Do Treatment Decisions Depend on Physicians' Financial Incentives?

Kurt R. Brekke • Tor Helge Holmås • Karin Monstad • Odd Rune Straume

uni Research
Rokkan Centre
Stein Rokkan Centre for Social Studies

Working paper
4-2015

Uni Research Rokkan Centre, The Stein Rokkan Centre for Social Studies, runs a publication series consisting of two parts, Reports and Working Papers. The Director of the Uni Research Rokkan Centre together with the Research Directors form the editorial board of the publication series.

The Report series includes scientific papers, such as final reports on research projects. The manuscripts are accepted by the editorial board, normally after a peer review.

The Working Paper series includes working papers, lecture transcripts and seminar papers. The manuscripts published as Working Papers are approved by project managers.

ISSN 1503-0946

Uni Research Rokkan Centre
Nygårdsgaten 5
5015 Bergen
Phone +47 55 58 97 10
Fax +47 55 58 97 11
E-mail: rokkansenteret@uni.no
http://rokkan.uni.no/

Do Treatment Decisions Depend on Physicians' Financial Incentives?*

Kurt R. Brekke†, Tor Helge Holmås‡, Karin Monstad§, Odd Rune Straume¶

July 5, 2015

Abstract

We study whether and how physicians respond to financial incentives, making use of detailed register data on the health-care services provided to patients by general practitioners (GPs) in Norway over a six-year period (2006-11). To identify GPs' treatment responses, we exploit that specialisation in general medicine entitles the GPs to a higher consultation fee, implying a change in total and relative fee payments. To control for demand and supply factors related to becoming a specialist, we estimate a GP fixed effect model focusing on a narrow time window around the date of specialist certification. Our results show a sharp response by the GPs immediately after obtaining specialist certification and thus a higher consultation fee: the number of visits increase, while the treatment intensity (prolonged consultations, lab tests, medical procedures) decline. These findings are consistent with a theory model where (partly) profit-motivated GPs face excess demand and income effects are sufficiently small. Finally, we find no evidence for adverse health effects (measured by emergency care centre visits) on patients due to the change in GPs' treatment behaviour after becoming a specialist.

Keywords: General Practitioners; Fee-for-service; Profit-motivation

JEL Classification: H42; H51; I11; I18

*The research is funded by the Research Council of Norway, Project no. 189498. We are grateful to Mathias Kifmann, Vardges Levonyan, and Tom Stargardt for valuable comments. The paper has also benefited from presentation at the BECCLE conference 2015, the Norwegian Health Economics Conference 2015, and the Hamburg Center for Health Economics seminar.

†Department of Economics, Norwegian School of Economics (NHH), Helleveien 30, N-5045 Bergen, Norway. E-mail: kurt.brekke@nhh.no.

‡Uni Rokkan Centre, Nygårdsgaten 5, N-5015 Bergen, Norway; and Health Economics Bergen (HEB). E-mail: tor.holmas@uni.no.

§Uni Rokkan Centre, Nygårdsgaten 5, N-5015 Bergen, Norway; and Health Economics Bergen (HEB). E-mail: karin.monstad@uni.no.

¶Department of Economics/NIPE, University of Minho, Campus de Gualtar, 4710-057 Braga, Portugal; and Department of Economics, University of Bergen. E-mail: o.r.straume@eeg.uminho.pt.

1 Introduction

Volume-based payment schemes for health care provision have become increasingly popular among policy makers.[1] Critics argue that such schemes lead to over-provision of health care and possibly supplier-induced demand, which result in excessive health expenditures without much gains to patients' health. However, proponents argue that the provider incentives generated by volume-based payment schemes are necessary for an efficient supply of health care and result in substantial health gains to patients. Knowledge about (whether and) how health care providers respond to financial incentives is therefore of great importance for the design of health policy.

In this paper we study the impact of fee-for-service payments on the provision of health care by General Practitioners (GPs). While there is a large economic literature on this topic, our paper makes use of a unique data set and offers a novel approach to identifying the effects of fee changes on GPs' provision of care. From administrative registry data, we obtain a panel data set covering all fee-for-service payments to GPs in Norway over the six year period 2006-11. To identify the effect of fee changes on the GPs' provision of care, we exploit variation related to specialisation in general medicine, which entitles the GPs to a higher consultation fee leaving the fees for other services unchanged. Since GPs become specialists at different dates, this approach gives us variation in the fee schedule over time and across GPs in terms of absolute and relative fee levels. To identify the causal effect of the fee-for-service payment, we focus on the GPs' health care provision in a narrow time window around the date of specialisation. In this short period it is not likely that much else than the change in the consultation fee affects the GPs' treatment decisions.

Estimating a GP fixed-effect model controlling for observable GP and patient characteristics, our results show that the GPs change their treatment behaviour drastically after receiving the specialist certification. In particular, we find that the higher consultation fee associated with specialisation leads to a strong, positive effect on the number of consultations, but has a negative effect on treatment intensity (measured by laboratory tests, medical procedures or prolonged consultations). Despite the reduction in treatment intensity, we find that the total income per consultation increases, which implies that the direct effect of the higher consultation fee dominates.

[1] Two key examples of volume-based payments schemes are fee-for-service (FFS) payments for physician services and diagnosis-related group (DRG) pricing for hospital services. Both schemes are widely used in almost every OECD country.

According to our theory model, these results are consistent with treatment decisions by profit-motivated GPs. A purely altruistic GP, which is a perfect agent for the patients, would not change treatment behaviour according to changes in the fee-for-service schedule. However, we show that a (partially) profit-motivated GP responds to a higher consultation fee by treating more patients, but with a lower treatment intensity, given that physician income effects are sufficiently small. The reason for this is two-fold. First, a higher consultation fee implies a change in relative prices (fees), making consultations more profitable relative to services related to the intensity of treatment. Second, the extra time spent on consultations implies that the marginal cost of medical treatments becomes higher due to the GPs' time constraint. In other words, the change in the fee schedule due to specialisation has a positive effect on the extensive margin (the number of patients treated), but a negative effect on the intensive margin (the amount of treatment per patient).

Having found that financial incentives influence the GPs medical treatment, a natural question is whether this has any impact on patients' health outcomes. Using emergency care centre visits shortly after a GP consultation as a measure of adverse health outcomes, we find no (positive or negative) effects after the GPs become specialists. In terms of policy implications, this result suggests that the higher consultation fee for specialists has a negative welfare effect since it increase the medical expenditures significantly without improving patients' health. However, our measure of health effects may be imprecise, implying that this particular result must be interpreted carefully.[2]

As mentioned above, there is a vast empirical literature on physician responses to financial incentives. The strand of this literature more closely related to the present paper is the one analysing the effect of fee changes on physicians' supply of medical services. The overall picture from this literature is somewhat mixed, although many studies find a positive supply response to higher fees. For example, studying the effects of changes in US Medicare fees, Hadley and Reschovsky (2006) find that a higher fee increases both the number of patients treated and service intensity. Similarly, Clemens and Gottlieb (2014) find strong positive supply effects of US Medicare fee increases. Using data from Canada, Kantarevic et al. (2008) also find mostly positive effects of fee increases on the supply of medical services. Furthermore, both Epstein and

[2]Note that we do not analyse the effects of GPs undertaking training to become specialists, which we believe improve GPs' skills and thus have positive impact on patients' health. We use specialisation only as an instrument for fee changes, and control for GPs' investment in human capital by focusing on a narrow time window around the date for specialist certification.

Johnson (2012) and Iizuka (2007) find some evidence of drug choice based on the prescribing physician's financial incentives in the US and Japan, respectively. On the other hand, Carlsen et al. (2003) find little or no effect of fee changes on the supply of laboratory tests in Norway.

