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An experimental analysis of patient dumping under different payment systems

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Abstract

Physicians behave differently depending on the payment systems, giving rise to several problems such as patient dumping in which patients are refused because of economic or liability reasons. This paper tests whether and to which extent the adoption of either fee-for-service or Salary system induces physicians to practice patient dumping. Through the combination of an artefactual field experiment and a laboratory experiment, we test whether the risk of being sued for having practiced dumping can affect physicians' behavior. Dumping is more often observed under Salary than under FFS. The introduction of dumping liability only mildly reduced dumping practice, though the provision of services increased. Our findings call for healthcare policy makers looking at the interplay between remuneration schemes and liability risks, and accounting for the trade-off between the reduction of the risk of being sued for patient dumping and the increase of the costs of the provision of medical services.

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1. Introduction

It is commonly acknowledged that financial incentives have a significant impact on the behavior of healthcare providers (Clemens and Gottlieb, 2014). To support governments in their attempt to optimize healthcare delivery, a considerable theoretical literature analyses pros and cons of alternative remuneration schemes (e.g., Ellis and McGuire, 1986; Chalkley and Malcomson, 1988; Ellis and McGuire, 1990; Ma, 1994; Simoens and Giuffrida, 2004; Makris and Siciliani, 2013; Ma and Mak, 2015). Robinson (2001) argues that, albeit most used, fee for service (FFS) and capitation (CAP) present many drawbacks. First, a remuneration which gives physicians a fixed fee for each service provided (FFS) incentivizes the provision of inappropriate services, inflating healthcare costs without any effect on health itself. Even worse, a lump-sum payment for a treated patient (CAP or Salary)[2] could lead some practitioners to curtail consultation time, thus harming patients' health (Maynard et al., 1986). Furthermore, under such scheme physicians may have the incentive to cream-skim patients selecting only consumers who are in a good health status (Matsaganis and Glennerster, 1994).

Citing Treiger (1986), patient dumping occurs "*when a hospital which is capable of providing the needed care sends a patient to another facility or simply turns away the patient because he is unable to pay*". Other authors refer to dumping as *the explicit avoidance of high-cost patients for financial reasons* (see e.g., Ellis, 1998). According to Ellis (1998), prospective payment systems may lead to significant problems for the most severely ill patients who may be dumped. Nonetheless, there are several factors which can determine patient dumping. Schlesinger et al. (1997) show that the level of dumping increases in areas with lower inpatient capacity in the public sector and higher competition among hospitals. The last finding is confirmed by Lin et al. (2006) in Taiwan, and they also find that the extent of dumping increases with the total number of patients treated under prospective payments. Moreover, patient dumping may be related to medical malpractice liability and its effects on medical service provision. Since physicians constantly face the risk of being sued for malpractice, they could turn away *a priori* patients to protect themselves if they are unable to provide them the best care in the fear of being sued (Zibulewsky, 2001).

[2] Salary, mainly used by hospitals, produces outcomes largely in line with CAP (Blomqvist and Busby, 2012).

Regardless of the underlying reason, patient dumping carries significant social costs. First, patients can face fatal treatment delays (Busse et al., 2006). Then, dumping leads patients to converge to (especially public) hospitals, triggering further treatment delays (Newhouse, 1983). Contrarily, another strand of literature supports dumping policy said to be welfare-improving to some extent (see e.g., Eze and Wolfe, 1993). As outlined by Busse et al. (2006), information asymmetry (between patients and hospitals) concerning patient type is mitigated by dumping, given the endogenous change in the distribution of patients across hospitals. Overall, there is still little consensus on the causes and the effects of patient dumping.

In this paper, we investigate the occurrence of patient dumping under two different payment schemes, FFS and Salary, building on both a field experiment with real physicians and a laboratory experiment with students. While similar to CAP, a Salary payment system in the context of patient dumping is more salient than CAP, since under the latter physicians do not receive the payment for dumped patient. Moreover, Salary is more plausible in our experiment in which real physicians are specialists working in hospitals. Although experimental evidence on the impact of payment systems on the quantity of medical services is fast growing (e.g., Henning Schmidt et al., 2011; Green, 2014; Lagarde and Blaauwn, 2017), the same cannot be said about patient dumping. This study represents the first attempt to fill this gap in the literature. Other than payment schemes, we investigate whether the introduction of both malpractice liability and the risk of being sued for patient dumping affect physicians' behavior.[3]

Building on the previous experimental literature (Hennig Schmidt et al., 2011; Brosig-Koch et al., 2017; Finocchiaro Castro et al., 2019), we develop a novel design exploiting the interplay of three issues affecting medical care decisions: dumping liability, medical liability, payment schemes. In the experimental design, common to both laboratory and field sessions, each participant playing the role of a physician decides whether to take charge of the patient, and then (in case of acceptance) to what extent to treat him, given a certain payment structure. Under both payment schemes, participants always face the risk of being sued for malpractice, and eventually an additional risk of being sued for practicing dumping. As usual in this literature, subjects' decision-making is incentivized by specifically designed financial rewards.

[3] The assessment of the hospital's perspective is beyond the scope of this paper; however, we can reasonably assume that physicians' choices, being all employed at public hospitals, reflect employers' directives.

Results show that patient dumping is more often observed under Salary than under FFS. However, subjects do not largely react to the introduction of dumping liability by reducing this practice, while it seems to trigger a higher amount of services provided. Furthermore, we find that older physicians are less likely to take charge of the patient (that is, they make more dumping) than their younger colleagues. Hence, policy makers should account for the trade-off between the reduction of patient dumping and the increase in the provision costs induced by a more stringent antidumping regulation. From a methodological viewpoint, our findings suggest paying close attention to the type of participants when running experiments on health issues. The mix of professional experience and highly perceived saliency of medical information make physicians the most fitting type of participants to employ in health-related experiments.

The rest of the paper is organized as follows. Section 2 describes the dumping practice and the relevant literature. In Section 3, we offer a simple theoretical framework of physicians' behavior from which we draw behavioral hypotheses to be tested in the experiment. Section 4 describes the experimental design and procedure. In Section 5, we discuss the results. Section 6 concludes the study.

2. Background

2.1 Patient dumping

The phenomenon of patient dumping has affected several national health systems around the world. It is, however, widely established that its highest relevance has taken place in USA. Cost containment efforts by both government and private sector and the increase in the number of uninsured were advocated as the main reasons for patient dumping (Treiger, 1986). Most of the uninsured delayed seeking healthcare until their illness had become serious, due to their economic status. For this reason, as the severity of their medical conditions increased, the cost of providing treatment for these patients increased as well, giving hospitals an economic incentive to dump them (Rice et al., 1988). As patient dumping was becoming more and more frequent, in 1985 the US Congress decided to enact COBRA to prohibit it. As a result, hospitals receiving Medicare funds were required to screen and stabilize all patients in need of emergency care and women in active labor before transferring them, if necessary, regardless of their

economic status (Saks, 2004)[4]. Hospitals and physicians caught violating COBRA statute are subject to monetary fines, and risk losing participation in Medicare. Furthermore, patients and the receiving hospitals could sue a referring hospital which has transgressed the provisions of COBRA, obtaining damages for personal harm or financial loss (Kellermann and Hackman, 1990). However, it is usually claimed that COBRA legislation and the following statutes fail to fully prevent dumping. For instance, Struik (2015) makes several examples of patient dumping episodes in several US cities, and reports that the Centres for Medicare and Medicaid Services (CMS) received a yearly average of about 500 EMTALA[5] complaints between 2006 and 2012.

In Italy, the National Health Service (NHS) ensures free access to low-cost healthcare, such as treatment at public hospitals, to all citizens and residents since its establishment; therefore, the emergency department[6] cannot refuse emergency patients who need to be diagnosed and stabilized (France et al., 2005). Then, if and only if there is another medical facility equipped with specialists who can provide a better treatment according to the medical diagnosis, the patient can be transferred (Agenzia di Sanità pubblica, 2002). Although patient dumping appeared to be mitigated in Italy, several cases of patient dumping lead to a recent judgement[7] stating that the doctor who refuses to treat an emergency patient is criminally responsible for dereliction of duty (Asprone, 2015).[8] Such conduct constitutes a crime if the admission is urgent and cannot be delayed without harming the patient's health. However, the recent need to reduce healthcare spending (reducing hospital beds, among others) could trigger treatments rationing which in the worst scenario may result in patient dumping (Gabriele, 2019). For this reason, the Italian parliament has enacted the Gelli-Bianco Act (n. 64/2017) to regulate all the cases of medical malpractice (Cupelli, 2017). In such a scenario, it becomes necessary to investigate the

[4] A hospital could transfer a patient in an emergency condition if and only if the patient requested a transfer or the physician certified that another facility could provide better treatment. The physician had to demonstrate and certify that the benefits of the transfer outweighed the risks because the transferring hospital could provide highly specialized technical teams and needed equipment. All transfer decisions needed the appraisal of a qualified staff member and the receiving hospital had to be informed of the pending transfer and had to consent to it. Moreover, appropriate transportation and medical services during the transfer had to be guaranteed to patients.

[5] Emergency Medical treatment and active Labor Act (EMTALA) is an act belonging to COBRA legislation.

[6] By emergency department, also called emergency room, we refer to **t**he department of a hospital responsible for the provision of medical and surgical care to patients arriving at the hospital in need of immediate care.

[7] Ruling n. 45844 of the 5th of November 2014.

[8] It happens in response to a request or an order but also when there is a substantial emergency for which an action is needed. In this way, public official's inertia constitutes a guilty refusal (art. 328 Code of Criminal Procedure).

reasons behind patient dumping which does not always have a financial nature and may be very insightful in a policy perspective[9].

