Games that Doctors Play
Two-layered agency problems in a medical system

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Abstract

Medical doctors act as agents of their patients by either treating them directly or referring them to other more or differently specialized doctors, who thereby become "agents of agents". The main aim of this paper is to model central aspects of such two-layered agency relations in the medical sector. On the basis of our model, we draw some tentative conclusions concerning policy issues. In particular, we suggest relying on a strict separation of roles between diagnostic and therapeutic agents with counseling practitioners acting as gate-keepers of the medical system.

JEL classification: I10, J40

1 Introduction and Overview

The doctor-patient interaction represents one of the most extreme and complicated examples of agency relations. It frequently involves the principal/patient trusting the agent/doctor to act in pursuit of the goals of the principal, who cannot measure the agent's performance. Although principal-agent relationships have been extensively studied over the past decades (see, for instance, SAPPINGTON [1991], IRLENBUSCH AND SLIWKA [2005], and the references therein), and the doctor-patient interaction has often been cited as a prominent example, hardly any attention has been devoted to the two-level principal-agent relationships that naturally emerge in medicine. When seeking health care, a patient contacts an expert who can either treat him directly or refer him to another expert, who can in turn treat the patient, involve a further expert, or transfer the patient back to the previously approached expert. In a medical system characterized by a positive pay per service component, doctors have an incentive to be consulted as often as possible. This may contrast with the interests of the patient, who would rather be healed with as few consultations as possible. Moreover, when uncertain about their own ability, doctors may nevertheless try to treat the patients, who consequently may not receive adequate treatment.

These adverse incentives render the introduction of counselors with no direct interest in keeping the patient for in-depth diagnosis or treatment a useful pragmatic reform. Such consultants, in receipt of a fixed salary, would operate as mere advisors or "pure gatekeepers" of the medical system. As compared to "treating doctors", "counseling practitioners" would be more inclined to induce their patients "to wait and see" while providing some nominal treatment.[1] Since more often than not the best treatment consists in practically doing nothing, to employ counseling practitioners has a clear advantage over relying on service providers, who are subject to pecuniary incentives that put a premium on treatment activities. Fixed salaried counseling practitioners have, in fact, no pecuniary reason for providing unnecessary treatment. Clearly, one would have to trust that they are intrinsically motivated to act in the patient's interests. But this pro-patient behavior is likely to arise because it is not at odds with the monetary interests of the counselors, who are financially disinterested. Moreover, given that no medical system can function well without some professional ethics, a modest amount of such ethics can be expected to operate in case of medical counseling practitioners as well.

Due to established traditions and/or insuperable complexities, the present process of medical diagnosis and treatment relies on pure counseling only to a modest extent. It rather obliges specialists either to pick another specialized treatment provider or to provide treatment themselves. Doctors are expected to act as agents of patients, of other stakeholders (like private and public health "insurance providers"), and, if they are employees, of their employer. Under existing conditions, doctors should behave in this manner being aware that their own income depends critically on whether they transfer or keep the patients, and on whether these patients are transferred back to them. But why should a doctor who thinks to be "reasonably" competent to find the correct diagnosis and provide an adequate treatment not proceed to cure the patient? Why should he pass on the patient to another doctor whose capabilities he does not know, but who, facing the same dilemma, may be less reluctant to treat the patient directly?

[1] This happens, for instance, with homoeopathic medicine's practitioners, who − if necessary − send their patients to specialists in allopathic medicine, and meanwhile treat them with chemically and biologically ineffectual, but psychologically useful "drugs".

To better understand the situation at hand and lay some grounds for addressing issues of increasing specialization and information asymmetries in health care, an analysis of multi-layered (as opposed to the well studied single-layered) principal-agent relationships may be appropriate. In pursuing this task, we start with the simplest case and consider two-layered principal-agent relations in a medical system that is characterized by pay for service rules. To reduce further the problem, we focus on the interaction between one patient and two medical doctors. In a number of cases both doctors can treat the patient adequately, whereas in other cases one doctor alone is adequate. Due to problems arising in such a situation, we turn to a setting where a medical doctor is serving as a *pure* counselor who has no direct interest in providing services, except for counseling and preliminary screening diagnosis.

More specifically, our analysis is structured as follows. In the next section, we describe the basic interaction among a patient, a general practitioner, and a specialist as a one-shot extensive-form game. In section 3, we solve the game in generic terms. In sections 4 and 5, we discuss and modify the original game. Section 6 concludes with some final observations, and the policy recommendation to make more extensive use of fixed-salaried counselors as gate keepers of the medical system.

2 The Basic Model

The game model represents the interaction among patient and doctors in a stylized way. The three actors who enter the stage to play the game are: the patient **P**, the "more *g*eneral" expert **G**, and the "more *s*pecialized" expert **S**. The selection of the persons on the scene is made before playing the game. The decisions to be analyzed concern whether the specific patient **P** should consult Dr. **G** or Dr. **S**, and whether the consulted doctor should treat the patient or refer him to the other doctor.