The results are considerably weaker (and more mixed) regarding cross-price effects on the supply of medical services; that is, the extent to which a fee change for a particular service leads to adjustments in the supply of other services. For example, the aforementioned study by Kantarevic et al. (2008) find mostly insignificant cross-price effects. Also using Canadian data, Hurley and Labelle (1995) find relatively weak and mixed evidence on a relationship between relative fees and the supply of medical services. Tai-Seale et al. (1998) conducts a specific empirical test of the McGuire-Pauly model[3] on US Medicare data and find some evidence of negative cross-price elasticities but overall quite mixed results.

A related strand of this literature consists of papers studying the effects of different physician payment schemes, usually fee-for-service contracts versus fixed-salary contracts. Also here the results are somewhat mixed. Using Canadian data, Devlin and Sarma (2008) find that fee-for-service leads to more patient visits, whereas Sørensen and Grytten (2003) find that fee-for-service increases service production by 20-40% in Norway, compared with a fixed-salary contract. A higher supply of medical services under fee-for-service is also confirmed experimentally by Hennig-Schmidt et al. (2011). On the other hand, Sarma et al. (2010) find no effect of fee-for-service on total hours worked by physicians in Canada, and, based on a field experiment in the UK, Gosden et al. (2003) find little or no significant effects of salaried contracts versus fee-for-service.

This literature, and our paper, also relates more broadly to the huge literature on supplier-induced demand (SID). Some early studies in this literature, e.g., Rice (1983, 1984), found quite strong evidence of a backward bending supply curve (indicating large income effects). Another example is Gruber and Owing (1996), who found that reduction in fertility rates in the US led to an increase in (higher-paid) caesarean section delivery and interpreted this as supplier-inducement in response to a negative income shock. However, later studies reveal more mixed findings. For example, a series of papers on Norwegian data (Grytten et al, 1995; 2001; Carlsen et al., 2003, 2011) report little or no evidence of SID.

[3]McGuire and Pauly (1991) present a theoretcial framework for studying physician response to changes in relative fees, incorporating both the profit-maximisation hypothesis (zero income effects) and the target income hypothesis (income effects of infinite size).

The rest of the paper is organised as follows. In Section 2 we present a theory model for analysing the effects of fee-for-service payments on GPs' provision of medical treatment. In Section 3 we present the institutional features of the Norwegian primary health care market. In Section 4 data and some descriptive statistics are presented. In Section 5 we explain our empirical strategy, while in Section 6 we report the results. In Section 7 we conduct several sensitivity tests checking the robustness of our results, whereas in Section 8 we analyse potential effects on patients' health outcomes. Finally, Section 9 concludes the paper.

2 A theoretical framework

Consider a physician that faces excess demand for medical treatment and can therefore freely choose the number of consultations offered per period.[4] Let n be the number of consultations and let s be intensity of treatment, such as consultation length, number of laboratory tests and procedures, etc. Suppose that n and s are choice variables in the following optimisation problem for the physician:

$$\max_{n,s} \Omega := \alpha n b(s) + (1-\alpha)\, u\left((p+qs)\, n\right) - c\left(T(n,s)\right), \tag{1}$$

where $b(\cdot)$ is a patient benefit function that is increasing and strictly concave in treatment intensity s, $u(\cdot)$ is the physician's utility of income, and $c(\cdot)$ is a strictly convex physician effort function, which depends on the time T spent by the physician on n consultations with treatment intensity s. If we let t_n measure the time spent per (standard length) consultation and t_s the time spent per unit of treatment intensity, the total time spent by the physician is given by $T = (t_n + t_s s)\, n$. The (regulated) prices the physician receives per consultation and per unit of treatment intensity are given by p and q, respectively. Finally, the parameter $\alpha \in [0,1]$ measures the degree to which the physician cares about patient benefit relative to own income. The case of $\alpha = 1$, in which the physician decides on the optimal treatment supply (n and s) solely by trading off patient benefit against costs of treatment, can be interpreted as the physician being a *perfect agent* for the patient. At the other extreme, where $\alpha = 0$, the physician does not care about patient benefit and decides on the optimal treatment supply by trading off own (utility

[4] In markets where patients are insured (implying that copayments are zero or very low), it is reasonable to assume, as for example Clemens and Gottlieb (2014) do, that health care quantity is mainly driven by physicians' supply decisions. Even if a physician does not face excess demand, there will in principle be some scope for *demand inducement* through recall visits, for example.

of) revenues against costs. By assuming that the utility function $u(\cdot)$ is weakly concave we also allow for the possibility of income effects (if $u''(\cdot) < 0$) on the physician's decision making.

The physician's optimal choices, n^* and s^*, are implicitly given by the following pair of first-order conditions:

$$\frac{\partial \Omega}{\partial n} = \alpha b(s^*) + (1-\alpha) u'\left((p+qs^*) n^*\right)(p+qs^*) - c'\left(T(n^*, s^*)\right)(t_n + t_s s^*) = 0, \tag{2}$$

$$\frac{\partial \Omega}{\partial s} = n^*\left(\alpha b'(s^*) + (1-\alpha) u'\left((p+qs^*) n^*\right) q - c'\left(T(n^*, s^*)\right) t_s\right) = 0. \tag{3}$$

We are interested in determining the effect on the optimal solution of a change in the price per consultation, p. By totally differentiating (2)-(3) and applying Cramer's rule, the effect of a change in the consultation price on the number of consultations is given by

$$\frac{\partial n^*}{\partial p} = -\frac{(1-\alpha) n}{\Delta}\begin{bmatrix} u'(\cdot)\left(\alpha b''(\cdot) - c''(\cdot) n t_s^2\right) \\ +n u''(\cdot)\left((1-\alpha) q^2 u'(\cdot) + \alpha(p+qs) b''(\cdot) + n t_s\left(t_n q - t_s p\right) c''(\cdot)\right) \end{bmatrix}, \tag{4}$$

where $\Delta := \left(\partial^2\Omega/\partial n^2\right)\left(\partial^2\Omega/\partial s^2\right) - \left(\partial^2\Omega/\partial n \partial s\right)^2$ is positive by the second-order condition. Similarly, the effect of a change in p on the physician's choice of treatment intensity is given by[5]

$$\frac{\partial s^*}{\partial p} = -\frac{(1-\alpha)}{\Delta}\begin{bmatrix} t_s u'(\cdot) c''(\cdot) T \\ -u''(\cdot) n\left((1-\alpha) q (p+qs) u'(\cdot) + \left(t_n q - t_s p\right) c''(\cdot) T\right) \end{bmatrix}. \tag{5}$$

Based on (4)-(5) we derive the following results:

Proposition 1 *(i) If the physician is a perfect agent for the patient ($\alpha = 1$), a change in the price per consultation has no effect on the number of consultations and the treatment intensity offered by the physician;*

(ii) If the physician is not a perfect agent for the patient ($\alpha < 1$), and if physician income effects are sufficiently small, a higher (lower) price per consultation leads to more (fewer) consultations and a lower (higher) treatment intensity.

If the physician is a perfect agent for the patient, the optimal supply of consultations and

[5] In both (4) and (5), we use the fact that, from (3), the optimal solution is characterised by

$$(1-\alpha) q u'(\cdot) = c'(\cdot) t_s - \alpha b'(\cdot).$$

treatment intensity depend only on a trade off between patient utility and treatment costs, neither of which depends on the price the physician receives per consultation. Consequently, changes in the physician payment has no effect on treatment decisions. On the other hand, if the physician also takes into account own revenue, the optimal decision is partly determined by the marginal revenue of increasing the number of consultation versus increasing the treatment intensity, which in turn depends on the relative prices, p/q. A higher price per consultation (p) increases the marginal revenue of consultations and therefore induces a profit-oriented physician to increase the number of consultations offered. The extra time spent on more consultations implies that the marginal cost of treatment intensity increases, which, all else equal, leads to a lower chosen treatment intensity.

