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Abstract

In all the Scandinavian countries, general practitioners (GPs) are, to a varying degree, remunerated with fee per service. Fees can be powerful economic incentives. However, whether or not GPs respond to these incentives is a point of contention in the literature. Some studies find strong associations between the number of patients and service utilization per patient, and interpret this as evidence of supplier-induced demand, other studies do not. The central claim here is that it may depend on the professional norms. Specifically, we expect GPs to respond to economic incentives only if professional norms (prescriptions for the acceptable actions within a given occupation) are absent or weak. To test this, we compare ordinary consultations, talk therapy and house calls for Danish GPs. Ordinary consultations are regulated by strong professional norms; house calls are regulated by norms of medium strength; and only very weak norms apply to talk therapy. As expected, we find stronger effects of economic incentives when the professional norms are weak and conclude that both economic incentives and professional norms are important factors.

Honorar aflønning af praktiserende læger: Mellem økonomiske incitamenter og professionelle normer

Praktiserende læger bliver i alle de skandinaviske lande (om end i varierende omfang) aflønnet med honorarer for de ydelser, de leverer. Disse honorarer kan være et væsentligt incitament, men om de praktiserende læger lader sig påvirke heraf, er et stridspunkt i litteraturen. Nogle studier finder en stærk sammenhæng mellem antallet af patienter på lægernes lister og ydelsesforbruget pr. patient og fortolker det som udbudsinduktion, mens andre studier ikke finder belæg for dette. Denne artikels centrale påstand er, at det afhænger af de professionelle normer. Mere specifikt forventer vi, at de praktiserende læger kun reagerer på økonomiske incitamenter, når de professionelle normer (forskrifter for acceptable handlinger indenfor faggruppen) er fraværende eller svage. For at teste dette, sammenligner vi almindelige konsultationer, samtaleterapi og hjemmebesøg for danske praktiserende læger. Almindelige konsultationer reguleres af stærke professionelle normer, normerne for samtaleterapi er svage, og hjemmebesøg ligger midt imellem. Som forventet finder vi stærkere effekter af økonomiske incitamenter, når de professionelle normer er svage, og konkluderer, at både økonomiske incitamenter og professionelle normer er vigtige.

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Introduction¹

About 40 years ago, Newhouse (1970) claimed that healthcare providers could stimulate the demand for their own services. The validity of this claim soon became one of the most controversial topics in health economics (Peacock & Richardson, 2007: 267). The idea is based on the assumption that healthcare providers wish to maximize income and minimize work load (with varying preferences for the mix of income and leisure). In order to obtain the preferred combination of work load and income, health care providers can make use of the fact that information is asymmetrically distributed: Patients rarely know how many (and which) health services they need. But can and will healthcare providers use this power to manipulate demand for their services? Do they take advantage of the information asymmetry and affect the demand if it is lower or higher than preferred? This is especially relevant in countries where income of health providers depends on the number and types of services supplied to the patients.

This is, to a varying degree, the case for general practitioners (GPs) in all the Scandinavian countries. Although the question is relevant for many health professions, this article focuses on GPs, because they are gatekeepers to the healthcare system and because no other health profession controls their services. In Norway, regular GPs receive per capita reimbursement (30 % of their income) combined with fee-for-service and out-of-pocket expenditures from the patient (70% of their income), while GPs in the public GP scheme are paid a fixed salary (Johnsen, 2006: 56). In Sweden, the mechanisms for paying providers vary among counties, but it is generally based on capitation for registered patients combined with fee-for-service and performance-based payments (Anell et al., 2012: 49). In Finland, the “personal doctor” system, where physicians are paid a combination of a basic salary, capitation payment and fee-for-service payment for visits, was introduced in 1986. The municipalities have the freedom to choose whether to implement this system, and approximately half of the relevant GPs belong to it (Vuorenkoski, 2008: 24). The traditional payment method for GPs in Finland is through a monthly salary with a few extra fee-for-service payments (ibid.: 69). Denmark does, however, have the most clear-cut fee-for-service system for GPs in Scandinavia. All Danish GPs are remunerated according to a national fee system combining capitation (a third of their income) and fees for services (the remaining two-thirds of the income) (Olejz et al., 2012: 80). Danish GPs are self-employed specialists in general medicine with a contract with the National Health Insurance (S & P, 1997-2006), and the two most important economic incentives are the list size (the number of patients a given GP has attached on his practice) and the fees. The combination of relative fees and time-use for the different services makes some services more lucrative than others, and list size matters for the incentive to stimulate/reduce patient demand to fit the GPs preferred combination of leisure and income. This can potentially affect service utilization, that is, how many services of a given service type each patient gets.

Whether these two incentives can be expected to affect the GPs' behavior is a point of contention in literature (Léonard et al., 2009). One position argues that lack of patients and fee changes will make GPs manipulate the demand for their services. Specifically, GPs with few patients are expected to give each patient more (lucrative) services than necessary (Evans, 1974; Bech et al., 2009), while GPs with many patients will oppositely ration their services. This position argues that *supplier-induced demand* occurs when a GP shifts a patient's demand for health care at a given price, convincing the patient to use more health care than a well-informed patient would have demanded. The demand can also be negatively affected, and this is called rationing (Green & Casper, 2000). The other position argues that GPs are driven by other factors than income and leisure and that cost containment measures ensure that neither supplier-induced demand nor rationing is of substantial magnitude (Grytten & Sørensen, 2001, 2007). Empirically, some studies support that supplier-induced demand happens (Dijk et al., 2012; Peacock & Richardson, 2007; Wennberg et al., 1982), while other studies find equally strong evidence to the contrary (Grytten & Sørensen, 2001, 2007; Davis et al., 2000; Madden et al., 2005; Delattre & Dormont, 2003:741).

