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Professional norms and physician behavior: homo oeconomicus or homo hippocraticus?

Iris Kesternich *
Heiner Schumacher **
Joachim Winter ***

* University of Munich
* Aarhus University
* University of Munich

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Iris Kesternich
University of Munich

Heiner Schumacher
Aarhus University

Joachim Winter
University of Munich

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Abstract: Physicians' treatment decisions determine the level of health care spending to a large extent. The analysis of physician agency describes how doctors trade off their own and their patients' benefits, with a third party (such as the collective of insured individuals or the taxpayers) bearing the costs. Professional norms are viewed as restraining physicians' self-interest and as introducing altruism towards the patient. We present a controlled experiment that analyzes the impact of professional norms on prospective physicians' trade-offs between her own profits, the patients' benefits, and the payers' expenses for medical care. We find that professional norms derived from the Hippocratic tradition shift weight to the patient in the physician's decisions while decreasing his self-interest and efficiency concerns.

Keywords: social preferences, allocation of medical resources, professional norms
JEL classification: A13, I19, C72, C91

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1 Introduction

"*Shopkeepers do not swear oaths about shopkeeping. Neither do investors swear oaths about investment. But in most places in the world, doctors swear oaths about doctoring.*" (Sulmasy, 1999)

Professional norms such as the Hippocratic Oath have governed physician practice since ancient times. It has been argued that norms, which protect the patient and constrain the physician's self-interest, exist because of the special nature of the commodity health. In his seminal analysis of health-care markets, Arrow observes that the "expected behavior" of a physician is quite different from that of business men in general: "His behavior is supposed to be governed by a concern for the customer's welfare which would not be expected of a salesman" (1963, p. 949).[1] Health economists have thus built models of physician behavior in which his patients' health or benefits are included in the physician's utility function, in addition to his own income or consumption (Arrow, 1963; Fuchs, 1974; McGuire, 2000).

Physician ethics traditionally govern physicians' concerns for patients – but what about the concern for health care cost and thus for society as a whole? Medical technologies vary widely in their cost-benefit ratios. Still, politicians and insurance companies are largely unable to restrict physicians in their medical decisions. This is frequently grounded in legal reasons. In the U.S., for example, state laws oblige insurers to pay for any medically necessary service (Chandra and Skinner, 2012). A professional norm which focuses solely on the patient, however, does not reflect the cost implications of treatment choices. Thus, medical ethics and financial incentives may imply that even procedures that benefit patients only weakly are widely used, resulting in large costs for the health care system (Chandra and Skinner, 2012). The World Medical Association's *Medical Ethics Manual* (WMA, 2009) devotes one of six chapters to the relationship between the physician and society, thus acknowledging its importance for physician ethics today. At

[1] Arrow (1963) discusses several aspects of the special nature of health: Illness and death decrease not only individuals' income-earning possibilities, but also the possibilities to enjoy any other commodity. Yet, unlike any other basic commodities such as food, health losses cannot be avoided through a sufficient level of income. In addition, physicians are experts, because medical knowledge is largely concentrated among them. Arrow also points out that the production of health services and the final product cannot be separated, which means that patients cannot test the service provided in advance.

the same time, the manual states that "the Hippocratic tradition of medical ethics has little guidance to offer with regard to relationships with society" (p. 65).

In this paper, we address the question of how professional norms change physicians' behavior when they trade-off their own profit, the patients' benefits, and the cost of medical care to society. No reliable empirical evidence exists on this question, and it is unlikely that observational studies will be able to uncover causal relationships, as it is hard to imagine how professional norms could be manipulated in real-world settings. Thus, the effects of such norms are confounded with other factors such as financial incentives, peer pressure, uncertainty about costs and benefits, and fear of being sued for malpractice. We therefore employ a controlled experiment to study the behavior of individuals in a situation in which decisions and incentives resemble those of physicians. Our subjects are 132 medical students from two large German universities.

Specifically, the novel experimental task allows us to observe how subjects (whom we call deciders in the following) trade off between three quantities: their own profit, the payoff of a receiver (the patient), and the contributions of a group of payers (the taxpayer or the collective of insured individuals). The task is a simple distribution game (with neutral framing) where the decider chooses the provision of a good which benefits the receiver but is paid for by several payers. The efficiency of the payment mechanism which translates the provision of the good into the receiver's payoffs can be manipulated experimentally.[2]

In order to test whether there is any effect of professional norms over and above the type of social preferences usually reported in distributional games, we vary the choice tasks along two dimensions. First, we manipulate the salience of professional norms. Before seeing the choice task, all subjects answer a questionnaire on their socio-economic background and their occupational choice. At the end of this survey, one third of our subjects is shown a modern version of the Hippocratic Oath embedded in a survey question. In the control group, this particular question is not asked (while the overall length of the survey is roughly the same). Second, we manipulate the identity of the receiver. For one third of our subjects, the receiver is another student subject. For another third, it is a real-world charity that is concerned with actual patients. For the final third of subjects, the receiver is also a charity but one that is not specifically concerned with patients.

[2] The experimental task was developed in a related study (Schumacher *et al.*, 2014) which, however, focuses on the effect of the size of the groups of payers and does not contain any framing manipulations with respect to professional norms.

