Economics of Healthcare Provider Altruism

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**UNIVERSITY
OF OSLO**
HEALTH ECONOMICS
RESEARCH NETWORK
Working paper 2023:4

Prepared for the Handbook of Labor, Human Resources and Population Economics edited by Klaus F. Zimmermann.

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Abstract

We propose a comprehensive overview of the main theoretical notions and empirical findings on altruism among physicians and other healthcare providers. While altruism in the behavioral and experimental economics literature is typically defined as a deviation from purely self-interested behavior, the theoretical health economics literature embeds the notion of physician altruism within the doctor–patient relationship. The altruism of physicians is typically defined as the weight in the doctor's utility function attached to patient's health benefits, besides the self-interested monetary considerations. We broadly group the empirical evidence into three main categories of evidence: evidence from (i) survey and interview data, (ii) prescriptions records, and (iii) behavioral experiments. Across each of those groups of studies and different methods, the evidence generally supports the theoretical notion that physicians behave 'altruistically' in their healthcare decisions. Some studies indicate, however, considerable heterogeneity in physicians' altruistic preferences.

1. Introduction

Altruism is a key component of medical professionalism: healthcare providers are expected to put the well-being of patients above their own self-interest. In their diagnostic and treatment decisions, physicians and other providers make fundamental tradeoffs between their own (financial) self-interest, patient benefit, and stewardship of social resources. It is important to understand social preferences, especially altruistic preferences of providers, since society and patients by and large rely on their altruism to correct for agency problems arising from information asymmetry between providers and patients regarding medical treatment (Arrow 1963).

This paper proposes a comprehensive overview of the various conceptualizations and empirical findings related to the notion of 'provider altruism' in health economics. Such a systematic assessment is needed because the existing theoretical and empirical literatures seem to interchangeably use different operational

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definitions of 'altruism', and to refer not just to physicians but also to nurses and other healthcare professionals. As we will document in this paper, the definition of altruism in the health economics literature is more specific and focused than the operational definition in the broader economics literature.

There are actually numerous streams of literature within health economics that have dealt with 'provider altruism' from different angles and perspectives. These streams, however, have somehow proceeded in parallel, and have rarely been interlinked and systematically tied together. In particular, what is currently missing is a critical overview bridging insights from both theoretical models and the empirical evidence. The purpose of this review paper is to fill this gap.

The reviewed literature reveals a variety of approaches on how the theoretical constructs of altruism, as defined in (behavioral) economic theory, can be operationally applied to the specific case of healthcare providers. We compare the empirical evidence on altruism among healthcare providers while bringing together insights from surveys and observational studies, drug prescriptions records, and more controlled field and laboratory experiments.

The remainder of the article is organized as follows: Section 2 discusses the definitions of altruism in economics (2.1), and briefly reviews the main empirical findings on altruism in behavioral and experimental economics (2.2). Section 3 discusses altruism in health economics from a theoretical perspective, by reviewing influential models (3.1) and their implications for the design of optimal healthcare governance and regulation (3.2). Section 4 discusses the evidence on provider altruism in health economics, and in particular reviews the evidence directly related to healthcare providers from survey data (4.1), prescriptions records (4.2), and behavioral experiments (4.3). Finally, Section 5 discusses the main findings from a methodological perspective before briefly concluding.

2. Altruism in economics

2.1. General definition of altruism

Evidence from behavioral and experimental economics has shown that the self-interested hypothesis poorly predicts situational outcomes where individual choices have a direct influence on others' payoffs. This evidence has motivated the study of pro-social behavior in various game-theoretic and bargaining settings, as well as the exploration of alternative behavioral motivations such as altruism, fairness, cooperation, trust, and reciprocity (e.g., Andreoni 1988; Forsythe et al. 1994; Berg et al. 1995; Camerer and Thaler 1995; Fehr and Schmidt 1999; Bolton and Ockenfels 2000; Fehr and Gächter 1997, 2000; Andreoni and Miller 2002; Charness and Rabin 2002; Herrmann et al. 2008; Fischbacher and Gächter 2010).

