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ABSTRACT

Healer or Gatekeeper? Physicians' Role Conflict When Symptoms Are Non-Verifiable*

Although physicians are often expected to be gatekeepers to health insurance benefits such as paid sick leave, research indicates a substantial reluctance to reject patient requests for sickness certificates. We show that private information on the patient's part creates a conflict between the healer and gatekeeper roles: if a patient reports subjective symptoms indicating a need for sick leave, the physician is unable to tell if the patient is truly sick or a shirker. We show that even if most physicians prefer to be good gatekeepers, all of them may trust their patients in Nash equilibrium. These ideas are illustrated using results from focus group interviews with Norwegian primary care physicians.

JEL Classification:	D11, D21, H42, I11, I18
Keywords:	sicklisting, subjective diagnoses, asymmetric information, focus group interviews

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NON-TECHNICAL SUMMARY

Primary care physicians often report a role conflict between their healer and gatekeeper roles. One possible reason is that the physician cannot always know whether patients are telling the truth about their subjectively experienced symptoms (e.g., pain, nausea, lack of energy). Some patients may exploit this, misreporting their symptoms in order to get unjustified benefits such as paid sick leave. When faced with patients reporting unverifiable symptoms that, if true, would entitle the patient to paid sick leave, the physician may be unable to distinguish truly sick patients from shirkers. While a good gatekeeper may need to be strict with such patients, the reverse may be true for a good healer (if sick leave is required for healing of the truly sick). We show that this role conflict is likely to make physicians poor gatekeepers: they will rarely be able to stop patients trying to obtain unjustified sickness certificates by misreporting symptoms. We illustrate our theoretical findings using results from a focus group interview study with Norwegian primary care physicians. These physicians report that when in doubt, they rarely, if ever, deny sickness certificates to patients insisting to need one.

1. Introduction

Primary care physicians serve two roles: they are healers and gatekeepers. While their gatekeeper role may seem particularly important in welfare states, where physicians are often expected to prevent misuse of publicly financed benefits such as paid sick leave (Mykletun et al., 2014), they also participate in restricting access to benefits of private health insurance schemes.

In the medical profession, it is widely acknowledged that there exists a conflict between the healer and gatekeeper roles, and that physicians struggle with this conflict (Alexanderson et al. 2009, Carlsen & Norheim 2005; Pearson 2000; Arnesen & Fredriksen 1995; Ayres 1996; Angell 1993). For an economist, this might appear puzzling. If benefit eligibility is conditional on medical need, wouldn't eligibility simply follow from the physician's assessment of the diagnosis and associated recommended medical treatment?

Private information, however, complicates this picture. While only the physician can be expected to have medical expertise and access to e.g. results of blood tests and x-rays, only the patient knows her subjectively experienced symptoms such as pain, nausea or dizziness. To arrive at the correct diagnosis, thus, one may need information from both parties.

In the present paper, we show that patients' private information on subjective symptoms gives rise to a conflict between the healer and gatekeeper roles. In particular, we study physicians' decision of whether to grant sickness certificates qualifying patients for paid sick leave. Patients aiming to get an unjustified paid leave can potentially exploit the physician's inability to verify their reported subjective symptoms. Even if physicians are fully aware of this, they may be unable to distinguish strategically misreporting shirkers from the truly sick. We show that in Nash equilibrium, physicians will act as if they believe every patient is reporting truthfully, unless the physician has a strong preference for being a good gatekeeper. We illustrate these conclusions using results from focus group interviews with Norwegian physicians.

Previous research on information asymmetries in the patient – physician relationship has studied physicians' superior ability to judge patients' need of treatment (e.g. Dranove 1988; Rochaix 1989; de Jaegher and Jegers 2000), and the information advantages of a potential patient - physician collusion vis-á-vis the insurer (Chalkley and Malcolmson 1998, Choné and Ma 2010, Alger and Ma 2003). The role of patients' private information vis-á-vis their physician has, to our knowledge, hardly been studied within health economics.

One underlying premise for our analysis is that physicians, rather than being purely selfish in the narrow sense, care about doing a good job. This is not new: In the health economics literature, assumptions of physician altruism towards patients have long been common (e.g. Arrow 1963, Farley 1986, de Jaegher and Jegers 2000, Alger and Ma 2003, Ma 2007). One reason for this is presumably that the pure self-interest model is hard to reconcile with empirically observed physician behavior (Godager et al., 2009).[1] In the current context, however, it is important to note that physicians' gatekeeper behavior is influenced not only by possible conflicts between their own narrow self-interest and the public interest, but also by conflicts between different aspects of the public interest, such as healing versus gatekeeping. In the medical profession, the general consensus seems to be that when conflicts arise, a physician's primary responsibility lies with the patient, not the insurer. The World Medical Association's *Code of Medical Ethics* asks physicians to pledge that "the health of my patient will be my first consideration" (WMA 2006); the *Charter of Medical Professionalism* (Medical Professionalism Project, 2002) states, as its first fundamental principle, the *primacy of patient welfare*: "Market forces, social pressures, and administrative exigencies must not compromise this principle" (op.cit, p. 244).

Below, we first present a stylized formal model where we assume that every physician is perfectly competent: if given the full diagnostic information, she can costlessly determine the patient's correct diagnosis. We thus abstract from incompetence, effort, and diagnostic uncertainty as sources of variation in sick-listing practices. We also disregard motives such as the physician's preference for the patient's social approval, assuming that physicians are motivated by income, by a desire to be a good healer, and possibly also a desire to be a good gatekeeper. We find that even for such perfectly competent and socially responsible physicians, there is an inherent conflict between healing and gatekeeping, which they will plausibly resolve by giving up on gatekeeping.

We then illustrate our conclusions by findings from a focus group interview study of Norwegian primary care physicians.[2] The data is based on a small set of participants and cannot be viewed as representative; rather, it provides examples of how primary care physicians can reason and relate to the gatekeeper – healer dilemma. While these physicians were familiar with the role conflict, they

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[1] More generally, work motivation can be influenced by concerns such as self-image (Benabou and Tirole 2002, 2003, 2006; Akerlof and Kranton 2005; Dur and Glazer 2008; Brekke and Nyborg 2008, 2010), vocation (Heyes, 2004; Besley and Ghatak, 2005), or a strong preference for public goods or public sector work *per se* (Francois 2007, Delfgaauw and Dur 2008).

[2] The data was collected a few years back, in 2007, and is documented in Carlsen (2008). The findings used below are concerned with very general aspects of the perceived healer – gatekeeper conflict. Carlsen (2008) focused on another aspect of the results than the one we study here, and several of the findings reported below are previously unpublished. During the time passed since the data collection, there have been adjustments in the Norwegian government's policy concerning primary care physicians' sicklisting, although not, in our judgement, in ways essential for the general findings which reported here.

mostly tackled it by trusting their patients. This is in line with several other Scandinavian surveys indicating that primary care physicians are reluctant to reject patients' requests for sickness certificates (Wahlström and Alexanderson 2004; Carlsen and Norheim 2003; Gulbrandsen, Førde and Aasland 2002; Englund, Tibblin and Svardsudd 2000; Larsen, Førde and Tellnes 1994).[3]

2. The model

Consider a society with $N > 0$ workers. sN of these workers ($0 < s < 1$) are sick, while the remaining $(1 - s)N$ workers are healthy. Let health status be binary and observable only by the worker herself: either one *is* and *feels* sick, or one *is* and *feels* healthy.[4] While patients observe their own subjectively experienced symptoms, they are generally unable to treat themselves if sick: they lack medical expertise, and are unable to perform and interpret the results of medical tests (such as x-rays, blood test etc.).