Each subject plays twelve distribution games. The first four games are standard dictator games. In the remaining eight games, which we call *cost dispersion games*, the payers are added as a third party. In these games, providing more of the good increases the receiver's payoff at the cost of the payers. The decider may or may not benefit from the provision of the good.

Our main findings are as follows. First, in the dictator games we replicate the existing experimental evidence on distributional preferences (as reviewed, for example, by Camerer, 2003). In these games, there is a strong positive effect of the Hippocratic Oath on the average amount of the good provided. Thus, the salience of the Hippocratic Oath increases the decider's altruism towards the receiver.

Second, subjects are concerned with efficiency, as the rate which translates the decider's payment into the receiver's payoff also affects their contributions. The salience of the Hippocratic Oath causes a stronger increase of the provision of the good when provision is relatively inefficient. Thus, the Hippocratic Oath decreases efficiency concerns.

Third, in the eight cost dispersion games, subjects show concerns for both the receiver's payoff as well as the costs for the payers. This holds even if the receiver is a charity. However, when the Hippocratic Oath is salient, more of the good is provided in these games. Thus, the professional norm benefits the receiver and harms the payers.

Forth, compared with a situation in which the receiver is another student, the concern for the receiver is stronger if it is a real-world charity and the strongest if it is a charity that cares for actual patients. In the dictator games, there is a positive interaction effect: the salience of the Hippocratic Oath has the strongest effect on the provision of the good when the receiver is a charity that cares for real patients.

These are striking result. They highlight that prospective physicians, just like individuals in many experimental studies before, exhibit a combination of selfish and other-regarding preferences, and that they detect efficiency losses and aim to reduce then. Importantly, however, all these effects are dampened by a professional norm that shifts all the weight towards the receiver. Thus, our findings support the notion that professional norms are "society's way of coping with market failure" (Arrow, 1971). In the interaction between the physician and her patient, the professional norm reflected in the Hippocratic Oath mitigates a fundamental agency conflict. However, professional norms can also can decrease

welfare if they exclude a relevant group of stakeholders. In the situation we consider, these stakeholders are the payers of medical services.

The remainder of this paper is structured as follows. We review the role of the Hippocratic Oath in medical practice and related literature in Section 2. Section 3 describes the methods we use; it contains descriptions of the experimental design, lists the conjectures we make, and describes the field procedures and the sample. We present the results in Section 4, and provide a discussion and draw some conclusions in Section 5.

2 Background and literature review

In this section, we first review the history and current role of the Hippocratic Oath (subsection 2.1). We then provide a brief review of the literature on physician behavior (subsection 2.2) and on preferences in simple distribution games (subsection 2.3).

2.1 The Hippocratic Oath

For centuries, the Hippocratic Oath has been the key manifestation of the ethics that governs the relationship between physicians and their patients (and their teachers, in the original version of the oath). The Hippocratic Oath goes back to the fourth century B.C.E. to either Hippocrates himself or one of his scholars (Hulkower, 2010 and Miles, 2005). Outside of Greece, it is first recorded to have been sworn in France in the ninth century, in Sweden in the tenth and eleventh century (Macer, 1990), and Germany in the early 16th century (Smith, 2008). It became part of the curriculae of medical schools already during the Middle ages (Crawshaw, 1970). The share of medical schools in the US where some variation of the Hippocratic Oath is sworn has been constantly increasing since the beginning of the 20th century, reaching almost 100 percent in 1992 (Orr *et al.*, 1997).

As a response to the medical crimes that had taken place in Nazi Germany, a modern version of the Hippocratic Oath was composed in 1948 (Sohl and Bassford, 1986). This version is referred to as the Declaration of Geneva. It reads:

> *At the time of being admitted as a member of the medical profession: I solemnly pledge to consecrate my life to the service of humanity; I will give to my teachers the respect and gratitude which is their due; I will practice my profession*

with conscience and dignity; The health and life of my patient will be my first consideration; I will respect the secrets which are confided in me; I will maintain by all means in my power, the honor and the noble traditions of the medical profession; My colleagues will be my brothers; I will not permit considerations of religion, nationality, race, party politics or social standing to intervene between my duty and my patient; I will maintain the utmost respect for human life, from the time of its conception, even under threat, I will not use my medical knowledge contrary to the laws of humanity; I make these promises solemnly, freely, and upon my honor.

Some form of this oath, in most cases the Declaration of Geneva, is still sworn by the large majority of graduates from medical schools today (Orr *et al.*, 1997). Oaths are usually sworn in a public context; they carry a moral weight; their commitment is general both in context and over time; and oaths place the honor of the swearer at risk in the case that they are broken (Sulmasy, 1999). The Hippocratic Oath is central to modern Western ethics. In fact, Baker (2012) argues that "the entire history of Western medical ethics was, in effect, a set of footnotes to the original Hippocratic Oath".

The Hippocratic Oath commits the physician to work towards the good of the patient. While the oath does not mention the physician's own benefit, it certainly suggests that it should only be secondary to that of the patient. Importantly, the oath does not mention the cost of treatment or the possibility that the physician might have to choose which of many patients he should help if resources are limited.

2.2 Physician behavior in health economics

In this selective discussion of the literature on physician behavior, reviewed in much more detail by McGuire (2000), we want to stress two points. First, models of physician behavior in health economics have largely abstracted from the presence of a third party (the payers) while this problem has historically been recognized by the medical profession. Second, the fact that physicians ignore payers when making treatment choices has been identified as one of the main reasons why health-care costs are so high.