In particular, altruism in economics is generally defined as an *act that benefits another at one's own expense* (Nagel 1970; Forsythe et al. 1994; Andreoni and Miller 2002). For an act to be altruistic, it must not only benefit the other at one's own cost but also be affected by the act's consequences for the other. Thus, a general account of altruism requires the consideration of two dimensions – that is, one dealing with the distribution of costs and benefits, and the other covering players' type and their motivations and interactions. In recent years, several theories and theoretical approaches have been developed to explain the observations of non-selfish behavior by using different formulations of the interrelations of the player types and motivations.

The conventional way of explaining altruistic behavior is to assume that altruistic motives are properties of individual preferences and that an individual behaves so as to satisfy her own preferences. In this way of modeling altruism, a person who behaves altruistically prefers that the other person's payoff is better rather than worse (see Gui and Sugden 2005). A standard model of such preferences is described in the review by Rotemberg (2014). In this model, the utility from payoff to a decision-maker i, when the realized allocation implies that i receives X_i while j receives X_j, is given by:

$$u_i(X_i, X_j) = v_i(X_i) + \alpha_i v_j(X_j), \ i \neq j \tag{1}$$

The model parameter α_i in (1) captures individual i's relative valuation of individual j's utility.

There are also other strategies for explaining altruistic behavior. One is to approach altruistic behavior as a situation where the interaction between the donor and the recipient involves reciprocity motives (see Rabin 1993). This means that the donor is motivated to return the recipient's kindness (or unkindness). The unique idea is that utilities are defined on beliefs as well as on chosen actions. Still another strategy is to assume that when acting altruistically, people respond to other people's expectations, which they are motivated to meet. These expectations can be rooted in social norms (or conventions, practices or perceptible regularities). As Bicchieri and Xiao (2010) explain, such expectations can be either empirical or normative–that is, inducing us either to do as others do or do as others think we ought to do.

Two comments are in order. First, economists often make a distinction between pure and impure altruism. This is based on Andreoni's (1989) notion that, when transferring money or another 'good' to the other, people receive utility not only from one's own benefit and from the recipient's benefit but also from the very act of giving ('*warm glow*'). Hence, pure altruism refers to an altruistic act motivated solely by one's caring for the other's wellbeing, whereas impure altruism includes in addition the positive warm glow motive for altruism. Second, the models attempting to explain altruistic behavior are typically constructed to also take into account other behavioral motivations, including one's willingness to reduce the other's utility by punishing, or by responding to the other's 'ill will' with spiteful behavior (see, e.g., Levine 1998; Fehr and Gächter 2000).

2.2. Evidence on altruism from experimental economics

Most economists' empirical research on altruism is carried out in laboratory or field experiments. A popular workhorse is the dictator game (DG). The original DG game was proposed in the experimental study of Kahneman et al. (1986). By the early 2000s, several variations of this basic game had been thoroughly explored (see Camerer 2003; Andreoni et al. 2008). The evidence shows that there is (at least) seemingly altruistic behavior in these experiments and that the 'nature and strength' of altruism is influenced by certain contextual variables in the experiment. Several questions, however, still remain open. In addition, there are important methodological questions related to the interpretation and generalizability of experimental results.

In the DG, the first player (the dictator) decides the allocation of money between herself and a second passive player, who simply receives her portion of the allocation. The game is simple and has clear predictions: In the DG, the dictator offers nothing to the second player. In those experimental games, altruism is typically measured as the empirical deviation from the purely self-interested allocations.

At face value, the experimental outcomes of the basic versions of the DG experiments are robust. Senders allocate about 20 percent of the money endowment to the receiver (Camerer 2003). These results have been traditionally interpreted as challenging the self-interest notion of traditional micro-economic theory. The overall picture, however, is more nuanced due to the volatility of the results, and their sensitivity to relatively minor changes in the experimental design (see List 2007; Zizzo 2013; Guala and Mittone 2010).

There are, in fact, several challenges to the interpretation of altruistic behavior in these experiments. First, Bardsley (2008) suggests that altruism in the DG is due to experimental demand effects. Second, List (2007) adds to this the change in subjects' expectations invoked by changes in the action set in the experiment, namely the addition of a 'take option', which has parallels in institutional features and social norms across environments outside the laboratory. Third, Cappelen et al. (2013) suggest that in addition to experimenter demand effect, institutions and social norms, seemingly altruistic behavior could arise because of subjects' motivation to signal not being entirely selfish (an 'audience effect' in Andreoni and Bernheim 2009). Similar

results and interpretations have been proposed in other variants of the DG where the dictators are given a costly 'outside option' by which they can avoid facing the situation of dividing money between themselves and the receivers (Dana et al. 2006, 2007). Finally, some studies, including a recent systematic review and meta-analysis (Galizzi and Navarro-Martinez 2019), have yielded mixed evidence on the external validity of the altruism findings elicited through laboratory-based experimental games (Benz and Meier 2008; Carpenter and Myers 2010; Franzen and Pointer 2013).

