variables used in the estimations is found in Table 1.

[Table 1 here]

4.2 Descriptive statistics

Table 1 shows descriptive statistics at the GP level, where means are taken first over each GP's patient population and then across all GPs for each year from 2008 to 2012. The frequency of prolonged consultations is fairly stable varying from 41 to 43 percent over the period. Concerning medical tests, we observe a slight increase in the use of HbA1c tests per consultation from 53 to 57 percent, and slight decrease in the use of blood sugar tests per consultation from 47 to 44 percent. As expected given the rise in nominal fees, the GPs' total income per consultation (*TotalFee*) has increased over the years studied.

Our prime interest is in the indicators of patients' SES. The proportion of patients with medium and high education is slightly increasing from 44 to 46 percent and from 16 to 18 percent, respectively, while the proportion of patients with low education is declining from 39 to 36 percent over the period. Patients' income is increasing over the period from around NOK 300,000 to 350,000, which is mainly due wage inflation. The proportions of patients with a background from Africa or Asia are low but slightly increasing over the period. Patients with an African background increases from 1 to 2 percent, whereas patients with an Asian background increases from 6 to 7 percent.

In order to get a first impression of how GP treatment varies by SES, we have split the sample by patients' level of education. This is shown in Table 2. We see that the GPs' total income per consultation is increasing in the patients' educational level. This may suggest that patients with higher SES receive more medical treatment than patients with lower SES. However, looking at the specific services provided by the GPs, the descriptive statistics indicate a different mix of services according to SES. Patients with high education tend to have more long consultations, but fewer medical tests. Educational level is clearly correlated with income and ethnicity, as well as patient age and gender, number of visits. Since these variables may influence the GPs' provision of health care, it is important to control for them in the empirical analysis.

[Table 2 here]

5 Empirical specification

Our interest is in the variation in GP services by patient SES within each GP's patient population. Clearly, patient populations vary in many respects that may be relevant. This variation is taken into account by including patient characteristics in the model. Although we benefit from a rich data set with GP characteristics, it is likely that unobservable characteristics of the GP (for instance, communicative skills or risk aversion) have an influence on GP practice patterns. Our main specification is therefore a model with fixed-effects at the GP level as presented below, where the subscripts i, k and t represent consultation, GP and year, respectively:

$$Y_{ikt} = \beta_0 + \beta_1 SES_{ikt} + \beta_2 PAT_{ikt} + \beta_3 GP_{kt} + \alpha_k + \delta_t + \varepsilon_{ikt}. \tag{8}$$

The dependent variable Y captures the GPs' medical treatment measured by the frequency of medical tests, the frequency of prolonged consultations, the number of visits, and the total income per consultation. Our key explanatory variable SES includes patients' educational level, total income and ethnicity. Patient characteristics are captured by the variable PAT, which includes age, gender, co-morbidity, and the yearly number of visits. GP represents time-variant GP characteristics, namely the number of patients enlisted and whether the GP is a specialist in general medicine. Observable time-invariant GP characteristics (such as gender, year of birth, office location, etc.) is captured by the GP fixed-effect α_k, along with unobserved time-invariant characteristics. δ_t is a vector of indicators for the years 2008–2012 and ε_{ikt} is an error term. The model is estimated with robust standard errors.

When estimating the relationship between patients' SES and the GPs provision of health care, it is important to control for patient heterogeneity related to illness severity and thus different need for medical treatment. It is well known that individuals with lower SES are, on average, in worse health than those with higher SES. Thus, observing that patients with low SES receive more health care does not necessarily imply that the GP systematically offer better treatment to patients with lower SES. Our empirical strategy to deal with this issue is two-fold. First, we limit our sample to one specific diagnosis which by definition implies less unobserved heterogeneity in illness severity. Second, we include several variables that captures observable heterogeneity among patients, such as age, gender, and two measures of comorbidity, as explained above.

For identification it is important with sufficient variation in patients' SES when using GP fixed effects. Figure 1 shows for each GP the distribution of patients with low, medium and high education, respectively.

[Figure 1 here]

We see that the large majority of GPs have patients in all educational categories.

