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# Why physicians are lousy gatekeepers: Sicklisting decisions when patients have private information on symptoms

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**Abstract**

In social insurance systems that grant workers paid sick leave, physicians act as gatekeepers, supposedly granting sickness certificates to the sick and not to shirkers. Previous research has emphasized the physician's superior ability to judge patients' need of treatment and potential collusion with the patient vis-á-vis an insurer. What is less well understood is the role of patients' private information. We explore the case where patients have private information about the presence of nonverifiable symptoms. Anyone can then claim to experience such symptoms, reducing physicians' ability to distinguish between sick patients and shirkers. Doubting a patients' reported symptoms may prevent good medical treatment of the truly sick. We show that for all parameter values, the Bayesian Nash equilibrium is that some physicians trust all claims of nonverifiable symptoms, sicklisting shirkers as well as sick; for many values, every physician is trusting. In particular, if physician strategies are observable by patients, extremely strong gatekeeping preferences are required to make physicians mistrust. To limit unwarranted sicklisting, policies reducing the benefits of shirking for healthy workers may be better suited than attempts to convince physicians to be strict.

**KEYWORDS**

moral hazard, physician gatekeeper, sick leave

**JEL CLASSIFICATION**

D11; D21; H42; I11; I18

## 1 | INTRODUCTION

Primary care physicians serve two roles: They are healers and gatekeepers. The gatekeeper role is particularly important in welfare states, where physicians often decide who is to be granted publicly financed benefits such as paid sick leave (Mykletun et al., 2014). Physicians also play a similar role in private health insurance schemes.

Below, we show how patients' private information limits physicians' ability to function well in both roles simultaneously. While our model is highly stylized, the mechanisms we describe have profound implications for the potential

effectiveness of policies aiming to reduce the prevalence of unwarranted sick leaves. Although we focus on physicians' sicklisting decisions, similar dilemmas may arise when prescribing medication such as opioids.

In the Bayesian Nash equilibrium of our model, some patients make nonverifiable claims that they experience symptoms indicating a medical need for sick leave. Whereas only the physician has medical expertise and access to, for example, 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, one may need information from both parties—and patients aiming to get an unjustified paid sick leave can potentially exploit this. We find that in equilibrium, the only physicians denying sickness certificates to such "shirkers" are those with a strong intrinsic preference for being effective gatekeepers. In many plausible settings, no physician has sufficiently strong gatekeeping preferences that they deny sicklisting to anybody. If physician strategies can be observed by patients, no physician rejects nonverifiable sicklisting requests—unless there exist doctors with so strong preferences for gatekeeping that they prioritize this even at the cost of losing all their patients.

Previous research on information asymmetries in the patient–physician relationship has emphasized physicians' superior ability to judge patients' need of treatment (e.g., De Jaegher & Jegers, 2000; Dranove, 1988; Rochaix, 1989) and the information advantages of a potential patient–physician collusion vis-á-vis the insurer (Alger & Ma, 2003; Chalkley & Malcolmson, 1998; Choné & Ma, 2011). To our knowledge, our focus on patients' private information vis-á-vis their physician is a novel perspective.

If not taking patients' private information into consideration, the conflict between the healer and gatekeeper roles we point out might seem rather artificial. After all, the healer needs to establish the correct diagnosis and the associated treatment; thus, issuing a sickness certificate if and only if sick leave is required for this treatment may seem like a straightforward gatekeeper strategy. In the medical profession, however, this role conflict is widely acknowledged (Alexanderson et al., 2009; Angell, 1993; Arnesen & Fredriksen, 1995; Ayres, 1996; Carlsen & Norheim, 2005; Pearson, 2000). Several empirical studies have found that primary care physicians are indeed reluctant to reject patients' requests for sickness certificates (Carlsen & Norheim, 2003; Englund, Tibblin, & Svärdsudd, 2000; Gulbrandsen, Førde, & Aasland, 2002; Larsen, Førde, & Tellnes, 1994; Nilsen, Malterud, Werner, Maeland, & Magnussen, 2015; Wahlström & Alexanderson, 2004).

Our analysis is, in particular, inspired by a focus group interview study of primary care physicians conducted by one of the authors (see Appendix S1), providing examples of possible strategies used by physicians in their everyday work to handle patients' private information. In summary, these physicians experienced the gatekeeper role 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, the physicians in the study regretted that they were, to a large extent, unable to function as gatekeepers for sickness certification, consequently rarely questioning patients' requests for sickness certification.