The game tree is depicted in Figure 1. The game starts with a fictitious chance move determining whether **P** would be served best by Dr. **G** − with probability g, by Dr. **S** − with probability s, or by both Dr. **G** and Dr. **S** − with probability $1-g-s$. We suppose that $0 < g, s, g+s < 1$, and $s < g$. The first condition is obvious. The second one is also rather plausible: in day to day medical practice, there is often someone who, a priori, is more likely to provide the adequate treatment. We assume, for convenience, that this is the more general expert **G**.

<u>Insert Figure 1 about here</u>

If their specialties are partly overlapping, the doctors may both be suitable choices for treatment and/or diagnosis. Yet, in some cases only one of the doctors can treat the patient satisfactorily. Distinguishing between situations is often impossible for the patient and also difficult for the experts who have to decide between transferring and treating the patient. This lack of knowledge combined with the agents' adverse incentives creates moral hazard problems, which lie at the heart of the two-layered agency relation.

Figure 1 captures the main features of the problem. After the chance move, the patient **P** learns about his illness as well as about the probabilities g, s, and $1-g-s$ of being best cured by **G**, **S**, or either doctor, respectively.[2] Yet, the patient does not know which of the three states of the world applies. Hence, the three decision nodes reached after the move of "mother nature" are encircled to form the single information set of the patient. Here, the patient must take a bet and, albeit uncertain, choose a doctor. The two

[2] Patients – like doctors – may tend to overestimate the competence of more specialized experts. We assume, however, that it is commonly known in the population how well qualified general practitioners and specialists are. If general practitioners are not likely to be better, it may still be assumed that patients and doctors share a common prior probability that one (class) of the doctors is more qualified in general although, under specific circumstances, the other may be better. If interpreted in this way, the model is quite general: it applies independently of whether one of the doctors is a street-level general practitioner or both are specialists with different competence and a priori likelihood of being best qualified.

options of the patient are *G*, consulting **G**, and *S*, consulting **S**. After **P**'s choice, the selected doctor can either try to cure **P** or send him on to the other doctor. The choice of **G** to send the patient on to **S** is indicated by *S* while his decision to keep the patient (i.e., not to send him on) is denoted by $\overline{S}$.[3] Likewise, **S** can choose between *G* and $\overline{G}$. A doctor eventually receiving the patient can cure **P** or send **P** back to the former doctor, who then has no further option: he must treat the patient, regardless of whether he is the best choice or not.

It is assumed that each doctor can correctly diagnose the ailment when he only can offer the best treatment. Otherwise, he cannot recognize how he compares with his colleague. It is not unusual in medicine that a doctor cannot clearly diagnose; he may be able to do something about symptoms, but be in the dark about causes as much as his patient. The states of the world between which doctors cannot discriminate are encircled as single information sets in the tree. Notwithstanding their imperfect information, the doctors must decide whether to send the patient on or treat him. If they send the patient on, their colleague makes the final decision of either sending the patient back or accepting the patient.

The payoffs that result from the decision making process are listed at the terminal nodes of Figure 1's tree in the order **P**, **G**, **S**. As utilities represent subjective rank orders we can fix each actor's best and worst payoffs at 1 and 0, respectively (of course, there is no claim to inter-subjective comparability involved).

Initially ignoring the signs "=", "==", "===" in the tree, Table 1 may help in interpreting the payoffs. Each of rows 1 to 6 refers to two symmetric cases yielding positive payoffs for the patient, who is always healed even though by exerting different

[3] It should be clear from the context whether we mean *S* as chosen by **P** or *S* as chosen by **G**. Thus, we will not distinguish between these actions.

effort. Rows 7 to 12 refer to single cases, and concern outcomes in which the patient remains without adequate treatment.

Insert Table 1 about here

Doctors are selfish in the sense that, in a pay per service system or a system compensating the number of separate consultations, they prefer being consulted to not being consulted and the more often the better. The patient wants to be healed, preferably with as few consultations of doctors as possible. Accordingly, we suppose that $0 < \underline{u}_i < \overline{u}_i < 1$ for i = **P**, **G**, **S**.

The proposed payoffs seem to be quite plausible. Given the great importance of being healthy as compared to other possible issues, the principal/patient prefers to be cured without delay (i.e., in one step rather than two, and in two steps rather than three), and the lack of cure yields **P** his lowest payoff, whatever the number of consulted doctors (either one or two). An agent/doctor earns, of course, nothing when he is not involved in the process. A doctor who comes into play only once without healing the patient receives the second lowest payoff (i.e., $\underline{u}_i$): he earns some income from being merely consulted,[4] but acquires a bad reputation because the patient remains uncured. For this reason, such a situation is regarded as worse than providing successful treatment with one consultation ($\overline{u}_i > \underline{u}_i$). On the other hand, a doctor who is involved twice in an unsuccessful treatment receives the better payoff $\overline{u}_i$: he has "tried his best" and referred **P** to the other doctor, who has sent **P** back to him. In such a case, because his failure to heal the patient apparently does not depend on him, the doctor incurs less severe reputation consequences. Obviously, being successful after two consultations is even better for the last service provider than being successful after one consultation. Hence, a competent

[4] It is assumed, indeed, that a doctor gains $\underline{u}_i$ even when he transfers **P**, and is not providing further treatment.

doctor earns his highest payoff when he is consulted twice. Without going over all the 54 payoffs, the preceding remarks should suffice to indicate the non-arbitrary character of the assumptions of our stylized model.