2.2 Literature Review

This paper contributes to two different strands of literature. First, it investigates the role of medical liability in affecting medical decisions. Although insurance typically covers physicians from the financial risks of malpractice litigation, there are several non-insurable costs, such as psychological and reputational costs (Kessler, 2011). This implies that physicians are often concerned about legal liability.[10] Not all physicians suffer however from the same liability risks, since medical specialists are more exposed to litigations (Jena et al., 2011). As a result, physicians prefer performing elective procedures which do not really affect the quality of care in the attempt to evade litigation, as it can be largely found in obstetrics (e.g., Currie and MacLeod, 2008; Shurtz, 2014) and heart disease (e.g., Kessler and McClellan, 2002; Avraham and Schanzenbach, 2015). Alternatively, physicians can choose to treat only less risky patients (i.e., cream-skimming) to decrease the probability of negative outcomes. Both practices known as defensive medicine have been reviewed by Danzon (2000), Kessler (2011), Bertoli and Grembi (2018). We contribute to this stream of literature showing how dumping liability affects both individual's decisions to take charge of patients and the level of medical service provided.

The second contribution of the paper relates to the growing experimental literature devoted to exploring how different payment structures affect medical service provision. The initial study in this field can be attributed to Henning Schmidt et al. (2011) who investigate how subjects (medical students) in the role of physicians provide medical services under FFS and CAP. They observe that patients are over-treated under FFS and under-treated under CAP. These results have been replicated in an artefactual field experiment by Brosig-Koch et al. (2016), who also find that students are more influenced in their decisions by financial incentives as compared to physicians who are more patient-regarding (see also Wang et al., 2020). Building on the same

[9] An emblematic episode has been recently recorded in Abruzzi where a 70-year-old man died in front of the hospital waiting to be admitted, after a previous rejection by another medical facility. For more details, see https://www.fanpage.it/attualita/avezzano-enzo-muore-in-auto-in-attesa-del-ricovero-tra-le-urla-della-moglie-fateci-e-entrare/

[10] In Italy, it is recorded the highest number of physicians sued for medical malpractice in Europe. For this reason, the NHS is obliged to pay high insurance premiums when it succeeds in finding an insurance company ready to bear the risk of monetary claims due to medical malpractice (Traina, 2009).

experimental design, Brosig-Koch et al. (2017) show that a calibrated mixed payment system can counterbalance the distortions in service provision led by non-blended payment schemes. In a similar setting, but allowing for uncertainty of the patient health outcome, Martinsson and Persson (2019) show that physicians' willingness to altruism varies across patients with different medical needs. In their laboratory experiment, Finocchiaro Castro et al. (2019) introduce the risk for physicians of being sued for medical malpractice under FFS and CAP. Results show that physicians provide a higher number of medical services when malpractice liability pressure comes into play.

We contribute to the above-mentioned literature by introducing in this framework the possibility for physicians of practicing patient dumping and the associated risk of being sued. Our extended experimental design, which combines an artefactual field experiment with real physicians and a laboratory experiment with students, allows us to study the interplay between payment systems and medical liability for malpractice and dumping in physicians' behavior, including both the choice of taking charge of the patient and the quantity of medical services.

3. Theoretical framework

In this section, we lay out a simple model of physicians' decision-making under both the risk of being sued for medical malpractice and the risk of being sued for patient dumping. The general structure largely draws from the standard framework set by Ellis and McGuire (1986), and then extended by Finocchiaro Castro et al. (2019) to include the risk of being sued for malpractice. Albeit simple, our model provides a framework (consistent with the following experimental design) for deriving the behavioral hypotheses to be tested in the experiment.

3.1 Theory model

Following the related literature, we consider a physician who cares for both profit and benefits to patients (Ellis and McGuire, 1986; McGuire and Pauly, 1991; Chandra et al., 2011). Physician's profit can be represented as follows:

$$\Pi(q) = R(q) - C(q) \quad (1)$$

where $R(q)$ is physician's revenue which does vary according to the payment system. Specifically, under FFS physicians receive a fee, p, based on a national fee schedule[11], for each medical service provided; thus, the revenue function is $R_{FFS} = pq$. On the contrary, under the Salary system subjects are paid a fixed sum which does not vary with the services provided; thus, the revenue function is $R_{Salary} = L$. We opted for Salary payment scheme as an alternative to FFS because it is the most common payment structure experienced in real life by physicians working at hospitals or clinics. Hence, we can state that $R'(q) \geq 0$ and $R''(q) = 0$ in coherence with the standard payment systems. Then, we consider a cost function for physicians, $C(q)$, to proxy the effort devoted in providing medical care. The total cost is set increasing and convex, $C'(q) > 0$ and $C''(q) > 0$.

As mentioned before, the physician cares also for the patient's benefit. $B(q, j)$ is the patient j's expected health benefit set increasing and concave, $B'(q) > 0$ and $\mathrm{B}''(q) < 0$, with j being the degree of patient severity. Patient's benefit resulting from medical treatment is given by $B(q, j) + \varepsilon$, where ε refers to a random component due to the unavoidable uncertainty surrounding the provision of medical care. The random component is assumed to be independent from the quantity of treatment given and follow a standard logistic distribution, $\varepsilon \sim Logistic(0, 1)$. Following previous literature, the total benefit function is assumed to follow an inverted u-shape, implying that it reaches a maximum at some severity-specific quantity, $q^B(j)$, after which it starts to fall (Ellis and McGuire, 1986; Brosig-Koch et al., 2017; Finocchiaro Castro et al., 2019).

When physicians run the risk of being sued for medical malpractice, they may also consider the disutility of malpractice litigation. Therefore, we consider another term to the physician's utility function to include the expected disutility caused by it (Finocchiaro Castro et al., 2019). Although it may be difficult for patients to judge whether medical provision is appropriate (Kerschbamer and Sutter, 2017), physicians use overtreatment to persuade that the patient's poor health is not due to malpractice but rather to the uncertainty surrounding the provision of medical care (Kessler and McClellan, 2002; Baicker et al., 2007; Mello et al., 2010; Kessler, 2011). In fact, according to Studdert et al. (2005), physicians are willing to practice positive

[11] The fee schedule assigns a fixed relative value to each health care service, recognizing that goods and services can have different production costs.

defensive medicine providing additional unnecessary care, to discourage patients from suing them or, even worse, to document diligence and prudence persuading the legal system that the patient has been treated according to the standard care. Following this literature, we thus assume that the probability of being sued for medical malpractice, $Pr(q, j)$, decreases with the amount of medical services provided, $Pr'(q) < 0$, and increases with the degree of patient severity (Finocchiaro Castro et al., 2019).

Finally, in our model we account for a punishing mechanism to physicians for dumping patients. We assume that, when the institutional system provides for this, physicians exercising dumping may be sued for it. Specifically, $d(j)$ is the probability for a physician of being sued for dumping. It is reasonable to assume that this probability increases with the severity of patient severity, $d'(j) > 0$. In fact, reports for patient dumping are likely to come from patients with serious health conditions, since mainly in these cases the refuse to treat them could cause irreparable damage to their health, leading patients themselves or their relatives to instigate a prosecution (Rice et al., 1988). If a physician is sued for dumping, he cannot be sued for malpractice and vice-versa; in fact, malpractice can only arise if the physician treats the patient.

Based on the above, the physician's utility function, which includes both medical malpractice and dumping liabilities, is given as follows:

$$U(q) = \begin{cases} if\ patient\ is\ treated & R(q) - C(q) + \alpha B(q,j) - Pr(q,j)H + \varepsilon \\ if\ patient\ is\ dumped & R_{dump} - d(j)D \end{cases} \quad (2)$$

where $\alpha \in [0, 1]$ measures the rate at which the physician is willing to give up one euro of profit for one euro of patient benefit (Ellis and McGuire, 1986). Then, H is the disutility coming from a malpractice litigation including all monetary and nonmonetary costs incurred to undertake a legal defensive action (Finocchiaro Castro et al., 2019); similarly, D is the disutility coming from complaints for patient dumping.[12] Finally, the revenue in case of patient dumping, R_{dump}, is equal to zero under FFS while the physician still earns the fixed sum under the Salary system.

[12] Although according to the COBRA legislation only hospitals can be directly sued for EMTALA violations, physicians responsible for such violations could face disciplinary actions and could be subject to civil monetary penalties (e.g., Zibulewsky, 2001). A similar context can be found in the Italian NHS (e.g., Traina, 2009).

In this context, physicians facing a patient make two sequential choices. First, they decide if taking charge of the patient or dumping him; then, in case of admission, they choose the quantity of medical services to provide. As usual in sequential choices, we solve the model backward.

In case of a patient being treated, the first order conditions for the optimal quantity of medical services under the two payment systems, q^*_{FFS} and q^*_{Salary}, are given by:

$$p + \alpha B'(q^*_{FFS}) - Pr'(q^*_{FFS})H = C'(q^*_{FFS}) \tag{3}$$

$$\alpha B'\left(q^*_{Salary}\right) - Pr'\left(q^*_{Salary}\right)H = C'\left(q^*_{Salary}\right) \tag{4}$$

which imply that $q^*_{FFS} > q^*_{Salary}$. To see this, $\alpha B'\left(q^*_{Salary}\right) - Pr'\left(q^*_{Salary}\right)H - C'\left(q^*_{Salary}\right)$ is equal to zero by (4), while (3) requires that $\alpha B'(q^*_{FFS}) - Pr'(q^*_{FFS})H - C'(q^*_{FFS})$ equals $-p$. Since the second order condition guarantees that $[\alpha B''(q,j) - Pr''(q,j)H - C''(q)]|_{q=q^*} < 0$, this implies that $q^*_{FFS} > q^*_{Salary}$.