6 Results

Our main interest is to analyse the GPs' provision of health care according to the patients' SES. In particular, we want to test whether patients with lower SES receive systematically less (or worse) medical treatment then patients with higher SES. In our empirical analysis we investigate this relationship, while controlling for relevant factors other than SES that might affect the outcomes of interest; namely a number of GP and patient characteristics. Notably, individual GP's unobserved characteristics are taken into account by fixed-effect models. Our main results are reported in Table 3.

[Table 3 here]

From the table we see that patients with lower SES – irrespective of whether this is measured as education, income or ethnicity – tend to generate lower income per consultation to the GPs. This could be interpreted as GPs offering less (or worse) services to patients with lower SES. However, when we consider the specific services offered to diabetes patients, we find no clear evidence for patients with lower SES receiving less (or worse) service from their GPs. In fact, the results show that GPs tend to offer more (less) medical tests to patients with low (high) education and more (less) prolonged consultations to patients with high (low) education. The same pattern is present when considering ethnicity, where patients with an Asian or African background tend to receive more medical tests but fewer prolonged consultations. These findings are consistent with our theory model where we show that when GPs are partially altruistic and the efficiency of communication is increasing in patients SES, then the optimal provision of health care can be to offer more medical tests but fewer prolonged consultations to patients with lower SES.[18]

However, the results regarding income shows a different pattern. Patients with lower income tend to receive not only fewer prolonged consultations but also fewer medical tests. While communication skills are likely to be positively correlated with patients' educational level and ethnicity (due to, for instance, language), the association with income is much less apparent. Thus, this may explain why patients' income level has a different impact on the GPs provision of medical care. Another issue is whether we can interpret this finding as evidence for a social gradient in health care provision. While our results show that patients with lower income receive less medical care per consultation, they also show that the same patients visit the GP more often. Thus, whether patients with low income receive more or less medical care is an open question.

7 Sensitivity analysis

We check the sensitivity of our results with respect to patient and GP characteristics in several ways. Regarding patient characteristics, we split the sample by patient age at age 67, which is the formal retirement age in Norway. One reason for this is that the demand for health care may be different before and after retirement according to patients' SES. In particular, patients with high SES are likely to have a higher alternative cost (due to higher earnings) when in the workforce, and thus visit the GPs less frequently than patients with a low SES. However, when retired this alternative cost may be much more similar and thus not sensitive to SES. In Table 4 we report the key results related to SES when splitting the sample by patient age.[19]

[Table 4 here]

The table shows that the results are to a large extent qualitatively the same and thus not sensitive to whether the patients are retired or not. In both age groups, patients with low education receive more medical tests and fewer prolonged consultations. However, the results regarding ethnicity change somewhat for patients above 67. In this age group, patients with an African or Asian background receive less medical tests and fewer prolonged consultations. On the other hand, patients with an Asian background have more visits. For patients below 67, the

[18] This result holds under the assumptions that consultations and testing are treatment substitutes and that patient utility is not too concave in consultation length (see Proposition 1).

[19] In Table A1 and A2 we report the full results from these estimations.

results are similar to our main results reported in Table 3. Finally, our results show that low income patients with age above 67 receive less prolonged consultations but not a significantly different number of medical tests than patients with higher income.

To investigate whether different groups of GPs treat patients differently depending on patient SES, we have estimated our empirical model, as specified in (8), on subsamples defined by GP characteristics, for instance according to whether the GP's number of patients enlisted is above or below the sample mean ("long" versus "short" list). Results are reported in Table 5. Here patient age is among the control variables.[20]

[Table 5 here]

The most striking result is the homogeneity in the GP population: irrespective of GP age, gender, specialist status, and number of patients enlisted, we find that the higher is the patient's level of education, the higher is the probability of a prolonged consultation and the lower is the probability of the tests taken.

8 Concluding remarks

In most countries we observe a positive relationship between SES and health; a phenomenon often referred to as the social gradient. There are different explanations for this phenomenon such as individual behaviour, environmental exposure, and the provision of health care. In this paper we focus on the latter by studying the provision of health care by GPs to patients according to their SES.

Having detailed register data on the services provided by the GPs to patients with diabetes over a five-year period (2008-12), we find no clear evidence for systematic over- or under-treatment of patients with low SES. Instead, our results show that GPs tend to offer different mix of services according to patients' SES. We find that patients with low education receive more medical tests but fewer prolonged consultations. The same pattern is present for patients with African or Asian background. These results are highly robust and based on a regression model with GP fixed effects, where we also control for a wide set of observable GP and patient characteristics.