There are $\Pi < N$ physicians. Workers decide whether or not to see a physician, and, if they do, which physician to see and which symptoms to report. Patients report their subjectively experienced symptoms (pain, dizziness etc.) to the physician before the physician performs tests and reports the results of these tests to the patient. The physician then decides which treatment (if any) to prescribe, including whether or not to sicklist.

For some diagnoses, absence from work is required for healing. Workers with these diagnoses are entitled to sick leave. We disregard any other reason for sicklisting (from the physician's point of view) than healing. Sick leave is not required for all diagnoses, and presence at work can also be part of the treatment.

Several simplifying assumptions allow us to focus on the effects of patients' private information, disregarding other factors that may complicate physicians' sicklisting decisions. First, physicians are assumed to be perfectly competent: if given information on a worker's full set of symptoms, every physician can effortlessly arrive at the patient's true diagnosis and associated correct medical treatment. Second, we disregard uncertainty and ambiguity, both in the relationship between symptoms, diagnoses and treatments, and in the healing process itself: a sick worker is assumed to heal – feel well – if and only if she receives the medically correct treatment for her diagnosis.

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[3] Alexanderson et al. (2009) report that 9 percent of Swedish physicians say "no" at least once a week to a patient who wants sick leave, 76 percent do so at least once a year, while 15 percent never do so. While these numbers may appear to indicate a stricter practice than the body of research quoted above, note that the middle category is very broad: saying "no" once a year is not very often.

[4] We disregard preventive health care; the only medical reason to see a doctor is that one feels unwell.

Sick workers' objective is to get well: that is, to maximize their probability of getting the correct treatment.[5]

Healthy workers have no medical reason to see a doctor. Nevertheless, some healthy workers may still do so in order to get an unjustified sickness certificate. Below, the phrase *shirker* denotes a healthy worker who sees a physician with the aim of getting an unjustified sickness certificate, and who chooses which physician to see and which symptoms to report so as to maximize her chances of succeeding in this aim.

Shirking, however, may be costly. Seeing the doctor takes time, effort and money. There may be psychological costs of lying; workers may worry about social sanctions from their peers, reduced career prospects if absent from work, less than full insurance coverage; they may also care about social and/or intrinsic benefits of work. Such costs can differ between workers. Thus, the easier it is to get an unjustified sickness certificate, the more workers may find it worthwhile to seek one.

Let $q \epsilon [0,1]$ be the (endogenous) success probability for a shirker (that is, q is the probability that a healthy worker seeing a physician gets a sickness certificate, given that the worker chooses which physician to see and which symptoms to report so as to maximize her chances of being sicklisted). Let l be the share of all N workers who prefer to be shirkers, and let l be increasing in the success probability q:

(1) $\qquad\qquad l = F(q),$

where F is a continuous function such that $F(0) = 0$, $F(1) < (1 - s)$, and for all $q < 1$, $\frac{\partial F(q)}{\partial q} > 0$.

A worker who faces sufficiently large costs of shirking will not seek an unjustified sickness certificate regardless of the probability of getting one. Let $c = 1 - s - F(1)$ be the share of N who are healthy, but never prefer to shirk, such that $1 - s > c > 0$.

The physician choice we are primarily interested in is whether or not to issue sickness certificates.[6] Assume that physicians care about their net income, about being a good healer, and possibly also about being good gatekeeper (focusing on the patient's private information, we disregard variation

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[5] This would be justified if, for example, nothing is enjoyable when feeling sick, making the worker willing to sacrifice any other concern in order to heal.

[6] Note that if sick leave were the only element of medical treatment, anyone would have a fair chance of guessing a patient's correct treatment (sick leave or not) without knowing the patient's symptoms. We assume, however, that such correct guesses are sufficiently unlikely to be disregarded. Our implicit assumption is that establishing the correct diagnosis is a prerequisite for healing because medical treatments may involve a multitude of additional required elements not made explicit in the formal model (e.g., medication, physiotherapy, exercise, radiation, surgery). Including such elements explicitly would complicate the formal model without adding substantial insights.

in physician effort). Let each physician's net income per patient (monetary payment minus costs, including effort) be exogenously fixed at a. Let τ_i denote the physician's strategy for granting or not granting sickness certificates (chosen from the set of all feasible rules for whom to grant a sickness certificate). The number of patients coming to see physician i, $P(\tau_i)$, the number of patients i heals, $H(\tau_i)$, and the number of unjustified sickness certificates she grants, $G(\tau_i)$, may all depend on her sicklisting strategy. Physician i maximizes her expected utility, given by

(2) $$U_i(\tau_i) = aP(\tau_i) + hH(\tau_i) - g_iG(\tau_i).$$

Here, $h > 0$ measures the strength of the preference to be a good healer, $g_i \geq 0$ reflects physician i's preference for being a good gatekeeper. Linear separability is assumed for simplicity. Let g_i be continuously distributed on the interval $[0, \bar{g}_i]$ where $\bar{g}_i > 0$, such that $g_i = 0$ for at least one physician and $g_i = \bar{g}_i$ for at least one i.[7]

For a given set of patients with known symptoms, there would be a straightforward optimal sicklisting strategy: to establish the correct diagnosis, granting a sickness certificate if and only if sick leave is part of the medical treatment for this diagnosis. This rule would maximize the physician's success as a healer $H(\tau_i)$, while minimizing the number of unjustified sick leaves at $G(\tau_i) = 0$ (recall that the payment per patient is fixed). To determine the correct diagnosis, however, private information from the patient may be required, and some patients, shirkers, may choose to misrepresent their subjectively experienced symptoms. In addition, the physicians' sicklisting strategy might affect the number of patients.

Let each worker j be characterized by a set of symptoms (σ_j^s, σ_j^v), where σ_j^s denotes worker j's subjective symptoms, while σ_j^v denotes her verifiable symptoms. *Subjective* symptoms are observable only by the patient, for example pain, nausea, dizziness, blurred vision, hallucinations or fatigue. *Verifiable* symptoms can be observed only by a physician, e.g. blood test results and interpretations of ultrasound or x-ray images. We disregard symptoms observable by both parties, or by none of them, as these would not matter substantially to the argument.[8]

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[7] Eq. (2) implies that doctors' altruism towards patients, possibly also towards the insurer, is of the "impure" kind (Andreoni 1990): physicians care about *their own contributions* to patients' health and to the prevention of shirking. A "purely" altruistic doctor would care about the total level of healing and gatekeeping in society, not her own contributions in particular. Pure altruism, however, yields implausible empirical predictions (Bergstrom et al. (1986); for a discussion, see Nyborg and Rege 2003).