In line with the literature on public service motivation (Besley & Ghatak, 2005; Brekke & Nyborg, 2010; Delfgaauw & Dur, 2008; Dur & Glazer, 2008; Francois, 2007; Heyes, 2004), an important premise underlying our analysis is that physicians, rather than being purely selfish in the narrow sense, care about doing a good job. While physician altruism toward patients have long been a common assumption in the health economics literature, (e.g., Alger & Ma, 2003; Arrow, 1963; De Jaegher & Jegers, 2000; Farley, 1986; Godager, Iversen, & Ma, 2009; Ma, 2007), we also explicitly account for the idea that physicians' social preferences may involve not only altruism or loyalty toward the patient but potentially also toward the insurer.[1]

Below, we first present the formal model, solving it for the two polar cases of fully unobservable and fully observable physician strategies. We then proceed to discuss limitations and policy implications of the model, before concluding.

## 2 | THE MODEL

In order to focus on the issue of private information, we abstract from several factors that would complicate the analysis without, we believe, adding substantial insight. First, we assume that every physician is perfectly competent in the sense that if given the full diagnostic information, she can costlessly determine the patient's correct diagnosis. This

[1]For the impact on work motivation of self-image concerns, vocation, or a preference for public good/public sector work per se, see (Bénabou & Tirole, 2002, 2003, 2006; Akerlof & Kranton, 2005; Dur & Glazer, 2008; Brekke & Nyborg, 2008, 2010; Heyes, 2004; Besley & Ghatak, 2005; Francois, 2007; and Delfgaauw & Dur, 2008).

eliminates variation in doctors' sicklisting practices due to incompetence, varying efforts, and diagnostic uncertainty. Second, we assume that physicians are motivated only by income, a desire to be an effective healer, and possibly also a desire to be an effective gatekeeper—disregarding motives such as a preference for the patient's social approval. Consequently, the conflict we identify between healing and gatekeeping is caused by neither social interaction, medical incompetence, nor limited effort.

## 2.1 | The environment

Consider a society with a mass $N$ of workers. A share $s$ of these workers ($0 < s < 1$) are sick, whereas the remaining 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.[2] Although 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.

Let each sick worker $j$ be characterized by a set of symptoms $\hat{\sigma}_j \in \Sigma$ where $\hat{\sigma}_j$ can consist of $j$'s subjective symptoms, verifiable symptoms, or both. *Subjective* symptoms are observable only by the patient, for example, pain, nausea, dizziness, blurred vision, hallucinations, or fatigue. We denote the set of subjective symptoms by $\Sigma^s$. *Verifiable* symptoms can be observed by a physician, for example, blood test results and interpretations of ultrasound or X-ray images. We disregard symptoms observable by neither patient nor physician, as these would not matter substantially to the argument.[3]

Let $D(\hat{\sigma}_j)$ denote the diagnosis corresponding to the set of symptoms $\hat{\sigma}_j$. In general, knowledge of both subjective and verifiable symptoms is 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 only. Myalgic encephalomyelitis (ME), schizophrenia, and migraine may serve as examples of this.

Denote the share of workers who are truly sick, but with subjective diagnoses, by $s^s$, and assume this share is exogenously given and common knowledge. As some sick workers also have verifiable diagnoses, we have $s^s < s$.

Workers report a set of symptoms $\sigma_j \in \Sigma$ to the physician, who then determines a diagnosis. If a worker reports a $\sigma_j$ with verifiable symptoms she does not experience, this is immediately revealed by the physician. She can, however, report any set of subjective symptoms. Although workers do not have medical training, 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.

There is a mass $\Pi < N$ of physicians. Workers decide whether or not to see a physician and, if they do, which physician to see and which symptoms to report. Workers only visit physicians once. They 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.[4] 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.

If given correct 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. For subjective symptoms, however, the physician has to choose whether to believe the patient's claims. We denote the action of trusting (i.e., treating the patient's information as if it is true) $T$ and the action of mistrusting (treating the patient's information as if it is untrue) $M$. As outlined below, the physician's behavior depends on her preferences, hence her type, and the equilibrium behavior of patients.

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.

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

[3]"Symptom" includes negative observations indicating that nothing is wrong. We assume that the distribution, possible values, and possible combinations in $\Sigma$ are complex enough that we can disregard the possibility of an uninformed person correctly guessing a worker $j$'s symptoms.