Before solving the game, let us interpret the tree somewhat further by focusing on its leftmost branches. First, "mother nature" randomly fixes the condition of the patient as that specific ailment that can be adequately treated only by Dr. **G**. Then the patient must make a choice being ignorant of the preceding random move. Let us assume that, when noticing to be ill, **P** contacts Dr. **G**. After being approached, Dr. **G** has to choose between S (i.e., involving **S**) or $\overline{S}$ (i.e., not involving **S**). If he decides for $\overline{S}$, the treatment ends with **P** being cured (and obtaining his best payoff), and **G** getting his second best payoff. If, instead, **G** opts for S, the other doctor comes into play. As the tree indicates, Dr. **S** is aware that his involvement implies that **G** has not acted in the best interests of the patient.[5] With such knowledge, **S** can either keep the patient (choosing $\overline{G}$) or transfer him back to **G** (choosing G). Noting that the other branches of the tree can be interpreted similarly, we turn to the solution of the game.

3 *Solving the Game Model*

Going back to Figure 1, we should now observe the signs "=", "==", and "===", indicating that the branch to which they are attached can be eliminated by backward induction arguments.

Supposing that doctors are "other-regarding" in the weak sense that they choose the option which is superior for the principal whenever they are indifferent between

[5] In medical practice, this information usually transpires from the kind of transfer that **G**, who expects the patient back, makes.

outcomes as to own monetary payoffs,[6] we can eliminate the branches marked with "=" since their alternative is weakly payoff-dominant. Alternatively, if we accept the argument that payoffs denote preferences *per se* so that other-regarding considerations concerning payoffs represent a sort of double counting, we ought to introduce modified payoffs. Rather reasonably, we can assume that a doctor contributing to success gets some small extra payoffs if the patient is healed. This payoff modification (that we leave out of account in order to minimize the number of payoffs) would allow us to apply the concept of strong dominance to remove the "="-branches.

Turning to the "=="-sign, we can eliminate the branches to which it is attached because the involved actor strictly prefers the alternative choice.[7]

Rationally anticipating that the actions marked with "==" will not be chosen, the actor who is to move at the preceding decision node will not select the option to which "===" is attached because the other option would give him a non-smaller payoff. At Dr. *i*'s (*i* = **G**, **S**) non-singleton information set, the (unmarked) decision of keeping the patient leads to payoff expectations $\varepsilon \underline{u}_i + (1-\varepsilon)\overline{u}_i$, which are greater than the payoff expectations $\varepsilon \underline{u}_i + (1-\varepsilon)\underline{u}_i$ from transferring the patient, for any $0 < \varepsilon < 1$.

Applying the three above dominance arguments (which are sufficiently, though not equally, compelling), we can reduce the tree of Figure 1 to the tree shown in Figure 2.

<u>Insert Figure 2 about here</u>

Rather obviously, Figure 2's tree can be further reduced. Except for possible mistakes (or trembles) that we can neglect, neither Dr. **G** nor Dr. **S** will decide to transfer the

6 Such an assumption is rather frequent in most of the principal-agent literature. According to SAPPINGTON [1991, p. 48], this method of "breaking ties" resolves a technical open-set problem of limited economic interest.

7 Note that some of the options marked with "==" are worse off than their alternative not only for the involved doctor but also for the patient. Thus, we may introduce modified payoffs in this case too.

patient when being in non-singleton information sets. In view of this, we get the game of Figure 3, involving just one "essential" decision maker, i.e., the patient **P**, whose strategic choice depends on the probabilities s and g.

<u>Insert Figure 3 about here</u>

In particular, the patient will expect to receive the payoffs

$g\underline{u}_P + (1 - g - s)1$, after the choice of *G*, and

$s\underline{u}_P + (1 - g - s)1$, after the choice of *S*.

Due to $g > s$, choosing *G* is better than choosing *S*. Thus, owning only the information as described in the tree, the patient should never consult the more specialized Dr. **S**, even though he is allowed to do so.

Under the condition $g > s$, rational play will involve the following actions.

P chooses *G*.

(i) If **G** is the doctor selected by chance as the most adequate to treat the patient (i.e., in case of "*g*"-event), Dr. **G** refers **P** to Dr. **S**, who transfers **P** back to Dr. **G**.

(ii) Otherwise (i.e., in case of "non-*g*"-event), Dr. **G** keeps the patient. This choice leads

(ii.a) either to cure **P** adequately, if "$1-g-s$"-event occurs;

(ii.b) or not to cure **P**, if "*s*"-event occurs.

The payoff expectations related to this solution play are

$$1 - s - (1 - \underline{u}_P)g\,, \qquad g + (1 - g - s)\bar{u}_G + s\underline{u}_G\,, \qquad \text{and} \quad g\underline{u}_S$$

for **P**, **G** and **S**, respectively.