3. Altruism in health economics: Some theoretical background

3.1. Physician altruism models

The analysis of physicians' behavior and decision-making has a central and noble tradition in health economics. The seminal paper by Arrow (1963)—arguably the first 'health economics' paper in history—examines the motives that differentiate physicians from purely profit-maximizing agents. In subsequent health economics modeling of physician behavior, it has become common to assume that the patient's health benefit appears as an argument in the physician's utility function with the interpretation that the physician has an altruistic concern for patient welfare (Ellis and McGuire, 1986; Woodward and Warren-Boulton, 1984; Farley, 1986).

Ellis and McGuire (1986) were among the first to formalize altruism in health care. They examined the decision-making of a physician acting as an agent for both a patient and a hospital. The physician is assumed to internalize the external effects of her decision-making on the hospital profit and the patient's health benefit. Formally, the physician's utility function in Ellis and McGuire (1986) is $U(\pi(q),B(q))$, where $\pi(q)$ refers to the hospital's profit and $B(q)$ to the patient's health benefit. The variable q measures the amount of hospital services provided for the patient during a hospital episode.[8] Ellis and McGuire (1986) assumed a fully insured patient, which implies that $B(q)$ can also be interpreted as the consumer surplus that the patient derives from accessing hospital services.

Ellis and McGuire (1986) define altruism as the physician's marginal rate of substitution of a patient's health benefit for hospital profits:

$$MRS = \frac{\partial U / \partial B}{\partial U / \partial \pi} \equiv \alpha. \qquad (2)$$

It is natural to assume that hospital profit and patient's health benefit increase the physician's utility. Thus, the degree of physician's altruism in Equation (2) measures the amount of hospital profits the physician needs as a compensation for a marginal reduction in the patient's health benefit to maintain the same level of utility.

Much of the later literature (e.g., Chalkey and Malcolmson 1998; Jack 2005; Choné and Ma 2011; Hennig-Schmidt et al. 2011; Godager and Wiesen 2013; Makris and Siciliani 2013) examining the effects of altruism in health care has used a linear and separable form of the physician's (health care provider more generally) utility function of the type:

$$U = \pi + \alpha B(q) = R - C(q) + \alpha B(q) \qquad (3)$$

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[8] Alternatively, the variable could also refer to the quality of hospital services (see, e.g., Kaarboe and Siciliani 2011).

where R and $C(q)$ refer to the hospital revenue and costs, and the parameter α denotes the degree of physician altruism towards the patient's welfare. This approach is in fact a special case of the general utility function used by Ellis and McGuire (1986), and α can be given a similar interpretation as in Equation (2).

Finally, Chalkey and Malcomson (1998) and Jack (2005) use a utility function of the type

$$U = \pi + \varphi(q), \tag{4}$$

where q is either quality or quantity of healthcare, or both. The term $\varphi(q)$ may contain the patient's health benefit from the use of health services but other elements could also be included. For example, it may measure the physician's private valuation of the quality of health services or any utility that the physician derives from the provision of health services. The utility function (4) is hence more general than the linear utility function (3) with the altruistic component. In empirical work it is crucial that the physician's altruism can be separated from other forms of valuing care.

3.2. Consequences of altruism for regulation and governance

Formal models on altruism in health economics have been developed in parallel to the literature dealing with provider payment mechanisms (see for instance Ellis and McGuire 1986; McGuire 2000; Choné and Ma 2011). The analysis of Ellis and McGuire (1986) illustrates the fundamental importance of altruism in the design of optimal payment mechanisms in health care. They show that the cost reimbursement and prospective payment mechanisms imply either excessive or sub-optimal provision of hospital services. Ellis and McGuire also considered a mixed payment mechanism:
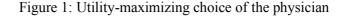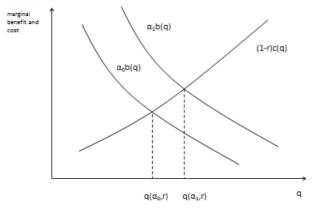
$$R = a + rC(q), \tag{5}$$