[4]For other diagnoses, *presence* at work may be required for healing. This does not, however, affect our results: Patients trying to get an unwarranted sickness certificate in order to shirk will avoid reporting the symptoms of such diagnoses.

## 2.2 | Worker behavior

Sick workers' objective is to get well. Thus, a sick worker maximizes her probability of getting the correct treatment for her actual diagnosis.[5] She chooses a doctor and presents a set of symptoms $\sigma_j$ given her true set of symptoms $\hat{\sigma}_j$.

Healthy workers have no medical reason to see a doctor. Those who do not see a physician do not present any diagnosis. We denote this by the action $\sigma_j = \emptyset$. Some healthy workers may still see a doctor 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 to maximize her chances of succeeding in this aim.

Shirking, however, may be costly to the worker. Seeing the doctor takes time, effort, and money. There may be psychological costs of lying (Gneezy, Rockenbach, & Serra-Garcia, 2013); workers may worry about reduced career prospects if absent from work (Markussen, 2012) and less than full insurance coverage; they may also care about social and/or intrinsic benefits of work presence (Brekke & Nyborg, 2010) and worry about suspected shirking being frowned upon (Lindbeck, Nyberg, & Weibull, 1999). These costs and benefits can differ between workers. Shirking is preferred only if the expected net benefits of shirking are positive.

Let $q \in [0,1]$ 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 an optimal choice of physician and symptoms to present.[6] A given healthy worker prefers shirking if this probability is high enough to make the worker's expected net benefits of shirking positive. In particular, each worker $j$ has a cutoff probability $q_j$ (i.e., she will attempt shirking whenever $q \geq q_j$).[7] Let $F$ be the cumulative distribution of $q_j$ in the population. Assume that $F(0) = 0$. A worker that would not shirk even if access to sick leave was certain is said to have $q_j > 1$. Then, for a given $q$, the share of workers attempting to shirk is

$$l = (1-s)[1-\mathrm{F}(q)]. \tag{1}$$

It follows that $0 \leq l < (1-s)$. A share $c = (1-s)[1-F(1)]$ of workers face sufficiently large costs of shirking that they never seek an unjustified sickness certificate regardless of the probability of getting one. We have $1 - s > c > 0$.

## 2.3 | Physician behavior

The physician choice we are primarily interested in is whether or not to issue sickness certificates as part of the patient's treatment.[8] Let each physician's net income per patient (monetary payment minus costs, including effort) be exogenously fixed at $a$ (disregarding variation in physician effort). Let $\tau_i$ 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.[9] Assume that physician $i$ maximizes her expected utility, where utility is given by

$$U_i(\tau_i) = aP(\tau_i) + hH(\tau_i) - g_i G(\tau_i). \tag{2}$$

[5]That is, sick workers behave as if they have lexicographic preferences for being healed, which would be justified if, for example, nothing is enjoyable when feeling unwell. If workers instead make trade-offs between health and, for example, income, some sick workers might abstain from seeing a doctor. Below, "sick workers" would then have to be replaced by "sick patients," that is, those sick workers actually seeking medical advice.

[6]When physician types cannot be observed, $q$ is the probability that a randomly chosen physician is of a type offering sick leaves to patients with subjective diagnoses (playing $T$ in the terminology introduced below).

[7]An individual $j$ with total costs of shirking $k_j$ and benefits of shirking $B_j$ would shirk if $k_j < qB_j$, yielding $q_j = \frac{k_j}{B_j}$.

[8]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, and surgery). Including such elements explicitly would complicate the formal model without adding substantial insights.

[9]The populations of both workers and physicians are modeled as continua. However, as they have the same cardinality, we get natural numbers when we divide the size of a set of the mass of workers on the size of a set of physicians.

Here, $h > 0$ measures the strength of the preference to be an effective healer, whereas $g_i \geq 0$ reflects physician $i$'s preference for being an effective gatekeeper. Linear separability is assumed for simplicity. Let $g_i$ have a cumulative distribution function $\Gamma$ on the proper interval $[0,\bar{g}]$ with $\Gamma'(0) > 0$ and $\Gamma'(\bar{g}) > 0$. Then, the type of physician, which we initially take to be private knowledge, is given by $g_i$.[10]

One interpretation of the preference function 2 is that physicians are nicely behaved individuals motivated by their Hippocratic Oath, focusing on healing the sick and, to varying degrees, also on gatekeeping for the welfare state. The structure is not limited to this interpretation, though. If doctors are mostly motivated by money, this corresponds to the $a$ parameter being high.