We suggest that the mixed results can partly be explained by professional norms. Professional norms are defined as prescriptions for the acceptable actions under given conditions applying to and sanctioned within a given occupation (Andersen, 2005: 25). By way of example, a professional norm among GPs could be a clinical recommendation about symptoms which must be present before a specific treatment is used. When norms are firm, economic incentives are expected to be ineffective. When norms are weak, economic incentives are expected to have real effects. The aim of this article is to investigate how professional norms affect the association between economic incentives and service utilization.

We approach this question by investigating two relationships. First, we look at the association between the number of patients associated with a GP (the list size) and service utilization (the number of services per patient). Supplier-induced demand and rationing imply that GPs with few patients supply more services for each patient than GPs with many patients. We expect this negative association between list size and service utilization to exist only when professional norms are weak. Second, we study the effect of fee changes on service utilization. If economic incentives are effective, a positive change in the fee of a specific service, relative to other services, should lead to increased utilization of this service. Again, we expect this positive relationship to exist only when norms are weak. This is tested on the very reliable Danish health insurance data, which has registered each GP's exact use of all services for ten years.

The structure of the article is as follows: We first explicate our theoretical expectations followed by a more in-depth introduction to the Danish health care system. Based on six qualitative interviews and documentary material, we then identify three services suitable for investigating the theoretical expectations. After a brief description of the data and methods, we test the hypotheses quanti-

tatively. Finally, we summarize the main insights and discuss theoretical and practical implications.

Service utilization, economic incentives and professional norms

Service utilization is the number of services per patient for a given GP for a given service type. Although traditional definitions see supplier-induced demand as a physician's ability to shift a patient's demand curve (Hadley et al., 1979), Labelle, Stoddart and Rice (1994: 354) point out that most empirical studies of supplier-induced demand test the theory using utilization, not demand data. High service utilization is thus seen as indication of high demand.

List size is the number of patients associated with a GP. If GPs cannot determine their number of patients themselves in a way that ensures that the demand fits their preferences perfectly, list size can be seen as an economic incentive. Assuming diminishing marginal utility of income, GPs with few patients will have a stronger incentive to supply more services for each patient to increase income, while GPs with many patients will be less incited to give their patients additional treatments. This implies that list size affects service utilization negatively. Still, it is also possible that service utilization affects list size, and that a confounder affects both (see Carlsen & Grytten, 1998 for a more detailed discussion). The aim of this article is not, however, to investigate a possible causal effect of list size on service utilization: We investigate how associations between list size, fees and service utilization depend on the existence of professional norms as discussed below.

The relative service fees are also seen as an economic incentive. In most GP remuneration systems (also the Danish system), GPs have a choice between alternative services with different fees. The relative fee is then the fee of a given service relative to the potential alternative service. If the service fees are externally fixed, and income effects are limited (see McGuire & Pauly, 1991), higher relative fees for a given service is expected to induce the GPs to increase utilization of this service type. When the relative fees are exogenously determined (like in Denmark) endogeneity does not present a problem for this type of economic incentive, and, as long as controls for time trends are included, neither does spuriousness.

Professional norms are, as mentioned, defined as prescriptions for the acceptable actions under given conditions applying to and sanctioned within a given occupation (Andersen, 2005: 25). The existence of professional norms has been explained in the following way: An occupation aspiring to become or remain a profession must convince the public that it 'keeps its house in order' to obtain higher pecuniary rewards and status for its members (Day & Klein, 1987: 19; Watson, 2003: 192). These rewards are collective assets, and the occupation as a collective actor is expected to implement and sanction a number of intra-occupational prescriptions for the acceptable actions under given conditions (that is, professional norms). In this way, sanctions can be significant, and we expect

individuals to follow these professional norms in spite of possible economic incentives. This implies that service utilization should not be associated with fees or list size for services regulated by strict professional norms. Most relevant are the norms concerning delivery of specific services. Do the prescriptions within the occupation strictly demand that the service should be given (only) under specific conditions, typically specified patient conditions? If a service is regulated by such a strict norm, GPs are expected to comply with the norm. The stricter the norm, the less variation due to economic incentives is expected.

Although professional norms are frequently mentioned in the supplier-induced demand literature, only few studies actually test whether they moderate the association between economic incentives and service utilization. Grytten et al. (2003: 66) argue that professional norms possibly control the behavior of GPs and that GPs therefore do not allow their own 'greed' to influence the production. They claim that supplier-induced demand does not occur, because 'reducing the desirable or actual treatment is not in accordance with medical ethics and professional norms' (ibid: 52, our translation). The implicit assumption behind Grytten et al.'s argument is that professional norms dictate the use of *all* GP services, but although the medical occupation is a strong profession (Freidson, 1970; Dent, 2003: 175-178; Saks, 1995), not all services are necessarily dictated by norms. Studies of other strong occupations, such as surgeons and dentists, show that norms do not cover all kinds of behavior (Andersen & Jakobsen, 2011; Andersen & Blegvad, 2003). Although sometimes portrayed as an exact (and omniscient) science, medical decision making is often both complex and uncertain. Richardson and Peacock (2006: 8-9) therefore claim that for many services the 'appropriate' level of service provision is not professionally defined. Using Norwegian data, Iversen and Lurås (2000: 447) show that when 'professional opinions differ', doctors with few patients make 'longer and more frequent consultations and more laboratory tests per listed person', and Davis et al. (2000: 407) argue that clinical factors rather than economic incentives explain the variations in clinical practices in New Zealand. Consequently, hypothesis 1 and 2 expect the negative association between the relevant economic incentive (list size and fees, respectively) and service utilization to be stronger for services with less strict norms.

Hypothesis 1: The less strict the professional norms that regulate a service, the stronger the negative association between list size and service utilization.