Following the Hippocratic tradition, physician ethics are defined to encompass only the concern for the patient. This is also the view taken in the theoretical analysis of physician agency in economics. In such models, the patient's health or benefit (Allard *et al.*, 2011;

Chandra and Skinner, 2012; Choné and Ma, 2011; Ellis and McGuire, 1986) or the quality of treatment (Chalkley and Malcomson, 1998) are included directly in the physician's utility function. Here, the benchmark for choosing quantity and quality of care is the patient's well-being. Physicians are assumed to be altruistic towards their patients, even when facing a trade-off between their own and their patients' benefits. By putting a break on the physicians' income maximization motive, medical ethics at least potentially increases total welfare as it ensures higher physician effort or a more patient-oriented choice between treatment options.

However, physicians' treatment decisions do not only affect patient welfare. They also have cost implications for the payers of health care. Thus, a broader definition of medical ethics might also encompass the physician's relationship with society. This idea is not new by any means. As pointed out by Baker (2012), the term "physician ethics" was coined in 1803 by the British physician Thomas Percival. He summarizes it as "the professional duties of physicians and surgeons to their patients, their fellow practitioners, to the public, and in law courts" (p. 61). Today, the World Medical Association's *Medical Ethics Manual* devotes one chapter (of six) to the relationship between the physician and society: "Medicine [...] takes place in a context of government, and corporate organization and funding" (WMA, 2009, p. 65). This is, however, not the view taken in the theoretical literature on physician agency. Concerns for total, and not only the patients', welfare are rarely modeled as constraints.[3]

Only few studies attempt to quantify empirically the impact of professional norms on physician behavior, as it is almost impossible to vary the degree of professional norms in real-world settings. Thus, their effects are confounded with other factors such as financial incentives, peer pressure, uncertainty about costs and benefits, and fear of being sued for malpractice. Currie and MacLeod's (2008) findings on the effect of tort reform on birth outcomes provide some evidence against the notion that physicians follow a principle of "First do no harm." After a tort reform, physicians were found to avoid unnecessary and harmful procedures, because malpractice risk was aligned more closely with the physicians' own actions. In turn, this suggests that they were performing these types of procedures before the reform. However, even though birth complications declined after the reform, indicators of infant health did not change a lot, indicating that in

[3] One rare exception is Chandra and Skinner (2012) who assume an "ethical norm against spending too much of the nation's resources".

severe cases, physicians did not change their behavior significantly. There is, however, also evidence that physicians do intrinsically care about the quality of the services they provide. Kolstad (2013) analyses the effects of performance assessments on physician behavior and finds that physicians are willing to forgo profits to provide better quality.

The small but growing experimental literature on physician choices has mostly focused on physicians' reactions (or those of subjects in situations resembling those faced by physicians) to the incentives they face with respect to their own income; for instance, Hennig-Schmidt *et al.* (2011) study the effects of different payment systems. Godager and Wiesen (2013) design a laboratory experiment in which a patient benefits from the physician's choices which allows them to quantify the utility weights of physicians' own payoffs and their patients' health. They find that physicians apply a positive weight to patients' health benefit, but that they vary substantially in their degree of altruism. In their experiment, professional norms are not varied, but all choices are made under one of our professional norm treatments, namely that the receiver of the payoff generated by prospective physicians' choices is a charity that cares for real patients. The choice situation we study includes a third party – the payers –, and it allows us to study the effect of a professional norm on the choices of physicians.

2.3 Heterogenity and context dependence of social preferences

The role of altruism in physician's choices has been stressed in the health economics literature, as reviewed above. For the most part independently, a large literature in the field of behavioral economics documents that a many individuals, and not just those working in specific professions such as physicians, can be described by other-regarding preferences. An ever-increasing body of evidence, both from the field and lab, shows that a large share of individuals exhibit efficiency concerns in situations with distributional consequences (Andreoni and Miller, 2002; Charness and Rabin, 2002; Engelmann and Strobel, 2004, 2007; Fisman *et al.*, 2007). In particular, men show greater concerns for efficiency than women (Andreoni and Vesterlund, 2001; Schildberg-Hoerisch, 2010). Messner *et al.* (2010) show that behavior in an experiment where subjects choose the distribution of payoffs through elections can best be explained through concerns for efficiency. This implies that physicians should not only take into account the patient's welfare, but also the welfare of those who pay for the services provided (the insurees or the general public).

Our paper is also related to an emerging literature on the context-dependence of preferences, in particular with respect to professional norms. Cohn *et al.* (2013) use a priming manipulation to show that individuals working in a large, international bank do not act more dishonestly in a control condition than employees in other industries. But when their professional identity as bankers was made salient, many of them became dishonest.

3 Methods

The aim of our experiment is to study how professional norms change distributional preferences. More specifically, we test whether the salience of the Hippocratic Oath affects how decision makers (whose situation is similar to that faced by physicians) trade-off their own payoff, the payoff of a passive receiver (a patient), and the payoff of a passive third party, a group of payers (society). The experiment is neutrally framed, and the sample consists of medical students. For these subjects both distributional decisions such as those we study and professional norms like the Hippocratic Oath will be relevant in their professional lives. In order to facilitate access to this population, the experiment was conducted over the internet. We first describe the design of the experiment (subsection 3.1) and state the conjectures that we will test (subsection 3.2). We then describe the sample and the implementation (subsection 3.3).

