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Physicians' responses to financial and social incentives: A medically framed real effort experiment

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ABSTRACT

Because compensation policies have critical implications for the provision of health care, and evidence of their effects is limited and difficult to study in the real world, laboratory experiments may be a valuable methodology to study the behavioural responses of health care providers. With this experiment undertaken in 2013, we add to this new literature by designing a new medically framed real effort task to test the effects of different remuneration schemes in a multi-tasking context. We assess the impact of different incentives on the quantity (productivity) and quality of outputs of 132 participants. We also test whether the existence of benefits to patients influences effort. The results show that salary yields the lowest quantity of output, and fee-for-service the highest. By contrast, we find that the highest quality is achieved when participants are paid by salary, followed by capitation. We also find a lot of heterogeneity in behaviour, with intrinsically motivated individuals hardly sensitive to financial incentives. Finally, we find that when work quality benefits patients directly, subjects improve the quality of their output, while maintaining the same levels of productivity. This paper adds to a nascent literature by providing a new approach to studying remuneration schemes and modelling the medical decision making environment in the lab.

1. Introduction

When planning radical health care reforms, governments often focus on the compensation structure of providers (typically FFS, capitation, or salary), as it can have an impact on the efficiency of health care expenditure, as well as the quantity and quality of care delivered. While the effects of these compensation policies have been well described in theory, it has been challenging to study them empirically (Gosden et al., 1999; Scott et al., 2011). Obstacles have included the difficulty of obtaining data not biased by self-selection problems or the confounding effect of other contextual factors, and the challenge of obtaining accurate measures of provider performance. Because of these issues, several studies have recently used laboratory experiments to explore the behavioural responses of doctors under alternative remuneration mechanisms.

Most of these health experimental studies adopt the approach pioneered by Hennig-Schmidt et al. (2011) where participants face a number of decision situations, with outcomes depending on specific cost and benefit functions. Taking the role of physicians, participants choose to deliver a hypothetical quantity of services q to patients, which determines simultaneously their profit and patients' benefit. The experiment is incentivised in two ways. First, participants receive monetary gains. Second, real patients outside the lab derive benefits, since monetary proceedings from the experiment are used to fund care for patients.

While this experimental approach presents the advantage that effort is not distorted by personal variables such as ability and experience, such 'chosen effort' experiments poorly reproduce some aspects of real work where effort is not hypothetical and always negative (van Dijk, Sonnemans et al., 2001), but instead can sometimes yield utility. As such intrinsic motives can influence responses to financial incentives, some experimental economists prefer to use 'real effort' experiments where participants are paid for performing simple tasks, such as simple mathematical calculations (Dohmen and Falk, 2011; Niederle and Vesterlund, 2007), moving sliders on a screen (Gill and Prowse, 2012), or entering data (Greiner et al., 2011; Tonin and Vlassopoulos, 2015).

In the health experimental literature, only one study has used a

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real effort experiment to test the impact of physicians' remuneration mechanisms (Green, 2014). While this study explores the effect of payment remunerations used in the health care industry, it uses a helping frame that has no relationship to health.

Our study contributes to this nascent literature in several ways. We designed a new medically framed real effort experiment, where two dimensions of performance are observed (quantity and quality). We assess the relative effects of the three traditional payment mechanisms for doctors (salary, capitation and FFS), and test how the presence of patients' benefits affects performance in the task. We find that productivity is highest under FFS, but that quality is maximised under salary. We also show that some individuals are intrinsically motivated to work well, and do not react to financial incentives, while social incentives improve subject performance. While quantity of output is lower under capitation than FFS in the absence of patients' benefits, this difference disappears with social incentives.

2. Related literature

2.1. Doctors' remuneration in the health economics literature

The potential effects of doctors' remuneration have been well described in the economic literature (McGuire, 2000). Under FFS, a throughput-based remuneration, if the FFS rate exceeds the marginal cost of delivering additional services, doctors will over-serve patients. Capitation systems provide an incentive to increase the numbers of patients served, but conditional on this, doctors have an incentive to reduce their effort and minimise the cost per patient. Because capitation systems with a uniform rate introduce the incentive for providers to select healthier (less costly) patients, risk-adjusted rates are often used to reflect the effort required by different types of patients (Newhouse, 1998). Finally, salary, a time-based remuneration scheme (the provider receives a set amount to work for a specified period of time), creates an incentive to exert little effort.