[8] "Symptom" includes negative observations indicating that nothing is wrong. We assume that the distribution, possible values and possible combinations of σ_j^s and σ_j^v are complex enough that we can disregard the possibility of an uninformed person correctly guessing a worker j's symptoms σ_j^s and/or σ_j^v.

Let $D(\sigma_j^s, \sigma_j^v)$ denote the diagnosis corresponding to the set of symptoms (σ_j^s, σ_j^v). In general, knowledge of both σ_j^s and σ_j^v are required to arrive at the correct diagnosis. However, for what we will call *subjective diagnoses,* the correct treatment is based on the patient's subjectively experienced symptoms (σ_j^s) only, while information on σ_j^v is superfluous when establishing the correct treatment. ME, schizophrenia and migraine might be examples of this. Formally, a diagnosis is subjective if, for any two $\sigma_j^{v\prime}$ and $\sigma_j^{v\prime\prime}$, $D\left(\sigma_j^s, \sigma_j^{v\prime}\right) = D\left(\sigma_j^s, \sigma_j^{v\prime\prime}\right)$.

Workers do not possess general medical knowledge. However, we assume that *every worker knows the symptoms of at least one subjective diagnosis requiring sick leave*. Hence, if a shirker strategically misreports her subjective symptoms, pretending to suffer from some subjective diagnosis requiring sick leave, the physician is unable to distinguish the shirker from a truly sick patient.

Let r_j denote the subjective symptoms patient *j* reports to her physician. Consider the following candidate sicklisting practices for physician *i*:

Trust, $\tau_i = T$: If sick leave is part of the medically correct treatment for the diagnosis $D\left(r_j, \sigma_j^v\right)$, *i* issues a sickness certificate. In every other case, *i* does not issue a sickness certificate.

Mistrust, $\tau_i = M$: If sick leave is part of the medically correct treatment for $D\left(r_j, \sigma_j^v\right)$, and $D\left(r_j, \sigma_j^v\right)$ is *not* a subjective diagnosis, *i* issues a sickness certificate. In every other case, *i* does not issue a sickness certificate.

That is, trusting physicians issue sickness certificates whenever this is justified on medical grounds, based on the patient's reported symptoms and the verified observations. Mistrusting physicians do not issue sickness certificates unless the need for sick leave can be verified, granting no sick leaves based on subjective symptoms alone.[9]

Let the share of N who are truly sick with subjective diagnoses, $s^s < s$, be exogenously given, and let s and s^s be known to physicians. Let $t \in [0,1]$ denote the share of physicians who trust $(\tau_i = T)$. Let both t and the share of shirkers l be common knowledge, and assume that physicians consider the impact on l of their own sicklisting strategy negligible.

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[9] Still another candidate strategy would be to randomize between Trust and Mistrust. Since the use of mixed strategies changes very little in the analysis below, we mostly ignore this option.

Below, we show that even if most physicians do have a preference for gatekeeping, every one of them may still be trusting in Nash equilibrium. This holds whether or not patients can observe doctors' sicklisting strategies.

3. Trusting and shirking with unobservable physician strategies

Our first result, formalized below as Proposition 1, is concerned with the case where patients cannot observe physicians' sicklisting strategies. Thus, patients cannot choose their doctor based on the doctor's sicklisting strategy; similarly, doctors cannot use their sicklisting strategies to attract patients.

In this case, there is always at least some trust and some shirking in the Nash equilibrium. In fact, unless $\bar{g}_i > h \frac{s^s}{(1-s-c)}$, *all* physicians trust in Nash equilibrium. That is, the higher the prevalence of subjective diagnoses requiring sick leave, and the higher the share of workers who will never shirk, the stronger the maximal gatekeeping preference must be for any physicians at all to choose Mistrust.[10]

Note that this result arises in the absence of economic or social incentives to please one's patients, and in spite of the assumption that establishing the correct diagnosis is costless. The gatekeeping problem is caused by patients' private information – and physicians' resulting inability to distinguish sick from shirkers – combined with physicians' preference to be good healers: by mistrusting, physicians deprive some of their truly sick patients the opportunity to heal – namely those suffering from subjective diagnoses requiring sick leave.

Nevertheless, shirking is not restricted only by physicians' choices, but also by the (implicit) decisions of workers themselves. Even if all physicians trust, thus leaving the gate open, shirking is still limited by $c > 0$.

Let S_j^s denote the symptoms of a subjective diagnosis requiring sick leave that j is familiar with. Let $\bar{q}_j > 0$ be a threshold such that if $q \geq \bar{q}_j$, worker j prefers to be a shirker; if $q < \bar{q}_j$, the worker prefers not to be a shirker.[11] We then have the following:

Proposition 1. When physician strategies cannot be observed by patients, there is a Nash equilibrium $(t, l) = (t^* > 0, l^* > 0)$ such that:

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[10] There is no other strategy which is strictly preferred to Trust and Mistrust.
[11] That is, for a share c of all workers, $\bar{q}_j \geq 1$.

i) Every sick worker j sees a doctor, reporting truthfully $r_j = \sigma_j^s$. ii) Every healthy worker j for whom $\bar{q}_j \leq t^*$ sees a doctor, misreporting $r_j = S_j^s \neq \sigma_j^s$; every healthy worker j for whom $\bar{q}_j > t^*$ does not see a doctor. iii) Every physician i with gatekeeping preferences g_i such that $hs^s \geq g_i l^*$ chooses $\tau_i = T$; any physician i for whom $hs^s < g_i l^*$ chooses $\tau_i = M$. iv) If $\bar{g}_i \leq h\frac{s^s}{(1-s-c)}$, then $t^* = 1$ and $l^* = 1 - s - c$. If $\bar{g}_i > h\frac{s^s}{(1-s-c)}$, then $0 < t^* < 1$, and $0 < l^* < 1 - s - c$.

Proof: See Appendix 1.

While the proof has been relegated to the Appendix, the Nash equilibrium can be understood as follows.

Sick workers always report their symptoms truthfully, aiming to get the correct medical treatment. Shirkers misreport their symptoms, pretending to suffer from a subjective diagnosis requiring sick leave, hoping that their doctor is trusting. Physicians thus cannot distinguish shirkers from the truly sick with subjective diagnoses requiring sick leave. The probability that a patient reporting such symptoms is actually sick, depends on the aggregate prevalence of such diagnoses, s^s, and the aggregate share of shirkers, l. Physicians prefer trust or mistrust depending on these probabilities and the physicians' healing and gatekeeping preferences. Their decisions determine the share of trusting physicians t, which in turn determines how many healthy workers become shirkers (i.e., how many workers decide to see a doctor aiming to get an unjustified sickness certificate)..

This is illustrated in Figure 1. Let $l(t)$ be the reaction curve of healthy workers, in terms of the share of shirkers l as a function of the share of trusting physicians t. We know that $l(0) = F(0) = 0$, since no shirker bothers to see a doctor if there is no chance of success; moreover, $l(1) = F(1) = 1 - s - c$.