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, the shirkers, may choose to misrepresent their subjectively experienced symptoms. In addition, the physicians' sicklisting strategy might affect the number of patients.

In theory, a physician can choose an action for any specific combination of patient and reported set of symptoms $\sigma_j$. To simplify, we focus on the following sicklisting practices for physician $i$:

*Trust*, $\tau_i = T$: If sick leave is part of the medically correct treatment for the diagnosis $D(\sigma_j)$, $i$ 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 $D(\sigma_j)$, and $D(\sigma_j)$ 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.[11]

When a share $l$ of workers wrongfully attempt to pass as sick, a physician with preferences as given by (2) trusts patients if $g_i \leq h\frac{s^s}{l}$.

The game structure can be summarized as follows: First, nature draws a type $g_i$ for every physician. Second, each worker chooses whether to see a physician and, if so, which physician to visit and which symptoms to present.

## 3 | TRUSTING AND SHIRKING WITH UNOBSERVABLE PHYSICIAN STRATEGIES

Assume first that patients cannot observe physicians' sicklisting strategies and thus cannot select a preferred physician 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 Bayesian Nash equilibrium. In fact, unless $\bar{g} > h\frac{s^s}{(1-s-c)}$, *all* physicians trust in Bayesian 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*.[12]

In the game, each patient $j$ chooses whether to not see a doctor ($\sigma_j = \emptyset$) or to see a doctor and present symptoms $\sigma_j \in \Sigma$. Let $\Sigma_j^s$ denote the symptoms of a subjective diagnosis requiring sick leave that $j$ is familiar with. Let $q^* > 0$ be a cutoff probability such that all workers $j$ with $q_j \geq q^*$ prefer to be shirkers, whereas all workers with $q_j < q^*$ do not shirk.[13] As the patient meets a physician whose strictness he does not know and the physician meets a patient whose true health state she does not know, we have to look for Bayesian Nash Equilibria. We then have the following:

[10]Equation 2 implies that doctors' altruism toward patients, possibly also toward 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, Blume, and Varian, 1986; for a discussion, see Nyborg & Rege, 2003).

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

[12]There is no other strategy which is strictly preferred to *Trust* and *Mistrust*.

[13]That is, for a share $c$ of all workers, $q_j \geq 1$.

**Proposition 1** There is a cutoff probability $q^*$ and cutoff weight $g^*$ such that when a worker and a physician are matched without knowing each other's type, there is a Bayesian Nash equilibrium where

i Every sick worker $j$ plays $\sigma_j = \hat{\sigma}_j$
ii Every healthy worker $j$ with $q_j < q^*$ plays $\sigma_j \in \Sigma_j^s$
iii Every healthy worker $j$ with $q_j \geq q^*$ plays $\sigma_j = \emptyset$
iv Every physician $i$ with gatekeeping preferences $g_i \leq g^*$ plays $\tau_i = T$
v Every physician $i$ with gatekeeping preferences $g_i > g^*$ plays $\tau_i = M$

In equilibrium, $q^* = G\left(h\frac{s^s}{(1-s-c)}\right)$ and $g^* = \frac{hs^s}{(1-s)[1-F(q^*)]}$.

The Bayesian 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, 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).