Hypothesis 2: The less strict the professional norms that regulate a service, the stronger the positive effect of an increase in the relative fee on service utilization.

Fees may also moderate the relationship between list size and service utilization. If GPs with small list sizes in fact increase service utilization, and if they do so

in order to increase income, they are likely to focus on the services which increase income the most relative to the work effort involved in providing the services. A higher relative fee for a given service makes inducing demand for this service more rewarding. Or, in other words, the association between list size and service utilization is likely to be stronger the higher the relative service fee is. This effect is also expected to depend on the professional norms.

Hypothesis 3: The less strict the professional norms that regulate a service, the stronger the positive effect of an increase in the relative fee on the correlation between list size and service utilization.

Design and specific expectations

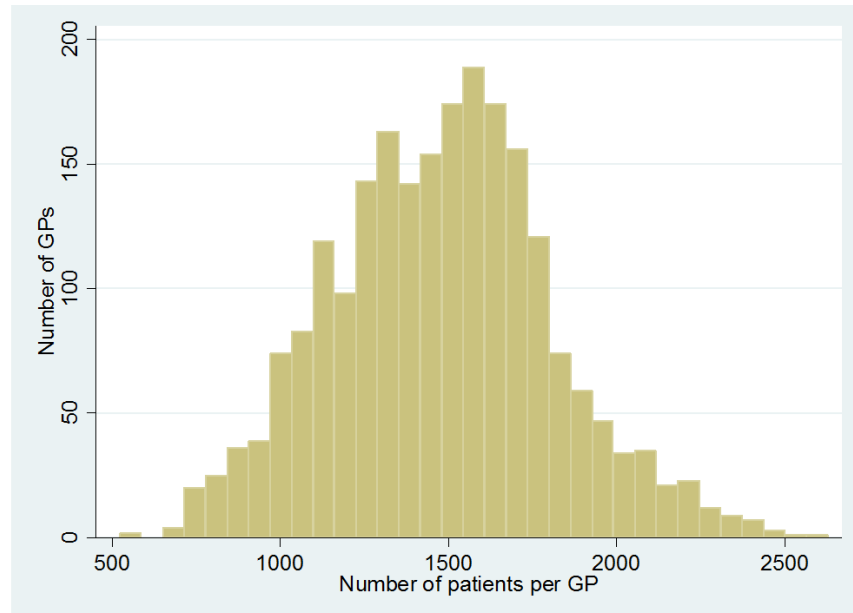
The general expectations are, as mentioned, tested on Danish GPs for three reasons. First, it is the most clear-cut fee-per-service system in Scandinavia with externally determined fees, no user payments, and significant changes in the fees over time. Other Scandinavian countries also remunerate GPs with fees depending on production, but the differences within the countries (between counties in Sweden and between GPs in the old and new systems in Norway and Finland) suggest that it is better to test the expectations for Danish GPs, because the choice between different systems in the other countries can be endogenous. Second, the list size varies in Denmark which is necessary to test whether list size and service utilization is correlated. Third, the strictness of the norms regulating Danish GP services varies. Below, the Danish system is described in more detail, demonstrating these three points more specifically.

In Denmark, the regions (before 2007: the counties) are responsible for planning, organizing and running primary health services, including GP services. GPs are all self-employed specialists in general medicine with a contract with the National Health Insurance (S & P 1997-2006). The pay system includes fee-per-item, fee-per-patient and a small fixed amount per GP. Only very few services, for example issuance of medical certificates, involve user payment. The fees are fixed in the agreement between the GP organization and the National Health Insurance. Fee-per-item comprises most of GPs' gross income. The GPs themselves register the service utilization for each patient. The filings are checked by the regions, which pay out remuneration on this basis. For day-time services, which are investigated in this article, the GPs almost exclusively provide services to patients on their own list.²

The agreement between the GP organization and the National Health Insurance specifies accessibility conditions. A patient with an acute need must be given an appointment the same day, while non-acute treatments must be attended to within five days (S & P 2006, § 39.1.c+d). Furthermore, central planning has ensured that almost all patients have two GP practices within 15 km (agreement between counties and GPs, 2006, section 14). The agreement also regulates the number of patients per GP. If it exceeds 1,600, the GPs can opt to turn away new patients. Once a GP has more than 2,542 patients, the list is closed automatically

unless patients are left without a choice of two practices within 15 km. If the number of patients is below 1,475 (before 2003: 1,325), the lists are automatically open. We investigate GPs in the county of Aarhus, where 133 practices were open in 2006, 130 were closed voluntarily, while only one practice exceeded the limit for automatic closure. Figure 1 shows the frequency distribution of number of patients per GP (list size) for all analyzed observations. An observation is a GP practice in a given year.

Figure 1. Distribution of number of patients per GP 1997-2006



The agreements between the Organization of Danish GPs and the National Health Insurance (S & P, 1997-2006) also list the services that can be provided and determine the fees for each service. Each contact between a patient and a GP is remunerated with a fee for a basic service (ordinary consultation, house call, telephone consultation, email consultation, talk therapy, or preventive consultation). Lab tests and other supplementary services can be added to a basic service and are remunerated with a separate fee.

Below, we compare the use of ordinary consultations, house calls and talk therapy. Ordinary consultation is the core service provided by Danish GPs. In 2006, this single service accounted for 55% of total gross remuneration (Danish Medical Association, 2009). The average GP performed more than 700 ordinary consultations in April and May (in the investigated years). With an average of little more than 11 sessions (again for April and May), talk therapy is much less frequently used. It was introduced in 1995 and has become increasingly popular,

growing from 5.5 in 1997 to 16.8 in 2006 for those using it. Finally, the average GP had 28 house calls in April and May. This has decreased from 37 in 1997 to 24 in 2006.