As the analysis of rational play shows, with the incentives assumed here, one should reconsider the idea of relying on service providing general practitioners as gate-keepers. The moral hazard problems (in particular, the adverse incentives leading the general practitioner to keep the patient in case of uncertainty about his own abilities) persist even if we slightly modify the model.

4 Some Variants of the Model

As the model stands, a doctor will invoke the other doctor's help only if he is aware of being the only suitable choice for the patient. In this case, according to the model, he can "take the risk" to transfer the patient, and trust the patient to return to him after the "mission into enemy territory".[8] However, this holds good only if the transferring doctor believes that the other does not strictly prefer to keep the patient and has other-regarding preferences, which lead him to opt for a weakly payoff-dominant action.

Assuming that when an agent is indifferent between options as to his own monetary payoffs, he will pursue the action that furthers the principal's well-being is very plausible and rather common. However, the indifference condition may not always apply.[9] Hence, in the present section, we alter the original model, and suppose that, after plays (g, G) and (s, S), the unqualified doctor has a monetary incentive to keep the patient, in the sense that the payoff of keeping **P** becomes higher than that of transferring **P** back.

As far as solution behavior is concerned, under the altered assumptions, Dr. **G** and Dr. **S** will both anticipate that, if transferred, the patient will not return. Hence, they will not transfer the patient at first. Reducing the tree of Figure 1 backwards, we now get Figure 4 that differs from Figure 3's tree in the leftmost and rightmost payoff vectors.

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[8] This behavior seems rather weird from the point of view of furthering the patient's interests. But, it is what one should expect in light of an interest-based principal agent perspective. A nice German remark describing the doctor's perspective reads: "Der Patient kehrt (nicht) vom Feindflug zurück".

[9] In case of g-event, for instance, if the adequate treatment amounts to being relatively inactive while monitoring the development of the patient's conditions, the more specialized Dr. **S** may provide it almost as satisfactorily as Dr. **G**, and draw additional monetary income out of the healing. The payoff vector after play ($g, G, S, \overline{G}$) may, thus, reasonably become $(\overline{u}_P, \underline{u}_G, \overline{u}_S)$. However, since these modified payoffs will not show up in the new reduced tree of Figure 4, they can be easily disregarded.

Insert Figure 4 about here

Obviously, the patient will choose G if $g > s$, because the latter implies that his expected payoffs after G, i.e., $1g+1(1-g-s)+0s$, exceed those after S, i.e., $1s+1(1-g-s)+0g$. Thus, the patient's behavior does not change in the second scenario. Due to the direct treatment by Dr. **G** in case of g-event, his payoff expectations increase as compared to the former scenario, but **P** still risks not being healed whenever he needs a more specialized doctor.

The incentive structure of the model should serve as a warning for those who intend to introduce institutional provisions assigning the role of gate-keepers to general practitioners. Admittedly, the latter may have a utility function that differs from mere monetary payoffs, and, therefore, be willing to refer their patients to a specialist notwithstanding their own conflicting pecuniary interests. However, to rely on somewhat heroic virtue, which is not eroded by pecuniary incentives to the contrary, seems unreasonable in institutional design. It is, therefore, worth taking the presence of adverse incentives into account.

Under the standard assumptions of rational and self-interested doctors, assigning the role of gate-keepers to "counseling practitioners" appears quite reasonable. Such counselors would provide no substantial service (even though they may be recruited from the ranks of former providers); after enrollment, they would be put on a fixed salary to perform only restricted diagnostic screening tasks. There is no need to introduce unitary residual claimants – as, e.g., in HMOs (Health Maintenance Organizations) – employing both specialists and gate keepers. It is possible to reform systems like the present German one without such sweeping reforms by simply modifying the utilization of sickness funds. One may, for instance, use these funds not for contracting general practitioners as gatekeepers (a measure which is considered right now, but which faces some of the difficulties discussed above), but rather for employing pure counselors and offer special contracts to those clients who are willing to take that route. The role of the treating general practitioner would then be that of a “specialist for general treatment” (though this may appear a paradox, it is not so in medical practice, and sickness funds could provide contracts of the appropriate kind).

5 Introducing Pure Counselors

Assuming that the counselor receives a fixed salary whatever his advice, we should not treat him as a full-fledged agent who maximizes a separate monetary payoff function. We should rather model him like a diagnostic test from which a signal originates. The test will be of some use only if we may trust the counselor to be intrinsically motivated to render good counsel and take his job seriously. This does not eliminate the principal-agent problem concerning doctors by assumption. In the situation envisioned here, the counselor is no longer subject to the incentives of service provision: his advice will not affect his pecuniary interests directly. Over the long haul, a counselor may be “fired” if some statistically observable quality of his counsel suggests serious flaws. Yet, as opposed to a service providing doctor, his monetary income is not *directly* contingent on how he advises.[10] The latter implies that a counselor must be other-regarding merely in the weak sense that he will do what is better for the other if this does not reduce his own income.