The above described substitution effects will determine the physician response to a consultation price increase if the income effects are sufficiently small (i.e., $u''(\cdot)$ is sufficiently small in absolute value). However, since a higher consultation price also directly increases the physician's income, the effect on the optimal choices of n and s is generally ambiguous in the presence of sufficiently large income effects, as illustrated by the second term in the square brackets of (4) and (5), respectively. However, from (5) we see that a sufficient (but not necessary) condition for $\partial s^*/\partial p < 0$ is $t_n/t_s > p/q$. Thus, the sign of $\partial s^*/\partial p$ is always negative, even in the presence of income effects, if the relative price of consultations is not too high compared with relative time costs. If, in addition, the physician is sufficiently profit-oriented (i.e., if α is sufficiently low), the sign of $\partial n^*/\partial p$ is also positive regardless of income effects, as can be verified from (4).

3 Institutional background

Norway has a public health care system financed through general taxation, i.e., National Health Service (NHS), where the state is responsible for secondary care and municipalities for primary care. GPs need a license to set up a practice and a contract with a municipality in order to offer services to patients within the NHS.[6] The number of GPs within each municipality is regulated by the Directorate of Health which also certifies the GPs with licenses. Thus, entry of physicians on the primary health care market is highly regulated in Norway.

There are more than 4000 public GPs with a municipality contract (called "fastleger" in

[6] GPs (with a license) may of course set up a practice for serving private patients, i.e., patients that either have private insurance or pay the full cost out-of-pocket.

Norwegian). 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.[7] However, GPs can potentially turn down new patients if their patient list is full. GPs are required to have at least 500 patients, but are not allowed to have more than 2500 patients. Within these boundaries, the GPs can actually decide the size of their list, and as long as their list is not full (closed), they are obliged to accept all new patients.

Almost all (95 percent of) GPs in Norway are self-employed with private practises.[8] Thus, the GPs are residual claimants of any surpluses (or deficits) related to treating patients within the NHS. However, prices are regulated (or set in negotiations between the government and the medical association), and cannot be set by the individual GP. The GPs receive third-party payments that are a combination of capitation and fee-for-service. The capitation part is paid by the municipalities, and the GPs are paid a flat payment per individual on their list (around NOK 400 per year). The fee-for-service part is paid by the National Insurance Scheme, and the GPs receive a fee per consultation and per medical procedure.

GPs may decide to become specialists in general medicine. This requires (at least) four years full-time GP practise, two years of training and course work, as well as a certain level of practise from working at both acute and specialist care units. Around 2/3 (approximately 2400) of the GPs are certified as specialists in general medicine. The specialist certificate has to be renewed every fifth year, which means that some GPs may lose their certification if they do not fulfill the criteria (e.g., not sufficient GP practice). When GPs become a specialist in general medicine they are entitled to a substantially higher consultation fee, while the fees for the residual GP services, such as laboratory tests and medical procedures, are left unchanged.

The fee schedule for GP services is regulated yearly by July 1. In Figure 1 we show the development in nominal fees for GP services over the period studied. The consumer price index is included for comparison.[9] We see that the basic consultation fee has not quite caught up with consumer prices, whereas the additional consultation fees, both for prolonged consultations and

[7] Of course, if individuals move to another municipality they are also allowed to switch GP across municipalities.
[8] The residual five percent of the GPs are basically publicly employed with regular salary contracts.
[9] The consumer price index is from Statistics Norway (www.ssb.no).

consultations with a GP specialist, have risen sharply during our sample period.[10]

[Figure 1]

4 Data and descriptive statistics

In order to examine whether GPs respond to financial incentives, we apply Norwegian administrative registry data from several sources. From the KUHR register, we obtain information about the fee-for-service payments to GPs from the National Insurance Scheme.[11] Since there are specific tariffs for each service, we observe the medical treatment provided to each patient, including medical procedures, laboratory tests, prolonged consultations, etc. We also observe the number of patient visits and the GP's total income per visit, as well as patient characteristics, such as age, gender and diagnosis.

To identify whether the GP is a specialist in general medicine or when he or she becomes such a specialist, we make us of the fee-for-service information in the KUHR register. Since the GP specialists are entitled to an additional consultation fee, we observe whether the GP is a specialist or the date the GP effectively becomes a specialist. GP characteristics, such as age and gender, are found in the GP database (Fastlegedatabasen), which also includes yearly information about the GP's patient list, such as number of patients enlisted and vacant slots.

The data sources mentioned above cover all GPs and virtually all GP consultations and services rendered.[12] We apply information for the years 2006-2011. From these data sources, we construct a GP panel data set with monthly observations. Using the information about GP's specialist status, we define three categories of GPs: the "Always", "Never" and "Becomes" specialist groups. In the "Becomes" specialist group, we restrict the sample to GPs that have practiced actively at least one month before and at least one month after specialist certification is granted. In a sensitivity test, we use a fourth category consisting of GPs who lose their specialist status for a temporary period.

[10] The fees for laboratory tests and medical producedures are numerous and therefore not possible to depict over time.

[11] 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. This register contains also fee-for-service payments to other private health care providers such as specialist doctors, dentists, physiotherapists, etc.

[12] 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 2010 (www.ssb.no/helse/statistikker/).

Our two main outcome variables are the number of consultations and treatment intensity. The former is measured by the variable *Visits*, which is the monthly number of consultations at the GP's office. The latter is captured by three different variables: (i) *LongCons* is the proportion of the GP's consultations that exceed 20 minutes; (ii) *Labtest* is the proportion of consultations where a test is taken[13]; and (iii) *Procedures* is the average number of medical procedures performed per consultation. In addition, we construct an outcome variable, *Totalfee*, which is the average GP payment per consultation, including both the fee-for-service and possible copayments from the patients.

Our explanatory variable of prime interest is *Specialist*, which takes the value one when the GP is a specialist and zero otherwise. Control variables include GP and patient characteristics. A description of all variables used in the estimations is found in Table 1.

[Table 1]

Descriptive statistics

Descriptive statistics by GP category are shown in Table 2. Our main interest is in the "Becomes" specialist category. During our sample period from 2006 to 2011, 538 GPs obtain specialist certification, which entitles them to a higher consultation fee. When comparing means before and after specialist certification is obtained, we observe that "Becomes" specialists have more consultations per month, but offer lower treatment intensity. The increase in *Totalfee* (around NOK 105) exceeds the extra consultation fee that the GPs can charge when becoming specialists (on average around NOK 72). Notice that these figures partly reflect the increase in the consultation fee over time (as seen in Figure 1), since we compare the GPs' total income per consultation before and after becoming a specialist. We also observe that the number of patients enlisted becomes slightly higher after specialisation, whereas the characteristics of the patient population seem to be fairly constant.

[Table 2]

For comparison we also include the descriptive statistics for the "Always" and "Never" spe-

[13] Unfortunately, we cannot identify the number of lab tests for a given consultation, only whether a lab test is performed.

cialist group. The most striking difference between these two groups is that "Always" specialists have more patients enlisted and more consultations per month. The “Never" specialists, in turn, offer more long consultations and medical procedures. As expected, "Always" specialists have a higher income per consultation, but the average difference of NOK 38 is less than the extra specialist fee they receive (on average NOK 72). A similar pattern is present for the “Temporary non-specialist” category.

These findings may suggest that the GPs respond to the changes in the fee schedule related to specialist status. However, it may also reflect supply-side factors, such as the GPs' skills in medical treatment due to specialisation, or demand-side factors, such as size and composition of the patients enlisted by the GP. In order to identify the causal effects of financial incentives on GPs' provision of medical care, a key challenge is to control for (observed and unobserved) differences in GP and patient characteristics. As a first approach to limit this problem, we focus only on the "Becomes" specialist category.

To study more closely to what extent GPs respond to financial incentives, we consider changes in the provision of medical care within a “window” 12 months before and 12 months after specialist status is gained, normalised to the level 12 months before certification. Figure 2 depicts a sharp shift in the trend of the GPs' total income per consultation and the number of consultations from one month before to one month after becoming a specialist. This effect appears to be instantaneous and fairly stable over time. From Figure 3 we see that treatment intensity falls as soon as specialist certification is obtained, especially considering the frequency of prolonged consultations and the number of procedures per consultation. Since Figure 2 and 3 are based on an unbalanced panel of GPs (see Figure A1 in the Appendix), we construct the same figures for a balanced panel with 181 GPs present in all periods. The picture is very similar, as shown in Figure A2 and A3 in the Appendix.