Information on fees can be found in S & P (1997-2006). In October 1999, the fees for talk therapy and house calls increased considerably relative to the fee for an ordinary consultation. As we shall return to below, this is modeled by a dummy variable (indicating time before and after fee change), because the other variations in relative fees are marginal (see table 1). We have collected data for service utilization in April and May for three years before the fee increase (1997-99) and seven years after the fee increase (2000-6). Data before 1997 were not available. After 2006, the counties were merged into regions.

Table 1. Fee increases relative to the fees in 1996 for talk therapy and house calls relative to fees for ordinary consultations. 1996 is the reference year.

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
House calls	0.0%	0.0%	0.0%	23.9%	34.5%	34.5%	31.4%	29.9%	28.4%	22.5%
Talk therapy	0.0%	0.0%	0.0%	33.2%	33.2%	33.3%	30.1%	28.6%	27.1%	21.3%

Sources: Agreements between the Health Insurance Negotiation Committee and the Association of General Practitioners.

Information about the firmness of professional norms regulating the three investigated services comes from in-depth interviews with six randomly selected GPs from the County of Aarhus conducted by one of the authors in 2006 combined with existing documents. Note that we are interested in norms concerning when specific services (ordinary consultations, house calls and talk therapy) should be offered. Other, and more detailed, norms apply to some of the actual treatments performed during a consultation.

The use of ordinary consultation is governed by a norm according to which a GP must see a patient for such a consultation if the patient contacts him with a medical problem, but not otherwise. The use of house calls is covered by medium-strong professional norms; it can be used as the GP wishes unless the patient is elderly; for this patient group, it must be used if they are unable to go to the clinic (as illustrated in the first of the quotes below). In contrast, both interviews and existing sources indicate that the use of talk therapy is, at the most, regulated by very weak norms. The interview statements consistently imply that the service can be used as the individual GP pleases (as illustrated by the last two quotes):

Professionally, you can't defend not visiting elderly patients if they are running a fever and can hardly walk (interviewed GP 1)

In relation to providing talk therapy, we act differently in relation to how well we know people and how our sympathy is that day You only use it if you feel motivated (GP 4)

If I know [a depressed patient] well and believe that cognitive therapy might help, I offer the talk therapy service (GP 2)

The contract between GPs and counties does not specify when talk therapy should be used (*ibid.*: 14-15; SFU & PLO, 2006), and a clinical guideline states that talk therapy *can* be used to give patients the treatment 'counseling' in case of, for instance, 'low spirits, decreased interest and reduced energy' (Danish College of General Practitioners, 2001: 8-9). The clinical guideline explicitly states that using talk therapy is voluntary. The norms are thus weak for the use of talk therapy, strong for the use of ordinary consultations, and in between for house calls.

Hypothesis 1 expects the negative association between list size and service utilization to be stronger for services with weaker norms, implying that the association should be strongest for talk therapy followed by house calls, while it should be weakest for ordinary consultations.

Likewise, hypothesis 2 expects the positive effect of increasing fees on service utilization to be higher for services with weaker norms. The fee for ordinary consultations was not changed (except for regulation following the rate of inflation), but the fee was increased for both talk therapy and house calls. Given that the norms regulating talk therapy are weaker than for house calls, the effect of the fee change is expected to be stronger for talk therapy than for house calls.

Hypothesis 3 expects GPs with short lists to face a stronger temptation to manipulate demand in order to affect income and therefore to be more sensitive to relative fees. This implies that when the fees for talk therapy and house calls increased in 2000, GPs with short lists could be expected to provide relatively more of these services. This effect is also expected to depend on the professional norms, indicating that the interaction between the two economic incentives should be stronger for talk therapy compared to house calls. Specifically, the effect of the fee change on the association between list size and service utilization is expected to be stronger for talk therapy than for house calls.

Data and methods

The hypotheses are tested on register panel data where units are GP practices in the County of Aarhus from 1997 to 2006. In this period, on average, 264 practices existed, growing slowly from 258 in 1997 to 267 in 2006. Most of them are single-person practices, that is, a practice with a single GP. The average size of a practice for the entire period is 1.5 GPs, increasing from 1.3 in 1997 to 1.8 in 2006. If the supplier permit is collective, the number of attached patients is divided by the number of GPs to calculate the number of patients per GP. The primary data source is the Danish Health Insurance Register, which offers information on the number and type of services. It is based on reports from GPs which are verified by the counties. Only practices still existing in 2006 were included. Practices with less than 1,000 patients were excluded as they are most often in the process of closing down, starting up, or

restructuring, which makes their data highly unreliable. We also exclude acute visits to emergency doctors outside of opening hours. Table 2 shows definitions and descriptive statistics for all variables.

Table 2. Variable definitions and descriptive statistics

Variable	Definition	Units	Time	Mean	Min	Max	Std. dev.	N	Source
Number of practices	Number of practices	County of Aarhus	Each year	264.2	258	267	3.01	10	Danish Health Insurance Register
Number of GPs	Number of GPs	County of Aarhus	Each Year	396.0	334	468	40.10	10	Survey
Ordinary consultations	Relative deviation from the average number of ordinary consultations provided per patient in April/May	Practice	1997-2006	0	-0.87	0.89	0.20	2624	Danish Health Insurance Register
Talk therapy consultations	Relative deviation from the average number of talk therapy consultations provided per patient in April/May	Practice	1997-2006	0	-1	6.42	0.99	2624	Danish Health Insurance Register
House calls	Relative deviation from the average number of house calls provided per patient in April/May	Practice	1997-2006	0	-1	5.72	0.79	2624	Danish Health Insurance Register
List size	Number of patients per GP	Practice	1997-2006	1479	523	2629	328	2242	Danish Health Insurance Register
Shared supplier permit	Status of practice: Variable equals 1 (0 otherwise) if practice has obtained permission to take in an extra GP without increasing the list size requirements	Practice	1997-2006	0.14	0	1	0.33	2229	Survey
Population density	Number of citizens per square kilometer in municipality in which practice is located	Practice	1997-2006	378.0	32	630	240.07	2308	Statistics Denmark, Tables BEF1 og ARE2
Proportion social housing	Share of households in social housing in municipality in which practice is located	Practice	1997-2006	21.57	1.7	29.6	9.04	2308	Statistics Denmark, Table BOL3