Further, let $t(l)$ be the reaction curve of physicians, in terms of the share of trusting physicians t as a function of the share of shirkers l. We know that $t(0) = 1$: a physician trusts if $hs^s \geq g_i l$, and $hs^s \geq 0$ always holds. The largest possible value of l is $(1 - s - c)$. Whether $t(1 - s - c)$ is smaller than or equal to 1, depends on whether $\bar{g}_i > h\frac{s^s}{(1-s-c)}$, as shown in the two panels of Figure 1.[12]

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[12] The steepness and curvature of the two reaction curves, and the exact location of the point $t(1 - s - c)$, depend on the properties of the distributions of $\bar{q}_j$ and g_i.
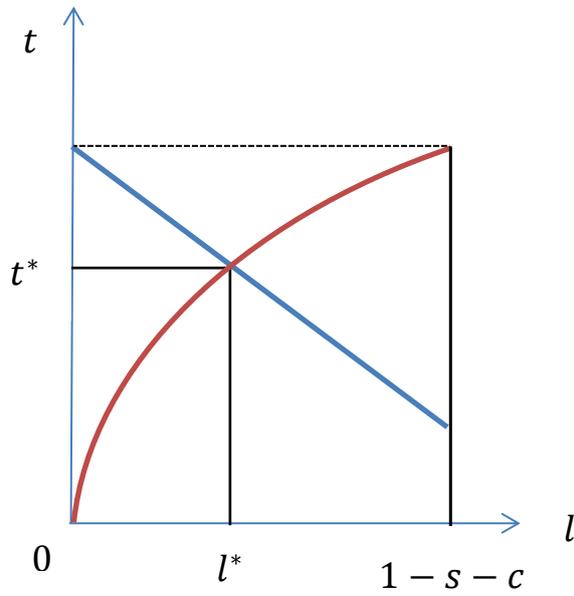
Panel *a*: Reaction curves when gatekeeping preferences are strong

$(\bar{g}_i > h \frac{s^s}{(1-s-c)})$
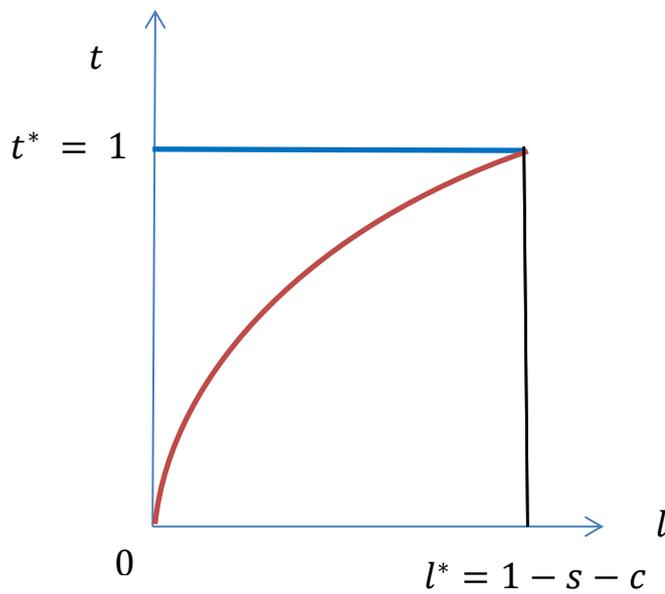
Panel *b*: Reaction curves when gatekeeping preferences are weak

$(\bar{g}_i \le h \frac{s^s}{(1-s-c)})$

Figure 1. Physicians' and healthy workers' reaction curves

— Workers' reaction curve, $l(t)$

— Physicians' reaction curve, $t(l)$

If the insurer finds that there is too much shirking in equilibrium, and would thus like physicians to be mistrusting, there is a straightforward way to achieve that goal: the insurer can simply make patients with subjective diagnoses ineligible for sick leave. In terms of consequences, this is equivalent to making all physicians mistrust their patients, while moving the gatekeeping versus healing dilemma from the physician to the insurer. For such a change to be welfare improving, however, the welfare gain to society caused by $t^* l^* N$ fewer individuals taking unjustified sick leave must exceed the welfare loss caused by $t^* s^s N$ fewer sick patients being healed. To judge whether this is the case, the levels of s^s and c would obviously matter, in addition to factors such as individual benefits of healing and the cost of funds.

4. Trusting and shirking with observable physician strategies

Consider now the situation where patients can, for some reason or the other, observe which physicians are mistrusting and trusting, respectively. Proposition 2 demonstrates that in this case, physicians' gatekeeping preferences must be extremely strong to make them mistrust their patients.

The reason is that, since trusting physicians are poorer gatekeepers *and* better healers, every patient – whether shirker or sick – prefers a trusting physician. This includes the sick with *verifiable* diagnoses, and the sick with subjective diagnoses *not* requiring sick leave: although these patients would have been treated correctly by mistrusting physicians, they do not know, before seeing the physician, what kind of diagnosis they have. If there is no limit to the number of patients a physician can accept, *every* patient will see a trusting physician.

The mistrusting physician must hence not only be willing to forego the lost healing opportunities for patients truly sick with subjective diagnoses requiring sick leave, as in Proposition 1 above. She must also forego all income from patients: from shirkers, the sick with subjective diagnoses requiring sick leave, and all other sick workers. In addition, she must forego the pleasure of being a good healer – for *any* sick patient at all, since no patient comes to her office.

Even at this substantial cost, the physician's mistrust will not reduce the overall shirking level in society: Healthy workers who prefer shirking will simply see someone else. Since doctors who mistrust in Nash equilibrium (if any) get no patients, the share of trusting physicians t is irrelevant to the share of shirkers l as well as for the number of healed patients.

When patients can observe physicians' sicklisting strategies, the share of shirkers equals $1 - s - c$, regardless of the maximal strength $\bar{g}_i$ of physicians' gatekeeping preferences. Shirking is limited only by c, the share of workers who are healthy but prefer not to shirk. The gate is open to shirkers, but not every healthy worker is a shirker.

Proposition 2: Assume that physician strategies can be observed by patients, and that there is no binding limit to a physician's number of patients $P(\tau_i)$. Then, there is a Nash equilibrium $(t, l) = (t^{**} > 0, l^{**} > 0)$ such that: i) Every sick worker j sees a doctor i whose $\tau_i = T$, reporting $r_j = \sigma_j^S$. ii) Every healthy worker j for whom $\bar{q}_j \leq t^{**}$ sees a doctor i whose $\tau_i = T$, reporting $r_j = S_j^S \neq \sigma_j^S$; every healthy worker j for whom $\bar{q}_j > t^{**}$ does not see a doctor. iii) Every physician i for whom $(a + h)s \geq (g_i - a)l$ prefers $\tau_i = T$; any physician i for whom $(a + h)s < (g_i - a)l$ prefers $\tau_i = M$. iv) If $\bar{g}_i \leq [\frac{s(a+h)}{1-s-c} + a]$, $t^{**} = 1$, while $l^{**} = 1 - s - c > 0$. If $\bar{g}_i > [\frac{s(a+h)}{1-s-c} + a]$, $0 < t^{**} < 1$, and $l^{**} = 1 - s - c$.

Proof: See Appendix 1.