3.1 Design of the experiment

We adopt a novel experimental design, developed in related work (Schumacher *et al.*, 2014) that analyzes preferences in games with concentrated benefits and dispersed costs. Each subject is randomly paired up with a group of other subjects. Each group consists of one decider, one receiver, and three payers. In each game, the decider chooses the provision $x \in \{0, 1, \ldots, 10\}$ of a good which affects her own payoff, $\pi_D = 15 + ax$, the payoff of a single receiver, $\pi_R = 5 + bx$, and the payoff of three payers, with $\pi_P = 15 - cx$ for each of them. The receiver has an endowment of 5 tokens which is lower than that of the other parties (whose endowment is 15 tokens). Thus, there exists a motive to redistribute payoffs. The parameters a, b, and c represent the number of tokens that each party receives or pays per unit of the good provided. The values of these parameters are summarized in Table 1. In total, there are twelve different distribution games. Each subject plays all twelve games.

– Insert Table 1 about here. –

The first four games are standard *dictator games* in which the decider shares her initial endowment with the receiver. Thus, the provision of the good is costly for the decider and benefits the receiver, while the payers are not affected. We vary b, the receiver's marginal payoff, between the dictator games to change the efficiency of providing the good.

In the remaining eight games, we analyze distributional preferences if it is not the decider herself but the payers who bear the costs of provision. In the *interested cost dispersion games* (games 5–10), both decider and receiver benefit from the provision of the good. In the *disinterested cost dispersion games* (games 11 and 12), only the receiver benefits from the provision of the good.

In order to study the effect of professional norms, we have implemented two treatment manipulations. The first is our *professional norm manipulation* which uses a conceptual priming approach to vary the salience of the Hippocratic Oath.[4] Specifically, we display the Hippocratic Oath to a randomly selected subsample. Before playing the twelve distribution games, subjects fill in a survey consisting of 28 questions which cover socio-demographic variables and address the subjects' occupational choices. With probability 1/3, a subject sees an additional survey question that contains a modern version of the Hippocratic Oath after the survey and before reading the instructions of the experiment. With reverse probability, the question containing the Hippocratic Oath is not presented. The exact wording of the survey question is

> *In Germany, physicians do not need to swear the 'Hippocratic Oath' any more before receiving their licence to practice. The current version of the Geneva Declaration of the World Medical Association reads:* [...] *In your opinion, how important should the Hippocratic Oath be for practicing physicians today?*

The second treatment manipulation is our *receiver type manipulation*. The receiver is either another student subject, a local charity organization that cares for real patients (the Munich Children's Hospice) induces a medical context, or a non-medical charity

[4] Priming refers to the temporary activation of an individual's mental representations and the effect of this activation on behavior in an unrelated subsequent task. As priming instruments, researchers have been using the writing of essays, responding to questionnaires, the "Scrambled Sentence Test", or subliminal presentations of priming words (see Bargh and Chartrand, 2000 for an overview and Benjamin *et al.*, 2010 for a recent example in the economics literature).

organization (Amnesty International). We distinguish between the two charities in order to separate out the effect of giving to a charity as such from the effect of giving to a specific, patient-oriented charity. The treatment in which the receiver is another student provides a neutral context, as it is used in standard laboratory experiments. The prior probability of each of these treatments was 1/3.

3.2 Conjectures

The Hippocratic Oath stresses patient welfare and does not comprise a concern for societal welfare. Thus, we conjecture that efficiency concerns will be weakened in the presence of this professional norm. If the treatment is inefficient in the sense that its marginal benefits are smaller than its marginal costs, the salience of the Hippocratic Oath will increase the provision of the good. The data from the experiment described above allow us to test the following conjectures. Conjectures 1 and 2 will be tested with the data from the dictator games 1–4:

Conjecture 1: If the Hippocratic Oath is salient, the decider provides more of the good, increasing the receiver's payoff and decreasing her own.

Conjecture 2: The increase in the provision of the good associated with making the Hippocratic Oath salient is larger if it is more inefficient to provide the good (i. e., if the increase in total payoff is smaller).

In order to analyze decisions when there is a separate group of payers, we also use the data from the interested and disinterested cost dispersion games 5–12:

Conjecture 3: If the Hippocratic Oath is salient, the decider provides more of the good, increasing both the receiver's payoff and decreasing the payers' payoffs.

As a robustness check, we test whether the receiver type affects decisions:

Conjecture 4: Compared with a situation in which the receiver is another student, the concern for the receiver is stronger if it is a real-world charity and the strongest if it is a charity that cares for actual patients.

3.3 Implementation and sample

The experiment was conducted over the internet and administered by CentERdata, Tilburg University.[5] Appendix A contains translations of the survey instrument and of the instructions for the experiment. All screens shown to the subjects in the internet experiment are shown in Appendix B.

The experimental design comprises two manipulations which are randomized independently, resulting in 2×3 framings. Subjects are randomly assigned to one of these six cells. Each subject makes the same twelve decisions (one in each of the twelve games defined above) with the framing being kept fixed. We only conduct between-subject comparisons.