[Figure 2 and 3]

However, a more thorough investigation is needed to account for factors that may affect the GPs' provision of services and possibly coincide with specialist certification, such as demand-side factors (e.g., changes in patient population) or supply-side factors (e.g., GP skills in medical treatment). In addition, a possible confounding factor is that becoming a specialist requires time

and effort from the GP, which might influence the provision of medical care during the qualifying period. In the next section, we explain our empirical strategy for dealing with these (and other) issues.

5 Empirical strategy

Our empirical strategy for identifying the GPs' responses to financial incentives is to compare the provision of medical care in a narrow "window" around the date the GP becomes a specialist in general medicine – from three months before to three months after the date of certification. The identifying assumption is that within such a short period, there are no changes (other than the specialist fee) that cannot be controlled for and that may affect treatment in a significant and systematic manner. Focusing on a short period, we control for all demand and supply changes that may influence the GPs' health care provision, such as changes the GPs' human capital or the size and composition of the patient population. In this way, we can identify the causal effect of the fee changes on the GPs medical treatment holding all other factors constant.

In the analysis we restrict the sample to the "Becomes" specialist group only, excluding the GPs that are "Always" or "Never" specialists. Since we do not use other GPs as controls, this implies that the counterfactual situation is represented by the "treated" GPs' medical treatment in the period just before their specialist certification. Moreover, since the GPs continuously become specialists at different dates over the observational period, it is unlikely that other factors coincide with becoming a specialist, and therefore unnecessary to use "Always" or "Never" specialists as a control group.[14]

Our empirical strategy ensures internal validity, but may raise a concern about external validity. The GPs that become specialists may differ from the non-specialists on unobservable characteristics that can be related to our outcome variables, for instance, regarding profit-motivation or degree of altruism. However, as shown in Figure A4 in the Appendix, the large majority (more than 80 percent) of the GPs become specialists during their career, and are thus highly representative for the population of GPs.

Our main specification is a model with fixed-effects at the GP level as presented below, where

[14]For sensitivity tests, we estimate models using the "Always" and "Never" specialist categories as control groups. The results are qualitively similar and available upon request.

the subscripts i, j and t represents GP, calender month, and year, respectively:

$$Y_{ijt} = \beta_0 + \beta_1 Specialist_{ijt} + \beta_2 \mathbf{GP}_{ijt} + \theta_j + \delta_t + \gamma_i + \varepsilon_{ijt} \tag{6}$$

The dependent variable Y represents the GPs' medical treatment measured by either the number of visits, the treatment intensity (rate of prolonged consultations, rate of laboratory tests, number of medical procedures), or the total fee earned per consultation; see Table 1 for a closer description. When estimating outcomes that reflect treatment intensity, the number of visits is included as control. The parameter of interest is β_1, which represents the change in Y from the pre to the post certification period. The vector **GP** comprises characteristics of the GP's patient population, including age, gender and comorbidity of visiting patients, and (yearly information about) the number of patients enlisted. The fixed-effect γ captures time-invariant GP characteristics, whether observable (such as gender, year of birth) or unobservable (e.g., altruism, profit-motivation, skills, etc.). Finally, we include month and year dummies to control for seasonal variation and time trends, whereas ε is an error term. All models are estimated with robust standard errors.

6 Results

Becoming a specialist in general medicine substantially increases the fee for consultations (more than 60 percent), but does not affect the fees for other GP services. Thus, the GP specialist status changes both the total and the relative fee payments. As shown in the theory section, the GPs' response to such a change in financial incentives depends on the degree of profit motivation relative to altruism. If the GP is a perfect agent for the patient, we expect no response to the extra specialist fee for consultation. However, if the GP is (to some extent) motivated by profits, the theory model predicts that the higher consultation fee leads to more consultations and lower treatment intensity, under the assumption of sufficiently small income effects.

In our empirical analysis we aim at testing these theoretical predictions by controlling for relevant factors other than financial incentives that might affect the GPs' treatment decisions. Our main results are reported in Table 3.

[Table 3]

The results show that GPs who become specialists change their service pattern profoundly from three month prior to certification to three month after certification. We estimate the impact of specialist status for five different outcomes reported in separate columns. After obtaining specialist certification, the GPs increase the number of visits per month by 19.5 on average, but reduce the treatment intensity per visit: the rate of prolonged consultations and laboratory tests are decreased by 3.2 and 1.0 percentage points, respectively, while the average number of medical procedures per consultation falls by about 0.02. Despite the decrease in treatment intensity, the total fee per consultation rises (with about NOK 61). Thus, the increase on consultation fee due to specialisation dominates the reduction in treatment intensity. Some of these effects are small in absolute values, but compared to pre-certification levels of the "Becomes" group, they are of considerable magnitude. Total fee per consultation rises by 28 percent, the number of visits increases by 9 percent, and treatment intensity falls by $2-10$ percent depending on which outcome is considered. Except for lab tests, all effects mentioned above are statistically significant at least at the one percent level.

Since we apply a fixed-effect model, the estimated parameters for our variables show how individual GPs on average respond to changes over time. From Table 3, we see that the effects of patient population characteristics (i.e., age, gender and comorbidity) are mostly insignificant and/or small. This is as expected given the small variation in patient population from the pre- to the post-certification period.

7 Sensitivity analysis

7.1 Narrowing the time window

A potential concern with our empirical strategy is that the GPs expend effort in the pre-certification period in order to qualify for specialisation. Thus, the finding that the number of visits increases sharply from three months before to three months after specialist certification could potentially be explained by such time-consuming effort. However, this cannot explain that GPs reduce the treatment intensity after receiving specialisation. Moreover, since the approval of specialisation by the medical association usually takes two to three months, the GPs are not likely to undertake time-consuming training in the short three month period before receiving the certification. To ensure that this not a problem to our results, we conduct a sensitivity test by

reducing the time window to one month before and after certification using the same empirical specification as in (6).

[Table 4]

As shown in Table 4, the results are almost identical to the results using a three month period before and after specialisation. Since the GPs do not expend training effort the month before receiving certification, these results confirm that the changes in GPs' medical treatment behaviour are due to the total and relative fee changes related to becoming a specialist.

The fee schedule is changed annually by 1st of July. This implies that the GPs that become specialists in June or July are exposed to the revision of the fee schedule in addition to the change in consultation fee for specialists. To check whether our results are affected by this, we exclude all GPs becoming specialist in these two months. From the lower section of Table 4, we see that the results are almost identical, except for a stronger effect on the number of visits (now 24.6, while before 19.3).

7.2 Extending the time window

An interesting question is whether the effects reported in Table 3 are just short term or actually represents a persistent shift in the GPs' provision of health care. To investigate this question, we include observations for the "Becomes specialist" group from three months up to 24 months after certification. Results are reported in Table 5.

[Table 5]

Although we observe minor changes in the effects as the after-certification period is extended, the results show the same overall picture as described above: after specialist certification, GPs increase their number of visits and decrease treatment intensity. Thus, the results in Table 5 increases our confidence in the main results that GPs respond to a higher consultation fee due to specialist certification, and that this effect is persistent over time.

7.3 Temporary non-specialists

In our data there are some GPs that temporarily lose their specialisation. This enables us to conduct a sensitivity test, where we investigate whether these GPs respond in the same way to

financial incentives as the "Becomes" specialists. When estimating the effects, we include only GPs who lose their specialist certification and then regain it during our observation period. This gives a sample of 54 GPs, defined as the "Temporary non-specialist" category in Section 4.

Since the number of GPs that temporarily lose their specialisation is fairly small, we use a difference-in-differences approach with the "Always specialists" as a comparison group representing the counterfactual situation. To identify the effect of fee changes due to (losing) specialisation, we include two dummy variables: (i) *NonSpec* which takes the value one in the periods when the GPs temporarily lose their specialist certification; and (ii) *Post NonSpec* which takes the value one in the periods after the GPs regain their specialist certification.