Again, the insurer can reduce shirking by restricting the right to paid sick leave to patients with verifiable diagnoses. This would reduce the number of shirkers by $N(1 - s - c)$; it would also reduce the number of healed patients by Ns^s. As before, this would improve social welfare only if preventing $N(1 - s - c)$ unjustified sick leaves matters more for social welfare than the healing of Ns^s sick workers.

The above presumes that there is no binding limit to how many patients the trusting physicians can accept. If there were such limits, even mistrusting physicians would get some patients. Their gatekeeping preferences would thus not need to be as strong as claimed above to make them prefer mistrust. Nevertheless, as long as doctors' capacity constraint (assuming it is equal for all doctors) exceeds N/Π, mistrusting doctors would still have strictly fewer patients than the trusting ones. The only patients seeing them would be the truly sick not accepted by a trusting doctor.

5. Discussion: the model

The main result of our formal analysis is that unless physicians' gatekeeping preferences are strong, possibly implausibly strong, the gate is essentially open. This does not necessarily mean that shirking is widespread; but it does mean that the final decision on whether or not to get an unjustified sick leave may lie with the patient, not, as is commonly assumed, with the physician.[13] When faced with a

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[13] Mykletun et al. (2014).

conflict between the healer and gatekeeper roles, physicians must be expected to give priority to the former. The physician is the patient's expert medical advisor, not her keeper.

Before proceeding to the empirical illustrations, let us mention a few caveats. First, if there is some imperfect signal indicating whether a patient is lying – e.g., the patient is avoiding eye contact – physicians could use the following kind of strategy: "Among patients with subjective diagnoses requiring sick leave, treat only those who do not avoid eye contact." While this would reduce the conflict between healing and gatekeeping, it would not eliminate it: as long as the signal is imperfect, the differentiation between sick and shirkers is still to some extent arbitrary. Physicians using this strategy would thus still be poorer healers than those trusting all patients. Consequently, substantial parts of our analysis would follow through as before, although with somewhat lowered stakes.

Second, the only legitimate reason for sicklisting considered above is that rest is required for healing. In practice, patients may be sicklisted because of limited functionality: the worker may simply not be capable of performing her usual tasks, even if being present at work would not have impaired her healing prospects. Empirical evidence indicates that many physicians consider functionality judgements a particularly troublesome aspect of sicklisting (Alexanderson et al. 2009). Such judgement requires, in addition to medical knowledge and information on symptoms, knowledge of the patient's working conditions and alternative job tasks. Physicians typically do not have first-hand access to the latter kind of information. Hence this type of sicklisting decisions are even more complex than those discussed here, as they involve three parties, all of whom may have private information and diverging interests – the patient, the physician, and the employer.

Third, in our model, those who sicklist the most are the best healers. This particular conclusion depends crucially on the assumptions of 1) perfectly competent physicians, and 2) effortless establishment of the correct diagnosis (given that information is available). In practice, physicians' competence and effort levels vary – and matter. If lack of competence and/or effort make physicians sicklist too much for patients' own good, this may well reverse the positive correlation between healing and sicklisting. Since we have disregarded differences in competence and effort, our model is silent on the possible consequences of such differences on sicklisting.

In our view, the most interesting finding from the theoretical model is the following: physicians face an intrinsic conflict between healing and gatekeeping – even if they are perfectly competent, do not care about patients' social approval, are not afraid to lose patients, and are willing to exert the efforts required to establish patients' diagnoses. While social and/or economic incentives may certainly amplify the problem, as in our observable physician strategy case with patient competition,

the role conflict is caused by private information on the patient's part, not by economic or social incentives as such. Thus, it cannot be fully resolved simply through changing physicians' incentives, nor by improvements in their medical skills.

6. Physicians' strategies and views: Focus group interviews

As mentioned in the introduction, previous research has confirmed that physicians struggle with the conflict between their healer and gatekeeper roles (Alexanderson et al. 2009, Carlsen & Norheim 2005; Arnesen & Fredriksen 1995). To give the reader a glimpse of how physicians handle this conflict in practice, we report below findings from a focus group interview study with Norwegian primary care physicians (Carlsen 2008), including previously unpublished material. While the interviews were conducted some years ago, our focus is on very general aspects of interviewees' responses. We do not claim that the reported views are representative of Norwegian physicians or physicians in general; rather, the interviews should be viewed as examples of how primary care physicians report to handle the conflict at hand. Qualitative findings may serve to convey a deeper understanding of statistical facts, and to build or support theory through hypotheses based on the data (see e.g. Huberman and Miles 2002). Our motive for including qualitative data in the present study is not to derive statistically significant quantitative results, but to explore whether these physicians' own experiences seem to be broadly consistent with our theoretical story – and if not, what kind of alternative stories they may be suggesting.

The interviews were conducted in groups, and were concerned with the physicians' experiences with and attitudes to sickness certification. Five focus group interviews with a total of 28 physicians were conducted.[14] Although the sample is small, not randomized, and not necessarily representative[15] (limitations that are normal for such studies), it is worth noting that the findings are largely in line with other quantitative and qualitative studies internationally (Englund and Svartsudd 2000; Wahlström and Alexanderson 2004; Freeman et al. 1999; Hussey et al. 2004, Winde et al. 2012).

Group interviews are often thought to be inadequate for surveying the range of different viewpoints within a group, while being better suited to expose generally accepted norms and attitudes (Kitzinger 1995). The latter was precisely the aim here. While group discussion may be dominated by 'politically

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[14] The Norwegian National Insurance Scheme offers full wage compensation during sick leave (except for the highest wages) for up to one year. While a sickness certificate issued by a physician is required for long-term absences, workers are allowed to self-declare sickness for absences of no more than a few days; the number of days depends on the type of employer (NAV, 2017).

[15] The observable profile of the study sample was fairly similar to the population of Norwegian primary care physicians. See Appendix 2 for details of the methodological design.

correct' statements, this is not necessarily problematic if the aim is to depicture common norms, i.e. the professional culture of a group.

Below, we restrict ourselves to report findings which represent "consensus views", in the sense that many interviewees expressed similar views, while no-one explicitly opposed these views.

The participating physicians consistently differentiated between short and long sickness spells, defining short sick leaves as lasting up to two or three weeks. Usually, these spells were characterized as "unproblematic cases", mostly related to bio-medically observable symptoms. Longer spells or repeated spells were frequently perceived as more problematic, and were also more often characterized by diffuse symptoms (i.e. including a greater proportion of "subjective diagnoses", in our terminology).

The physicians agreed that for shorter periods, they generally issued sickness certificates without questioning the patient's request at all. Such decisions were often made quickly, as most patients had easily verifiable symptoms of common, undramatic ailments. Several participants said that for all practical purposes, patients asking for certification for a single, shorter period of sickness absence grant themselves the certification. None of the physicians could come up with examples of themselves denying patients shorter sick leaves, as this extract from one of the focus group discussions illustrates:

Doctor A: You rarely question the patient's request for a sickness certification. It is hard to steer that process.

Doctor B: For many conditions, the patient in principle grants himself or herself sick leave; we just sign.

Doctor C: It is like B. says: at the outset, they often sicklist themselves; I rarely deny a sick leave when they ask for it, at least.