Then, looking at the physician's utility function (2), the physician chooses to treat patient *j* over to dump him provided that $R(q^*) - C(q^*) + \alpha B(q^*,j) - Pr(q^*,j)H + \varepsilon > R_{dump} - d(j)D$, that is:

$$\begin{aligned} Pr\{treat\ j\} &= Pr\left\{R(q^*) - C(q^*) + \alpha B(q^*,j) - Pr(q^*,j)H + \varepsilon > R_{dump} - d(j)D\right\} = \\ &= Pr\left\{\varepsilon < R(q^*) - C(q^*) + \alpha B(q^*,j) - Pr(q^*,j)H - R_{dump} + d(j)D\right\} = \\ &= \frac{e^{\left[R(q^*) - C(q^*) + \alpha B(q^*,j) - Pr(q^*,j)H - R_{dump} + d(j)D\right]}}{1 + e^{\left[R(q^*) - C(q^*) + \alpha B(q^*,j) - Pr(q^*,j)H - R_{dump} + d(j)D\right]}} \end{aligned} \tag{5}$$

where we exploit the fact that $\varepsilon \sim Logistic(0,1)$. Equation (5) represents the probability for patient *j* of receiving treatment. Differentiating (5) with respect to *j*, we can inspect how dumping practice changes with the degree of patient severity:

$$\frac{\partial Pr\{treat\ j\}}{\partial j} = Pr\{treat\ j\}\frac{R'_q\left(q'(j)\right) - C'_q\left(q'(j)\right) + \left[B'_q\left(q'(j)\right) + B'_j(j)\right] - \left[Pr'_q\left(q'(j)\right) + Pr'_j(j)\right]H + d'(j)D}{1 + e^{\left[R(q^*) - C(q^*) + \alpha B(q^*,j) - Pr(q^*,j)H - R_{dump} + d(j)D\right]}} \gtreqless 0 \tag{6}$$

From (6), we can see that how dumping practice changes with respect to *j* is highly ambiguous. On the one hand, a higher severity increases the risk of being sued for dumping, $d'(j)$, and the expected patient's benefit from treatment, $B'_q\left(q'(j)\right)$, as well as the revenue (only in FFS) because of the increase in the optimal quantity, $R'_q\left(q'(j)\right)$; this leads physicians to be more

inclined to accept patients. On the other hand, a higher j increases treatment cost, $C_q'\big(q'(j)\big)$, and the risk of being sued for malpractice, $Pr_j'(j)$; this indeed makes dumping more appealing.

Finally, integrating (5) over the distribution $f(j)$ of patient's severity, we obtain the equilibrium level of dumping as a proportion of patients in the population:

$$Dumping = 1 - \int_j \left\{ \frac{e^{\left[R(q^*) - C(q^*) + \alpha B(q^*, j) - Pr(q^*, j)H - R_{dump} + d(j)D\right]}}{1 + e^{\left[R(q^*) - C(q^*) + \alpha B(q^*, j) - Pr(q^*, j)H - R_{dump} + d(j)D\right]}} \right\} f(j)\, dj \qquad (7)$$

Equation (7) gives us the equilibrium level of dumping as a function of the physicians' payment system, as well as the risk of being sued for both malpractice and dumping; this allows us to consistently derive behavioral hypotheses to be tested in the following experiment.

3.2 Behavioral hypotheses

Our first hypothesis deals with the impact of the payment system on the practice of patient dumping. According to the Cook Count Study[13] in 1986 and referred to the period 1980-1983, eighty-seven percent of hospitals which decided to reject or transfer patients to other medical facilities cited the lack of insurance as the sole reason for such a conduct. Furthermore, Harvard Medical School's study[14] pointed out that, when there was no medical reason to transfer the patient, some patients were transferred due to financial interests of hospitals and physicians (Treiger, 1986). Evidence shows that patient dumping is still practiced (even after the introduction of antidumping legislations, such as EMTALA), and most of the time it is due to financial reasons (see e.g., Zaubi et al., 2016).

When physicians are paid through a prospective system, such as Salary, they are induced to control mainly for the costs of patient care (Ellis and McGuire, 1986).[15] Providers could decide to screen patients to separate those who are in a good health status (more profitable patients) from those who have an undiagnosed disease (less profitable patients), thus dumping high-risk patients (Matsaganis and Glennerster, 1994; Sappington and Lewis, 1999). On the contrary,

[13] A Prospective Study of 467 Patients.
[14] It was conducted at Highland Hospital in Oakland (Treiger, 1986).
[15] In this perspective, physicians are considered to act as an agent of the hospital in which they are employed (Chalkley and Malcomson, 1998).

FFS gives physicians an incentive to provide as many health care services as possible (Donaldson and Gerard, 1989). Therefore, as long as financial incentives are concerned, physicians should be less willing to dump patients under FFS.

Looking at (7), this prediction seems to be consistent with our model. In case of patient dumping, the financial revenue, R_{dump}, strongly disincentives this choice under FFS, while it does not under Salary in which physicians still earn the fixed compensation. Moreover, in case of patient being treated, physicians choose a higher level of services under FFS, $q^*_{FFS} > q^*_{Salary}$, which implies that the probability of facing a malpractice litigation should be lower under FFS, further reducing the incentive to dump patients in FFS. Thus, our first behavioral hypothesis is:

Hypothesis 1: *In the absence of dumping liability, the level of patient dumping achieved under Salary is higher than the one reached under FFS.*

Second, we examine whether the introduction of dumping liability affects physicians' attitude towards patients. According to (5), regardless of the payment system, the probability of treating patient j increases with the risk of being sued for dumping, $d(j)$, as well as with the expected disutility of a dumping litigation, D;[16] similarly, it is easy to see that the equilibrium level of dumping (7) decreases with dumping liability. As a result, we expect that the introduction of this institutional mechanism to be a deterrent for physicians against the practice of dumping.

Hypothesis 2: *When physicians can be sued for patient dumping, the level of dumping decreases regardless of the payment systems.*

Previous experimental evidence has shown that physicians paid by FFS tend to over-treat patients, while they under-treat them when paid by a fixed sum independent of the amount of

[16] Formally, the partial derivative of the probability of being treated (5) with respect to the risk of being sued is:

$$\frac{\partial Pr\{treat\ j\}}{\partial d} = Pr\{treat\ j\}\frac{D}{1 + e^{[R(q^*)-C(q^*)+\alpha B(q^*,j)-Pr(q^*,j)H-R_{dump}+d(j)D]}} > 0$$

services provided (Hennig Schmidt et al., 2011; Brosig-Koch et al., 2017). This evidence is consistent with the above framework for which, as previously said, physicians choose a higher level of medical services under FFS, $q^*_{FFS} > q^*_{Salary}$. Therefore, we further check whether, in case of patient admission, the quantity of services differs between the two payment systems.

Hypothesis 3: *When physicians do not dump patients, they provide more medical services under FFS than under Salary.*

Finally, we want to look at the role played by the degree of patient severity in physicians' dumping decisions. As shown by (6), the effect of illness severity on the probability of being treated is theoretically ambiguous, being possible that physicians prefer to dump high-severity patients (for instance, because they involve a higher risk of malpractice litigation) as well as low-severity patients (because they gain a lower expected benefit from treatment). Therefore, we do not make any theoretical prior in this respect and leave the answer to the behavioral data.

4. Experiment

4.1 Experimental Design

In this experiment, each participant plays the role of a physician and decides whether to take charge of the patient and, eventually, the level of medical services to provide, given a certain payment structure. At the beginning of the experiment, participants are randomly assigned to different payment conditions, either Salary or FFS. Under both payment schemes, participants always face the risk of being sued for malpractice and, furthermore, run an additional risk of being sued for practicing dumping. This potential sanction is the only deterrent that can be used against the incentive to practice patient dumping. In fact, the lack of effective means to prove violations jeopardizes the capacity of monitoring and then, punishing infringements through appropriate fines (Kellermann and Hackman, 1990).[17]

[17] Hospitals can often find a way to subvert the legislation, because there is no entity checking discharge plans,

Table 1 reports the 2x2 design which allows for both within-subject and between-subject analysis (e.g., Brosig-Koch et al., 2017). At a within level, participants under the same payment structure act both in the absence and in the presence of the risk of being sued for dumping. Additionally, the comparison between the two different payment conditions allows for between-groups tests.

Table 1: Experimental structure

	DUMPING		
PAYMENT SCHEME		YES	NO
	FFS	*FFS with dumping liability*	*FFS*
	SALARY	*Salary with dumping liability*	*Salary*

FFS: fee-for-service.

In each treatment, participants face 9 different patients, pooled into three different groups according to the degree of their illness ($j = 1, 2, 3$). For each patient, subjects are made aware of her diagnosis[18] provided in Table 2, leading to a common disease easily understandable to any participant. Patients are presented in a random order, which varies across treatments, to avoid carry-over effects (Charness et al., 2012). Patient types reflect the patients' different states of health: good ($j = 1$), intermediate ($j = 2$), bad ($j = 3$).

Table 2: Diagnoses

Pathologies	**Severity of illness**
hypertension	1
Measles	1
fever and a cough	1
cholecystitis	2
femur fracture	2
respiratory distress	2
hepatic coma	3
intestinal obstruction	3
stroke	3

which are often falsified due to the lack of monitoring system. For instance, medical facilities could cite the inability to properly treat the patient as the sole reason for refusing him, when this is not the case (Treiger, 1986). Therefore, the only risk for a physician practicing dumping is being sued by patients.

[18] Diagnoses have been provided by a general practitioner, and then classified according to the severity of illness.