Variable	Definition	Units	Time	Mean	Min	Max	Std. dev.	N	Source
Proportion third world immigrants	Number of residents in municipality of practice with citizenship outside of the EU, Scandinavian countries, or North America per 10,000 citizens	Practice	1997-2006	316.92	29	515	135.40	2308	Database on municipalities, Ministry of Social Welfare
Social index	Index of socio-economic stress (unemployment size of low income groups, etc.) as defined in Ministry of Interior, 2007: 40 of municipality in which practice is located	Practice	1997-2006	1.15	0.51	1.45	0.30	2308	Database on municipalities, Ministry of Social Welfare
Fee change	Dummy variable measuring whether it is before the increase in fees for house calls and talk therapy (year 1997-1999) or after (2000-2006)	Practice	1997-2006	0=before fee change 1= after fee change		N/A	N/A	N/A	Agreements GPs vs. Health insurance

Note: The data from the Danish Health Insurance Register was made available by the County of Aarhus.

The analysis consists of a series of fixed effects regression models. We use fixed effects models, because this enables us to control for omitted variables which differ between practices but are constant over time for a given combination of GP and service type³. This takes into account any tendency not related to the independent variables for specific practices to deviate from the normal level of service production per patient (such as practices with unusually healthy patients which, for this reason, deliver unusually few services per patient).

Since the hypotheses predicts differences between on the one hand talk therapy and ordinary consultations and on the other hand talk therapy and house calls, we estimate two dummy regressions in which we compare these two sets of services. Interaction terms between list size and a dummy variable for whether the service is talk therapy (or the reference service) estimate whether the effect of list size differs between services. Similarly, we use an interaction term between fee change and the talk therapy dummy variable to test whether professional norms matter for the effect of a fee increase. Finally, a third-order interaction term between list size, fee change and the talk therapy dummy variable estimates whether an increase in the relative fee has a stronger effect on the association between list size and service utilization for talk therapy (without firm

professional norms) compared to the reference service. Equation 1 below formalizes this.

Equation 1: Fixed effects model of service utilization

$$Y_{ijt} = \beta_{1j}L_{it} + \beta_{2j}F + \beta_{3j}FL_{it} + \beta_{4j}T + \beta_{5j}FT + \beta X_{it} + \alpha_{ij} + u_{ijt}$$

In equation 1, Y_{ijt} is service utilization, defined as the relative deviation from the average service utilization per patient of service type j for GP $_i$ at time t . It is measured by calculating the relative deviation from the average use per patient of a given service j for each GP $_i$.⁴

L_{it} denotes the list size for a given GP $_i$ in a given year t . List size is measured as the number of patients in 1,000's per GP. The average list size is just below 1,500 patients. The shortest GP list observed in the ten-year period is 523, and the longest 2,629. The number of GPs per practice is not available for 1997-2005 in the Danish Health Insurance Register, and this information has therefore been collected by a telephone survey (98 % response rate) among all of the practices.

F is fee change and captures the change in service utilization after the fee change in 2000 and is 0 before the fee change (1996-1999) and 1 after the fee change (2000-2006). The fee (both before and after the fee change) is financed by the counties and paid directly to the GPs (none of the investigated services involve user payments).

FL_{it} is an interaction term between fee change and list size, allowing for changes in the effect of the list size after the fee change.

T is an index for calendar year which takes account of possible time trends for each service type. We include FT to allow for changes in the time trend after the fee increase for each service j .

X_{it} is a vector of structural characteristics (such as urbanization and practice type) for a given GP $_i$ in a given year t , and β is a vector of parameters. α_{ij} are GP fixed effects for each GP's use of the specific services (capturing also the difference between services), and u_{ijt} is the error term.

Results

Hypothesis 1 expects that the negative association between list size and service utilization is stronger for services with less strict professional norms. Specifically, the association is expected to be stronger for talk therapy compared to (1) ordinary consultation and (2) house calls. Looking only at the period before the fee change, the results do not confirm the hypothesis. In this period, the left-hand regression in table 3 shows a negative, but statistically insignificant association between list size and service utilization of ordinary services (β_1 is estimated to be -0.097 for ordinary consultations). This association does not differ between ordinary consultations and talk therapy. The estimated difference (-0.047) is small and statistically insignificant. For talk therapy, the effect of list size is estimated to $-0.097 - 0.047 = -0.144$. In contrast, the right hand regression in table

3 shows a stronger and statistically significant association for the reference service, house calls (β_1 is estimated to be -0.295 for this service). The association between list size and service utilization is thus *weaker* for talk therapy compared to house calls (the difference is 0.14). How the fee change affects these associations, will be presented below (when we discuss hypothesis 3), but we will first discuss service type differences in the effect of fee change on the level of service utilization.