[20] The full estimation result, showing all variables, is available from the authors upon request.

To develop economic intuition for the empirical findings, we consider a theory model with a GP that offers two types of treatment (medical testing and consultation) to patients who derive utility from health gains generated by the treatment. Assuming that the quality of consultation increases with the patients' SES (due to, for instance, communication skills), our theory model is consistent with the empirical findings if the GPs are partially altruistic and medical testing and consultation are either substitute or independent treatments.

In contrast to the results on education and ethnicity, we find that patients with low income tend to receive less medical testing and also fewer prolonged consultations. However, while education and ethnicity are likely to influence the quality of consultation due to communicative skills, income is less likely to play a role in this respect. This may explain the difference in the results. Another issue is whether the results regarding income can be considered as evidence for a social gradient in the health care provision. While this may be the case, we also find that patients with low income visit the GP more often. Thus, it is unclear whether patients with lower income receive less health care when accounting for the fact that they visit the GPs more often than patients with higher income.

To conclude, we find no systematic evidence for a social gradient in the provision of health care by the GPs, but rather that the GPs differentiate the services offered to patients according to their SES. A natural implication from our findings is that the provision of health care by the GPs is not likely to reinforce the positive relationship between SES and health inequalities. Unfortunately, our data does not allow us to test whether the differentiation of services provided by the GPs to patients with different SES actually contributes to reducing the health inequalities related to SES. This is a question of great importance, which we leave for future research.

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Appendix

[Table A1 and A2 here]