The physicians felt that most people preferred working, and would therefore not attempt deceiving the physician, even though a minority might be trying to stay away from work for reasons other than strictly medical ones.

Doctor D: It is my opinion, and my point of departure, that people do want to work; hence I do not have the feeling that it is important to identify people who misuse the social security system.

When it comes to longer sickness spells, the physicians often found their role to be more complicated. The participants said they occasionally attempt to negotiate with the patient and make an effort to convince the patient of trying, sometimes little by little, to return to full time work; but even in these cases the physicians admitted to give in to the patient's request more often than not.

Doctor E: At the outset, they sicklist themselves, I rarely deny a sickness certificate when they ask for it. But I do play a role in getting them back. Then I negotiate and wring and wriggle and play a much more important role, I think.

Doctor F: We try to make them join us in a setup where they can function, where they feel that this will work out. Then you give and take a little: "Now you try out this, and then we'll talk in a week or two, and perhaps then you can manage to work even a bit more." If we just say straight no, the whole situation gets locked.

In the interviews, some of the physicians claimed that they simply do not believe that patients attempt lying to their physician; firstly, because they believed few would want to shirk, and secondly, because they thought it would be difficult and uncomfortable for the patient to betray the reciprocal trust of the doctor – patient relationship. However, as discussions in the groups evolved, several of the participants reflected further on this issue or were opposed by colleagues in the group, and then acknowledged that it is logical that they are probably, sometimes, deceived by patients.

Doctor G: If you arrive at the wrong diagnosis, then your conclusion about whether sick leave is required will of course be wrong too.
Doctor H: Yes, obviously. I just expose my naïveté by saying that I don't discover much cheating.

Nevertheless, they also claimed that it is very difficult to reveal a lie indicating a subjective diagnosis:

Doctor I: It can be hard with musculoskeletal problems that you cannot really pin down. The patient may for example claim to feel pain, and you perform thorough tests, but cannot find anything, except that the patient says he or she is in pain. That is difficult. To what extent should you say that you think this is only psychological?

Additionally they felt inhibited by a sense of duty to trust the patient and center the diagnosis on the patient's subjective experience; thus some said they had "decided to believe" the patients.

Doctor J: You cannot relate to a world in which everyone is a potential cheater – that you are standing there holding back a whole nation of shirkers who really just want to be at home. Then you could not work. A horrible thought!

Or, it could simply be too socially distressing for the physician to relate to patients while thinking of them as liars:

Doctor K: […] otherwise you have to sit and think that this person in front of me is lying, right to my face. And we cannot sit like that all day, thinking that way.

The physicians also felt hindered from revealing shirkers by their professional responsibility as the patient's regular primary care physician. This responsibility allegedly makes them averse to taking health risks on the patient's behalf, and incites primary care physicians to practice defensively.

Doctor L: Then there are those times when I've been really suspicious, but then I'm afraid that my own prejudices play a role. Am I certain about this? And if I think this guy is a real shirker, there's a good chance that I'm actually wrong; that this person seems unsympathetic to me does not necessarily mean that he does not qualify for a sick leave. For it has happened, sometimes, that I've been a bit harsh with the patient, and then they end up in a hospital policlinic and it turns out that "good heavens, man, this person has meniscrupture, I have to do an arthroscopy […]". And I think: Oh […], I've been rude to that patient.

Doctor M: I remember two rather young patients, 30 to 40 years, with substantial back pains, where I was skeptical to one of them. She has ended up being operated by specialists twice. Such experiences strengthen my conviction that I have to consider my own prejudices.

In summary, the physicians experienced the gatekeeper role regarding sickness certification as problematic, largely because they had reason to believe that a minority is granted sick leave without real medical reasons, while at the same time feeling that they had no choice but to trust their patients. Hence shorter sickness certifications were issued practically without questions asked. Longer sickness leaves were more often negotiated, and the physician would attempt to probe further for possibilities for the patient to return to work; nevertheless, these sick leaves were also usually granted in the end. Hence, the physicians in our study regretted that they were, to a large extent, unable to function as gatekeepers for sickness certification.

Doctor N: I find this a difficult task. One feels a squeeze between what society wants and what the patient wants. Usually I feel that I work more for the patient than for society.

7. Concluding remarks

Several studies have found that physicians struggle with the conflict between their healer and gatekeeper roles, and that as a result, their gatekeeping tends to be lax (e.g., Alexanderson et al.

2009, Carlsen & Norheim 2005; Arnesen & Fredriksen 1995). If insurers wish to address this problem, they first need to understand the root of the perceived dilemma.

We show that a healer – gatekeeper role conflict arises due to the patient's private information about her own symptoms. This information asymmetry makes the physician unable to distinguish shirkers from a subgroup of truly sick patients. Given this, keeping the gate closed to shirkers unavoidably involves closing it to some of the truly sick as well.

Our theoretical analysis demonstrates that if patients *cannot* observe physicians' sicklisting strategies, some physicians may mistrust their patients in Nash equilibrium, provided that these physicians have strong preferences for gatekeeping. If patients *can* observe physicians' strategies, however, the healer – gatekeeper conflict is considerably amplified. In this case, both shirkers and the truly sick shy away from physicians who do not trust, leaving the latter with no or few patients. In this case, implausibly strong gatekeeping preferences are required to make physicians mistrust patients' reported symptoms in the Nash equilibrium.

Physicians' trust can be exploited by rational and cynical shirkers who seek unjustified sickness certificates. However, since the dilemma is caused by asymmetric information, not merely sloppiness or incompetence by physicians, it cannot be removed simply by changing physicians' incentives.

Given that professional norms among physicans stress the duty to place the patient's interests first (WMA 2006), it seems likely that many physicians will give priority to healing over gatekeeping when conflicts arise. If the insurer wishes to reverse this priority, this can be achieved in a very straightforward manner: simply by making the sick with non-verifiable diagnoses ineligible for sick leave benefits. Expecting physicians to take responsibility for such a decision, however, seems unlikely to succeed.

Among physicians participating in the focus group study reported above, the healing – gatekeeping conflict was a familiar one. Of those interviewed, none could remember to have denied a short-term sick leave at the patient's request. While physicians reported that they sometimes, in cases of long-term sick leaves, try to persuade patients that it would be better to return to work, a leave would usually be granted anyway if they were unable to convince the patient about this. Thus, they seemed to agree that the choice of whether to be sicklisted lies, essentially, with the patient herself, while the physician basically serves as the patient's medical advisor. These findings are in line with previous empirical work (e.g. Carlsen and Norheim 2005; Larsen et al 1994).

If the gate is indeed open, the interesting puzzle may not be why sick leave rates are so high in welfare states with generous sick leave coverage, but rather why they are so low. In Norway, where the interviews reported above were conducted, the National Insurance Scheme is exceptionally generous, offering workers a 100% salary coverage during sick leave (although restricted for very high salaries) for up to one year. However, in addition to the possible social and intrinsic benefits of working (Brekke and Nyborg 2010) and psychological costs of lying (Gneezy et al. 2013), empirical research indicates substantial long-term pecuniary losses associated with sick leaves, even if there is formally full coverage (Markussen 2012).