After having observed the patient's diagnosis, each participant must decide if he wants to take charge of the patient or not. Then, in case of acceptance, he chooses the quantity of medical services, q, to provide ($0 \leq q \leq 10$). Under FFS, both his profit and the patient's health benefit are affected by that choice. When it comes to the Salary scheme, instead, subjects receive regular time-based payments, which means a fixed euro amount per specific period. Therefore, in contrast to FFS, physician's profit under Salary is independent from the quantity of medical services but varies with the costs. Physician's profit can be represented as follows:

$$\Pi(q) = \begin{cases} pq - cq^2 \; under \; FFS \\ L - cq^2 \; under \; Salary \end{cases} \tag{8}$$

Building on previous experimental design (Brosig-Koch et al., 2017; Lagarde and Blaauwn, 2017; Finocchiaro Castro et al., 2019), we set $p = 2$, the fee for each unit of service provided, $c = 0.1$, the marginal cost for service provision, and $L = 10$, which refers to a fixed salary.

As far as patients are concerned, their expected benefit is given by (Brosig-Koch et al., 2017):

$$B^j(q) = \begin{cases} B_0^j + q \;\; if q \leq q^* \\ B_1^j - q \; if \; q \geq q^* \end{cases} \tag{9}$$

with $B_0^{j=1} = 7$, $B_0^{j=2} = 5$, $B_0^{j=3} = 3$ and $B_1^j = B_0^j + 2q^* \; \forall j$. Based on (9), the optimal quantity of medical services to provide for patients is given by $q^* = 3$ for low severity ($j = 1$), $q^* = 5$ for intermediate severity ($j = 2$), and $q^* = 7$ for high severity ($j = 3$).

The probability of being sued for medical malpractice is also influenced by the quantity of medical services provided, and it is formally given by (Finocchiaro Castro et al., 2019):

$$Pr^j(q) = \lambda^j \left(1 - \frac{q}{10}\right) \tag{10}$$

in which $\lambda^{j=1} = 0.3$, $\lambda^{j=2} = 0.4$, and $\lambda^{j=3} = 0.5$. Therefore, the risk of being sued for malpractice is always higher for more severe patients, $Pr^{j=1}(q) < Pr^{j=2}(q) < Pr^{j=3}(q) \; \forall q$. When participants are sued, their total profit is reset to zero for that period (i.e., for that patient).

Finally, the probability of being sued for dumping increases with the degree of illness, and it is set in $d(1) = 0.1$, $d(2) = 0.15$, and $d(3) = 0.2$. Since hospitals and physicians can often subvert the antidumping law, as suggested above, their probability of facing a complaint for dumping is conceivably not very high.

The complete set of parameter values, the patterns of physicians' revenues and profit in the different liability contexts, as well as patients' health benefit are reported in the Appendix B (see Table B.1). All parameters in the experiment were common knowledge for the participants.

Patients are assumed to be passive, accepting each level of medical services provided by physicians. Although real patients are not actually present in the experiment, participants are aware that their choices affect real patients outside the lab, as patients' health benefit is converted into money and transferred to the *Per Mano ONLUS*, a local voluntary association which monitors and assists real patients affected by Duchenne Muscular Dystrophy (e.g., Henning Schmidt et al., 2011; Brosig-Koch et al. 2017; Finocchiaro Castro et al., 2019).

4.2 Experimental procedure

The artefactual field experiment was conducted at the main hospital of Reggio Calabria, thanks to an agreement signed by the same hospital and the Mediterranean University. Local physicians who chose to contribute to this research took part in the experiment during their coffee-breaks. For this reason, the experiment was conducted in different tranches, and with pool of different sizes.[19] 36 physicians joined the experimental sessions (19 for FFS treatments, and 17 for Salary treatments). 47% of physicians were emergency room doctors, to preserve the external validity of the experiment. In fact, ER physicians are those who more frequently screen patients and decide to take charge of, and then hospitalize, them (Iannello et al., 2015). The rest of physicians were cardiologists or oncologists.

The laboratory experiment was run at the Mediterranean Experimental and Behavioural Economics Lab (M.E.B.E.L.) of the Mediterranean University of Reggio Calabria, in which 64 economics and law students joined different sessions (30 for FFS treatments, and 34 for Salary treatments). Overall, we conducted twelve sessions between the hospital and the laboratory.

Upon arrival, subjects were randomly allocated to the given seats, where they completed their task in full anonymity, using Z-tree (Fischbacher, 2007). Since liability conditions, either for malpractice or for dumping, can change physicians' attitude towards risks, before starting the

[19] Notice that since the design does not provide for participants' interaction, we did not require a specific amount of participants in the room to start the experiment.

experiment we measured subjects' attitude. Results show that 66% of the subjects can be classified as risk averse, 20% of them turned out to be risk loving, and the remaining subjects were not classifiable.

Instructions[20] were read aloud, and all participants' doubts were clarified before starting the experimental sessions. After having completed the main decision tasks for all treatments (i.e., two for each participant), participants answer a questionnaire about their social-economic status. At the end of the experiment, one of the periods was randomly selected and subjects were paid with voucher meals (to be used in the physicians/students' respective cafeteria) whose value corresponded to their profit in that period.[21] We chose to use meal tickets to preserve the salience of the incentive mechanism (i.e. participants can soon spend them at their cafeteria, during their lunch break), though being very low compared to physicians' opportunity cost. In fact, physicians should have intrinsic motivation on their own, knowing that they are contributing to research, and paying them something corresponding to their opportunity cost could reduce the quality of information they provide during the experiment (Gneezy and Rustichini, 2000).[22] The experimental sessions lasted approximately half an hour, and the average reward was € 9.03 per participant.

5. Results

5.1 Descriptive analysis and nonparametric tests

In the following analysis, the main variables of interest are subjects' choices concerning whether to take charge of the patient and then the level of services to provide. The variable *Choice* refers to the first decision made by participants in this experiment, choosing whether to take charge of the patient (*Choice = 1*) or to refuse to treat him (*Choice = 0*). If the subject decides to treat the patient, he moves to the second choice on the level of services to provide.

[20] Instructions of dumping treatment under FFS condition are reported in the Appendix A.
[21] According to McKeganey (2001), food voucher could replace cash payment for research participation, being appropriate to the category of the participant group.
[22] The above-mentioned incentive is reasonably salient for two reasons. First, cafeteria is the only hospital internal alternative available to physicians. Although there are some external cafés, walking distance from the hospital, their opportunity cost may be high (physicians would have to push out and walk for 15 minutes). Additionally, according to the regulation, the internal cafeteria must charge 20% discounted rates to the hospital's employees.

Table 3 and 4 report the summary statistics for the four different treatments.

Result 1: Consistently with our hypothesis 1, the average frequency of choosing to treat the patient is higher under FFS (0.94) than under Salary (0.82), with differences significant at the 1% level (p-value < 0.001, Wilcoxon signed-rank test).

Result 2: Contrary to our hypothesis 2, subjects seem to be insensitive to the introduction of dumping liability both under FFS (p-value = 0.10, Wilcoxon signed-rank test) and under Salary (p-value = 0.60, Wilcoxon signed-rank test).

Table 3: Summary statistics Salary

	Salary			Salary with dumping liability		
	mean	sd	obs	mean	sd	obs
Choice*	.82	.38	459	.81	.39	459
Quantity of services provided	4.69	2.19	377	5.04	2.21	371

* *Choice* refers to the participant 's decision whether to take charge of the patient (*Choice = 1*) or to refuse to treat him (*Choice = 0*).

Table 4: Summary statistics FFS

	FFS			FFS with dumping liability		
	mean	sd	obs	mean	sd	obs
Choice*	.93	.26	441	.94	.23	441
Quantity of services provided	5.85	2.62	410	6.1	2.58	417

FFS:fee-for-service; * *Choice* refers to the participant 's decision whether to take charge of the patient (*Choice = 1*) or to refuse to treat him (*Choice = 0).*

Result 3: Consistently with our hypothesis 3, the quantity of medical services provided is higher under FFS than under Salary, with differences significant at the 1% level (p-value < 0.001, Wilcoxon signed-rank test).

However, the quantity of medical services provided by participants seems to be affected by the introduction of dumping liability both under FFS (p-value < 0.05, Wilcoxon signed-rank test) and, even more, under Salary (p-value < 0.001, Wilcoxon signed-rank test).

Table 5 summarizes all the nonparametric tests run to compare different treatments.

Table 5: Nonparametric tests

	Choice[#]	**Quantity of services provided**
Mann-Whitney U-tests for between-subject comparisons		
FFS vs SALARY	0.0001	0.0001
FFS without d.l.* vs SALARY without d.l.*	0.0001	0.0001
FFS with d.l.* vs SALARY with d.l.*	0.0001	0.0001
Wilcoxon signed-rank tests for within-subject comparisons		
FFS without d.l.* vs FFS with d.l.*	0.107	0.025
SALARY without d.l.* vs SALARY with d.l.*	0.62	0.0004

FFS: fee-for-service; *d. l.= dumping liability; # *Choice* refers to the participant 's decision whether to take charge of the patient (*Choice = 1*) or to refuse to treat him (*Choice = 0).* The Mann-Whitney U-tests have been run on the following samples, N_{FFS}= 49 and N_{Salary}=51. The number of matched pairs in each Wilcoxon signed-rank test, run under the FFS, is 441 (9 choices, 3 fictitious patients for each of the 3 levels of severity of illness, made by 49 subjects), whereas the number of matched pairs in each Wilcoxon signed-rank test, run under the Salary, is 459 (9 choices, 3 fictitious patients for each of the 3 levels of severity of illness, made by 51 subjects.

Based on the above, under malpractice liability the introduction of an additional liability for dumping does not seem to affect significantly participants' choice on treating the patient but does affect the amount of medical services to provide. What results to be much relevant for both decisions, however, is the payment structure, with the frequency of dumping significantly higher under Salary than under FFS.