FIGURES AND TABLES

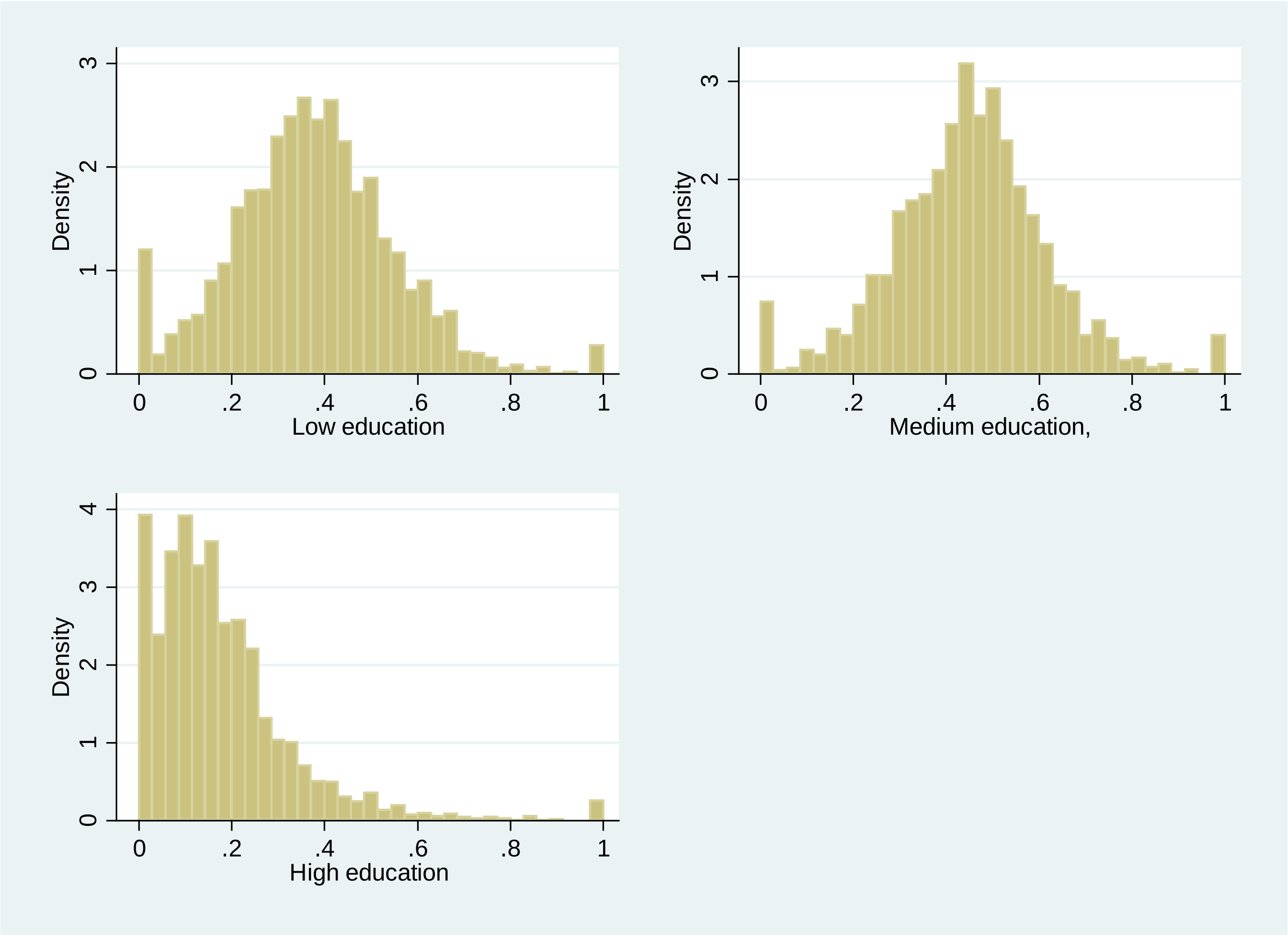

Figure 1. Frequency of low, medium and high educated diabetes patients at GP level, 2010.

Table 1. Descriptive statistics, at GP level (means with standard deviations in parentheses)

		2008	2009	2010	2011	2012
Dependent variables						
LongCons	1 if the consultation is prolonged	0.43	0.42	0.41	0.42	0.43
HbA1c	1 if test of glycated haemoglobin is taken	0.53	0.54	0.54	0.56	0.57
Bloodsugar	1 if test of glucose is taken	0.47	0.47	0.46	0.44	0.44
VisitsT90	Number of visits per year, T90 main diagnosis	3.85 (1.49)	3.79 (1.38)	3.82 (1.35)	3.77 (1.38)	3.74 (1.44)
TotalFee	GP's total remuneration per consultation (NOK)	389.29 (84.93)	401.35 (88.35)	408.04 (105.76)	420.39 (91.00)	434.24 (93.12)
Patient information						
Education (baseline: patients with higher education)						
Educ1	1 if compulsory school only	0.39	0.38	0.37	0.37	0.36
Educ2	1 if upper secondary education	0.44	0.45	0.45	0.45	0.46
Income (baseline: patients with income higher than the yearly sample mean)						
LowInc	1 if income is lower than the sample mean	0.62	0.62	0.62	0.62	0.63
Ethnicity (baseline: patients with Norwegian, European or American background)						
Africa	1 if patient has African background	0.01	0.01	0.02	0.02	0.02
Asia	1 if patient has Asian background	0.06	0.06	0.06	0.06	0.07
PatAge	Patient age	63.24 (5.57)	63.31 (5.34)	63.46 (5.40)	63.41 (5.37)	63.47 (5.33)
PatMale	1 if patient is male	0.52	0.53	0.53	0.54	0.54
CoMoHarth	1 if secondary diagnosis is within chapter K (cardiovascular)	0.15	0.12	0.14	0.13	0.12
CoMoOther	1 if other secondary diagnosis	0.18	0.15	0.18	0.18	0.18
OtherVisits	Number of visits per year, other main diagnoses	3.56 (1.88)	0.68 (0.24)	3.63 (1.76)	3.68 (1.87)	3.72 (1.81)
GP information						
GPAge	Age of the GP	49.17 (9.73)	49.31 (9.94)	49.50 (10.24)	49.55 (10.43)	49.57 (10.59)
GPMale	1 if the GP is male	0.68	0.67	0.66	0.65	0.64
Specialist	1 if the GP is certified as a specialist in	0.63	0.63	0.62	0.63	0.63
ListLength	Number of patients on GPs list (in 100)	12.03 (3.99)	12.02 (3.96)	11.92 (4.01)	11.85 (3.98)	11.82 (3.88)
VisitsPerDay	Number of consultations per day	14.93 (4.83)	14.94 (4.84)	15.00 (4.72)	15.14 (4.76)	15.05 (4.72)
Number of GPs		3647	3729	3843	3936	4007

Table 2. Descriptive statistics, by patient SES (means with standard deviations in parentheses)