where a is a lump-sum payment and r defines the fraction of the total hospital costs reimbursed by the payer. Denoting marginal health benefit and marginal cost by $b(q)$ and $c(q)$, respectively, and using the utility function (3),[9] with strictly concave health benefit $B(q)$ and convex cost $C(q)$ in q: the first-order condition for a physician's treatment choice can be written as follows:

$$-(1-r)c(q) + \alpha b(\text{q}) = 0. \tag{6}$$

Figure 1, below, illustrates the optimal care provision and the impact of altruism on the supply of health care. Assuming the cost-reimbursement parameter r is given, the physician with a degree of altruism α_0 chooses the amount of health care $q(\alpha_0,r)$. Ceteris paribus, a more altruistic physician $(\alpha_1 > \alpha_0)$ chooses a higher amount of health care $q(\alpha_1,r)$. Similarly, a higher fraction of the hospital costs reimbursed by the regulator implies a lower marginal cost for the hospital, which consequently induces the physician to increase the provision of health care. Such a change would shift the hospital's marginal cost to the right in Figure 1.

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[9] We also assume a strictly concave health benefit $b(q)$ and a convex cost $C(q)$ in q.

Figure 1: Utility-maximizing choice of the physician

Ellis and McGuire (1986) also show that to achieve an efficient amount of health care services,[10] the payment mechanism must be designed to satisfy the condition:

$$r = 1 - \alpha. \tag{7}$$

Hence, the optimal rate of cost reimbursement is negatively associated with the degree of physician altruism. The lower the α (implying less concern for the patient's health benefit), the higher is the optimal rate of cost reimbursement. Further, when the physician values hospital profits and the patient's health benefit equally (i.e., $\alpha = 1$), the hospital payment should be a flat payment ($r = 0$). In this case a fully prospective payment implements the social optimum. On the other hand, if the physician values the patient's health benefit less than the hospital profit and $\alpha < 1$, the physician can be induced to provide the efficient amount of health services by a partial reimbursement of the hospital profit.

Several theoretical papers since Ellis and McGuire (1986) have examined the role and implications of altruism in health care. For instance, Ma (1994) shows that, if a provider is partially altruistic and there is a positive demand response from care quality, the first-best levels of both quality-generating and cost-reducing efforts can be implemented by means of a single prospective payment parameter. Further, Chalkley and Malcomson (1998) show that if the physician attaches any positive value to the patient's health benefit, then a prospective payment will induce an optimal cost-reducing effort and some positive, but sub-optimal, level of quality. The optimal rate of supply-side cost-sharing (which motivate the first-best quantity in Ellis and McGuire 1986) as well as the second-best solution in Chalkley and Malcomson (1998) depend on whether the patient's health benefit is part of the physician objective function.

The distribution of physician altruism in markets has also a prominent role. Therefore, more assumptions regarding physician altruism have been introduced in recent theoretical papers. For example, Ma and Riordan (2002) analyze health insurance and moral hazard in managed care with physician–patient interaction. Siciliani (2009) models the impact of performance pay on the provision of medical services when providers differ in their degree of altruism. Allard et al. (2011) investigate treatment and referral decisions of altruistic physicians under a gatekeeping regime. Common to these studies is the assumption that the physician's altruism is known.

The models by Jack (2005) and Choné and Ma (2011) introduce the combination of unknown and heterogeneous degrees of physician altruism. Jack (2005) analyzes the incentive mechanisms in the presence

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[10] This is achieved when the marginal benefit of additional consumption equals the marginal cost of producing such hospital services.

of asymmetric information about physicians' altruism. The provider's utility is positively related to quality of medical services, but this utility is unknown to the third-party payer. Jack (2005) shows that, when physician altruism is not contractible, incentive mechanisms need to be designed so that physicians reveal their altruistic types, and concludes that a non-linear scheme relating physicians' payment to incurred costs is optimal. Choné and Ma (2011) consider a model of asymmetric information where the purchaser does not know the patient's valuation of health benefit, nor the physician's weights on patient's health benefit and own profit.