The bottom line of our study is that primary care physicians' main role seems to be that of the patient's expert advisor, not her keeper. As advisors, they may certainly restrict sick leaves by suggesting to the patient, whenever relevant, that her healing prospects are best served by returning to work. Nevertheless, given the conflicts between gatekeeping and healing pointed out above, the expectation that physicians can fulfill both roles without substantial conflict seems unfounded.

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Appendix 1

Proofs

Proof of Proposition 1:

i) By assumption, any sick worker j maximizes the probability of getting the correct treatment for her diagnosis. Given physicians' strategies, j cannot do better than choosing a doctor randomly and reporting truthfully ($r_j = \sigma_j^S$): For all diagnoses except the subjective requiring sick leave, any doctor will provide the correct treatment. If j's diagnosis is a subjective one requiring sick leave, j will only be treated by trusting doctors; however, she cannot distinguish trusting from mistrusting before choosing her doctor. Moreover, by misreporting symptoms she will generally get the wrong diagnosis. Further, unless $\sigma_j^S = S_j^S$, j does not even know that her diagnosis is a subjective one; and even if she knew her diagnosis and treatment, she could not make a mistrusting doctor treat her correctly by misrepresenting her symptoms, since she does not know which verifiable symptoms the doctor will be observing.

ii) By assumption, every worker for whom $q \geq \bar{q}_j$ is a shirker. Given physicians' strategies, a shirker j cannot get a sickness certificates from a doctor i whose $\tau_i = M$: j's true symptoms σ_j^S would indicate that she is well; if j reports $r_j = S_j^S \neq \sigma_j^S$, a physician i whose $\tau_i = M$ will not sicklist; and if j misreports $r_j \neq S_j^S$ (where $r_j \neq \sigma_j^S$), claiming to be sick and need sick leave, i's verifiable observations (unknown to j when reporting her subjective symptoms) will not confirm the claim.

A shirker j can get a sickness certificates from a doctor i if $\tau_i = T$, but only by reporting $r_j = S_j^S \neq \sigma_j^S$: j's true symptoms would indicate that she is well, and if j reports $r_j \neq S_j^S$, claiming to be sick and in need of sick leave, i's verifiable observations will not confirm the claim. Hence a shirker gets a sickness certificate if and only if $r_j = S_j^S$ and $\tau_i = T$. This further implies that $q = t = t^*$.

iii) Using eq. (2), we know that a physician prefers Trust to Mistrust if

$$E[\mathrm{aP}(T) + \mathrm{hH}(T) - \mathrm{g}_i\mathrm{G}(T)] \geq E[\mathrm{aP}(M) + \mathrm{hH}(M) - \mathrm{g}_i\mathrm{G}(M)].$$

First, $E\mathrm{P}(T) = E\mathrm{P}(M) = N(s + l)/\Pi$, since patients choose physicians at random. Second, a trusting doctor heals all sick patients, hence $EH(T) = \frac{Ns}{\Pi}$. Mistrusting doctors heal all their patients except those reporting the symptoms of a subjective diagnosis requiring sick leave, i.e., $\mathrm{EH}(M) = \frac{N(s - s^s)}{\Pi}$.

Third, a trusting doctor grants sick leaves to all liars seeing her: $EG(T) = \frac{lN}{\Pi}$. A mistrusting doctor grants no unjustified sick leaves, so $EG(M) = 0$.

Inserting this into the inequality above yields the result that a physician prefers trust if $hs^s \geq g_i l$. Hence in the Nash equilibrium (t^*, l^*) a physician prefers trust if $hs^s \geq g_i l^*$.

Finally, no other sicklisting strategy than Mistrust or Trust can strictly improve physicians' expected utility, given the strategies of others: assume for a moment that there are no patients reporting the symptoms of a subjective diagnosis requiring sick leave. Then, $E[aP(T)]$ is unaffected by the choice of τ_i, $E[hH(T)]$ is maximized by granting sick leave whenever this is part of the medically correct treatment for diagnosis $D(r_j, \sigma_j^v)$, and $E[g_i G(T)]$ is minimized by granting sick leave *only* when this is part of the medically correct treatment for diagnosis $D(r_j, \sigma_j^v)$. Thus, the only non-trivial choice for the physician is whether to sicklist patients reporting the symptoms of a subjective diagnosis requiring sick leave, which is precisely the difference between strategies Trust and Mistrust. Obviously, a physician who is indifferent between Trust and Mistrust may use a mixed strategy, randomizing between the two. Taking this possibility explicitly into account would not substantially alter the analysis below.

iv) By eq. (1) and $q = t^*$ as shown above, we know that $l^* = F(t^*)$. From iii) we know that a physician i trusts if $g_i \leq h \frac{s^s}{l^*}$. However, l^* cannot exceed $1 - s - c$. Hence, if $\bar{g}_i \leq h \frac{s^s}{(1-s-c)}$, then $g_i \leq h \frac{s^s}{l^*}$ holds for all i even when l is at its maximum value, implying that a Nash equilibrium must have $t^* = 1$. Using eq. (1), the best response of workers to $t^* = 1$ is given by $l^* = F(1) = 1 - s - c$. Given that $\bar{g}_i \leq h \frac{s^s}{(1-s-c)}$, the best response of physicians to $l^* = 1 - s - c$ is to trust, as shown above. Hence $(t^*, l^*) = (1, 1 - s - c)$ is a Nash equilibrium when $\bar{g}_i \leq h \frac{s^s}{(1-s-c)}$.

If $\bar{g}_i > h \frac{s^s}{(1-s-c)}$, the situation $(1, 1 - s - c)$ cannot be a Nash equilibrium: while $l = 1 - s - c$ is still a best response to $t = 1$, the reverse is no longer true. Thus, in this case, a Nash equilibrium must have $t^* < 1$. By eq. (1), workers' best response to $t^* < 1$ implies $l^* = F(t^*) < 1 - s - c$, since $F(q) < 1$ for $q < 1$, and $t^* < 1$. By assumption, $c < 1 - s$, so $1 - s - c > 0$. It remains to be shown that such a Nash equilibrium exists.

Let $l(t)$ be the reaction curve of healthy workers, in terms of the share of shirkers l as a function of the share of trusting physicians t. We know, by the properties of F, that $l(0) = F(0) = 0$. Moreover,

$l(1) = F(1) = 1 - s - c$. Thus, by the continuity and monotonicity of F, there must be some $l(t) \in [0, 1 - s - c]$ such that $l(t) = F(t)$ for every $t \in [0,1]$.

Further, let $t(l)$ be the reaction curve of physicians, in terms of the share of trusting physicians t as a function of the share of shirkers l. We know that $t(0) = 1$: a physician trusts if $hs^s \geq g_i l$, and $hs^s \geq 0$ always holds. We further know that if $\bar{g}_i > h\frac{s^s}{(1-s-c)}$, then $0 < t(1 - s - c) < 1$: First, we cannot have $t(1 - s - c) = 0$; that would imply $hs^s < g_i l$ for all i, which cannot be true, since $g_i = 0$ for at least one physician. Second, when $\bar{g}_i > h\frac{s^s}{(1-s-c)}$, we cannot have $t(1 - s - c) = 1$ since that would require $\bar{g}_i \leq h\frac{s^s}{(1-s-c)}$. Since g_i varies and t is the share of physicians for whom $hs^s \geq g_i l$, t must be a continuous and weakly decreasing function of l.