	Low education	Medium education	High education
Dependent variables:			
LongCons	0.37	0.40	0.43
HbA1c	0.61	0.62	0.60
BloodSugar	0.52	0.52	0.49
VisitsT90	4.37 (3.29)	4.15 (2.86)	4.00 (2.72)
TotalFee	420.20 (171.82)	428.59 (171.61)	432.81 (175.28)
Patient characteristics:			
Income	0.82	0.58	0.32
Africa	0.02	0.01	0.03
Asia	0.08	0.03	0.11
PatAge	65.87 (13.78)	63.74 (12.57)	60.59 (12.93)
PatMale	0.47	0.59	0.62
CoMoHearth	0.14	0.15	0.13
CoMoOther	0.18	0.18	0.18
OtherVisits	3.84 (4.97)	3.46 (4.39)	3.26 (4.21)
Number of consultations	510 376	604 147	212 938

Table 3. Patient SES and content of GP consultations, full estimation results. Fixed-effect estimator.

	LongCons	HbA1c	BloodSugar	VisitsT90	TotalFee
Educ1	-0.0534***	0.0208***	0.0288***	0.3227***	-5.4799***
	(0.0013)	(0.0012)	(0.0011)	(0.0075)	(0.4416)
Educ2	-0.0282***	0.0164***	0.0194***	0.1702***	-3.0333***
	(0.0012)	(0.0011)	(0.0011)	(0.0067)	(0.4103)
LowInc	-0.0293***	-0.0055***	-0.0049***	0.1990***	-2.0974***
	(0.0010)	(0.0009)	(0.0009)	(0.0057)	(0.3260)
Africa	-0.0932***	-0.0026	0.0096**	-0.0870***	-18.1823***
	(0.0034)	(0.0033)	(0.0032)	(0.0213)	(1.3460)
Asia	-0.0930***	0.0046*	0.0105***	0.1451***	-15.8308***
	(0.0019)	(0.0018)	(0.0017)	(0.0118)	(0.6567)
PatAge	-0.0007***	0.0004***	0.0006***	-0.0098***	-0.1049***
	(0.0000)	(0.0000)	(0.0000)	(0.0002)	(0.0112)
PatMale	-0.0059***	-0.0013	0.0003	0.0538***	0.7802**
	(0.0008)	(0.0008)	(0.0008)	(0.0051)	(0.2842)
CoMoHeart	0.0751***	0.0280***	0.0150***	-0.6502***	35.4573***
	(0.0013)	(0.0011)	(0.0011)	(0.0069)	(0.4393)
CoMoOther	0.0891***	-0.0083***	-0.0177***	-0.3780***	41.9801***
	(0.0012)	(0.0011)	(0.0010)	(0.0067)	(0.4173)
VisitsT90	-0.0031***	-0.0129***	-0.0053***		-4.3038***
	(0.0001)	(0.0001)	(0.0001)		(0.0494)
OtherVisits	-0.0008***	-0.0128***	-0.0088***	0.0238***	-1.3554***
	(0.0001)	(0.0001)	(0.0001)	(0.0009)	(0.0320)
ListLength	-0.0063***	0.0044***	0.0038***	-0.0169***	-0.1601
	(0.0005)	(0.0005)	(0.0005)	(0.0030)	(0.1716)
Specialist	-0.0210***	-0.0026	-0.0185***	0.0615***	68.2408***
	(0.0029)	(0.0027)	(0.0026)	(0.0168)	(0.9858)
Constant	0.5879***	0.5941***	0.4884***	4.8108***	380.6936***
	(0.0074)	(0.0069)	(0.0067)	(0.0438)	(2.5071)
GP dummy	Yes	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes	Yes
Consultations	1327461	1327461	1327461	1327461	1327461
GPs	4726	4726	4726	4726	4726
R^2	0.187	0.313	0.377	0.196	0.241

Robust standard errors in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4. Patient SES and content of GP consultations, by patient age. Fixed-effect estimator.