In the latter respect, the counseling doctor’s role seems similar to that of a judge. If we expect judges to execute their duties responsibly, we may expect the same of counseling or finding doctors (at least if we can construe reputation mechanisms working

[10] How shifts in reimbursement affect medical practice can be learnt from the case study of FEICHT [2003]. Admittedly, making reimbursement contingent on objective success would not work in medicine, except for very special cases.

for doctors as they do for judges). In the setting under consideration, given adequate salaries and operating conditions, the selection of intrinsically motivated individuals seems possible. The recruitment-procedure could be somewhat similar to the English process of recruiting judges from the ranks of experienced and proven legal practitioners. What seems to work rather well in case of legal practice might work well in medical practice, too.

Without going into details, we know that deviations from conventional principal-agent logic − in which good conduct requires an incentive in each and every instance − are possible under appropriate conditions (see LE GRAND [2003] for some evidence close to medical topics, and, e.g., FEHR ET AL. [1998], VAN DER HEIJDEN ET AL. [2001], and GÄCHTER AND FALK [2002] for more general experimental evidence on fairness and reciprocity). In view of this, it seems reasonable to assume that intrinsically motivated medical counselors do exist, and they would find well even though their income does not depend on effort in a case by case manner. As opposed to the original setting, where the pecuniary incentives of service- and counsel-providers tended to crowd-out intrinsic motivations to find well, pure counseling may not be subject to the same problem.

Let us refer to an intrinsically motivated pure counselor by **C**. The counselor, **C**, is functionally equivalent to a diagnostic test that can be applied by or to the patient at a cost *c*. If the patient can be healed only by Dr. **G**, “the test” **C** yields the advice, G', to go to the less specialized service-provider **G** with probability $\overline{\mu} > ½$, and the opposite advice, S', to see the specialist **S**, with complementary probability $1-\overline{\mu}$. Likewise, if only Dr. **S** can provide adequate service, the test leads to the bad advice, G', with probability $\underline{\mu} < ½$ and to the good advice, S', with complementary probability $1-\underline{\mu} > ½$. In sum,

$$\Pr\{G'|g\text{ - event}\} = \overline{\mu} > \frac{1}{2} > 1 - \overline{\mu} = \Pr\{S'|g\text{ - event}\}$$

$$\Pr\{S'|s\text{ - event}\} = 1 - \underline{\mu} > \frac{1}{2} > \underline{\mu} = \Pr\{G'|s\text{ - event}\}.$$

If both Dr. **G** and Dr. **S** are equally suitable for treatment, we assume that the counselor will choose one of the two doctors with equal likelihood, although any other probability would do well in so far as the patient's interests are concerned. In case of "$1-g-s$"-event, secondary considerations, like the cost of treatment, may come into play. More specifically, the counselor's ethical code may contain a lexicographical ordering of the patient's interests with cost considerations having the second place in the ranking. So, if health interests are served equally well, cost considerations may become important. However, this would not affect the patient's strategic situation because **P** is supposed to decide whether following or not the signal on the basis of non-financial aspects.

On a more general level of analysis, cost considerations do play a role for the patients, who pay for the health system. Introducing pure counselors causes a cost to the patients, and whether this is in their best interests is not undisputable. It depends, for instance, on how patients evaluate pecuniary costs relative to health interests as well as on how good the rendered advice is.

Let us make the following assumptions:

1. Receiving counsel is mandatory; i.e., **P** incurs the cost *c*, and receives either the signal G' that he should choose *G* or the signal S' that he should choose *S*.
2. **P** knows the reliabilities $\overline{\mu}$ and $1-\underline{\mu}$ of the signals G' and S', respectively.
3. **P** is not obliged to follow the counsel, but can freely decide between *G* and *S* whatever the received signal.

We can now address the issue of whether introducing a pure counselor is worth the cost *c*. To keep things within manageable dimensions, we rely on the reduced tree of

Figure 4. The two service providing doctors are still in the game. We assume that the signal does not affect the initial chance move or the doctors' proclivity for transferring a patient. This allows us to focus, *ceteris paribus*, on the effects of additional information on the behavior of the principal **P**, who is now split into **P**G and **P**S according to his informational state.

Introducing **C** into the reduced game of Figure 4, we obtain the tree presented in Figure 5. If healed, the patient receives his maximal payoff of "1". Since the cost c is incurred anyhow, maximizing the patient's payoffs amounts to maximizing the overall probability of avoiding the "wrong" doctor. In particular, when deciding whether to follow or not the signal, the patient will follow S' only if

$$g(1-\overline{\mu}) < s(1-\underline{\mu}) \text{ or, equivalently, } \frac{g}{s} < \frac{1-\underline{\mu}}{1-\overline{\mu}},$$

and G' only if

$$g\overline{\mu} > s\underline{\mu} \text{ or } \frac{g}{s} > \frac{\underline{\mu}}{\overline{\mu}}.$$

We can ignore the case in which both doctors are equally suitable, because this does not affect the patient's payoff maximizing strategy.