As described above, the sample of participants in our experiment is mixed. Thus, we investigate whether different groups of participants behave differently. Table 6 shows how the average frequency of dumping differs between physicians and students. In all treatments, physicians practice dumping with higher frequency than students. Furthermore, the difference in *Choice* between the payment systems is more relevant for physicians than for students. This evidence might be due to the fact that, given their working experience, medical doctors react more than students to the incentives given by the different payment schemes and liability risks.

Table 6: Frequency choice by participants' type

	Choice[#]			
	FFS	FFS with d.l.[*]	SALARY	SALARY with d.l.[*]
Participant's type				
Physicians (N=36)	0.86	0.87	0.65	0.69
Students (N=64)	0.97	0.99	0.90	0.87
p-value	0.0001	0.0001	0.0001	0.0001

d. l. [*]= dumping liability; [#] *Choice* refers to the participant 's decision whether to take charge of the patient (*Choice = 1*) or to refuse to treat him (*Choice = 0)*; FFS: fee-for-service.

Similarly, Table 7 reports the average quantity of medical services across treatments for physicians and students. Again, the introduction of dumping liability leads to a higher level of services provided for both subject's types. Also in this case, however, the between-subject comparison shows that physicians react more than students to the incentive structures.

Table 7: Average quantities by participants' type

	Quantity			
	FFS	FFS with d.l. [*]	SALARY	SALARY with d.l. [*]
Participants' type				
Physicians (N=36)	4.81	5.12	4.2	4.65
Students (N=64)	6.43	6.63	4.87	5.19
p-value	0.001	0.001	0.0011	0.0031

d.l. [*] = dumping liability.

As suggested by the theoretical framework, the severity of illness may play a relevant role in affecting physicians' decisions. Table 8 shows the average dumping frequency (i.e., *Choice*) by patient's severity of illness.

Table 8: Average dumping frequency by treatment, severity, and participants' type

	FFS Physicians	FFS Students	FFS with d.l.* Physicians	FFS with d.l.* Students	SALARY Physicians	SALARY Students	SALARY with d.l.* Physicians	SALARY with d.l.* Students
Severity of illness#=1	0.65	0.94	0.65	0.99	0.10	0.88	0.16	0.81
Severity of illness=2	0.96	0.97	0.96	1	0.88	0.97	0.96	0.88
Severity of illness=3	0.95	1	0.98	1	0.98	0.86	0.96	0.91

FFS: fee-for-service; d.l.* = dumping liability; # the level of severity of illness can be low (1), intermediate (2), bad (3).

The analysis of behavioral data suggests that while students' choices on taking charge of patients do not seem to be heavily affected by the severity of illness, physicians' choices actually do. Specifically, the difference in dumping practice between physicians and students is marked for patients with low severity of illness for which physicians practice much more dumping, while differences are not relevant for medium-severity and high-severity patients. This evidence seems to indicate that when physicians must choose among different patients, they prioritize seriously ill patients. The difference between physicians and students in dumping behavior might be due to the working experience of the formers in real medical contexts in which resource constraints are usually relevant.

We also check whether the severity of illness affects the level of medical services, reported in Table 9. The level of services provided is generally higher for students than for physicians, regardless of both the financial scheme and the patient's severity. Finally, the introduction of dumping liability tends to increase the quantity of services provided to patients (with the only exception of high-severity patient under FFS).

Table 9: Average quantity by treatment, severity, and participants' type

	FFS Physicians	FFS Students	FFS with d.l.* Physicians	FFS with d.l.* Students	SALARY Physicians	SALARY Students	SALARY with d.l.* Physicians	SALARY with d.l.* Students
Severity of illness=1	3.16	4.67	3.78	6.29	2.2	2.86	2.86	3.21
Severity of illness=2	4.8	6.31	5.2	6.7	4.04	4.98	4.59	5.13
Severity of illness=3	6.03	8.29	5.95	6.87	4.54	6.82	4.96	7.03

FFS: fee-for-service; d.l.* = dumping liability; # the level of severity of illness can be low (1), intermediate (2), bad (3).

5.2 Regression analysis

We also run some regressions to investigate the determinants of individual behavior in both the dumping practice and the level of services provided.[23] We consider two dependent variables alternatively: *Choice* and *Quantity*. Table 10 describes all the variables used in the analysis.

Given the structure of the experiment, we need to account for the presence of censored observations in the level of services, since *Quantity* takes a value only if subject's choice equals 1 at the first decision stage (that is, for not dumped patients). This may also trigger a selection problem in the sample in the second stage induced by the first decision stage. In this case, Heckman (1979) and, more generally, two-step selection models are more consistent than the standard OLS, since they account for the selection bias induced by the dependence between the selection equation and the outcome equation, in our case *Choice* and *Quantity* respectively.

In our case, the lambda parameter (i.e., the inverse Mills ratio, which should correct the selection bias in the second stage) from the Heckman model results not significant in the outcome equation, implying that the estimate of the outcome equation converges to a standard OLS. Although surprising, this might be due to our controlled experimental setting in which the determinants of the individual decision-making (and, especially, patients' severity of illness) are fully known by the subjects, and controlled for in the regression estimates. A possible alternative to Heckman (1979) is given by the Cragg (1971) limited dependent variable model, which uses a logit model for the selection equation (i.e., the choice of practicing dumping) and a truncated regression for the outcome equation (i.e., the number of services). In this respect, the Lin and Schmidt (1984)'s test for the Tobit model versus the Cragg (1971) model rejects the former in favor of the latter.[24]

[23] Since each subject make 9 different decisions (i.e., 9 different patients), standard errors are clustered at the subject level (Cameron et al., 2008).

[24] The Tobit model can be considered a special case of the Cragg's model in which the same set of parameters determine both the discrete choice and the continuous choice (Lin and Schmidt, 1984). In our case, this restriction may not be plausible, as dumping decisions may differ from the choice on the number of services to provide. In this context, the Lin and Smith (1984)'s test uses the Lagrange multiplier (LM) test to assess the plausibility of the restriction involved in the Tobit model whereas one would have to estimate the unrestricted Cragg's model.

Table 10: Variables list

Variable	Description	N	mean	sd	min	Max
Age	Age	1,800	31.17	12.83	19	68
Emergencydepartment	Dummy for emergency department physician	1,800	0.170	0.376	0	1
Male	Dummy for gender	1,800	0.510	0.500	0	1
Degreeofillness	Severity of illness on a three-point scale	1,800	2	0.817	1	3
FFS	Dummy for fee for service	1,800	0.490	0.500	0	1
Salary	Dummy for salary	1,800	0.510	0.500	0	1
Dumping	Dummy for dumping liability	1,800	0.500	0.500	0	1
Choice	Dummy for choice	1,800	0.874	0.331	0	1
Quantity	Quantity of services provided	1,575	5.450	2.486	0	10
Riskseeking *	Dummy for risk seeking	1,116	0.258	0.438	0	1
Student	Dummy for student	1,800	0.640	0.480	0	1
Physician	Dummy for physician	1,800	0.360	0.480	0	1
q_e	Efficient quantity of medical services	1,800	4.333	0.943	3	5
q_opt	Patient-optimal quantity	1,800	5	1.633	3	7
q_ediff	Deviation from the efficient quantity	1,575	1.002	2.335	-5	7
q_optdiff	Deviation from the patient-optimal quantity	1,575	0.278	2.355	-7	7
FFS*Dumping	Interaction variable	1,800	0.245	0.430	0	1
Male*Riskseeking	Interaction variable	1,116	0.0806	0.272	0	1

* The lower number of observations is due to the exclusion of subjects whose inconsistent choices in the HL questionnaire have prevented them from being classified as either risk-seeker, risk-neutral or risk-averse.

As for the decision on whether to take charge of patients or practice dumping, Table 11 reports the logit estimates in which *Choice* is the dependent variable. Table 12 reports the same estimates by subjects' type (i.e., physicians and students). Numbers reported in the tables correspond to marginal effects.

Table 11: Logit for choice

	(1)	(2)	(3)
2.degreeofillness	0.215***	0.294***	0.287 ***
	(0.036)	(0.044)	(0.044)
3.degreeofillness	0.215***	0.295***	0.288***
	(0.039)	(0.047)	(0.047)
FFS	0.097***	0.101***	0.098***
	(0.021)	(0.027)	(0.027)
Dumping	0.0035	0.016*	0.015*
	(0.013)	(0.009)	(0.008)
Male		0.015	-0.014
		(0.021)	(0.021)
Age		-0.0021**	-0.002**
		(0.0268)	(0.001)
Physician		-0.069**	-0.066**
		(0.031)	(0.028)
Emergency department		-0.018	-0.021
		(0.032)	(0.029)
Riskseeking*		0.001	-0.032
		(0.025)	(0.027)
Male*Riskseeking			0.129**
			(0.052)
FFS*Dumping			0.0016
			(0.018)
Observations	1800	1116	1116

Clustered standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; *Choice* refers to the participant 's decision whether to take charge of the patient (*Choice = 1*) or to refuse to treat him (*Choice = 0*). 2.degreeofillness and 3.degreeofillness are dummy variables equal to 1 if patient's severity of illness is either intermediate or high and 0 if the severity is low. FFS is a dummy variable equal to 1 if subjects are paid by FFS and 0 if they are paid by Salary. Dumping is a dummy variable equal to 1 if subjects joined a session where dumping liability has been implemented and 0 otherwise. Male is a dummy variable equal to 1 if the subject is male and 0 otherwise. Physician is a dummy variable equal to 1 if the subject is a physician and 0 otherwise. Emergency department is a dummy variable equal to 1 if the physician works at the Emergency department and 0 otherwise. Riskseeking is a dummy variable equal to 1 if the subject is classified as risk-lover according to Holt and Laury (2002)'s questionnaire and 0 otherwise. * The lower number of observations is due to the exclusion of subjects whose inconsistent choices in the HL questionnaire have prevented them from being classified as either risk-seeker, risk-neutral or risk-averse.