	LongCons	HbA1c	BloodSugar	VisitsT90	TotalFee
A. Patients aged 25-66 (747 593 consultations)					
Educ1	-0.0567***	0.0195***	0.0294***	0.3843***	-6.3080***
	(0.0016)	(0.0015)	(0.0015)	(0.0099)	(0.5662)
Educ2	-0.0324***	0.0172***	0.0198***	0.1698***	-4.0257***
	(0.0015)	(0.0014)	(0.0013)	(0.0085)	(0.5180)
LowInc	-0.0318***	-0.0079***	-0.0063***	0.2617***	-1.6936***
	(0.0012)	(0.0011)	(0.0011)	(0.0072)	(0.4141)
Africa	-0.0820***	0.0051	0.0167***	-0.0108	-15.7092***
	(0.0036)	(0.0036)	(0.0035)	(0.0232)	(1.4656)
Asia	-0.0825***	0.0095***	0.0145***	0.1592***	-14.4602***
	(0.0021)	(0.0020)	(0.0019)	(0.0133)	(0.7415)
B. Patients aged 67 or above (579 868 consultations)					
Educ1	-0.0477***	0.0221***	0.0262***	0.2573***	-3.3549***
	(0.0022)	(0.0020)	(0.0020)	(0.0117)	(0.7505)
Educ2	-0.0219***	0.0141***	0.0171***	0.1798***	-0.9414
	(0.0021)	(0.0019)	(0.0019)	(0.0110)	(0.7048)
LowInc	-0.0224***	-0.0002	-0.0006	0.0439***	-2.6609***
	(0.0017)	(0.0015)	(0.0015)	(0.0092)	(0.5574)
Africa	-0.1504***	-0.0432***	-0.0484***	-0.6232***	-40.4956***
	(0.0105)	(0.0105)	(0.0099)	(0.0500)	(3.4859)
Asia	-0.1374***	-0.0214***	-0.0176***	0.1232***	-25.5048***
	(0.0047)	(0.0047)	(0.0045)	(0.0280)	(1.6309)

Robust standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 5. Patient SES and content of GP consultation, GP heterogeneity. Fixed effect estimator.

	Female GP	**Male GP**	**GP aged >=50**	**GP aged <50**	**Not specialist**	**Specialist**	**Long list**	**Short list**
(I). Dep. variable: Long consultations								
Edu1	0.0244***	-0.0540***	-0.0531***	-0.0538***	-0.0493***	-0.0548***	-0.0486***	-0.0582***
	(0.0019)	(0.0014)	(0.0021)	(0.0016)	(0.0024)	(0.0015)	(0.0018)	(0.0018)
Edu2	0.0554***	-0.0283***	-0.0268***	-0.0293***	-0.0251***	-0.0293***	-0.0252***	-0.0314***
	(0.0027)	(0.0013)	(0.0020)	(0.0015)	(0.0023)	(0.0014)	(0.0016)	(0.0017)
LowInc	0.0005***	-0.0299***	-0.0300***	-0.0288***	-0.0255***	-0.0307***	-0.0329***	-0.0254***
	(0.0000)	(0.0011)	(0.0016)	(0.0012)	(0.0018)	(0.0011)	(0.0013)	(0.0014)
(II). Dep. variable: HbA1c test								
Edu1	0.0234***	0.0199***	0.0185***	0.0222***	0.0204***	0.0209***	0.0202***	0.0213***
	(0.0025)	(0.0013)	(0.0020)	(0.0015)	(0.0022)	(0.0014)	(0.0016)	(0.0017)
Edu2	0.0157***	0.0165***	0.0164***	0.0165***	0.0152***	0.0168***	0.0166***	0.0164***
	(0.0024)	(0.0012)	(0.0019)	(0.0014)	(0.0021)	(0.0013)	(0.0015)	(0.0016)
LowInc	0.0008	-0.0071***	-0.0043**	-0.0062***	-0.0064***	-0.0051***	-0.0089***	-0.0022
	(0.0019)	(0.0010)	(0.0015)	(0.0011)	(0.0016)	(0.0010)	(0.0012)	(0.0012)
(III). Dep. variable: Blood sugar test								
Edu1	0.0267***	0.0293***	0.0233***	0.0321***	0.0245***	0.0304***	0.0309***	0.0265***
	(0.0024)	(0.0013)	(0.0019)	(0.0014)	(0.0022)	(0.0013)	(0.0016)	(0.0016)
Edu2	0.0174***	0.0199***	0.0183***	0.0202***	0.0147***	0.0212***	0.0223***	0.0163***
	(0.0023)	(0.0012)	(0.0018)	(0.0013)	(0.0021)	(0.0012)	(0.0015)	(0.0015)
LowInc	-0.0033	-0.0054***	-0.0032*	-0.0063***	-0.0059***	-0.0044***	-0.0072***	-0.0025*
	(0.0019)	(0.0010)	(0.0014)	(0.0011)	(0.0016)	(0.0010)	(0.0012)	(0.0012)
(IV). Dep. variable: VisitsT90								
Edu1	0.3381***	0.3184***	0.3444***	0.3086***	0.3082***	0.3296***	0.3483***	0.3035***
	(0.0150)	(0.0087)	(0.0122)	(0.0095)	(0.0139)	(0.0090)	(0.0110)	(0.0103)
Edu2	0.1253***	0.1819***	0.2052***	0.1497***	0.2169***	0.1516***	0.1573***	0.1824***
	(0.0134)	(0.0078)	(0.0110)	(0.0085)	(0.0130)	(0.0079)	(0.0096)	(0.0094)
LowInc	0.2442***	0.1871***	0.1867***	0.2061***	0.2129***	0.1934***	0.2086***	0.1903***
	(0.0112)	(0.0066)	(0.0095)	(0.0072)	(0.0104)	(0.0068)	(0.0084)	(0.0077)
(V). Dep. variable: Total fee								
Edu1	-6.1830***	-5.2619***	-5.8459***	-5.2331***	-5.4020***	-5.5166***	-4.3358***	-6.5771***
	(0.9646)	(0.4956)	(0.7730)	(0.5335)	(0.8630)	(0.5134)	(0.6092)	(0.6421)
Edu2	-5.3193***	-2.3905***	-3.3027***	-2.8380***	-3.5054***	-2.8591***	-2.1674***	-3.9524***
	(0.9079)	(0.4591)	(0.7256)	(0.4941)	(0.8206)	(0.4728)	(0.5596)	(0.6036)
LowInc	0.1528	-2.7188***	-2.0209***	-2.2298***	-1.2878*	-2.3948***	-3.1431***	-1.0803*
	(0.7061)	(0.3675)	(0.5663)	(0.3968)	(0.6219)	(0.3819)	(0.4611)	(0.4607)
N	*293 837*	*1 033 624*	*832 853*	*494 608*	*396 082*	*931 379*	*636 803*	*690 658*