[Table 6]

We find that in the period after loss of certification, GPs have fewer consultations and higher treatment intensity than they had when they were remunerated as specialists. These results are consistent with our results reported in Tables 3 and 4. When GPs regain their specialist certification, their medical treatment pattern is almost identical as before their certification was lost. The estimated parameters for the *Post NonSpec* variable are either insignificant or ignorable in magnitude, with the exception that the number of procedures per consultation has increased.

8 Patients' health outcomes

Having found that GPs change their medical treatment pattern due to changes in the fee-for-service schedule, a natural question is whether this has as any impact on the patients' health. To investigate this question, we consider whether the patients receive emergency care shortly after visiting the GP. We believe this measure captures adverse health effects that potentially are due to insufficient treatment by the GPs. In our data we have information about all patient visits at emergency care centres. For all patients we observe the date of the GP visit and the date for emergency care for the patients that receive this. Based on this we define a visit to an emergency care centre within a week (either three or seven days) after a GP visit as an adverse health effect. In the analysis, we use the same specification as in our main model given in (6) using all consultations three months before and after the GPs received their specialist

certification. As reported in the table, we consider both the change in the absolute number of emergency visits and the change in the proportion of all consultations that result in an emergency visit within three or seven days after a GP visit.

[Table 7]

As can be seen from the table, we find no evidence for adverse health effects due to the change in the GPs' medical treatment. Thus, the GPs' response to the change in the fee schedule does not seem to affect patients negatively. In terms of policy implications, our results suggest that the higher consultation fee has a negative welfare effect since it increase the medical expenditures significantly without resulting in positive health effects for the patients. However, our measure of patient health outcomes is imprecise and may not capture all relevant aspects related to the effect of the medical treatment. Thus, we cannot rule out that the change in the GPs medical treatment after becoming specialists may involve positive (or negative) health effects for their patients.

9 Concluding remarks

In this paper we provide evidence that physicians respond to financial incentives. Using rich register data, we employ a panel data set covering all patient visits to GPs in Norway over the six year period 2006-11. We take a novel approach to identify the causal effects of changes in the fee schedule on physicians medical treatment by focusing on GPs that become specialists in general medicine and thus are entitled to a higher consultation fee. This approach yields variation in the fee schedule across GPs over time due to the fact that GPs obtain certification at different dates. Since becoming a specialist is endogenous, we estimate the effects in a narrow time window around the date of specialisation. In this short period it is not likely that much else than the change in the consultation fee affects the GPs' treatment decisions.

Our results show the GPs that become a specialist in general medicine change their treatment behaviour immediately after becoming a specialist. We find that the higher consultation fee associated with specialisation leads to a strong positive effect on the number of consultations, but a negative effect on treatment intensity (measured by laboratory tests, medical procedures and prolonged consultations). Despite the reduction in treatment intensity, we find that the total

income per consultation increases, which implies that the direct effect of the higher consultation fee dominates.

These results are consistent with a theory model with excess demand where the GPs are partly profit motivated and income effects are sufficiently small. In this setting, a GP would respond to a higher consultation fee by treating more patients, but with a lower intensity of medical treatments for two reasons: First, a higher consultation fee implies a change in relative prices (fees), making consultations more profitable relative to treatment intensity. Second, the extra time spent on consultations implies that the marginal cost of medical treatments becomes higher due to the GPs' time constraint.

Finally, our empirical analysis find no (positive or negative) effect on patients' health outcomes measured by emergency care visits shortly after a GP visit. This result suggests a negative welfare effect due to the large increase in medical expenditures. However, our measure of health effects may be imprecise, implying that the result must be interpreted carefully. Moreover, we do not study the effect of becoming a specialist per se. GPs that undertake specialist training are likely to improve their treatment skills gradually over time. However, we use only specialisation as an instrument for changes in fees, and our analysis does not focus on the social value of specialisation in general medicine.

A Appendix

[Figure A1 to A4]

References

[1] Carlsen, F., Grytten, J., Skau, I., 2003. Financial incentives and the supply of laboratory tests. European Journal of Health Economics, 4, 279–285.

[2] Carlsen, F., Grytten, J., Skau, I., 2011. Physician response to fee changes: using inheritance as a quasi-natural experiment. Applied Economics, 15, 1913–1922.

[3] Clemens, J., Gottlieb, J.D., 2014. Do physicians' financial incentives affect medical treatment and patient health? American Economic Review, 104, 1320–1349.

[4] Devlin, R.A., Sarma, S., 2008. Do physician remuneration schemes matter? The case of Canadian family physicians. Journal of Health Economics, 27, 1168–1181.

[5] Epstein, A.J., 2012. Physician response to financial incentives when choosing drugs to treat breast cancer. International Journal of Health Care Finance and Economics, 12, 285–302.

[6] Gosden, T., Sibbald, B., Williams, J., Petchey, R., Leese, B., 2003. Paying doctors by salary: a controlled study of general practitioner behaviour in England. Health Policy, 64, 415–423.

[7] Gruber, J., Owings, M., 1996. Physician financial incentives and cesarean section delivery. RAND Journal of Economics, 27, 99–123.

[8] Grytten, J., Carlsen, F., Sørensen, R., 1995. Supplier inducement in a public health care system. Journal of Health Economics, 14, 207–229.

[9] Grytten, J., Carlsen, F., Skau, I., 2001. The income effect and supplier induced demand. Evidence from primary physician services in Norway. Applied Economics, 33, 1455–1467.

[10] Hennig-Schmidt, H., Selten, R., Wiesen, D., 2011. How payment systems affect physicians' provision behaviour – An experimental investigation. Journal of Health Economics, 30, 637–646.

[11] Hadley, J., Reschovsky, J.D., 2006. Medicare fees and physicians' medicare service volume: Beneficiaries treated and services per beneficiary. International Journal of Health Care Finance and Economics, 6, 131–150.

[12] Hurley, J., Labelle, R., 1995. Relative fees and the utilization of physicians' services in Canada. Health Economics, 4, 419–438.

[13] Iizuka, T., 2007. Experts' agency problems: evidence from the prescription drug market in Japan. RAND Journal of Economics, 38, 844–862.

[14] Kantarevic, J., Kralj, B., Weinkauf, D., 2008. Income effects and physician labour supply: evidence from the threshold system in Ontario. Canadian Journal of Economics, 41, 1262–1284.

[15] McGuire, T.G., Pauly, M.V., 1991. Physician responses to fee changes with multiple payers. Journal of Health Economics, 10, 385–410.

[16] Rice, T., 1983. The impact of changing Medicare reimbursement rates on physician-induced demand. Medical Care, 21, 803–815.

[17] Rice, T., 1984. Physician-induced demand for medical care: New evidence from the Medicare program. Advances in Health Economics and Health Services Research, 5, 129–160.

[18] Sarma, S., Devlin, R.A., Belhadji, B., Thind, A., 2010. Does the way physicians are paid influence the way they practice? The case of Canadian family physicians' work activity. Health Policy, 98, 203–217.

[19] Sørensen, R., Grytten, J., 2003. Service production and contract choice in primary physician services. Health Policy, 66, 73–93.

[20] Tai-Seale, M., Rice, T.H., Stearns, S.C., 1998. Volume responses to Medicare payment reductions with multiple payers: A test of the McGuire-Pauly model. Health Economics, 7, 199–219.