Subjects are informed that they will be assigned randomly to groups of five (when the receiver is another student) or four (when the receiver is a charity). After the experiment, we randomly pick one game for each group that will be implemented. We also randomly select one subject from each group who takes on the role of the decider and (when the receiver is a student) one subject who takes on the role of the receiver. The other three subjects of the group take on the role of payers. The decider's action in the chosen game then determines the payoffs of all parties. Hence, a subject's decision can only affect her own payoff if she is chosen to be the decider, but not if she is in the role of the receiver or payer. This is explicitly communicated to participants in the instructions.

Subjects do not receive feedback about the actions of others except through their payment after the experiment. When making their decisions, subjects receive detailed information about the (potential) consequences of their actions on the decision screen: their own payoff, the receiver's payoff, the payoff of each payer, and the group payoff (see the Online Appendix for a typical decision screen).

We recruited 132 medical students from the University of Munich and the Technical University of Munich. They were invited to participate by e-mail. After answering a background questionnaire, they started the experiment online. The instructions carefully explained the design using several numerical examples. Subjects could participate in the experiment only if they answered two control questions correctly. Access to the

[5] CentERdata has more than a decade of experience running internet surveys and experiments. Among other studies, CentERdata maintains the Dutch Household Survey (DHS) and the LISS Internet Panel. For more information, see `http://centerdata.nl/en`.

experiment was open for two weeks. Payments were made one week after the experiment. A participant's payoff of π tokens was converted into 0.5π EUR. Average earnings were about 6 EUR; the experiment took, on average, 15 minutes. Of the 132 subjects, 37 were randomized into the Hippocratic Oath treatment, while the remaining 95 subjects did not see this professional norm. In the second dimension, 49 subjects were randomized into the student receiver treatment, for 49 the receiver was Amnesty International, and for 34 it was the Munich Children's Hospice.

CentERdata delivered the data from the experimental games in anonymous form (without names and e-mail addresses). The survey software produced and delivered to us a separate dataset containing the information required to make the payments, comprising only the names and the final payoff amounts. The fact that the survey, experimental data, and personal identifiers would never be combined (other than for the purpose of making the payments) was made clear to participants in the invitation e-mails and on the first screen of the experiment.

4 Results

In subsection 4.1, we present our findings regarding the effect of the Hippocratic Oath on the decider's behavior in the dictator games, and we test conjectures 1 and 2. In subsection 4.2, we analyze the cost dispersion games and test conjecture 3. In subsection 4.3, we study whether the receiver's identity affects distributional preferences and test conjecture 4. Finally, in order to study the interaction of the professional norm and the receiver type manipulation in conjunction with the efficiency of the provision technology, we present regression results in subsection 4.4.

4.1 Dictator games

In each dictator game, the decider shares her initial endowment with the receiver, and the payers are not affected by the provision of the good. We keep incentives for the decider constant across the dictator games (she loses one token per unit of the good provided). The receiver's marginal benefit decreases as subjects proceed from game 1 to game 4, and so does the efficiency of providing the good.

When the Hippocratic Oath is not shown and the receiver is another student subject (39 subjects were in this condition), subjects provide on average 27 percent of the maximal possible amount.[6] Most subjects either give nothing or between 40 and 50 percent. These results are in line with the large body of evidence on behavior in the dictator game, as summarized by Camerer (2003). Importantly, these data confirm that distributional preferences in our sample of medical students are not special.

Table 2 shows the average units of the good provided per game, with columns containing the figures for all subjects as well as stratified by the professional norm manipulation. In the dictator games, subjects provide on average 33 percent of the maximal possible amount when the Hippocratic Oath is non salient, while they provide 48 percent when it is salient. In all dictator games, the salience of the Hippocratic Oath significantly increases the provision of the good. The corresponding final payoffs for the decider and the receiver are shown in Figure 1, again separated by the professional norm manipulation.[7] Thus, the weight of the receiver in the decider's utility function increases. In other words, selfish motives get weaker, and altruism toward the receiver gets stronger. This confirms conjecture 1.

– Insert Table 2 about here. –

– Insert Figure 1 about here. –

We now turn to conjecture 2 which states that the increase in the provision of the good associated with making the Hippocratic Oath salient is larger if it is more inefficient to provide the good. Turning to the last column of Table 2, we observe that the relative increase in the provision of the good when the Hippocratic Oath is salient, compared to the treatment when it is not shown, gets larger as subjects proceed from the first to the last of the dictator games. The effect of the Hippocratic Oath on the provision of the good is 25 percent in game 1, 36 percent in game 2, 67 percent in game 3, and 81 percent in game 4. Thus, the salience of the Hippocratic Oath induces subjects to provide relatively more of the good when it is more inefficient to do so. In other words, efficiency concerns are weakened in the presence of the Hippocratic Oath. This confirms conjecture 2.

[6] The average amounts provided in the four dictator games are 2.87, 2.66, 2.48, and 2.48 units.

[7] Significance levels for the differences between the bars in Figure 1 are the same as those for the corresponding tests shown in the top panel of Table 2.

4.2 Cost dispersion games

Next, we investigate what happens if there is another party in the game that pays for the good's provision. In the interested cost dispersion games (games 5–10), both the decider and the receiver benefit from the good's provision, while the payers pay for it. In the disinterested distribution games (games 11–12), the decider has no monetary incentives to provide the good. The provision of the good decreases total group payoff in each of these games, and this decrease gets stronger as subjects proceed from game 5 to game 12.