These conclusions derive largely from models of physician behaviour which consider performance as a one-dimensional output, ignoring the fact that doctors' output, like that of hospitals (Chalkley and Malcomson, 1998), is multi-dimensional. Even when restricting the focus to clinical care, doctors decide not only how many patients to see (quantity of effort), but also how much time to dedicate to each patient, whether to examine them thoroughly, etc (quality). Agency theory suggests that doctors are likely to neglect quality at the expense of quantity in such a multi-tasking context, because quality of care is much more difficult to observe (Holstrom and Milgrom, 1991), especially when their remuneration is linked to the quantity of services provided (e.g. FFS). By contrast, salary schemes, which provide low-powered incentives for quantity of output should have less negative consequences for quality of care.

2.2. Doctors' remuneration in the health experimental literature

The small but growing literature studying physician behaviour in the lab has mostly followed the design of Hennig-Schmidt et al. (2011)described above. Most studies have focused on two payment mechanisms, FFS and capitation, and on one unique outcome q interpreted as the services delivered to patients. Hennig-Schmidt et al. (2011) found that participants provided a quantity of services higher than optimal in FFS, but lower in capitation. They also found that with a uniform capitation rate, more costly patients end up with fewer services than healthier ones. Extensions of this experiment have sought to study the effects of blended payment mechanism (Brosig-Koch et al., 2017), and pay-for-performance schemes (Brosig-Koch et al., 2013; Keser et al., 2013). Two aspects have not been tested with this experimental set-up: the effect of capitation on the number of patients treated, and the impact of the multi-tasking environment faced by providers.

These two gaps were partly addressed in the experiment designed by Green (2014) which is more closely related to our approach. The study uses a real effort task where participants are asked to correct spelling mistakes on behalf of others, under five payments: salary, capitation, FFS, report cards with FFS, and capitation. The results suggest that the highest quantity of services is produced under FFS, and when subjects are paid by salary or capitation they reach the same productivity. The results also indicate no difference in quality (number of correct edits) under the three payment mechanisms, which the author interprets as evidence of intrinsic motivation.

There are several distinctions between our design and the one used by Green (2014). First, the task we employ (data entry) is less likely to depend on individuals' prior knowledge or abilities, allowing a sharper evaluation of the causal effect of incentives. Second, our experiment is closer to the health setting as it adopts a medical framing (subjects are asked to enter the blood test results of patients into a computer), is played with medical students, and social incentives are implemented benefits to real patients outside the lab. Third, we look at a broader range of outcomes (including number of patients treated and average services per patient). Fourth, we investigate the impact of risk-adjusted capitation rates.

2.3. Doctors' financial incentives and pro-social motivation

In economic models physicians are traditionally assumed to maximise income. This assumption leads to the conclusion that, due to the asymmetry of information between themselves and patients, doctors are likely to recommend unnecessary treatment under FFS (Evans, 1974). Yet, professional norms and health care providers' altruism are recognised sources of pro-social motivation, which have led more recent models to incorporate patients' benefits into doctors' utility function (Chone and Ma, 2011; Liu and Ma, 2013; Makris and Siciliani, 2013).

There is empirical evidence that doctors take into account patients' benefits, for example when they forego profits for higher quality of care (Kolstad, 2013) or when they accept posts in hardship areas where they can serve more patients (Lagarde and Blaauw, 2014). The experimental literature has studied further physicians' prosocial motives, showing that medical and nursing students' altruism is more powerful than other students' (Hennig-Schmidt and Wiesen, 2014; Jacobsen et al., 2011), even though some evidence emphasises substantial heterogeneity in their altruistic concerns (Godager and Wiesen, 2013). Kesternich et al. (2015) show that when professional values are made more salient (with the Hippocratic Oath) or when social incentives benefit actual patients (rather than students), medical students behave more altruistically. While these studies show the existence of physicians' prosocial motivation, they do not compare the performance of subjects with and without social incentives. In our study, we follow Tonin and Vlassopoulos (2015) who compare the performance of workers facing social incentives to those who do not, to isolate the impact of prosocial motivation on productivity.

3. Methods

3.1. A medically-framed real effort task

The experiment involved a real effort task framed in a medical context and constructed to reproduce the main characteristics of the medical decision-making environment. The experiment