In Nash equilibrium, we must have $l^* = l(t)$ and $t^* = t(l)$. Hence, if $\bar{g}_i > h\frac{s^s}{(1-s-c)}$, there must exist some $t^* \in \langle 0, 1 \rangle$ and $l^* \in \langle 0, 1 \rangle$ such that (t^*, l^*) is a unique Nash equilibrium. This is illustrated in Figure 1 (note, however, that the steepness and curvature of the two reaction curves, and the exact location of the point $t(1 - s - c)$, depend on the properties of the distributions of $\bar{q}_j$ and g_i).∎

Proof of Proposition 2

i) By assumption, any sick worker j maximizes the probability of getting the correct treatment for her diagnosis. Given physicians' strategies, j cannot do better than choosing a doctor whose $\tau_i = T$ and reporting truthfully ($r_j = \sigma_j^s$): For all diagnoses except the subjective requiring sick leave, any doctor will provide the correct treatment; if j's diagnosis is a subjective one requiring sick leave, j will only be treated by trusting doctors. Unless $\sigma_j^s = S_j^s$, j does not know whether her diagnosis is a subjective one requiring sick leave. Hence if she chooses a doctor for whom $\tau_i = T$, she is sure to be treated correctly even if her diagnosis turns out to be a subjective one requiring sick leave. If $\sigma_j^s = S_j^s$, j knows for sure that she will only be treated by a trusting doctor. Thus, all sick workers strictly prefer a doctor for whom $\tau_i = T$. By the same reasons as discussed in the proof to Proposition 1 i), she will report truthfully ($r_j = \sigma_j^s$).

ii) Every worker for whom $q \geq \bar{q}_j$ is a shirker. Given physicians' strategies, a shirker j cannot get a sickness certificate from a doctor i whose $\tau_i = M$; she can get one from a doctor i whose $\tau_i = T$, but only by reporting $r_j = S_j^s \neq \sigma_j^s$ (see the proof to Prop.1, part ii). Hence every shirker strictly prefers a doctor whose $\tau_i = T$. Due to the assumption that there are no binding limits to $P(\tau_i)$, trusting

physicians share all patients between themselves. Hence by choosing a doctor i whose $\tau_i = T$, and reporting $r_j = S_j^s \neq \sigma_j^s$, the success probability of a shirker is $q = 1$.

iii) Using eq. (2), we know that a physician prefers trust to mistrust if

$$E[aP(T) + hH(T) - g_i G(T)] \geq E[aP(M) + hH(M) - g_i G(M)].$$

First, given patients' strategies, $EP(M) = 0$, since all patients prefer trusting physicians; $EP(T) = \frac{N(s+l)}{t\Pi}$, since trusting physicians share all patients between them, and patients cannot distinguish between trusting doctors, thus choosing randomly among them. Second, a trusting doctor heals all her sick patients, hence $EH(T) = \frac{Ns}{t\Pi}$; mistrusting doctors do not get any patients, and thus cannot heal anyone, so $EH(M) = 0$. Third, a trusting doctor grants sick leave to all liars seeing her: $EG(T) = \frac{lN}{t\Pi}$. A mistrusting doctor grants no unjustified sick leaves, so $EG(M) = 0$. Inserting this into the inequality above and rearranging, gives that i prefers trust whenever $s(a + h) + l(a - g_i) \geq 0$, or $[\frac{s(a+h)}{l} + a] \geq g_i$.

vi) By eq. (1) and $q = 1$ as shown above, we know that in the Nash equilibrium (t^{**}, l^{**}), $l^{**} = (1 - s - c)$. From iii) we know that i trusts if $[\frac{s(a+h)}{l} + a] \geq g_i$. Thus, if $\bar{g}_i \leq [\frac{s(a+h)}{1-s-c} + a]$, all physicians are trusting when $l = l^{**}$, and we must have $(t^{**}, l^{**}) = (1, 1 - s - c)$.

If, on the other hand, $\bar{g}_i > [\frac{s(a+h)}{1-s-c} + a]$, there exist i with strong enough gatekeeping preferences to mistrust even if it means that they lose all their patients. Thus, if there is a Nash equilibrium in this case, $t^{**} < 1$. However, we still have $l^{**} = 1 - s - c$: By eq. (1) and the fact that $q = 1$ (see the proof to Prop.2 ii) above), workers' best response is given by $l = F(1) = 1 - s - c$, since by definition of c, $F(1) = 1 - s - c$. Since there exists i with $g_i = 0$, $t^{**} > 0$. ∎

Appendix 2

Empirical method and procedures

During the fall of 2007, 97 invitations to participate in focus group interviews were sent to a random sample of coordinators for physicians' educational groups from the Norwegian counties of Hordaland and Oslo. Groups that responded by contacting us were included in the study consecutively. We continued interviewing groups until a point where no substantial new findings appeared; a point of data saturation (Glaser and Strauss 1967). In total we conducted five group interviews with a total of 28 physicians participating. The profile of the study sample was fairly similar to the population of Norwegian primary care physicians (see Table 1). All group participants knew each other from monthly meetings in the educational groups.

Table 1: Characteristics of the participating physicians and all primary care physicians in Norway

	Interview sample	Population of primary care physicians in Norway[*]
Physicians	28	3891
Percentage male	61%	68%
Mean age	45	48
Mean no of listed patients	1172	1196
Percentage with vacancies on list	38%	47%
Percentage specialists	46%	56%

[*] Source: The Norwegian Labour and Welfare Administration. Data from the Regular General Practitioner Scheme 4. Quarter 2007. (http://www.nav.no/page?id=1073743257)

One of the authors[16] conducted the interviews following a semi-structured interview guide.[17] The researcher attempted to promote free discussion around the main topics of the interview guide. These topics were based on earlier Scandinavian studies of primary care physicians' gatekeeper role in sickness certification (Carlsen and Norheim 2005, Englund, Tibblin, and Svardsudd 2000, Gulbrandsen, Førde and Aasland 2002, Wahlström and Alexanderson 2004). Interviews lasted

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[16] Carlsen, who is trained as an anthropologist and experienced in conducting group interviews.
[17] The project was approved by the Privacy Ombudsman against the privacy and license requirements of the Data Inspectorate in relation to the Personal Data Act and Health Register Act. Participants signed an informed consent form containing information about their right to anonymity and right to withdraw from the study at any point. The participants also filled in a brief questionnaire about themselves and their medical practice.

between 60 and 90 minutes and were recorded and transcribed word for word by a research assistant. The transcripts were then analyzed using thematic content analysis (Green and Thorogood 2004) to extract shared concerns and fundamental premises.

The interview guide included the following themes:

- Experience with the gatekeeper role
- Perceptions of the regulations regarding sick leave and the concept of illness
- Trust and mistrust in the patient-physician relationship
- Assessing patients' diagnoses and work capacity
- Examples of difficult decisions
- Suggestions for improvements of the system