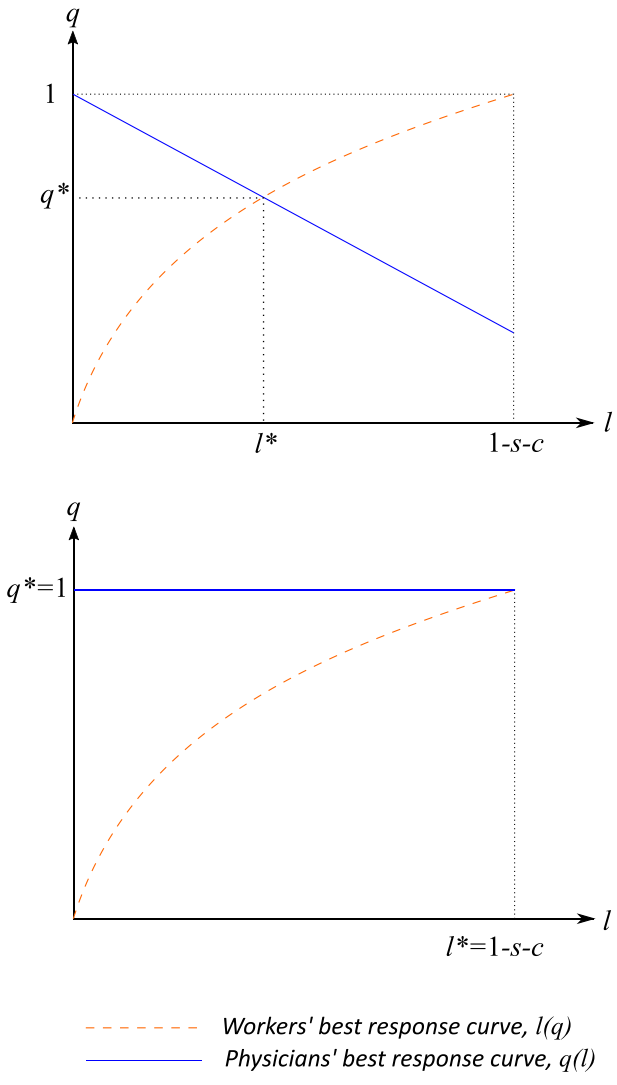


**FIGURE 1** Physicians' and healthy workers' reaction curves. Upper panel: Best response curves when gatekeeping preferences are strong ($\bar{g} > h\frac{s^s}{(1-s-c)}$). Lower panel: Best response curves when gatekeeping preferences are weak ($\bar{g} \leq h\frac{s^s}{(1-s-c)}$) [Colour figure can be viewed at wileyonlinelibrary.com]

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

Further, let $q(l)$ be the best response curve of physicians, in terms of the share of trusting physicians as a function of the share of shirkers $l$. We know that $q(0) = 1$. 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 $q(1 - s - c)$ is smaller than or equal to 1, depends on whether $\bar{g} > h\frac{s^s}{(1-s-c)}$, as shown in the two panels of Figure 1.[14]

Note that Proposition  is driven neither by physicians' income concerns nor by any cost involved in establishing the correct diagnosis. The relatively lax gatekeeping is caused by physicians' inability to distinguish sick from shirkers, combined with the preference to be effective healers: By mistrusting, physicians know that some of their truly sick patients—those suffering from subjective diagnoses requiring sick leave—will not heal.

Recall, however, that even if all physicians trust, thus leaving the gate open, shirking is limited because only workers with $q_j < 1$ prefer to shirk. Although not formally included in our model, social norms may be one important factor to limit the share of workers for whom this holds. If social disapproval of a (suspected) shirker is decreasing in the share of shirkers, multiple equilibria can arise; a situation with low shirking, but high social stigma for suspected shirkers, may then represent one stable equilibrium (see Lindbeck et al., 1999; Young, 2015).

It is interesting to note that in the case depicted in the upper panel of Figure 1, where some physicians are willing and able to limit shirking in equilibrium, there is a tension between formal and effective insurance coverage.[15] If better formal insurance coverage makes workers' expected net gains of shirking positive at lower success probabilities, increased coverage induces more shirking. This corresponds to a lower $c$, tilting workers' best response curve downwards in the figure, because $l(1 - s - c) = 1$ must still hold. This would increase equilibrium mistrust, implying lower effective insurance coverage for subjective diagnoses requiring sick leave.

## 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  demonstrates that in this case, physicians' gatekeeping preferences must be extremely strong to make them mistrust their patients.

As before, nature first draws a type $g_i$ for every physician. The type is now common knowledge. Hence, her trust strategy $\tau_i$ is also common knowledge. Assume that there is no binding limit to a physician's number of patients $P(\tau_i)$. Second, each worker chooses whether to see a physician and, if so, which physician to visit and which symptoms to present. Physicians do not know the true health status of patients, but there is no strategic uncertainty and signaling, so we look for a Bayesian Nash equilibrium.