Since, by assumption, $\overline{\mu} > ½ > \underline{\mu}$, we have $(1-\underline{\mu})/(1-\overline{\mu}) > \underline{\mu}/\overline{\mu}$, implying that the set $\left(\frac{\underline{\mu}}{\overline{\mu}}, \frac{1-\underline{\mu}}{1-\overline{\mu}}\right)$ is not empty. For $\frac{g}{s} \notin (\frac{\underline{\mu}}{\overline{\mu}}, \frac{1-\underline{\mu}}{1-\overline{\mu}})$, patients would not follow the advice, notwithstanding the payment of c; in this case, imposing the cost of impartial counseling on patients would be a dead-weight loss. However, if the *a priori* probabilities g and s fulfill $\frac{g}{s} \in (\frac{\underline{\mu}}{\overline{\mu}}, \frac{1-\underline{\mu}}{1-\overline{\mu}})$, it may make sense to introduce a counselor.

<u>Insert Figure 5 about here</u>

The patient's expected payoffs in the presence of sufficiently reliable counseling are

$$U_P^C = g[\overline{\mu}1 + (1-\overline{\mu})0] + (1-g-s)1 + s[(1-\underline{\mu})1 + s\underline{\mu}0] = 1 - g(1-\overline{\mu}) - s\underline{\mu}.$$

To investigate whether and to what extent introducing a pure counselor is worthwhile, we need to compare U_P^C with the payoffs, U_P^{-C}, the patient expects to receive without counsel. The latter are given by

$$U_P^{-C} = \max\{g + (1-g-s), s + (1-g-s)\} = \max\{1-s, 1-g\}.$$

A perfectly reliable counselor with $\overline{\mu} = 1 = 1 - \underline{\mu}$ would yield $U_P^C = 1$, and therefore improve upon the result U_P^{-C} attainable without counselor **C** provided that the cost c is smaller than s or g.

More generally, assuming that the signals are equally reliable (i.e., $\overline{\mu} = 1 - \underline{\mu}$), introducing a counselor is advantageous for the patient whenever $\overline{\mu} = 1 - \underline{\mu} > s/(g+s)$ or $\overline{\mu} = 1 - \underline{\mu} > g/(g+s)$, depending on whether $s < g$ or $s > g$, respectively.

6 Discussion

There are two extreme possibilities of analyzing the doctor-patient relationship. On the one hand, we may follow the official rhetoric on health provision that frames all doctors as "white knights" acting always in the patients' best interests. On the other hand, in line with standard rational choice theory and economics, we may assume that all doctors are "knaves", in the sense that nothing but the pursuit of their monetary self-interest motivates them. Both views are definitely too extreme and untrue to the facts. It seems much more plausible that the truth is located somewhere "in-between" these two polar opinions.

On the middle ground, there is the possibility of fixed-salaried individuals who are intrinsically motivated to provide patients with good counsel, and refer them to a specialist only when more serious treatment is required. Counseling may emerge without being made mandatory by some sort of market process: under certain circumstances, insurance companies as well as individual patients may be willing to pay for such services. Alternatively, contracts may be offered that render compulsory for the patient to follow the counsel. These contracts are especially advisable when the probability that doctors are equally competent is quite large, or when one doctor is in all likelihood the best choice, but the costs of his services are very high as compared to those of another doctor. It should be noted, however, that such policy prescriptions hinge on the assumption that counselors exhibit other-regarding concerns, thereby deviating from standard economic suggestions according to which, in order to reach outcomes that serve the principal, the monetary income of the agents should directly depend on the quality of their counsel.

In line with standard principal-agent theory, a very respectable tradition of political theory maintains that, in institutional design, "every man ought to be supposed a knave and to have no other end, in all his actions, than private interest" (see HUME [1985, VI/I, 42], and, in present constitutional political economics, BRENNAN AND BUCHANAN [1985]). Accordingly, health care policy prescriptions should be formulated under the assumption that selfishness is a decisive behavioral guideline. This implies to design institutions which *induce* doctors to behave in the interest of the patient whenever this is possible.

But 'knave-proof' institutions alone are not sufficient to align the agents' goals with those of the principal. Intrinsic motivations and professionalism, as long as they do exist, can help in reaching such desirable result. Moreover, providing doctors with extrinsic motives (for instance, monitoring their activities) may drive out their intrinsic motivations to serve the patients satisfactorily (see FREY [1997], for a more general study of crowding-out effects). Although we do believe that such effects are important, it may still be necessary to seek for institutions that do not render “honesty” (i.e., acting according to the professional ethical code) too disadvantageous due to monetary incentives. Assuming the presence of weakly other-regarding motivations in professionals may be a good policy, while trusting that everybody will choose according to professional ethical codes even against monetary motives out of strong other-regarding concerns may be a bit far fetched.