TABLES

Table 1. Variable definitions

GP categories:	
Always specialist	1 if GP is registered as a specialist in general medicine for the whole period
Never specialist	1 if GP is not registered as a specialist in any month within the observation period
Becomes specialist	1 if GP becomes a specialist in general medicine within the data period
Temporary non-specialist	1 in months when the GP has temporarily lost the specialist certification.
Dependent variables	
TotalFee	Average amount earned per consultation, NOK
LongCons	Prolonged consultations, rate
LabTests	Laboratory tests, rate
Procedures	Average number of procedures (per consultation)
Visits	Number of visits (consultations per month)
Explanatory variables	
Specialist	1 in months after a GP in the becomes specialist category has gained specialist status
PatAge	Average age of (visiting) patients
PatMale	Proportion of male (visiting) patients
CoMorb	Proportion of (visiting) patients with a secondary diagnosis
GPAge	Age of the GP
GPMale	1 if the GP is male
ListLength	Number of patients listed with GP, in 100s (by 1 January each year)
NonSpec	1 in months after a GP in the temporarily non-specialist category loses specialist status
Post NonSpec	1 in months after the certification has been regained by a GP in the temporarily non-specialist category

Table 2. Descriptive statistics, means and standard deviations in parenthesis.

	Always specialist	Never specialist	Becomes specialist		Temporary non-specialist	
			Before	After	Specialist	Non-specialist
TotalFee	286.68	248.52	221.52	326.31	290.67	260.85
	(90.69)	(69.75)	(71.16)	(64.41)	(82.52)	(78.89)
LongCons	0.27	0.34	0.31	0.28	0.31	0.40
	(0.14)	(0.18)	(0.15)	(0.13)	(0.16)	(0.25)
LabTest	0.43	0.42	0.41	0.41	0.39	0.39
	(0.11)	(0.13)	(0.11)	(0.210)	(0.12)	(0.12)
Procedures	0.21	0.24	0.26	0.25	0.23	0.27
	(0.13)	(0.18)	(0.16)	(0.17)	(0.15)	(0.18)
Visits	265.97	229.91	220.82	253.03	265.75	219.63
	(115.41)	(120.61)	(98.60)	(112.02	(129.05)	(98.88)
PatAge	47.91	46.26	43.89	44.69	47.92	48.61
	(6.60)	(7.70)	(7.29)	(6.52)	(7.32)	(7.72)
PatMale	0.41	0.41	0.39	0.39	0.43	0.45
	(0.12)	(0.11)	(0.10)	(0.10)	(0.10)	(0.09)
CoMorb	0.20	0.20	0.18	0.18	0.22	0.25
	(0.17)	(0.17)	(0.14)	(0.15)	(0.18)	(0.21)
GPAge	53.52	44.24	40.19	43.51	52.53	50.66
	(6.84)	(10.83)	(7.64)	(6.90)	(7.30)	(9.32)
GPMale	0.72	0.64	0.62	0.59	0.88	0.95
	(0.45)	(0.48)	(0.48)	(0.49)	(0.32)	(0.20)
ListLength	1308.04	1162.67	1153.81	1223.18	1299.09	1159.61
	(361.28)	(402.05)	(320.13)	(331.16)	(409.77)	(348.13)
Observations	126 014	64 252	14 188	17 835	2 808	575
GPs	1 936	1 398	538	538	54	54

Table 3. GP treatment decisions, changes as specialist certification is obtained.

	(1) TotalFee	(2) LongCons	(3) LabTest	(4) Procedures	(5) Visits
Specialist	61.4249***	-0.0316***	-0.0099*	-0.0207**	19.4960***
	(1.8475)	(0.0052)	(0.0047)	(0.0077)	(5.2476)
PatAge	-0.7223	-0.0003	0.0033*	-0.0021	-2.5543**
	(0.7850)	(0.0015)	(0.0014)	(0.0011)	(0.8912)
PatMale	-82.1155	-0.1046	0.1375	-0.0940	42.6218
	(72.8948)	(0.0739)	(0.0772)	(0.1301)	(51.6252)
CoMorb	0.4019*	0.0007	0.0006	0.0005	-0.1207
	(0.2024)	(0.0005)	(0.0005)	(0.0010)	(0.3249)
Visits	-0.0447***	-0.0001**	0.0000	-0.0001*	
	(0.0133)	(0.0000)	(0.0000)	(0.0000)	
ListLength	-4.7117	0.0073***	0.0007	-0.0260	-0.8772
	(3.9336)	(0.0021)	(0.0035)	(0.0151)	(2.2092)
Cons	386.7921***	0.2626**	0.2193*	0.6407***	322.0174***
	(78.8321)	(0.0953)	(0.0894)	(0.1846)	(63.7056)
Year/month fixed effects	Yes	Yes	Yes	Yes	Yes
GP fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	3043	3043	3043	3043	3043
GPs	538	538	538	538	538
R^2	0.650	0.119	0.084	0.061	0.211

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

Table 4. GP treatment decisions, analysed over a shorter pre and post certification period.

	(1) TotalFee	(2) LongCons	(3) LabTestst	(4) Procedures	(5) Visits
1 months before and 1 months after					
Specialist	62.2542***	-0.0273***	-0.0106**	-0.0209***	19.2512***
	(1.3386)	(0.0037)	(0.0039)	(0.0048)	(4.0094)
Observations	1076	1076	1076	1076	1076
GPs	538	538	538	538	538
R2	0.825	0.162	0.110	0.070	0.265
1 months before and 1 months after, excluding GPs becoming specialist in June or July					
Specialist	60.5044***	-0.0322***	-0.0150**	-0.0193***	24.5853***
	(1.6366)	(0.0051)	(0.0049)	(0.0056)	(4.7190)
Observations	944	944	944	944	944
GPs	538	538	538	538	538
R2	0.834	0.169	0.125	0.070	0.282

Robust standard errors in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. All models are estimated with GP, year and month fixed effects and with the same set of explanatory variables as in Table 3.

Table 5. GP treatment decisions, analysed over a longer post certification period.

	(1) TotalFee	(2) LongCons	(3) LabTestst	(4) Procedures	(5) Visits
3 months before and 6 months after					
Specialist	59.0154***	-0.0257***	-0.0116***	-0.0144**	22.7039***
	(1.5992)	(0.0035)	(0.0033)	(0.0047)	(3.7880)
Observations	4519	4519	4519	4519	4519
GPs	538	538	538	538	538
R2	0.616	0.113	0.074	0.040	0.239
3 months before and 12 months after					
Specialist	57.3149***	-0.0268***	-0.0129***	-0.0173***	21.9896***
	(1.0752)	(0.0023)	(0.0022)	(0.0032)	(2.6151)
Observations	7175	7175	7175	7175	7175
GPs	538	538	538	538	538
R2	0.572	0.093	0.075	0.035	0.225
3 months before and 24 months after					
Specialist	56.8295***	-0.0267***	-0.0161***	-0.0175***	20.9107***
	(0.9005)	(0.0019)	(0.0018)	(0.0028)	(2.0446)
Observations	11482	11482	11482	11482	11482
GPs	538	538	538	538	538
R2	0.522	0.071	0.066	0.028	0.227

Robust standard errors in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. All models are estimated with GP, year and month fixed effects and with the same set of explanatory variables as in Table 3.

Table 6. GP treatment decisions, changes for the "Temporarily non-specialist" category.

	(1) TotalFee	(2) LongCons	(3) LabTestst	(4) Procedures	(5) Visits
NonSpec	-52.3182***	0.0354***	0.0302***	0.0271***	-34.8748***
	(1.6718)	(0.0032)	(0.0031)	(0.0036)	(3.4601)
Post NonSpec	-0.6203	-0.0054*	-0.0007	0.0103***	-0.4807
	(1.2764)	(0.0024)	(0.0024)	(0.0028)	(2.6427)
PatAge	0.6672***	0.0019***	0.0029***	-0.0007***	-4.8478***
	(0.0340)	(0.0001)	(0.0001)	(0.0001)	(0.0691)
PatMale	-3.6690*	-0.0671***	0.0300***	-0.0559***	7.7112*
	(1.8359)	(0.0035)	(0.0034)	(0.0040)	(3.8011)
CoMorb	0.0907***	0.0009***	0.0002***	0.0004***	-0.2207***
	(0.0112)	(0.0000)	(0.0000)	(0.0000)	(0.0231)
Visits	-0.0244***	-0.0001***	0.0000***	-0.0000***	
	(0.0014)	(0.0000)	(0.0000)	(0.0000)	
ListLength	-0.5593***	-0.0038***	0.0014***	0.0013***	7.7999***
	(0.1092)	(0.0002)	(0.0002)	(0.0002)	(0.2250)
Cons	241.2865***	0.2641***	0.2351***	0.2388***	416.7599***
	(2.3211)	(0.0044)	(0.0043)	(0.0051)	(4.6618)
Year/month fixed effects	Yes	Yes	Yes	Yes	Yes
GP fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	129 397	129 397	129 397	129 397	129 397
GPs	1 990	1 990	1 990	1 990	1 990
R^2	0.545	0.068	0.096	0.016	0.270

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

Table 7. Number of patients visiting an emergency care centre within 3 or 7 days.