The probability of taking charge of patients increases with their severity of illness, although this effect is largely driven by physicians. As suggested above, this result may be due to the physicians' willingness to prioritize the most critical patients if they must select which patient to admit. Patient dumping is significantly lower under FFS, consistently with our hypothesis 1. In fact, the more subjects are paid for the services they provide, the less dumping is observed; on the contrary, receiving a fixed payment such as Salary results in subjects' lower willingness to take charge of patients. The introduction of dumping liability seems to have only mild effects on patient dumping, though the effect for physicians is consistent with our hypothesis 2. Participants' age, especially in the case of physicians, decreases the probability of taking charge of patients, implying that older physicians are more willing to practice dumping. Again, this may be due to their greater working experience. Overall, physicians result more willing to practice dumping than students. In addition, male subjects classified as risk seekers are more likely to take charge of patients.

Table 12: Logit for choice by participants' type

	Physicians (n=36)			Students (n=64)		
	(1)	(2)	(3)	(1)	(2)	(3)
2.degreeofillness	0.542***	0.547***	0.548***	0.049**	0.025	0.026
	(0.053)	(0.049)	(0.047)	(0.02)	(0.033)	(0.033)
3.degreeofillness	0.565***	0.571***	0.571***	0.036	0	0
	(0.059)	(0.054)	(0.052)	(0.024)	(0.039)	(0.041)
FFS	0.179***	0.213**	0.246***	0.122**	0.108**	0.096*
	(0.035)	(0.051)	(0.054)	(0.037)	(0.046)	(0.045)
Dumping	0.0246	0.019	0.035*	-0.007	0.029*	0.011
	(0.016)	(0.015)	(0.016)	(0.023)	(0.0184)	(0.018)
Male		0.065	0.004		-0.043	-0.078*
		(0.044)	(0.053)		(0.032)	(0.039)
Age		-0.005**	-0.006**		0.006	0.011*
		(0.0019)	(0.002)		(0.006)	(0.006)
Emergency department		-0.056	-0.07			
		(0.064)	(0.06)			
Riskseeking*		0.028	-0.024		-0.096	-0.179**
		(0.046)	(0.051)		(0.076)	(0.069)
Male*Riskseeking			0.201*			
			(0.080)			
FFS*Dumping			-0.035			0.093**
			(0.032)			(0.041)
Observations	648	630	630	1152	486	468

Clustered standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. 2.degreeofillness and 3.degreeofillness are dummy variables equal to 1 if patient's severity of illness is either intermediate or high and 0 if the severity is low. FFS is a dummy variable equal to 1 if subjects are paid by FFS and 0 if they are paid by Salary. Dumping is a dummy variable equal to 1 if subjects joined a session where dumping liability has been implemented and 0 otherwise. Male is a dummy variable equal to 1 if the subject is male and 0 otherwise. Physician is a dummy variable equal to 1 if the subject is a physician and 0 otherwise. Emergency department is a dummy variable equal to 1 if the physician works at the Emergency department and 0 otherwise. Riskseeking is a dummy variable equal to 1 if the subject is classified as risk-lover according to Holt and Laury (2002)'s questionnaire and 0 otherwise. The lower number of observations is due to the exclusion of subjects whose inconsistent choices in the HL questionnaire have prevented them from being classified as either risk-seeker, risk-neutral or risk-averse.

Then, Table 13 provides the truncated regressions in which *Quantity* is the dependent variable, while Table 14 reports the same estimates by subjects' type. In this second stage regression, 175 observations are truncated because of dumping in the first stage.

The quantity of medical services provided is higher under FFS than under Salary. This evidence replicates a standard result in the literature on over- and under-provision of medical services (e.g., Henning Schmidt et al., 2011; Brosig-Koch et al., 2016). As for dumping liability, although it is not directly linked to the quantity of services provided, it turns out to affect the extent to which patients are treated (Finocchiaro Castro et al., 2019).[25] However, dumping liability seems to be more salient to physicians than students (see Table 14). This may be due to the fact that real physicians frequently face the possibility of being sued during their job, and

[25] Finocchiaro Castro et al. (2019) find that the introduction of medical malpractice liability (in that case, strictly related to the amount of medical care) significantly increases the amount of services provided.

thus are more sensitive to liability risks. The positive relationship between dumping liability and quantity of care lies, in fact, in the physicians' responsiveness to liability risks. As reported in Table 8, physicians tend to treat more medium and high severity patients, for which (once admitted) malpractice liability plays a more significant role. Hence, under dumping liability pressure and in line with our theoretical model, physicians taking charge of patients with medium or high degree of illness provide a higher quantity of medical services.

Table 13: Truncated regression for quantity

	(1)	(2)
2.degreeofillness	2.136***	2.130***
	(0.204)	(0.202)
3.degreeofillness	3.581***	3.577***
	(0.247)	(0.247)
FFS	1.276***	1.412***
	(0.392)	(0.403)
Dumping	0.172*	0.321**
	(0.0973)	(0.132)
Age	0.0353	0.0346
	(0.0277)	(0.0267)
Male	-0.149	-0.0901
	(0.402)	(0.412)
Physician	-1.795***	-1.783***
	(0.680)	(0.663)
Emergency department	-0.717	-0.701
	(0.607)	(0.598)
Riskseeking*	0.184	0.278
	(0.530)	(0.582)
Male*Risk		-0.246
		(0.998)
FFS*Dumping		-0.274
		(0.191)
Sigma	1.900***	1.898***
	(0.112)	(0.111)
Constant	2.024***	1.936***
	(0.624)	(0.635)
Observations	940	940

Clustered standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. 2.degreeofillness and 3.degreeofillness are dummy variables equal to 1 if patient's severity of illness is either intermediate or high and 0 if the severity is low. FFS is a dummy variable equal to 1 if subjects are paid by FFS and 0 if they are paid by Salary. Dumping is a dummy variable equal to 1 if subjects joined a session where dumping liability has been implemented and 0 otherwise. Male is a dummy variable equal to 1 if the subject is male and 0 otherwise. Physician is a dummy variable equal to 1 if the subject is a physician and 0 otherwise. Emergency department is a dummy variable equal to 1 if the physician works at the Emergency department and 0 otherwise. Riskseeking is a dummy variable equal to 1 if the subject is classified as risk-lover according to Holt and Laury (2002)'s questionnaire and 0 otherwise. * The lower number of observations is due to the exclusion of subjects whose inconsistent choices in the HL questionnaire have prevented them from being classified as either risk-seeker, risk-neutral or risk-averse.

Severity of illness increases the number of services provided by both physicians and students, since higher severity patients generally require more medical care. However, differences in provision among patient's types are larger for students than for physicians. Presumably, real physicians can be more accurate in balancing the allocation of services to different types of patients. Consistently with this interpretation, physicians are generally found to provide less services than students.

Table 14: Truncated regression for quantity by participants' type

	Physicians (n=36)			Students (n=64)		
	(1)	(2)	(3)	(1)	(2)	(3)
2.degreeofillness	1.723***	1.865***	1.734***	1.575***	2.126***	2.132***
	(0.343)	(0.336)	(0.296)	(0.153)	(0.171)	(0.171)
3.degreeofillness	2.459***	2.632***	2.506***	3.050***	4.436***	4.444***
	(0.363)	(0.335)	(0.291)	(0.264)	(0.250)	(0.249)
FFS	0.980*	1.180*	1.011	1.549***	1.135**	1.420***
	(0.546)	(0.650)	(0.689)	(0.364)	(0.452)	(0.484)
Dumping	0.376***	0.358***	0.531***	0.235**	-0.0234	0.144
	(0.0801)	(0.0865)	(0.129)	(0.119)	(0.174)	(0.227)
Age		0.0257	0.0193		0.203**	0.259**
		(0.0297)	(0.0240)		(0.100)	(0.103)
Male		0.505	1.415**		-0.866*	-1.209***
		(0.656)	(0.610)		(0.455)	(0.468)
Emergency department		-0.663	-0.343			
		(0.701)	(0.696)			
Riskseeking*		-0.0896	0.771		1.082	-0.0330
		(0.692)	(0.759)		(0.804)	(0.482)
Male*Riskseeking			-2.253**			2.847***
			(1.142)			(0.626)
FFS*Dumping			-0.267			-0.313
			(0.180)			(0.343)
Sigma	1.960***	1.852***	1.778***	2.154***	1.718***	1.664***
	(0.205)	(0.188)	(0.156)	(0.120)	(0.146)	(0.149)
Constant	2.233***	0.946	0.857	3.312***	-1.620	-2.851
	(0.488)	(1.122)	(0.988)	(0.240)	(2.235)	(2.298)
Observations	499	483	483	1,074	457	457

Clustered standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. 2.degreeofillness and 3.degreeofillness are dummy variables equal to 1 if patient's severity of illness is either intermediate or high and 0 if the severity is low. FFS is a dummy variable equal to 1 if subjects are paid by FFS and 0 if they are paid by Salary. Dumping is a dummy variable equal to 1 if subjects joined a session where dumping liability has been implemented and 0 otherwise. Male is a dummy variable equal to 1 if the subject is male and 0 otherwise. Physician is a dummy variable equal to 1 if the subject is a physician and 0 otherwise. Emergency department is a dummy variable equal to 1 if the physician works at the Emergency department and 0 otherwise. Riskseeking is a dummy variable equal to 1 if the subject is classified as risk-lover according to Holt and Laury (2002)'s questionnaire and 0 otherwise.
* The lower number of observations is due to the exclusion of subjects whose inconsistent choices in the HL questionnaire have prevented them from being classified as either risk-seeker, risk-neutral or risk-averse.