Table 3. Regressions of relative difference from average service utilization per patient. April-May 1997-2006. Unstandardized reg. coefficients. Fixed effects (for both service type and GPs)

	Talk therapy compared to ordinary con. (ref.)	Talk therapy compared to house calls (ref.)
Intercept	2.345	2.231
List size in 1,000's of patients (for reference service)	-0.097	-0.295 ***
Difference in association with list size (between talk therapy and reference service)	-0.047	0.140
Effect of fee change (for reference service)	0.148	0.259 *
Difference in effect of fee change (between talk therapy and reference service)	0.543 ***	0.421 *
Fee change effect on association with list size (for reference service)	-0.006	-0.008
Diff. in fee change effect on assoc. with list size (between talk therapy and reference service)	-0.318 ***	-0.315 **
Time trend (for reference service)	-0.024	-0.136 ***
Difference in time trend (between talk therapy and reference service)	0.079 *	0.190 ***
Change in time trend after fee change (for reference service)	0.035	0.094 ***
Difference in change in time trend after fee (between talk therapy and reference service)	0.006	-0.057
Shared supplier permit	-0.068	-0.097
Population density	-0.007 *	-0.005
Proportion social housing	0.071 **	0.079 **
Proportion third world immigrants	-0.001 **	-0.001 **
Social index	-0.846 *	-1.318 **
R ² within	0.2056	0.196
R ² between	0.0002	0.018
R ² overall	0.0049	0.033
N	4306	4306

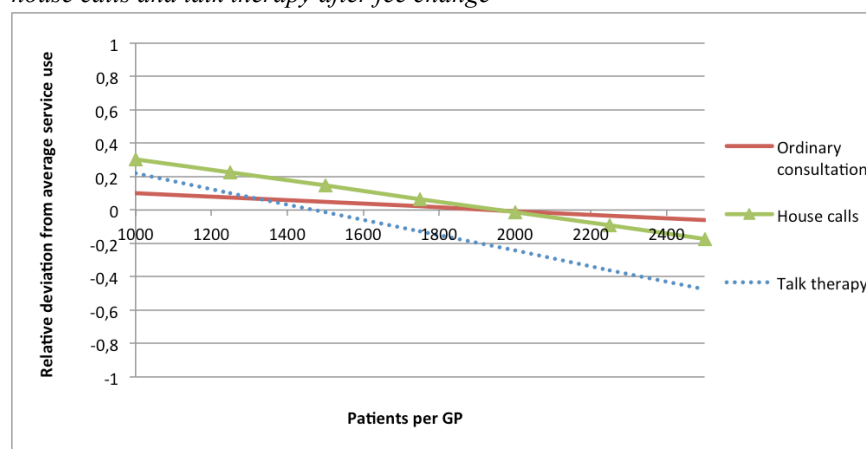
Note: Year 1997 (without fee change) is reference. * $p < 0.05$ ** $p < 0.01$, *** $p < 0.001$

According to hypothesis 2, less strict professional norms result in a stronger positive effect of an increase in the relative fee on service utilization. The right hand regression in table 3 shows that the positive effect of the fee increase on

service utilization (β_2) is stronger for talk therapy ($0.259+0.421=0.680$) than for house calls (0.259). The difference (0.421) is statistically significant, and hypothesis 2 is thus supported. The left-hand regression in table 3 shows that the increased fee for talk therapy and house calls did not affect service utilization of ordinary consultations significantly, and the positive and statistically significant difference in the effect of fee change between talk therapy and ordinary consultation only confirms that the use of talk therapy was changed drastically when the fee was increased. For talk therapy, the fee change (controlled for the general time⁵ trend) did, as mentioned, increase the service utilization by 0.680 , and this means that the fee change made the GPs increase their use of talk therapy services with 68 % of the average service utilization (calculated based on the entire period). This is a quite substantial effect.

According to hypothesis 3, less strict professional norms imply a stronger positive effect of an increase in the relative fee on the association between list size and service utilization. Specifically, the effect of the fee change on this association is expected to be stronger for talk therapy than for house calls. Table 3 (right hand side) shows that this is the case as the interaction between list size, fee change and talk therapy is both strong and statistically significant (-0.315). The fee change does not affect the association between list size and service utilization for neither ordinary consultations nor house calls, and the interaction between list size and fee change (β_3) is only different from zero for talk therapy. But for this service, the combination of a high fee and the absence of firm professional norms results in a rather strong association between list size and service utilization. Figure 2 illustrates the estimated relationship between list size and service utilization for the three services just after the fee increase (the level of talk therapy continued to increase from 2000 to 2006).

Figure 2. The relationship between list size and use of ordinary consultations, house calls and talk therapy after fee change



Note: Illustrated for year 2000 for average values of other variables, fixed effects model.

Utilization of house calls decreased until the fee change (β_4 , the general time trend before the fee change, is negative for house calls), but this stopped when the fee was increased. The change in time trend after the fee increase (β_5) is positive for house calls and almost cancels out the negative general effect, meaning that service utilization for house calls did not change over time after the fee change. Both regressions in table 3 indicate that there was a small positive time trend (β_4) for talk therapy and that this did not change when the fee was changed. Table 4 sums up the results concerning the three hypotheses.

Table 4. Hypotheses, specific expectations and results

Hypotheses	Specific expectations	Result
H1: The less strict the professional norms that regulate a service, the stronger the negative association between list size and service utilization	a. The negative association between list size and service utilization is stronger for talk therapy compared to ordinary consultations b. The negative association between list size and service utilization is stronger for talk therapy compared to house calls	Not supported. The association between service utilization and list size for talk therapy differ from neither house calls nor ordinary consultations
H2: The less strict the professional norms that regulate a service, the stronger the positive effect of an increase in the relative fee on service utilization	The positive effect of an increase in the relative fee on service utilization is stronger for talk therapy than for house calls	Supported. A statistically and substantially significant difference can be found in the effect of fee change between talk therapy and house calls
H3: The less strict the professional norms that regulate a service, the stronger the positive effect of an increase in the relative fee on the correlation between list size and service utilization	The positive effect of an increase in the relative fee on the association between list size and service utilization is stronger for talk therapy than for house calls	Supported. The fee increase strengthens the association between list size and service utilization substantially and significantly more for talk therapy compared to house calls