**Proposition 2** In the game where physicians' type $g_i$ is common knowledge, there is a Bayesian Nash equilibrium with a cutoff probability $q^{**}$ and a cutoff weight $g^{**}$ where

i Every sick worker $j$ chooses a physician randomly among physicians with $g_i \leq g^{**}$, reporting $\sigma_j = \hat{\sigma}_j$.
ii Every healthy worker $j$ for whom $q_j \leq q^{**}$ chooses a physician randomly among physicians with $g_i \leq g^{**}$ and plays $\sigma_j \in \Sigma_j^s$.
iii Every healthy worker $j$ for whom $q_j > q^{**}$ plays $\sigma_j = \emptyset$.
iv Every physician $i$ for whom $g_i \leq g^{**}$ plays $\tau_i = T$; any physician $i$ for whom $g_i > g^{**}$ plays $\tau_i = M$.

In equilibrium, $g^{**} = \frac{s(a+h)}{1-s-c} + a$ and $q^{**} = 1$.

*Proof* See Appendix S2.

[14]The steepness and curvature of the two reaction curves, and the exact location of the point $q(1 - s - c)$, depend on the properties of the distributions of $q_j$ and $g_i$.
[15]We are grateful to a reviewer for pointing out this.

In the present model, trusting physicians are poorer gatekeepers and better healers. Thus, 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.[16]

A 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  above. She must also be willing to 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 an effective healer—for *any* sick patient at all, because 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.

The share of shirkers now equals $1 - s - c$, regardless of the maximal strength $\bar{g}$ 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.

If there were binding limits to how many patients each trusting physician could accept, 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 $N/\Pi$, 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 | IMPLICATIONS AND LIMITATIONS

In our formal model, lax gatekeeping is caused by inherently asymmetric information—leaving the physician with few other options for improving her gatekeeping than to mistrust patients, which would also reduce her capacity as a healer.[17]

Income preferences play no crucial role in this: If physician strategies are unobservable, there is no way for physicians to please potential patients in our model; if physician strategies are observable, competition for patients is so fierce that even a doctor with very weak preferences for income would have to trust her patients to prevent being abandoned by them. Nor are physicians being sloppy in this model.

In fact, if the insurer prefers physicians to be mistrusting, this can essentially be achieved by making patients with subjective diagnoses ineligible for paid sick leave (which would not necessarily be welfare improving).[18]

In the medical profession, the general consensus seems to be that when role conflicts arise, a physician's primary responsibility lies with the patient, not the insurer.[19] Consequently, when physicians cannot perform well both as healers and gatekeepers, it seems more realistic to consider them primarily as *patients' medical advisors.* Although the moral hazard problem of cynical shirkers itself seems hard to solve, viewing doctors as advisors to the patients hints at two main routes for possible policy interventions: strengthening the quality of the advice and reducing patients' willingness to shirk.

Empirical research finds that physicians' sicklisting practices do indeed matter for the prevalence of absenteeism (Godøy & Dale-Olsen, 2018; Markussen, Røed, & Røgeberg, 2013). Contrary to our stylized model assumptions, real-life physicians are neither perfectly competent nor generally able to establish diagnoses and treatments without effort.

[16]In an empirical study based on Norwegian administrative register data, Markussen and Røed (2017) find that Norwegian patients prefer lenient physicians.

[17]If there exists an imperfect signal of whether a patient is lying—for example, she is avoiding eye contact—the physician can choose to trust only those patients reporting subjective symptoms who do not avoid eye contact. Such strategies may reduce the conflict between healing and gatekeeping but not eliminate it: As long as the signal is imperfect, the judgment of who is sick and who is a shirker is also imperfect, and most of our analysis would go through as before.

[18]If the insurer leaves sicklisting to specially assigned health insurance physicians, rather than the patient's usual primary care physician, this would essentially correspond to the case of unobservable physician strategies in our model: The healer-gatekeeper role conflict is present but not amplified by competition for patients.

[19]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).

Thus, they may sicklist more than is medically warranted not only due to the moral hazard problem discussed above but also due to limited expertise and effort and because sicklisting can be an easy way to give patients an impression that something is being done—that is, suboptimal medical advice.[20] This problem may be addressed by policies helping improve the medical quality of physicians' sicklisting decisions, for example, information and evidence-based best practice guidelines, emphasizing the benefits of continuous work participation for some diagnoses.