Results for the cost dispersion games are shown in the bottom panels of Table 2. We observe that subjects always provide more of the good when the Hippocratic Oath is salient than when it is not. On average the increase in the provision of the good is 25 percent. This increase is statistically significant in games 5–9. In games 10–12, the point estimates are of the expected sign but they are not statistically significant.[8] Figure 2 shows how subjects' decisions translate into payoffs for the payers. When the Hippocratic Oath is salient, the payers' payoffs are always smaller. This largely confirms conjecture 3.

– Insert Figure 2 about here. –

4.3 Identity of the receiver

The second treatment manipulation of our experiment concerns the identity of the receiver (another student, Amnesty International, or the children's hospice). In Table 3, we show the average numbers of units of the good provided separated by receiver type for each of the twelve games. For the dictator and disinterested cost dispersion games we find a large and significant increase in the provision of the good when the receiver is a charity, and the increase is even larger when the charity is aimed at real patients. The effect is less clear for the interested cost dispersion games. For some games, the provision of the good increases significantly, for others it does not. We therefore only find weak support for conjecture 4. However, this implies that subjects take into account the payers' payoff even if the receiver is a charity and when they benefit from the provision of the good themselves.

– Insert Table 3 about here. –

[8] We conjecture that the effect of our priming instrument decreases over time so that the difference becomes insignificant in the last games.

4.4 Regression analysis

In order to analyze the interaction effects of the two orthogonal treatment manipulations as well as changes in efficiency, we use regression analysis. Regression results using the data from the dictator games can be found in Columns (1) and (2) of Table 4.

– Insert Table 4 about here. –

Column (1) contains the results of an OLS regression of the units of the good provided on all relevant decision parameters. Along with point estimates, we report standard errors clustered at the subject level to account for the fact that we observe four decisions for each subject. The constant has the following interpretation: At an efficiency of zero (a situation in which the receiver's benefit varies one-to-one with the amount the decider has to give up), with a student receiver and without the salience of the Hippocratic Oath, the average decider will provide 1.255 units of the good. The coefficient estimate of the efficiency variable shows that subjects take the efficiency of giving into account: An increase in efficiency by one token is associated with an increase of 0.935 units of the good provided. Salience of the Hippocratic Oath more than doubles the average provision of the good (as the coefficient estimate of the Hippocratic Oath dummy variable is slightly larger than the constant). The results of a Tobit regression, which addresses the fact that provision is restricted to be non-negative and at most 10 units, are reported in Column (2). They are not qualitatively different from the OLS results.

Columns (3) and (4) of Table 4 contain the results of regressions that include interaction terms for the professional norms and receiver type manipulation as well as the efficiency level. Ideally, we would like to analyze the interactions of these two treatments, but given that our sample contains only 132 subjects, groups get very small if we consider the full set of interactions. Nonetheless, we would like to comment on two significant and interesting interaction effects: Column (3) shows that the two treatments making professional norms salient (the Hippocratic Oath and a medical charity as receiver) reinforce each other, and the Tobit results in Column (4) are again qualitatively similar.

The negative and significant interaction effect between the efficiency of providing the good and the salience of the Hippocratic Oath in Column (4) confirms conjecture 2 in a regression framework.

Finally, we use the data from all games in order to estimate the effect of changes in the decider's, the receiver's, and each payer's payoffs. Results are reported in Table 5 (which has the same structure as Table 4). First, we find that our subjects react strongly to incentives: For each token that their own incentives increase, they increase the number of units of the good provided by 1.73. They also react to changes in the respective receiver's benefit, but less than to their own payoffs. They increase the number of units of the good provided by 0.71 for each token the receiver's payoff increases. Lastly, subjects react to increases in the cost borne by the three payers. To determine how subjects react to total costs, we divide the reaction to each payer's cost by three. We find that for each unit of total cost increase, subjects reduce their provision of the good on average by $\frac{-1.56}{3} = -0.52$ units. Column (3) of Table 5 contains the results for a regression model that includes all game parameters, dummies for the two manipulations, and interaction terms of these variables with the Hippocratic Oath treatment dummy. None of these interaction effects are statistically significant, which might be due to small cell sizes. As before, Columns (2) and (4) contain results for the corresponding Tobit models, and the coefficient estimates are not qualitatively different.

– Insert Table 5 about here. –

5 Summary, discussion and conclusions

In this paper, we studied the impact of professional norms on the behavior of prospective physicians in simple distribution games. Our first experimental manipulation makes the Hippocratic Oath – a professional norm which focuses the physician's treatment choice on the patient's benefit – salient before the games are played. The second manipulation varies the identity of the receivers. Instead of other student subjects, the receiver is either a real-world charity that cares for patients or a real-world charity that does not have specific reference to patients.

We observed that subjects' behavior does not differ from that usually observed in experimental studies. In particular, subjects have concerns for efficiency. This holds even if the receiver is a real-world charity. However, the salience of professional norms significantly increases subjects' willingness to give up some of their own payoffs for the benefit of another subject, and reduces the extent to which subjects react to efficiency. We therefore conclude that professional norms mitigate problems of asymmetric information between

physician and patient, but they may also lower societal welfare through the enhanced provision of costly treatments with mild benefits for the patient.