Discussion and conclusion

This article aimed to investigate how professional norms affect the association between economic incentives and utilization of GP services. The central theoretical claim was that the effect of economic incentives depends on the existence of strict professional norms concerning use of the service in question. Investigating three services with varying strictness of the professional norms (firmest for ordinary consultations, softest for talk therapy) for 257 Danish GP practices over 10 years, we found (1) that the less strict the professional norms that regulate a service, the stronger the positive effect of an increase in the relative fee on service utilization, and (2) that the strength of the correlation between list size and service utilization depends both on the relative fee for the given service and on the professional norms that regulate the service. This supported two of the hypotheses; the less strict the professional norms that regulate a service, the stronger the positive effect of an increase in the relative fee on service utilization (hypothesis 2), and the stronger the positive effect of an increase in the relative fee

on the correlation between list size and service utilization (hypothesis 3). In contrast, we did not find a stronger negative association between list size and service utilization when less strict professional norms regulate a service (as expected in hypothesis 1). If a service is not lucrative, it seems that GPs with few patients do not have a higher utilization of this service even if it is not regulated by professional norms.

The primary insight is thus that the configuration of professional norms, relative fees and list size matter for service utilization. We therefore propose a possible synthesis between the conflicting results in the supplier-induced demand literature: Supplier-induced demand may only exist for lucrative services without professional norms.

The very high validity and reliability of the Danish health insurance data enabled us to measure the GPs' behavior directly, and that is one of the major strengths of the analysis. The register is used for the remuneration of the GPs, and the figures are therefore very carefully controlled. A limitation in the data may be that to earn more money the GPs could be reporting services they never provided. Interviews with both representatives from the counties and GPs do, however, indicate that there are very few intentionally fraudulent registrations because of the control mechanism and strong intra-occupational norms against cheating. Another potential limitation in the analysis is that we have exclusively used Danish data. For example, it would be interesting to combine Danish and Norwegian data as Norwegians pay part of the bill themselves (which may constrain GPs' potential provision of 'extra' services). Finally, the low R^2 values indicate that other variables, in addition to the ones investigated in this study, may affect service utilization. This could for example be GP characteristics (e.g. personal preference for some treatments), or community characteristics (the included socioeconomic control variables for example may not capture all relevant variation between municipalities). But at least some of the variation is probably stochastic, reflecting for example the different spread of influenza epidemics.

The results imply that professional norms are important and indicate that the relationship between fees, list sizes and norms is complex. First, (as expected) we found that the less strict the professional norms that regulate a service, the stronger the positive effect of an increase in the relative fee on service utilization. Second, we found that service utilization and list size are not necessarily more highly correlated for services without professional norms. In other words, short lists in themselves do not (even for these services) lead to increased service utilization; the fee for the relevant service must also be relatively high. This is hardly surprising if the association is actually due to supplier-induced demand; it seems logical that GPs with short lists would induce demand for the most lucrative services, if they actually wanted to increase their income.

The findings may explain part of the conflicting results in the supplier-induced demand literature concerning the associations between list size and service utilization. Short lists do not, even in the absence of professional norms, always lead to increased utilization of a given service; it seems only to be the

case if the fee is high. A strong effect of list size thus seems to require that the service is both relatively well-paid and only weakly regulated by professional norms. Seen in this light, the controversy in the literature is hardly surprising, given that this interaction has not been included in earlier analyses. The results indicate that we must take list sizes, fees and norms into account simultaneously in order to fully understand the variations in service utilization. When strong professional norms apply, the effect of economic incentives seems to be absent or feeble. Norms often – but not always – apply to the central and most prevalent services. This is certainly the case in the Danish GP system where the ordinary consultation is governed by strong norms and accounts for more than half of the GP gross income.

The real world implications of the study are plentiful. The study indicates that when there are no user fees for services and no strict professional norms, the GP's economic incentives matter for service utilization. This can be harmful. If the patients of GPs with long lists receive insufficient services, it can lead to health problems, and if the higher service utilization for patients attending GPs with short lists is a sign of over-utilization, it is an economic problem for society. The good news is that professional norms prevent some of the potential drawbacks, but further studies of norms and remuneration systems over time are necessary to establish whether professional norms *per se* are unaffected by the economic incentives in the long run. Designing robust incentives is definitely not easy; this article has demonstrated that the fees in such contracts should be very carefully determined and that the professional norms of the relevant occupation should be taken into consideration when designing the incentive systems.

References

- Andersen, Lotte Bøgh & Mads Leth Jakobsen (2011) 'Does Ownership Matter for the Provision of Professionalized Services? Hip operations at publicly and privately owned clinics in Denmark', *Public Administration*, 89 (3): 956-974.
- Andersen, Lotte Bøgh & Marianne Blegvad (2003) 'Normer eller Egennytte? Professionelle og økonomiske incitamenter i dansk børnetandpleje', *Politica*, 35(2): 125-135.
- Andersen, Lotte Bøgh (2005) Offentligt ansattes strategier, *Politica*, Århus.
- Anell, Anders, Anna H Glengård & Sherry Merkur (2012) 'Sweden: Health system review', *Health Systems in Transition*, 14(5).
- Bech, Mickael, Brian Bekker Hansen, Jørgen Lauridsen and Torben Højmark Sørensen (2009) 'Udbudspåvirkning af forbruget i almen lægepraksis'. *Norsk Økonomisk Tidsskrift*, 122: 20-35.
- Carlsen, Fredrik & Jostein Grytten (1998) 'More physicians: Improved availability or induced demand?' *Health Economics*, 7: 495-508.
- Danish College of General Practitioners (2001) Diagnostik og behandling af depression. http://www.dsam.dk/files/9/depression_2001.pdf.