Liu and Ma (2013) analyze the process of delegating decision-making to an altruistic physician. Here, the physician can either commit to treatment decisions at the time a payment contract is accepted, or can refrain from commitment and learn later about the patient's illness. Based on the physician's commitment, the first best is implemented by a single payment contract to all types of altruistic physicians. In the case without the physician's commitment, Liu and Ma (2013) show that the most altruistic physician earns a positive profit and that treatment decisions are distorted from the first best.

4. Altruism in health economics: Empirical evidence

Despite provider altruism being critically important from a theoretical perspective and in designing optimal regulation and governance schemes in healthcare, relatively little is known about physician altruism from an empirical perspective. The next sections provide an overview of the existing evidence on provider altruism in healthcare from different branches of the empirical literature.

The empirical evidence to date can be broadly grouped into three main categories of evidence: evidence from (i) survey and interview data (4.1); (ii) prescriptions records (4.2); and (iii) behavioral experiments (4.3).

4.1. Evidence on provider altruism from survey and interview data

Several questionnaires have been designed to measure altruistic motivation in surveys. Penner et al. (1995) developed the Prosocial Personality Battery, comprising two factors: self-reporting of other-oriented empathy; and participation in helpful behaviours or activities. Blackall et al. (2007) developed the Penn State College of Medicine (PSCOM) Professionalism Questionnaire, which includes seven elements of professionalism including altruism.

An alternative test by Pawlikowski et al. (2012) consists of a Scale of Attitudes towards the Patient (SAtP) assessing four dimensions: respect for autonomy, altruism, empathy, and holistic approach to a patient. Gutiérrez et al. (2006) developed the Nursing Motives for Helping Scale (N-MHS), consisting of nine items. Among these, altruism is identified by response to items such as: (the nurse) '*tries to identify the receiver's needs and offers the most efficacious kind of help, obtaining all the necessary attention for the patient*'. Besides these general questionnaires, a number of ad-hoc surveys and interviews have been conducted in developing and developed countries in order to identify altruistic motivations among healthcare professionals.

A first group of studies refer to *nurses*. For example, a survey of 767 nurses in Norway revealed that '*human dignity*' and '*altruism*' were the most prominent moral values (Fagermoen 1997). Another large survey of nurses in Belgium showed that '*altruism*' was a recurring concept (De Cooman 2008). A survey with nurses and nursing students in Australia found that both groups were very high in '*altruistic ideals*' (Eley et al. 2012).

Smith et al. (2013) include a survey to measure altruism as a test of the internal validity of their DG experiments with final-year *nursing students* (see more in Section 3.5). For altruism, the following statements were used: '*helping others with my time or money is very important to me*'; and '*personally assisting people in trouble is very important to me.*'

Similarly, Serra et al. (2011) included a survey to assess philanthropic motivation besides their DG experiments with *nursing and medical students* in Ethiopia (see Section 3.5). Students were asked to rank eight job characteristics according to their importance: 13 percent of the doctors and 34 percent of the nurses ranked the '*opportunity to help the poor*' as the most important job characteristic.

Regarding *medical students*, a survey conducted in 1981-1982 demonstrated that a typical USD School of Medicine student viewed their calling into medicine as primarily altruistic in nature (Kahler and Soule 1991). A similar outlook was identified in the UK among junior doctors and medical students who see medicine as defined by responsibility towards patients, requiring qualities such as altruism (Chard et al., 2006).

Regarding *physicians*, Allaby (2003) studied local doctors' motivation for serving in charitable clinics in urban Nepal. One of the three most frequently cited reasons for deciding to work in a charitable clinic was a '*desire to serve the poor and improve society*'. A review by Ratanawongsa et al. (2006) found three 'sentinel motivators' throughout the careers of doctors, from entering medical school to selecting specialties that best fit their personalities: of these sentinel motivators '*altruism*' ranked the highest in importance.

How physician behavior relates to market competition has been analyzed in a study by Scott and Sivey (2022) who linked real world market structure with preference parameters elicited in discrete choice experiments; for studies on the relationship between altruism and competition using incentivized lab experiments, see Section 4.3. Their results suggest that physicians who are more motivated by monetary incentives (i.e., less altruistic) are more likely to exploit their market power to raise prices in markets characterized by limited competition.