Robust standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

APPENDIX

Table A1. Content of GP consultations for diabetes patients, GP fixed-effects estimators with robust standard errors in parentheses. Patients aged 25-66.

	LongCons	HbA1c	BloodSugar	VisitsT90	TotalFee
Educ1	-0.0567***	0.0195***	0.0294***	0.3843***	-6.3080***
	(0.0016)	(0.0015)	(0.0015)	(0.0099)	(0.5662)
Educ2	-0.0324***	0.0172***	0.0198***	0.1698***	-4.0257***
	(0.0015)	(0.0014)	(0.0013)	(0.0085)	(0.5180)
LowInc	-0.0318***	-0.0079***	-0.0063***	0.2617***	-1.6936***
	(0.0012)	(0.0011)	(0.0011)	(0.0072)	(0.4141)
Africa	-0.0820***	0.0051	0.0167***	-0.0108	-15.7092***
	(0.0036)	(0.0036)	(0.0035)	(0.0232)	(1.4656)
Asia	-0.0825***	0.0095***	0.0145***	0.1592***	-14.4602***
	(0.0021)	(0.0020)	(0.0019)	(0.0133)	(0.7415)
PatAge	-0.0004***	0.0012***	0.0012***	-0.0069***	0.0989***
	(0.0001)	(0.0001)	(0.0001)	(0.0004)	(0.0218)
PatMale	-0.0003	0.0036***	0.0087***	0.0367***	2.3159***
	(0.0012)	(0.0011)	(0.0010)	(0.0071)	(0.3957)
CoMoHeart	0.0756***	0.0225***	0.0100***	-0.6660***	33.0930***
	(0.0019)	(0.0016)	(0.0016)	(0.0100)	(0.6328)
CoMoOther	0.0763***	-0.0162***	-0.0257***	-0.3398***	41.9749***
	(0.0015)	(0.0014)	(0.0014)	(0.0090)	(0.5617)
VisitsT90	-0.0027***	-0.0113***	-0.0039***		-4.1991***
	(0.0002)	(0.0002)	(0.0002)		(0.0654)
OtherVisits	-0.0010***	-0.0118***	-0.0081***	0.0304***	-1.4426***
	(0.0001)	(0.0001)	(0.0001)	(0.0014)	(0.0443)
ListLength	-0.0050***	0.0046***	0.0039***	-0.0123**	-0.0814
	(0.0007)	(0.0006)	(0.0006)	(0.0040)	(0.2249)
Specialist	-0.0196***	-0.0003	-0.0158***	0.0839***	69.8105***
	(0.0038)	(0.0036)	(0.0035)	(0.0226)	(1.3263)
Constant	0.5553***	0.5298***	0.4348***	4.5138***	367.2982***
	(0.0098)	(0.0092)	(0.0089)	(0.0595)	(3.3756)
GP dummy	Yes	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes	Yes
Consultations	747593	747593	747593	747593	747593
GPs	4708	4708	4708	4708	4708
R^2	0.183	0.305	0.371	0.208	0.230