Finally, the last regressions reported in Table 15 focus on the deviation from the efficient quantity, by participants' type.[26] Overprovision is more often observed for high severity

[26] Similar regression results for the deviation from the patients' optimal quantity are available upon request.

patients. Additionally, the deviation from the efficient quantity increases under FFS. However, physicians show a more optimizing behavior than students, balancing patient's health benefit and treatment costs. Physicians working in the hospital, in fact, always face the trade-off between benefits and costs of each treatment decision. Also dumping liability is found to increase the deviation from the efficient quantity; however, as usually found in the analysis, dumping liability is more salient to physicians.

Table 15: Deviation from the efficient quantity ($q - q^e$) by participants' type

	Physicians (n=36)			Students (n=64)		
	(1)	(2)	(3)	(1)	(2)	(3)
2.degreeofillness	-0.313	-0.211	-0.335	-0.464***	0.0753	0.0839
	(0.300)	(0.306)	(0.279)	(0.149)	(0.180)	(0.180)
3.degreeofillness	0.413	0.547*	0.429	1.003***	2.385***	2.395***
	(0.318)	(0.310)	(0.279)	(0.258)	(0.260)	(0.260)
FFS	0.954*	1.154*	0.991	1.505***	1.109**	1.387***
	(0.541)	(0.642)	(0.687)	(0.362)	(0.447)	(0.478)
Dumping	0.380***	0.349***	0.521***	0.238**	-0.0227	0.139
	(0.0825)	(0.0867)	(0.127)	(0.117)	(0.171)	(0.221)
Age		0.0251	0.0189		0.198*	0.253**
		(0.0291)	(0.0236)		(0.0982)	(0.102)
Male		0.493	1.392**		-0.849*	-1.182**
		(0.647)	(0.603)		(0.447)	(0.461)
Emergency department		-0.646	-0.334			
		(0.685)	(0.692)			
Riskseeking*		-0.0914	0.752		1.079	-0.0204
		(0.680)	(0.747)		(0.800)	(0.483)
Male*Riskseeking			-2.207*			2.809***
			(1.109)			(0.618)
FFS*Dumping			-0.263			-0.306
			(0.179)			(0.339)
Constant	-0.704	-1.925*	-2.021**	0.381	-4.459*	-5.657**
	(0.475)	(1.066)	(0.942)	(0.230)	(2.180)	(2.253)
Observations	500	483	483	1,075	457	457

Clustered standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. 2.degreeofillness and 3.degreeofillness are dummy variables equal to 1 if patient's severity of illness is either intermediate or high and 0 if the severity is low. FFS is a dummy variable equal to 1 if subjects are paid by FFS and 0 if they are paid by Salary. Dumping is a dummy variable equal to 1 if subjects joined a session where dumping liability has been implemented and 0 otherwise. Male is a dummy variable equal to 1 if the subject is male and 0 otherwise. Physician is a dummy variable equal to 1 if the subject is a physician and 0 otherwise. Emergency department is a dummy variable equal to 1 if the physician works at the Emergency department and 0 otherwise. Riskseeking is a dummy variable equal to 1 if the subject is classified as risk-lover according to Holt and Laury (2002)'s questionnaire and 0 otherwise. * The lower number of observations is due to the exclusion of subjects whose inconsistent choices in the HL questionnaire have prevented them from being classified as either risk-seeker, risk-neutral or risk-averse.

6. Conclusions

This study combined artefactual field experiment and laboratory experiment with the participation of 36 real physicians, either emergency department doctors, cardiologists, or oncologists, and 64 students. Drawing from similar experimental setting (e.g., Henning Schmidt et al., 2011; Finocchiaro Castro et al., 2019) and adding patients' diagnoses, we tested whether and to which extent the adoption of FFS or Salary payment system can induce subjects to practice patient dumping. We also checked whether the introduction of the physician's risk of being sued for having practiced dumping has effect on his behavior. Results show that dumping is more often observed under Salary than under FFS. The introduction of dumping liability seems to have only mild effects on reducing dumping practice, though it appears to induce a higher amount of services provided. However, dumping liability results to be more salient to physicians, presumably because of their greater sensitivity to liability risks.[27]

Thus, our experiment shows that dumping can be viewed with different perspectives (e.g., hospital physicians believe that patient's pathology falls under the competence of a family practitioner; physicians tend to prioritize serious ill patient if they must decide which patient to take charge of, and so on). Since older physicians are found to take charge of patients less than their younger colleagues, introducing economics training among more experienced physicians to incentivize cost-conscious care could be welfare-improving. In fact, as also suggested by Cohen et al. (1982), assessing the level of physicians' training and their years of experience is the first step to design effective medical education programs.

From a methodological viewpoint, our findings suggest paying close attention to the background of participants when running experiments especially on health issues. Though the great majority of lab experiments involves students with different backgrounds as participants, the mix of professional experience and highly perceived saliency of medical information make real physicians the most fitting type of participants in health-related experiments.

Looking at the policy implications from our study, in the design of the institutional setting healthcare policy makers should account for the trade-off between the reduction of dumping practice and the increase in the costs of the provision of medical services. If the priority of the

[27] This is consistent with the evidence in Finocchiaro Castro et al. (2019) who found that subjects with a medical background (both medical students and physicians) appear to be more sensitive to malpractice liability pressure.

regulator is to avoid unnecessary treatments and hospitalizations, thus reducing expenditures, salary is the most effective remuneration scheme of physicians, since it incentivizes them to refuse not seriously ill patients. If the regulator wants to reduce the rate of dumped patients, thus avoiding further legal complications, FFS is the preferred alternative. On the contrary, introducing dumping liability seems to have only mild effects in reducing dumping practice, while it also increases the amount of services provided, as it is the case for malpractice liability (Finocchiaro Castro et al., 2019).

Therefore, our results call for policy makers considering the interplay between remuneration schemes and liability risks in the design of healthcare policy. Specifically, when physicians are paid by FFS, the introduction of dumping liability not only may not be effective in reducing dumping practice (indeed, already limited under FFS), but may also exacerbate over-provision of medical care. On the contrary, when Salary is the main remuneration scheme of physicians, the increase in medical services induced by liability risks may counterbalance the incentive for physicians to under-provide care, and thus bring closer to the optimal level of care. This leads us to conclude that dumping liability is more desirable in those health systems in which medical doctors are paid by salary with respect to those in which FFS is the main remuneration scheme.

Finally, our experimental study, though the first on dumping practice, may suffer from some limitations which need to be overcome by future research. In this regard, our experimental design may not consider sufficiently well the circumstances which lead physicians to dump patients, such as the desire to prioritize more serious patients or the believe that patient's pathology falls under the competence of a family practitioner. Hence, future streams of research may focus on experimental designs that include the role played by these aspects potentially relevant in driving physicians' decision-making.

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Appendix A

Instructions

Welcome to our experiment

You are going to join an experiment on individual decision-making. Instructions are straightforward and, if you pay close attention, you may gain a monetary amount that will be paid to you in corresponding meal tickets at the end of the experiment. The amount of cash you may win depends only on your decisions and will not be affected by other participants' decisions. Your monetary gains, measured in Experimental Crown (EC), will be converted into Euro at the following exchange rate 1 EC = 0.45 Euro. For example, if, at the end of the experiment, you achieve 40 EC, you will receive a 18 Euro meal ticket.

Experimental design

The experiment lasts approximately 30 min and is divided into two stages. You will receive detailed instructions at the beginning of each stage. Please, remind that the decisions taken in one stage of the experiment do not have effects on the decisions that you will have to take in the following stage of the experiment.

Stage I

Please, read carefully the following instructions regarding stage I. If anything in the instructions is not clear please raise your hand and one of the experimenters will approach you. From this moment onward, you cannot communicate with any other participant. If you fail to do so, you will be asked to leave the room

Stage I lasts for nine periods. In each period, you will play in the role of a physician and you will have to decide whether to take charge of an already diagnosed patient. In each period you will face a patient with a different diagnosis. Each diagnosis is associated with a different level

of severity of illness (low, medium, high). If you decide to treat the patient you then have to decide how many medical prescriptions to provide to patients. In other words, you have to decide on the level of medical care (in terms of drugs, diagnostic exams, …) to provide to patients according to their severity of illness. Thus, you will face nine patients. When taking the decision on patient's medical care, you can choose among 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 prescriptions per patient.

If you decide not to treat the patient you will skip to the following period. If you decide otherwise to treat the patient, after the decision on the level of medical prescriptions to provide, the patient could sue you for medical malpractice with probability *Pr*, which depends on the level of medical prescriptions already provided.

The following table show the relationship between patient's severity of illness and your profit, if you decide not to treat the patient.

Severity of illness	Your profit
Low (1)	0
Medium (2)	0
High (3)	0

The other tables we will provide before taking your decision, show the relationship between provided prescriptions and the probability of being sued.

Earnings

In each period of stage I, you will be paid according to the FFS payment system. Your earnings increase together with the number of medical prescriptions that you provide to patients. Moreover, you bear a cost due to the level of effort devoted to visiting each patient that depends on how many medical prescriptions you provide to patients. If you get sued by a patient, you will incur a fixed monetary loss equal to the profits earned in the same period you are sued. Hence, your profit in each period is computed as the payment you receive from the FFS system minus the cost due to the provision of medical services minus, if sued, the monetary loss due to being sued by the patient.

Each level of medical prescription provided accrues a certain level of benefit to patient according to her/his severity of illness. Therefore, your choice on the quantity of medical prescriptions to provide determines both your profits and the patients' benefits.

In each period, you will see on the screen (see below) all the information regarding the patient you currently face: his diagnosis, the associated severity of illness, your earning according to the payment system in use, the related costs, the probability of being sued for each possible level of medical prescriptions, the monetary loss due to being sued, your profits and the corresponding patient's benefits.