Finally, altruism has also been identified among *dentists*. Du Toit et al. (2014) for instance, conducted an international cross-sectional survey of the reasons to choose a career in dentistry with 711 first-year dental students from thirteen countries in six continents. The second greatest motive, identified by 36.3 percent of respondents, was '*I want to be a dentist who helps poor and underprivileged people.*'

4.2. Evidence on physician altruism from prescriptions records

The literature analyzing prescription choices of physicians in primary healthcare provides some empirical evidence on physician altruism (Hellerstein 1998; Lundin 2000; Crea et al. 2019). While Ellis and McGuire (1986) examined a physician deriving utility from hospital profit and patient's health benefit, Hellerstein (1998), Lundin (2000) and Crea et al. (2019) assume that physicians are interested in patient welfare and insurance expenditures. Within this framework, they compare physicians' marginal utility from patient welfare with their marginal disutility from insurance expenditures.

Hellerstein (1998) developed a model of an altruistic physician for prescribing drugs. In her model, the physician diagnoses the patient, chooses a drug to treat the illness, and faces a choice between branded and generic versions of the drug. Consistently with empirical facts, the branded version of the drug is assumed to be more expensive that the generic version, while both are equivalent in rendering health benefits to the patient. Hellerstein (1998) assumes that the physician internalizes the effects of her decision-making on patient's welfare and health insurance expenditures. If γ_p and γ_i denote the degree of the physician's altruism and the private marginal cost of insurance expenditure for the physician, respectively, a more generous insurance induces the doctor to prescribe a branded version of the drug when $\gamma_p > \gamma_i$, that is, when, in her utility function, the physician gives a higher weight to the patient's utility than to insurance expenditure. Later this has been called an ex post moral hazard in the market for prescription drugs (see, e.g., Lundin 2000 and Crea et al. 2019).

Lundin (2000) examined the role of health insurance in the market for prescription drugs using data collected from two pharmacies in Sweden in 1992 and 1993. The probit estimates of the probability that doctors prescribe generic versus branded versions of drugs to their patients gave support for both the altruism and the moral hazard hypotheses. Physicians weigh the patients' benefits from health insurance more than insurance expenditures, which implies that a higher insurance coverage increases (decreases, respectively) the probability of prescribing a branded (generic, respectively) version of a drug.

Crea et al. (2019) utilized pharmaceutical prescriptions data from the Social Insurance institution in Finland, for the period 2003 to 2010, focusing on lipid modifying agents ('statins'), with a total of more than 11 million prescriptions. They estimated the probability that doctors prescribe generic versus branded versions of statins for their patients, as a function of the shares of the difference in prices that patients have to pay out of their pocket and that which is covered by insurance. Using panel logit models controlling for a wide range of doctors, patients, and drugs characteristics, Crea et al. (2019) find that the estimated coefficients and the average marginal effects associated with moral hazard and altruism are nearly zero. The estimated coefficients directly reject the altruism and moral hazard hypotheses, when Crea et al. (2019) distinctly account for both the patient and the insurer shares of expenditure. As an alternative explanation, they found strong and robust evidence of habits persistence in prescribing branded drugs.

In these studies, the degree of physician altruism is estimated utilizing the variation of the out-of-pocket payments of patients. This implies a focus solely on physicians' concerns towards patients' financial welfare. Physicians may be less sensitive to patients' out-of-pocket prices than to health benefits obtained from the consumption of pharmaceuticals and, more generally, from healthcare. Other groups of studies focus on estimates of altruism considering the health benefits of patients.

4.3. Evidence on provider altruism from behavioral experiments

4.3.1. Experiments with medical framing

In contrast to the observational studies discussed above, behavioral experiments in health (Galizzi and Wiesen 2017, 2018) enable researchers to explicitly study tradeoffs between patients' health benefit and profit under controlled conditions and using incentivized behavioral data. In addition, choice situations can be implemented with trade-offs that closely relate to Arrow's (1963) notion of patient-regarding altruism and the theoretical models of physician behavior outlined in Section 2.2.

The first controlled laboratory experiment which implements patient health benefit in an incentivize compatible way is Hennig-Schmidt et al. (2011).[11] In a framed physician decision-making task, medical students chose, in the role of physicians, quantities of medical services, determining both their profit and the health benefit of patients outside the laboratory. Subjects faced a tradeoff as they were unable to maximize the patient's health benefit and their profit at the same time. Monetary values were attached to both the profit and the patient's health benefit. Hennig-Schmidt et al. (2011) identified the causal effect of variations in the payment system on physicians' quantity choices, which implied altruistic motivations underlying medical students' decisions, while their main focus was not physician altruism.