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table A2. Content of GP consultations for diabetes patients, GP fixed-effects estimators with robust standard errors in parentheses. Patients aged 67 years and above.

	LongCons	HbA1c	BloodSugar	VisitsT90	TotalFee
Educ1	-0.0477^{***}	0.0221^{***}	0.0262^{***}	0.2573^{***}	-3.3549^{***}
	(0.0022)	(0.0020)	(0.0020)	(0.0117)	(0.7505)
Educ2	-0.0219^{***}	0.0141^{***}	0.0171^{***}	0.1798^{***}	-0.9414
	(0.0021)	(0.0019)	(0.0019)	(0.0110)	(0.7048)
LowInc	-0.0224^{***}	-0.0002	-0.0006	0.0439^{***}	-2.6609^{***}
	(0.0017)	(0.0015)	(0.0015)	(0.0092)	(0.5574)
Africa	-0.1504^{***}	-0.0432^{***}	-0.0484^{***}	-0.6232^{***}	-40.4956^{***}
	(0.0105)	(0.0105)	(0.0099)	(0.0500)	(3.4859)
Asia	-0.1374^{***}	-0.0214^{***}	-0.0176^{***}	0.1232^{***}	-25.5048^{***}
	(0.0047)	(0.0047)	(0.0045)	(0.0280)	(1.6309)
PatAge	-0.0010^{***}	-0.0006^{***}	-0.0000	-0.0083^{***}	-0.2081^{***}
	(0.0001)	(0.0001)	(0.0001)	(0.0005)	(0.0304)
PatMale	-0.0126^{***}	-0.0078^{***}	-0.0110^{***}	0.0703^{***}	-1.1593^{**}
	(0.0013)	(0.0012)	(0.0011)	(0.0073)	(0.4189)
CoMoHeart	0.0765^{***}	0.0339^{***}	0.0207^{***}	-0.6187^{***}	37.2342^{***}
	(0.0018)	(0.0016)	(0.0016)	(0.0094)	(0.6298)
CoMoOther	0.1087^{***}	0.0036^{*}	-0.0055^{***}	-0.4189^{***}	42.0949^{***}
	(0.0018)	(0.0016)	(0.0016)	(0.0095)	(0.6219)
VisitsT90	-0.0039^{***}	-0.0158^{***}	-0.0076^{***}		-4.6179^{***}
	(0.0002)	(0.0002)	(0.0002)		(0.0781)
OtherVisits	-0.0004^{***}	-0.0137^{***}	-0.0095^{***}	0.0094^{***}	-1.2551^{***}
	(0.0001)	(0.0001)	(0.0001)	(0.0010)	(0.0475)
ListLength	-0.0079^{***}	0.0042^{***}	0.0036^{***}	-0.0261^{***}	-0.2069
	(0.0008)	(0.0007)	(0.0007)	(0.0043)	(0.2663)
Specialist	-0.0224^{***}	-0.0070	-0.0228^{***}	0.0154	65.5614^{***}
	(0.0044)	(0.0041)	(0.0040)	(0.0243)	(1.4764)
	0.6246^{***}	0.6950^{***}	0.5668^{***}	5.0260^{***}	391.0425^{***}
Constant	(0.0134)	(0.0124)	(0.0121)	(0.0722)	(4.3596)
GP dummy	Yes	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes	Yes
Consultations	579868	579868	579868	579868	579868
GPs	4672	4672	4672	4672	4672
R^2	0.210	0.337	0.398	0.260	0.268

Robust standard errors in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

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