Stage II

Please, read carefully the following instructions regarding stage I. If anything in the instructions is not clear please raise your hand and one of the experimenters will approach you. From this moment onward, you cannot communicate with any other participant. If you fail to do so, you will be asked to leave the room.

Stage II lasts for nine periods. In each period, you will play in the role of a physician and you will have to decide whether to take charge of an already diagnosed patient. In each period you will face a patient with a different diagnosis. Each diagnosis is associated with a different level of severity of illness (low, medium, high). If you decide to treat the patient you then have to decide how many medical prescriptions to provide to patients. In other words, you have to decide on the level of medical care (in terms of drugs, diagnostic exams, …) to provide to patients according to their severity of illness. Thus, you will face nine patients. When taking the decision on patient's medical care, you can choose among 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 prescriptions per patient.

If you decide not to treat the patient, before skipping to the following period, you may be sued with probability *d*, which depends on the patient's severity of illness. If you decide otherwise to treat the patient, after the decision on the level of medical prescriptions to provide, the patient could sue you for medical malpractice with probability Pr, which depends on the level of medical prescriptions already provided.

The following table show the relationship between the probability of being sued for not treating the patient, *d*, and the patient's severity of illness.

Severity of illness	Probability *d*	Your profit
Low (1)	10%	-10
Medium (2)	15%	-10
High (3)	20%	-10

Earnings

In each period of stage II, you will be paid according to the FFS payment system. Your earnings increase together with the number of medical prescriptions that you provide to patients. Moreover, you bear a cost due to the level of effort devoted to visiting each patient that depends on how many medical prescriptions you provide to patients. If you decide not to treat the patient and you get sued for that, you will incur a loss as shown in table and your profit will be simply equal to it. If you decide to treat the patient and you get sued by a patient for malpractice, you will incur a fixed monetary loss equal to the profits earned in the same period you are sued. Hence, if you treat the patient, your profit in each period is computed as the payment you receive from the FFS system minus the cost due to the provision of medical services minus, if sued, the monetary loss due to being sued by the patient.

Each level of medical prescription provided accrues a certain level of benefit to patient according to her/his severity of illness. Therefore, your choice on the quantity of medical prescriptions to provide determines both your profits and the patients' benefits.

In each period, you will see on the screen (see below) all the information regarding the patient you currently face: his diagnosis, the associated severity of illness, your earning according to the payment system in use, the related costs, the probability of being sued for each possible level of medical prescriptions, the monetary loss due to being sued, your profits and the corresponding patient's benefits.

Stage I (for a different pool)

Please, read carefully the following instructions regarding stage I. If anything in the instructions is not clear please raise your hand and one of the experimenters will approach you. From this moment onward, you cannot communicate with any other participant. If you fail to do so, you will be asked to leave the room.

Stage I lasts for nine periods. In each period, you will play in the role of a physician and you will have to decide whether to take charge of an already diagnosed patient. In each period you will face a patient with a different diagnosis. Each diagnosis is associated with a different level of severity of illness (low, medium, high). If you decide to treat the patient you then have to decide how many medical prescriptions to provide to patients. In other words, you have to decide on the level of medical care (in terms of drugs, diagnostic exams, …) to provide to patients according to their severity of illness. Thus, you will face nine patients. When taking the decision on patient's medical care, you can choose among 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 prescriptions per patient.

If you decide not to treat the patient you will skip to the following period. If you decide otherwise to treat the patient, after the decision on the level of medical prescriptions to provide, the patient could sue you for medical malpractice with probability *Pr*, which depends on the level of medical prescriptions already provided.

The following table show the relationship between patient's severity of illness and your profit, if you decide not to treat the patient.

Severity of illness	Your profit
Low (1)	10
Medium (2)	10
High (3)	10

The other tables we will provide before taking your decision, show the relationship between provided prescriptions and the probability of being sued.

Earnings

In each period of Stage I, you will be given a fixed salary. Your remuneration does not vary with the quantity of medical services provided. Your profit in each period is computed as your fixed salary equal to 10, minus the cost due to the provision of medical services if you treat the patient, minus, if sued, the monetary loss due to being sued by the patient.

Each level of medical prescription provided accrues a certain level of benefit to patient according to her/his severity of illness. Therefore, your choice on the quantity of medical prescriptions to provide determines both your profits and the patients' benefits.

In each period, you will see on the screen (see below) all the information regarding the patient you currently face: his diagnosis, the associated severity of illness, your earning according to the payment system in use, the related costs, the probability of being sued for each possible level of medical prescriptions, the monetary loss due to being sued, your profits and the corresponding patient's benefits.

Stage II (for a different pool)

Please, read carefully the following instructions regarding stage I. If anything in the instructions is not clear please raise your hand and one of the experimenters will approach you. From this moment onward, you cannot communicate with any other participant. If you fail to do so, you will be asked to leave the room.

Stage II lasts for nine periods. In each period, you will play in the role of a physician and you will have to decide whether to take charge of an already diagnosed patient. In each period you will face a patient with a different diagnosis. Each diagnosis is associated with a different level of severity of illness (low, medium, high). If you decide to treat the patient you then have to decide how many medical prescriptions to provide to patients. In other words, you have to decide on the level of medical care (in terms of drugs, diagnostic exams, …) to provide to patients according to their severity of illness. Thus, you will face nine patients. When taking the decision on patient's medical care, you can choose among 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 prescriptions per patient.

If you decide not to treat the patient, before skipping to the following period, you may be sued with probability *d*, which depends on the patient's severity of illness. If you decide otherwise to treat the patient, after the decision on the level of medical prescriptions to provide, the patient

could sue you for medical malpractice with probability Pr, which depends on the level of medical prescriptions already provided.

The following table show the relationship between the probability of being sued for not treating the patient, *d*, and the patient's severity of illness.

Severity of illness	Probability *d*	Profit
Low (1)	10%	0
Medium (2)	15%	0
High (3)	20%	0

The other tables we will provide before taking your decision, show the relationship between provided prescriptions and the probability of being sued.

Earnings

In each period of Stage II, you will be given a fixed salary. Your remuneration does not vary with the quantity of medical services provided. If you decide not to treat the patient and you get sued for that, you will incur a loss as shown in table and your profit will be simply equal to it. Otherwise, your profit in each period is computed as your fixed salary equal to 10, minus the cost due to the provision of medical services if you treat the patient, minus, if sued, the monetary loss due to being sued by the patient.

Each level of medical prescription provided accrues a certain level of benefit to patient according to her/his severity of illness. Therefore, your choice on the quantity of medical prescriptions to provide determines both your profits and the patients' benefits.

In each period, you will see on the screen (see below) all the information regarding the patient you currently face: his diagnosis, the associated severity of illness, your earning according to the payment system in use, the related costs, the probability of being sued for each possible level of medical prescriptions, the monetary loss due to being sued, your profits and the corresponding patient's benefits.

Payment

At the end of the experiment, one of the nine periods of stage I will be randomly drawn. The profit achieved in that period will be paid to you in corresponding meal tickets. While you in this stage have decided in the role of physician on service provision for hypothetical patients, real patients' health outside the lab is affected by your choices. The overall benefits accruing to patients will be converted into Euro and donated to the charity 'Per Mano onlus', https://permanoonlus.wixsite.com/per-mano-onlus. To verify that the monetary amount corresponding to the sum of the patients' benefits in a session is transferred, one of the subjects will be randomly chosen to be a monitor. When the experiment is over, the monitor will verify that one of the experimenters will transfer the monetary amount through credit card payment on the Per Mano ONLUS website. The money will support the charity assisting people affected by Duchenne Muscular Dystrophy.

Questionnaire

Before starting the experiment, we kindly ask you to answer some simple questions aiming at checking your comprehension of the design of stage I and of the profit generation mechanism.

If you have any question regarding the questionnaire, please raise your hand and one of the experimenters will come to your seat. Stage I will start only when all the participants answer to all questions correctly.

Appendix B

Table B.1: Parameter values

		Quantity (q)										
Treatment	**Variable**	0	1	2	3	4	5	6	7	8	9	10
FFS	R^{FFS}	0	2	4	6	8	10	12	14	16	18	20
Salary	R^{Salary}	10	10	10	10	10	10	10	10	10	10	10
all	c	0	0,1	0,4	0,9	1,6	2,5	3,6	4,9	6,4	8,1	10
FFS	π	0	1,9	3,6	5,1	6,4	7,5	8,4	9,1	9,6	9,9	10
Salary	π	10	9,9	9,6	9,1	8,4	7,5	6,4	5,1	3,6	1,9	0
all	$Pr_{j=1}$	30%	27%	24%	21%	18%	15%	12%	9%	6%	3%	0%
	$Pr_{j=2}$	40%	36%	32%	28%	24%	20%	16%	12%	8%	4%	0%
	$Pr_{j=3}$	50%	45%	40%	35%	30%	25%	20%	15%	10%	5%	0%
all	$B_{j=1}$	7	8	9	10	9	8	7	6	5	4	3
	$B_{j=2}$	5	6	7	8	9	10	9	8	7	6	5
	$B_{j=3}$	3	4	5	6	7	8	9	10	9	8	7
		Patient dumping ($d_{j=1}$ =10%; $d_{j=2}$ =15%; $d_{j=3}$ =20%)										
FFS with *d.l.*	*π if not sued*	0	0	0	0	0	0	0	0	0	0	0
Salary with *d.l.*	*π if not sued*	10	10	10	10	10	10	10	10	10	10	10
FFS with *d.l.*	*π if sued*	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10
Salary with *d.l.*	*π if sued*	0	0	0	0	0	0	0	0	0	0	0

FFS: fee-for-service; *R*: revenue; *C*: total cost; π: profit; *Pr*: probability of being sued for malpractice; *B*: patients' health benefit; *d*: probability of being sued for dumping.