Models like the one discussed here can help us in identifying adverse incentives that may prevent “honest” professionalism from flourishing. Similar to extrinsic motivations, adverse incentives can drive out intrinsic motivations to obey the ethical code. Whether the solution play developed here is plausible in the real world cannot be decided a priori for it depends on our background knowledge of doctors’ motivations and on empirical findings from the literature. It may be noted, though, that the model supports the suspicion that impartial counseling in the medical sector may be a very good idea, in particular on the diagnostic stage (in this sense, practices like counseling by doctors with fixed salaries at the Mayo clinic may in fact have much wider application).

We should base our policy prescriptions on theoretical reasoning, empirical evidence, and our knowledge of the path dependence of reform processes. In a world of medical experts with competing interests, reforms furthering co-operation in the interest of the patients may be hard to achieve even if most medical experts are willing to serve their patients. Integration of services in a unitary organization as an HMO with a single residual claimant (an individual or a group of shareholders) may provide an answer to some of the discussed problems. Yet, patients may somewhat doubt that they would always receive the adequate service due to the conflicting interests of the provider. A system involving "counseling gatekeepers" may mitigate this problem, and seems more in line with established structures of health care provision in many European countries.

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Table 1
Possible Outcomes and Payoffs of the Game

Condition		Outcome	Payoffs		
			P	**G**	**S**
1	non-*s*-event, **P** chooses G, **G** chooses $\overline{S}$	cure by **G** without transfer	1	$\bar{u}_G$	0
2	non-*g*-event, **P** chooses S, **S** chooses $\overline{G}$	cure by **S** without transfer	1	0	$\bar{u}_S$
3	non-*s*-event, **P** chooses S, **S** chooses G, **G** chooses $\overline{S}$	cure by **G** with one transfer	$\bar{u}_P$	$\bar{u}_G$	$\underline{u}_S$
4	non-*g*-event, **P** chooses G, **G** chooses S, **S** chooses $\overline{G}$	cure by **S** with one transfer	$\bar{u}_P$	$\underline{u}_G$	$\bar{u}_S$
5	non-*s*-event, **P** chooses G, **G** chooses S, **S** chooses G	cure by **G** with two transfers	$\underline{u}_P$	1	$\underline{u}_S$
6	non-*g*-event, **P** chooses S, **S** chooses G, **G** chooses S	cure by **S** with two transfers	$\underline{u}_P$	$\underline{u}_G$	1
7	*s*-event, **P** chooses G, **G** chooses $\overline{S}$	no-cure, only **G** involved	0	$\underline{u}_G$	0
8	*g*-event, **P** chooses S, **S** chooses $\overline{G}$	no-cure, only **S** involved	0	0	$\underline{u}_S$
9	*s*-event, **P** chooses S, **S** chooses G, **G** chooses $\overline{S}$	no-cure, one transfer to **G**	0	$\underline{u}_G$	$\underline{u}_S$
10	*g*-event, **P** chooses G, **G** chooses S, **S** chooses $\overline{G}$	no-cure, one transfer to **S**	0	$\underline{u}_G$	$\underline{u}_S$
11	*s*-event, **P** chooses G, **G** chooses S, **S** chooses G	no-cure with two transfers	0	$\bar{u}_G$	$\underline{u}_S$
12	*g*-event, **P** chooses S, **S** chooses G, **G** chooses S	no-cure with two transfers	0	$\underline{u}_G$	$\bar{u}_S$