In real life situations, we expect concerns for efficiency to be weaker for several reasons. First, costs to society are often not salient to physicians when they make their treatment choices. Second, while treatment costs may be large, they are usually dispersed among many payers (insurance holders or tax payers). Schumacher *et al.* (2014) show that decision makers neglect the costs to payers and thus efficiency concerns if the cost of treatment are high, but dispersed among many individuals. Peer effects or concerns for social status may induce the physician to dislike providing less treatment than his reference groups of physicians active in the same field (Cooper and Rebitzer, 2002; Kolstad, 2013).

These concerns notwithstanding, our findings provide strong evidence that professional norms affect the way in which physicians perceive the trade-off between the patients' benefits, their own payoffs, and the payments made by a group of payers. The Hippocratic Oath, which is still the predominant behavioral norm in the medical profession, puts all its emphasis on the patient. While it appears to have the potential of restraining the physician's self-interest, it does not take into account the welfare of those who pay. As discussed above, the World Medical Association realizes this tension in its Ethics Manual, and an active discussion takes place in the medical ethics literature as well; see for example Brett (2012).

Several directions for future research emerge. Using experimental designs such as ours, one might study how professional norms affect behavior in other professions in which some degree of altruism might be socially beneficial. While the Hippocratic Oath might have weaker effects in different populations, there might be other professional norms that are quite relevant for them, as suggested by the study about the effect of social norms on bankers' behavior (Cohn *et al.*, 2013). Finally, coming back to physician behavior, it would also be interesting to study how physician behavior is affected by making the fact salient that the budget for medical services is fixed, which implies that treating one patient more expensively implicitly harms another who necessarily will receive less treatment. In fact, the World Medical Association (2009) stresses this trade-off in the current version of its Ethics Manual, but this is not the professional norm induced by the – still prevailing – Hippocratic Oath or the Declaration of Geneva.

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Tables and figures

Table 1: Design of the experiment (tokens per unit provided by the decider)

Game	Type	Decider benefit a	Receiver benefit b	Cost per payer c	Group total payoff $a+b-3c$
1	Dictator	-1.0	2.0	0.0	1.0
2		-1.0	1.5	0.0	0.5
3		-1.0	0.9	0.0	-0.1
4		-1.0	0.5	0.0	-0.5
5	Interested cost dispersion	0.5	0.3	0.5	-0.7
6		0.5	0.1	0.5	-0.9
7		1.0	0.8	1.0	-1.2
8		1.0	0.5	1.0	-1.5
9		1.0	0.3	1.0	-1.7
10		1.0	0.1	1.0	-1.9
11	Disinterested cost dispersion	0.0	1.0	1.0	-2.0
12		0.0	0.5	1.0	-2.5

Table 2: Average number of units provided, by professional norm manipulation

Game	Type	All	No Hippocratic Oath	Hippocratic Oath	Significance	Percentage Change
1	Dictator	4.36	4.07	5.08	*	0.25
2		4.13	3.75	5.11	**	0.36
3		3.34	2.81	4.70	***	0.67
4		3.04	2.47	4.49	***	0.81
5	Interested cost dispersion	6.17	5.86	6.95	*	0.18
6		5.52	5.04	6.76	**	0.34
7		5.48	5.15	6.35	**	0.23
8		5.30	4.94	6.22	**	0.26
9		4.68	4.14	6.08	***	0.47
10		3.88	3.71	4.32	NS	0.17
11	Disinterested cost dispersion	4.39	4.20	4.89	NS	0.16
12		3.95	3.76	4.46	NS	0.19

Notes: t-tests for differences in means; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 3: Average number of units provided, by receiver type manipulation

		Units of the good provided			Significance of difference	
Game	Type	Student	Amnesty	Hospice	S vs. A&H	A vs. H
1	Dictator	2.80	4.82	5.94	***	*
2		2.80	4.29	5.82	***	**
3		2.67	3.12	4.62	**	**
4		2.41	2.96	4.06	**	*
5	Interested cost dispersion	6.02	6.39	6.06	NS	NS
6		5.47	6.00	4.91	NS	NS
7		5.12	5.51	5.97	NS	NS
8		4.61	5.78	5.59	**	NS
9		4.02	4.96	5.24	**	NS
10		3.59	4.43	3.50	NS	NS
11	Disinterested cost dispersion	3.37	4.41	5.85	***	*
12		3.12	4.00	5.09	**	**

Notes: t-tests for differences in means; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 4: Regressions predicting units provided: dictator games only (games 1–4)

Regressors	(1) OLS	(2) Tobit	(3) OLS	(4) Tobit
Efficiency	0.935***	1.650***	1.133***	1.986***
	[0.226]	[0.389]	[0.275]	[0.470]
Receiver is "Amnesty"	0.994**	1.502**	0.677	1.139
	[0.453]	[0.712]	[0.493]	[0.786]
Receiver is "Hospice"	2.247***	3.463***	1.642**	2.541**
	[0.615]	[1.012]	[0.715]	[1.128]
Hippocratic Oath is shown	1.313**	2.011**	0.932	1.920
	[0.543]	[0.823]	[0.865]	[1.478]
Efficiency * Hippocratic Oath			-0.703	-1.240*
			[0.472]	[0.746]
Receiver "Amnesty" * Hippocratic Oath			1.448	1.647
			[1.090]	[1.653]
Receiver "Hospice" * Hippocratic Oath			2.238*	3.304
			[1.325]	[2.201]
Sigma		4.556***		4.507***
		[0.353]		[0.351]
Constant	2.190***	0.936	2.399**	1.210*
	[0.328]	[0.603]	[0.350]	[0.640]
Observations	528	528	528	528
R^2 or pseudo R^2	0.142	0.035	0.159	0.039