- Danish Medical Association (2009) *Notat om aktivitet og økonomi februar 2009*, available at www.laeger.dk [accessed 1 April 2009].
- Davis, Peter, Barry Gribben, Alastair Scott & Roy Lay-Yee (2000) 'The supply hypothesis and medical practice variation in primary care: testing economic and clinical models of inter-practitioner variation', *Social Science and Medicine*, 50: 407-418.
- Day, Patricia & Rudolf Klein (1987) *Accountability. Five public sectors*, Tavistock Publications, London and New York.
- Delattre, Eric & Brigitte Dormont (2003) 'Fixed fees and physician-induced demand: A panel data study on French Physicians', *Health Economics*, 12: 741-754.
- Dent, Mike (2003) *Remodelling hospitals and health professions in Europe. Medicine, nursing and the state*, Palgrave Macmillan, Basingstoke.
- Dijk, Christel E. van, Bernard van den Berg, Robert A. Verheij, Peter Spreeuwenberg, Peter P. Groenewegen & Dinny H. de Bakker (2012) 'Moral hazard and supplier-induced demand: Empirical evidence in general practice', Article published online in *Health Economy*, 20 February 2012.
- Evans, Robert G. (1974) 'Supplier-induced demand: Some empirical evidence and implications' in Mark Perlman (ed.), *The economics of health and medical care*, Macmillan, London & Basingstoke.
- Freidson, Eliot (1970) *Professional Dominance: The Social Structure of Medical Care*, Altherton Press, New York.
- Green, David G. & Laura Casper (2000) *Delay, Denial and Dilution: The Impact of NHS Rationing on Heart Disease and Cancer* IEA Health and Welfare Unit, London.
- Grytten, Jostein, Irene Skau, Rune J. Sørensen & Olaf G. Aasland (2003) *Fastlegereformen - en analyse av fastlegenes arbeidsbelastning og tjenestetilbud*, Research Report no. 11. Handelshøyskolen BI, Oslo.
- Grytten, Jostein & Rune J. Sørensen (2001) 'Type of contract and supplier-induced demand for primary physicians in Norway', *Journal of Health Economics*, 20: 379-393.
- Grytten, Jostein & Rune Sørensen (2007) 'Primary physician services-list size and primary physicians' service production', *Journal of Health Economics*, 26(4): 721-41.
- Hadley, Jack, John Holahan & William Scanlon (1979) 'Can fee-for-service reimbursement coexist with demand creation?' *Inquiry*, 16 (3): 247-58.
- Iversen, Tor & Hilde Lurås (2000) 'Economic motives and professional norms: the case of general medical practice', *Journal of Economic Behavior & Organization*, 43: 447-470.
- Johnsen, Jan Roth (2006) 'Norway', *Health Systems in Transition*, 8(1).
- Labelle, Roberta, Greg Stoddart & Thomas Rice (1994) 'A Re-examination of the Meaning and Importance of Supplier-induced Demand', *Journal of Health Economics*, 13(3): 347-68.

- Léonard, Christian, Sabine Stordeur & Dominique Roberfroid (2009) 'Association between physician density and health care consumption: A systematic review of the evidence', *Health Policy*, 91 (2): 121–134.
- Madden, David, Anne Nolan & Brian Nolan (2005) 'GP reimbursement and visiting behaviour in Ireland', *Health Economics*, 14: 1047-1060.
- McGuire, Thomas G. & Mark V. Pauly (1991) 'Physician response to fee changes with multiple payers', *Journal of Health Economics*, 10(4): 385-410.
- Ministry of Interior. 2007. Kommunal udligning og generelle tilskud 2008. Ministry of Interior, Copenhagen.
- Ministry of Social Welfare. 2008. Municipal Key Figures. <http://noegletal.dk/>
- Newhouse, Joseph P. (1970) 'A Model of Physician Pricing', *Southern Economic Journal*, 37(2): 174-183.
- Olejaz, Maria, Annegrete Juul Nielsen, Andreas Rudkjøbing, Hans Okkels Birk, Allan Krasnik & Cristina Hernández-Quevedo (2012) 'Denmark: Health system review', *Health Systems in Transition*, 14(2).
- Peacock, Stuart J. & Jeffrey R. J. Richardson (2007) 'Supplier-induced demand: re-examining identification and misspecification in cross-sectional analysis', *European Journal of Health Economics*, 8: 267-277.
- Richardson, Jeff & Stuart Peacock (2006) Reconsidering theories and evidence of supplier induced demand, Research Paper 2006 (13), Centre for Health Economics, Monash University, Australia.
- S & P (Sygesikringens Forhandlingsudvalg & Praktiserende Lægers Organisation) (1997-2006) 'Landsoverenskomster for almen lægepraksis' [contracts between Danish Medical Association and the National Health Insurance]. New contracts are available at www.okportal.dk. Older contracts were obtained from *Danish Regions*.
- Saks, Mike (1995) *Professions and the public interest. Medical power, altruism and alternative medicine*, Routledge, London and New York.
- SFU & PLO. 2006. Anvendelse af Landsoverenskomstens ydelser. Available at www.laeger.dk
- Vuorenkoski, Lauri (2008) 'Finland: Health system review', *Health Systems in Transition*, 10(4).
- Watson, Tony J. (2003/1980) *Sociology, work and industry*, 4th edition, Routledge, London.
- Wennberg, John E., Benjamin A. Barnes & Michael Zubkoff (1982) Professional uncertainty and the problem of supplier-induced demand *Social Science & Medicine*, 16 (7): 811–824.