Figure 1

The Game Tree

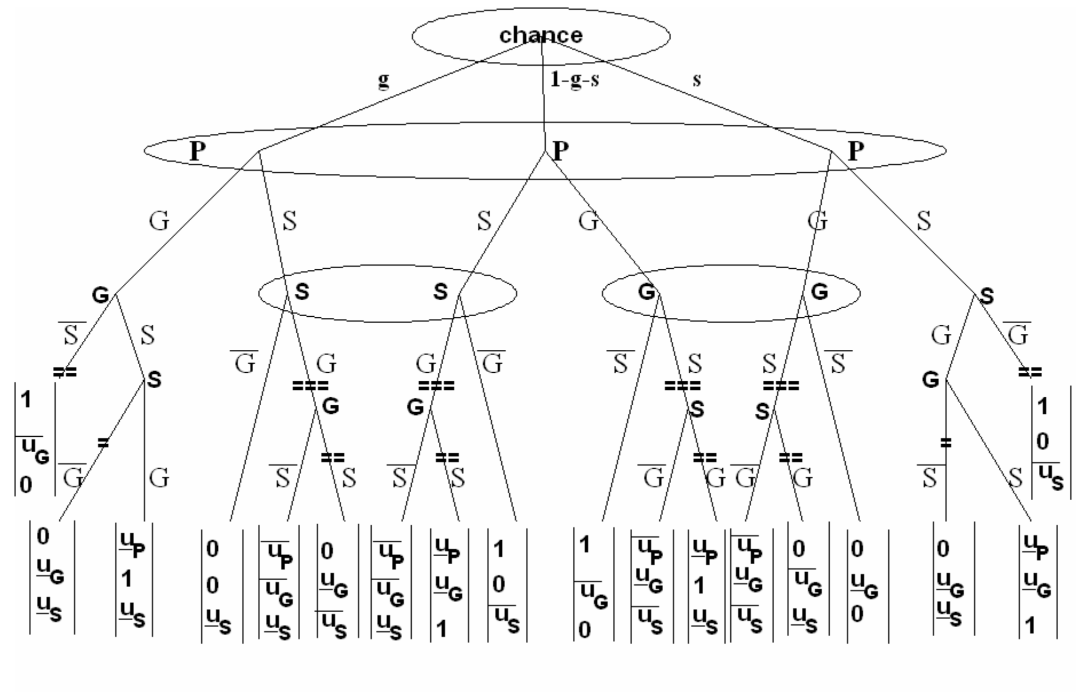

Figure 2

Game Tree after Elimination of Dominated Strategies

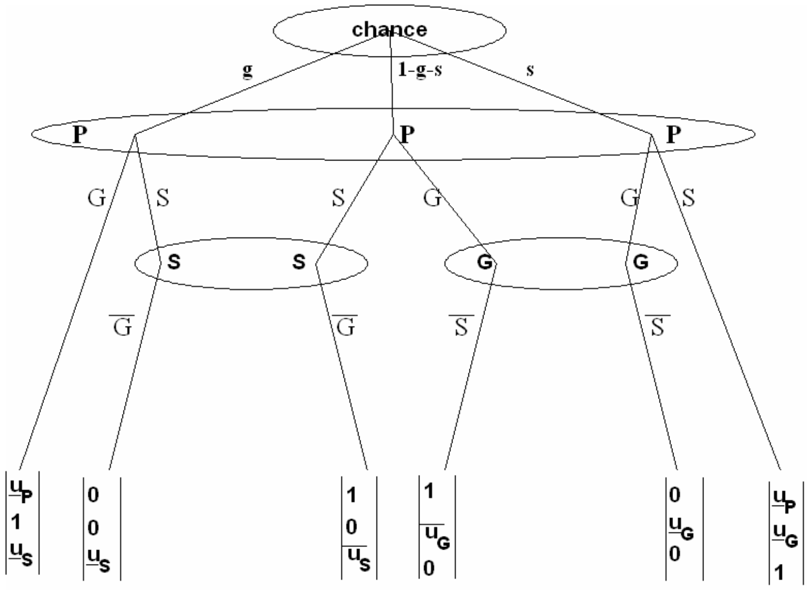

Figure 3

Reduced Game Tree if the First Consulted Doctor Transfers the Patient

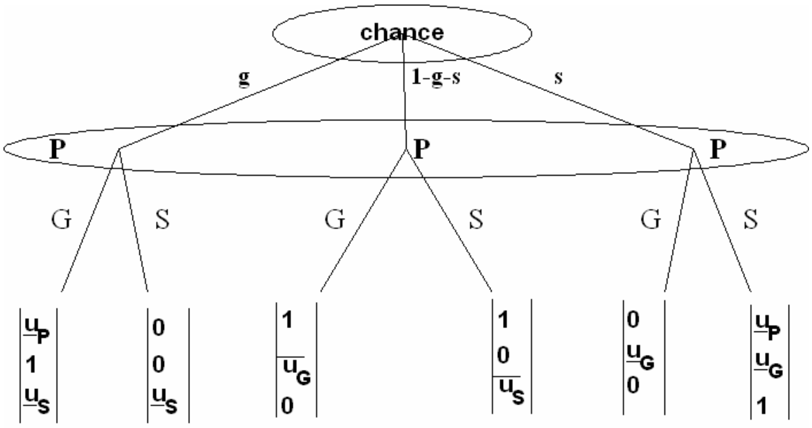

Figure 4

Reduced Game Tree if the First Consulted Doctor does not Transfer the Patient

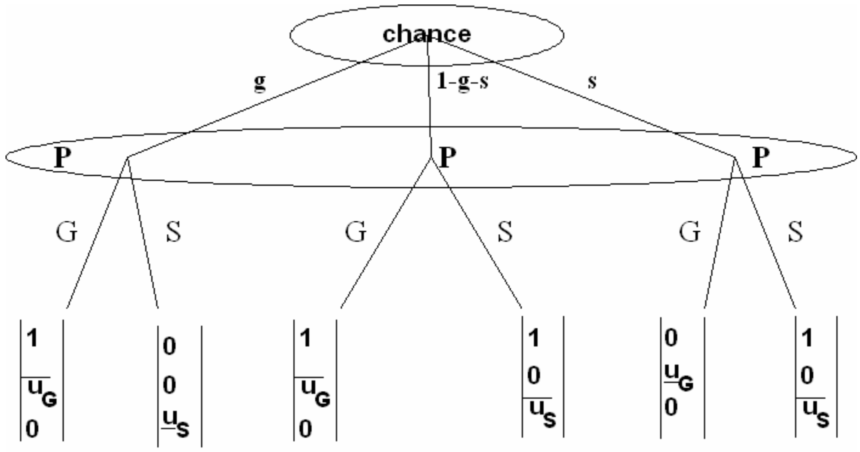

Figure 5

Reduced Game Tree with a Pure Counselor **C**