	(1) Number of patients, within 3 days	(2) Number of patients, within 7 days	(3) Proportion of all consultations, within 3 days	(4) Proportion of all consultations, within 7 days
Specialist	-0.1419	-0.0183	-0.0002	0.0001
	(0.0797)	(0.1213)	(0.0004)	(0.0006)
PatAge	-0.0069	-0.0102	-0.0001	-0.0001
	(0.0062)	(0.0099)	(0.0001)	(0.0001)
PatMale	0.1791	0.0047	0.0009	0.0075
	(0.3417)	(0.5028)	(0.0039)	(0.0070)
CoMorb	-0.0035	-0.0147**	0.0000	-0.0000
	(0.0030)	(0.0052)	(0.0000)	(0.0000)
Visits	0.0031***	0.0052***	0.0000	-0.0000
	(0.0003)	(0.0006)	(0.0000)	(0.0000)
ListLength	0.0242	0.0236	0.0001	0.0000
	(0.0351)	(0.0544)	(0.0002)	(0.0002)
Cons	-0.8792	0.7591	0.0037	0.0111
	(0.8749)	(1.3429)	(0.0044)	(0.0074)
Year/month fixed effects	Yes	Yes	Yes	Yes
GP fixed effects	Yes	Yes	Yes	Yes
Observations	3043	3043	3043	3043
GPs	538	538	538	538
R^2	0.058	0.072	0.015	0.018

FIGURES

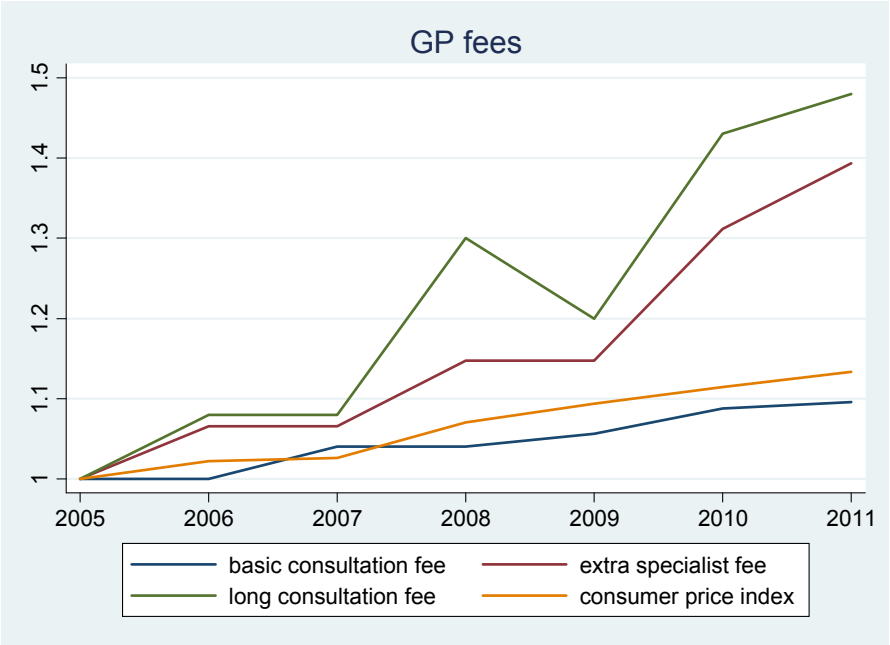

Figure 1. GP fees over time, nominal terms, with 2005 as base year (www.lovdata.no). In Norwegian kroner (NOK) the fees as of July 2005 are as follows: basic consultation fee NOK 125, long consultation fee NOK 100, and extra specialist fee NOK 61.

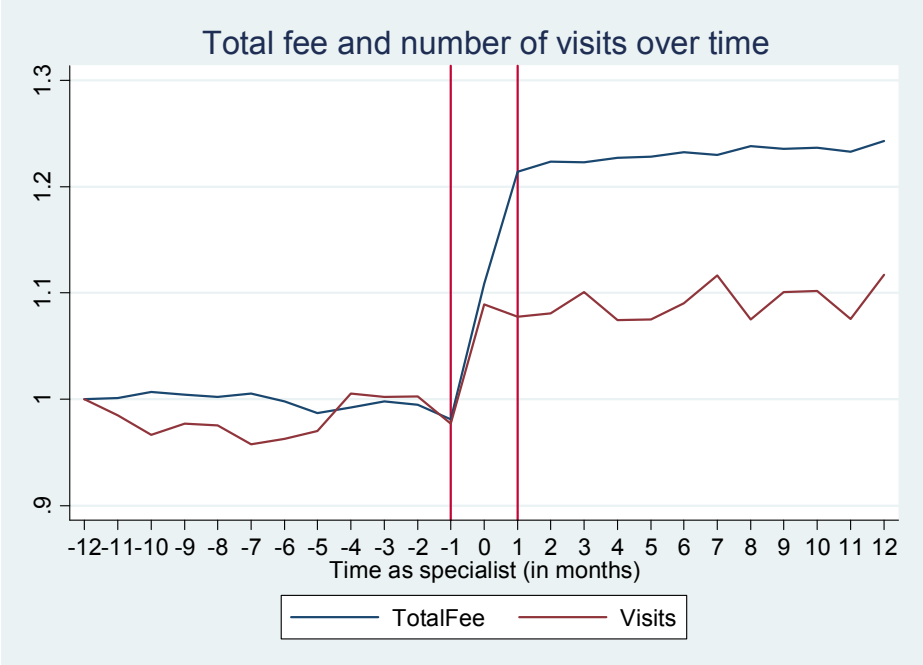

Figure 2.Total fee per consultation and number of visits per month, means taken over all GPs in the estimated sample who become specialists within the period studied.

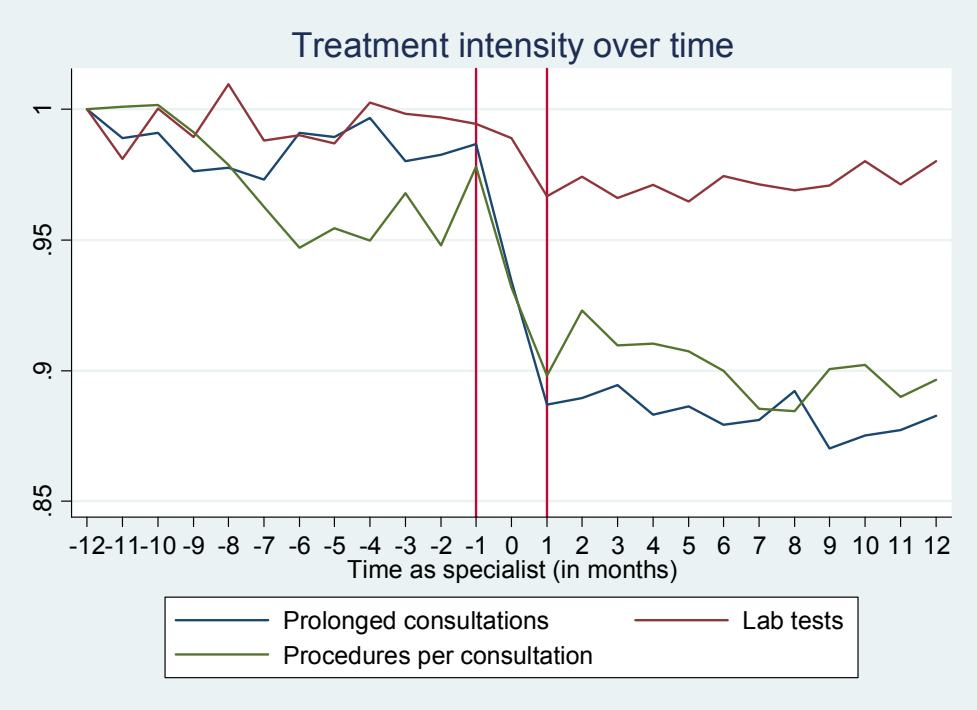

Figure 3. Treatment intensity over time. Means are taken over all GPs in the estimated sample who become specialists within the period studied.