Second, our analysis implies that although the physician provides medical advice and issues sickness certificates, the decision to be sicklisted lies, essentially, with the patient: If she prefers to shirk and is cynical enough, she can choose to do so. Thus, rather than encouraging physicians' strictness, policies to reduce unwarranted absenteeism may aim at reducing the benefits or increasing the costs of shirking—preferably without hurting the truly sick. For example, rest from one's usual job tasks does not necessarily preclude social interaction and physical presence at the workplace. A requirement of part-time presence at the workplace (or a community health/activity center) during sick leave, with no work obligation, may be neutral or beneficial to the health of patients with moderate mental issues, while reducing healthy workers' options to travel or work in the black market while shirking. Because people tend to find lying unpleasant (Gneezy et al., 2013), it is also possible that requiring patients to take explicit responsibility for their nonverifiable statements, for example, by signing them, would increase the perceived costs of shirking.

Although explicit social welfare judgment requires further specification of the model, socially (second best) optimal gatekeeping would involve a trade-off between two main factors: the welfare loss of not providing treatment for subjective diagnoses requiring sick leave (depending in turn on the prevalence and seriousness of such diagnoses) and the net social costs of shirking.[21] Shirking opportunities cause inefficiencies to the extent that it distorts individual behaviors, both directly and via the social cost of public funds. Note, however, that unwarranted sick leave benefits per se do not represent real costs, but income redistributions—which could even, especially with social welfare functions not distinguishing between lawful and unlawful transfers, be deemed socially desirable.[22]

Dynamic factors such as changing social norms are not included in our formal model. If shirking is socially learned, or if social sanctions toward shirkers are decreasing in the share of shirkers, shirkers may be playing a coordination game in which low and high shirking levels can both be stable equilibria, with a tipping point somewhere in between (Lindbeck et al., 1999; see also Hesselius, Nilsson, & Johansson, 2009, Godøy & Dale-Olsen, 2018). A marginal shirker has little impact in equilibrium; however, close to the tipping point, she may cause dramatic changes in others' behavior, possibly involving a very high social marginal cost of shirking.

## 6 | CONCLUDING REMARKS

In addition to their role as healers, physicians are typically expected to serve as gatekeepers to benefits such as paid sick leave. However, patients' private information about their own symptoms creates a moral hazard problem that physicians cannot be expected to solve. When faced with a patient who claims to experience nonverifiable symptoms indicating a medical need for sick leave, the physician cannot know whether the patient is a shirker or truly sick. By mistrusting patients' nonverifiable claims, physicians run the risk of not providing proper treatment to the truly sick. Given that professional norms stress physicians' duty to place the patient's interests first (WMA, 2006), gatekeeping is likely to be lax.

Although social and/or economic incentives can amplify this conflict, as in the observable physician strategy case with patient competition discussed above, its source is intrinsically asymmetric information. Thus, the conflict cannot be resolved by changing physicians' incentives or reminding them of their duty to be strict.

Because shirkers can exploit their private information as indicated above, the decision to be sicklisted even in the absence of medical need lies essentially with the patient, not the physician (Mykletun et al., 2014). Findings from our focus group interviews with primary care physicians (Appendix S1) illustrate this view. Policies reducing the net

[20]In the model, the only legitimate reason for sicklisting is that absence from work is required for healing. In practice, sicklisting may occur because the worker is incapable of performing her usual tasks, although work presence as such might not impair her healing prospects. Research indicates that many physicians consider functionality judgements a particularly troublesome aspect of sicklisting (Alexanderson et al., 2009), requiring even more knowledge the physician typically lacks (e.g., working conditions and alternative job tasks).

[21]To what extent these costs and benefits should include physicians' utility of healing and gatekeeping depends partly on the welfare interpretation of physicians' motivation (e.g., impure altruism or duty orientation) and the chosen social welfare function (see Brekke & Nyborg, 2008; Nyborg, 2011).

[22]This would be the case, for example, if those shirking are poor, the marginal utility of income is decreasing, and the social welfare function is utilitarian.

benefits of obtaining unwarranted sickness certificates, such as partial presence requirements, may thus be more likely to succeed than policies aimed at making physicians "stricter" in the sense of trusting the patient less.

This is not to question previous evidence that individual physicians can and do affect absenteeism among their patients (Markussen et al., 2013). To focus on the moral hazard problem, our model assumes that any physician can costlessly establish the correct diagnosis and treatment once she has access to the relevant information. In practice, physicians are not perfectly competent. Policies supporting the quality of physicians' medical advice are thus likely to affect sicklisting rates, even if not eliminating the options for cynical shirkers discussed above.

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 focus group interviews 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 1 year. However, in addition to the possible social and intrinsic benefits of working (Brekke & 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). Thus, even if the gate should essentially be open to cynical shirkers, they may be less numerous than one might fear.

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