Notes: Robust standard errors in brackets, clustered by subject; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 5: Regressions predicting units provided: all games (games 1–12)

Regressors	(1) OLS	(2) Tobit	(3) OLS	(4) Tobit
Decider's profit a	1.731***	2.970***	1.677***	2.952***
	[0.301]	[0.564]	[0.350]	[0.649]
Receiver's benefit b	0.716***	1.437***	0.821***	1.688***
	[0.184]	[0.340]	[0.224]	[0.404]
Cost per payer c	-1.560***	-2.700***	-1.266***	-2.256***
	[0.381]	[0.663]	[0.462]	[0.786]
Receiver is "Amnesty"	0.771**	1.315**	0.532	0.958
	[0.367]	[0.603]	[0.441]	[0.736]
Receiver is "Hospice"	1.217**	2.110**	0.994*	1.693*
	[0.502]	[0.866]	[0.593]	[0.976]
Hippocratic Oath is shown	1.143***	1.818***	1.336*	2.326**
	[0.415]	[0.688]	[0.700]	[1.139]
Decider's profit * Hippocratic Oath			0.190	0.055
			[0.689]	[1.168]
Receiver's benefit * Hippocratic Oath			-0.377	-0.912
			[0.389]	[0.672]
Each payer's cost * Hippocratic Oath			-1.052	-1.580
			[0.797]	[1.331]
Receiver "Amnesty" * Hippocratic Oath			1.004	1.492
			[0.772]	[1.179]
Receiver "Hospice" * Hippocratic Oath			0.916	1.632
			[1.110]	[1.940]
Sigma		5.405***		5.390***
		[0.394]		[0.394]
Constant	3.859***	3.246***	3.754***	3.032***
	[0.319]	[0.535]	[0.360]	[0.598]
Observations	1,584	1,584	1,584	1,584
R^2 or pseudo R^2	0.086	0.020	0.090	0.021

Notes: Robust standard errors in brackets, clustered by subject; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Figure 1: Payoffs in the dictator games (games 1–4), by professional norm manipulation

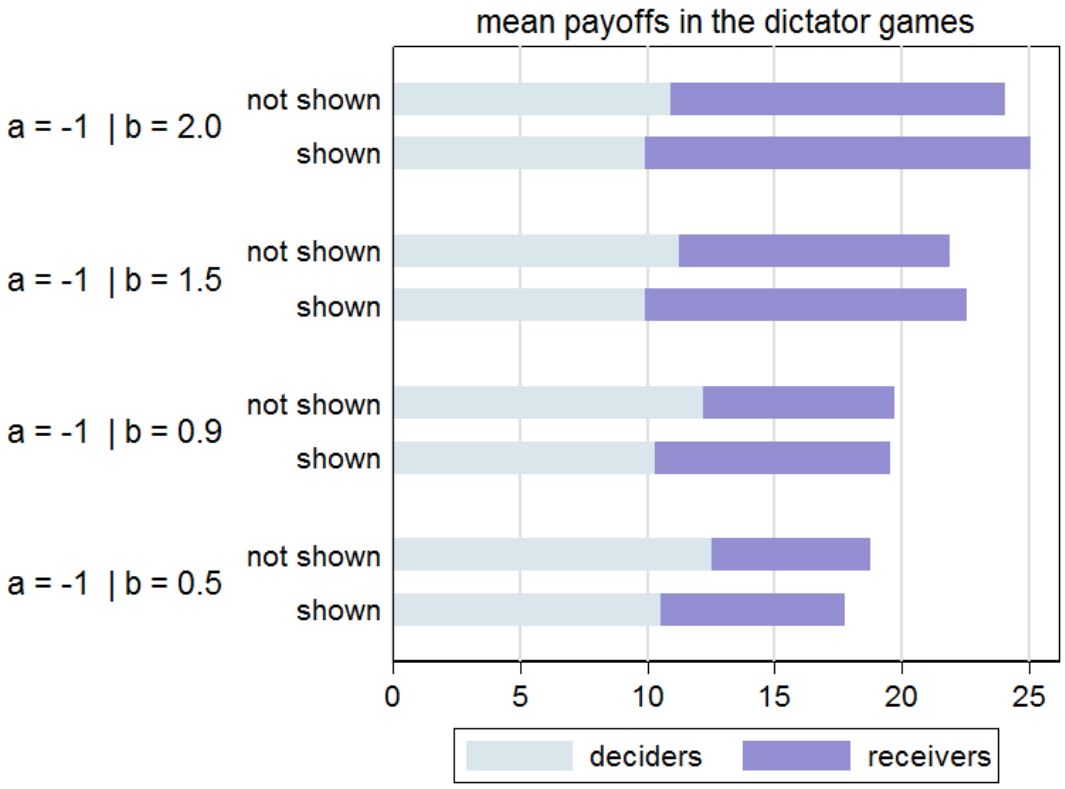

Figure 2: Payoffs in the cost dispersion games (games 5–12), by professional norm manipulation