FIGURES APPENDIX

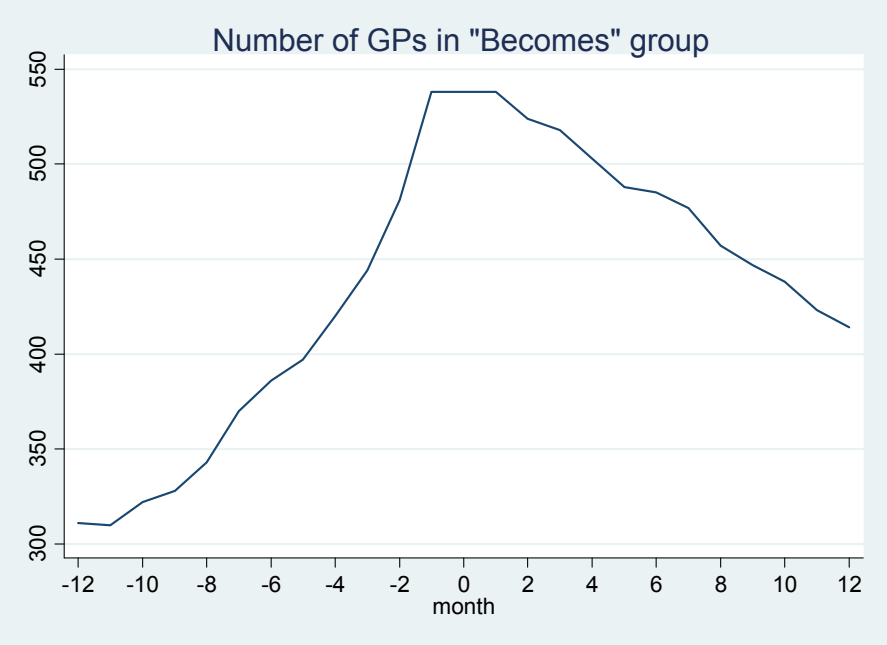

Figure A1. Number of GPs in the " Becomes" group who are included in the data. The horizontal axis shows month relative to month of certification.

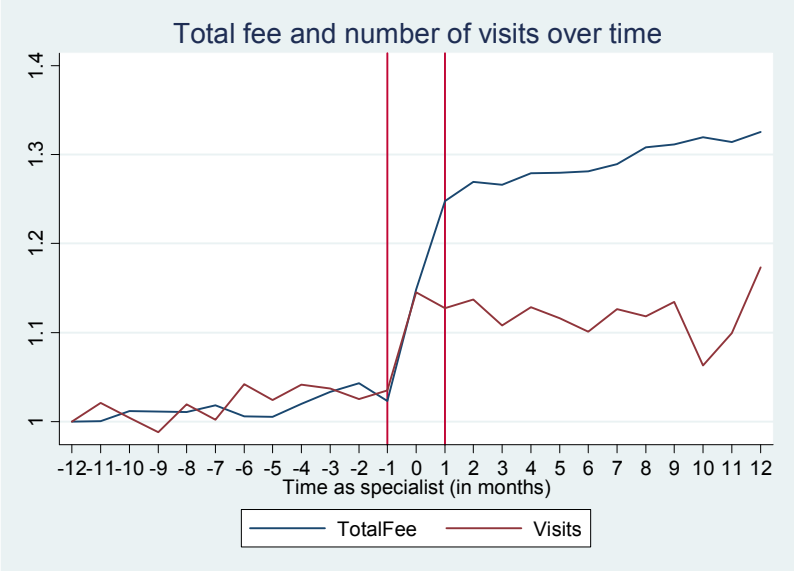

Figure A2. Total fee per consultation and number of visits per month, relative to month of certification. Means taken over all GPs in the estimated sample who become specialists within the period studied and are present in the data for all 25 months.

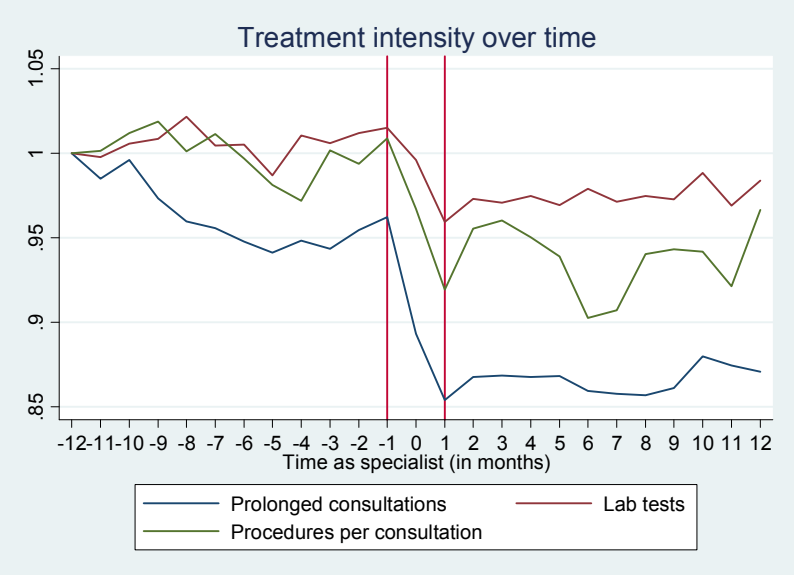

Figure A3. Treatment intensity relative to month of certification. Means taken over all GPs in the estimated sample who become specialists within the period studied and are present in the data for all 25 months.

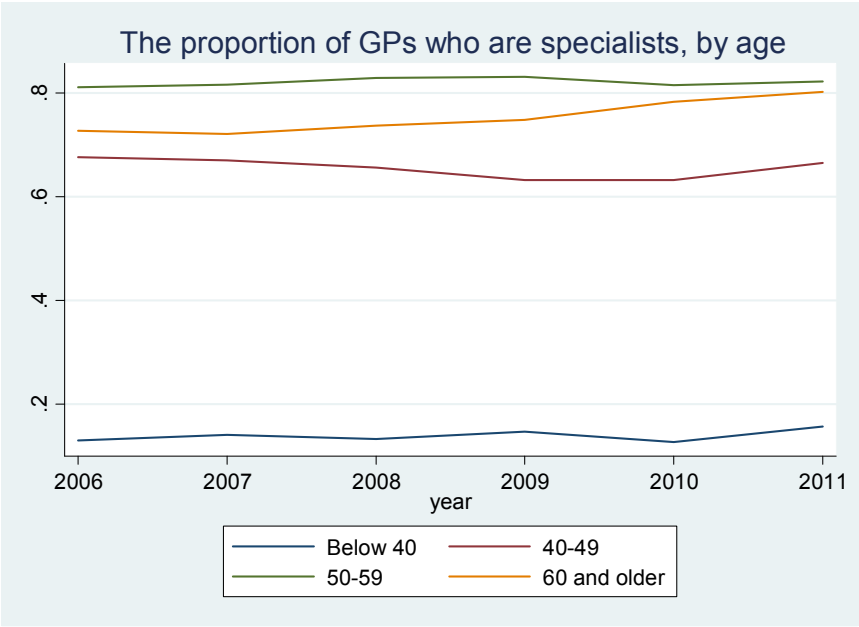

Figure A4. The proportion of GPs who are certified as specialist, by age groups.