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[11] Notice that the experimental set up introduced by Hennig-Schmidt et al. (2011) motivated several recent experimental studies investigating incentives for physicians. These experiments analyze, for example, the impact of fee-for-service and capitation systems (Brosig-Koch et al. 2016, 2017; Wang et al. 2020), mixed payment systems (Brosig-Koch et al. 2017), and performance information (Godager et al. 2016) on physicians' medical service provision. In a related experiment, Waibel and Wiesen (2021) analyze the impact of referral fees on altruistic providers.

Godager and Wiesen (2013), however, focused explicitly on physician altruism, and used the marginal rate of substitution (MRS) between patients' health benefit and physicians' profit as a measure of physician altruism. In particular, using the experimental data from Hennig-Schmidt et al. (2011), they estimated multinomial logit and mixed logit regressions and provided estimates of individual decision-makers' MRS. The results indicate that almost all medical students put a positive weight on patients' health benefit. Godager and Wiesen (2013) also found substantial heterogeneity in the degree of physician altruism. In particular, some medical students attached a higher value to their profit than to the patients' health benefit (26%). The majority of medical students either attached equal weights to profit and health benefit (29%) or put an even higher weight on the patient (44%). In a related experiment, Godager et al. (2016) analyzed how quantity choices were influenced by disclosing outcome information, finding variation in physician altruism similar to that of Godager and Wiesen (2013).

Further, Brosig-Koch et al. (2017) identify physician altruism by means of an incentivized laboratory experiment in the fashion of Hennig-Schmidt et al.'s (2011) design. They infer physician altruism from subjects' quantity choices for determining profit and patient's health benefit and find that patient benefits have a significant impact on subjects' choices. Similar to Godager and Wiesen (2013), they report substantial heterogeneity in physician altruism. Using the same experimental set up as Hennig-Schmidt et al. (2011), Hennig-Schmidt and Wiesen (2014) report considerable differences between medical students and students from other majors in their altruistic motivation towards a patient. Employing laboratory and artefactual field experiments, Brosig-Koch et al. (2016) showed that practicing physicians, medical students, and non-medical students respond in a similar way to incentives inherent in fee-for-service and capitation. Physicians exert, however, the highest altruistic motivation in their medical service provision.

Wang et al. (2020) employed Hennig-Schmidt et al.'s (2011) experimental design and studied patient-regarding altruism in a sample of 99 Chinese physicians working at community health centers, and compared their preferences with those of 178 Chinese and 42 German medical students. To make the incentives to care for the patient health benefit salient, the money corresponding to patient benefits aggregated over all decisions was transferred to one real patient's in-hospital account to reduce his out-of-pocket payment for a cancer treatment. Wang et al. (2020) report generally comparable altruism level across the three samples.

Using data from an experiment where decision-makers compete for patients and make strategic treatment choices, Ge and Godager (2021) estimate altruism parameters assuming quantal response equilibria (McKelvey and Palfrey, 1995) from a log-linear model specification similar to that Wang et al. (2020). Ge and Godager (2021) report that the altruism parameter from the competition experiment with 136 medical and non-medical students is not significantly different from the results reported by Wang et al. (2020). The results of Ge and Godager (2021) show how competition can result in substantial behavioral responses without changes in altruistic preferences if one allows for the possibility that competition influences the degree of randomness in decision making. Using the same experimental setup as Ge and Godager (2021), Byambadalai et al. (2022) pursue an alternative approach. They employ a non-parametric estimation following Guerre et al. (2000) to estimate altruism distributions from Bayes-Nash equilibrium qualities from a sample of 361 medical and non-medical students. They report that market competition tends to reduce subjects' altruistic concerns.

Using a sample of 202 Chinese medical students, Ge et al. (2022) analyze whether physicians' concern towards the patient include a concern for patients' consumption alongside the patients' health benefits. To this end, Ge et al. (2022) employ an incentivized discrete choice experiment which allows them to determine separately the health benefits and the consumption opportunities of a real patient. The attributes of health benefit and patient consumption opportunities are incentivized analogous to Wang et al. (2020). The in-kind transfer for medical treatment of the patient is different from a cash transfer, adhering to the patient's consumption opportunities.

Besides the concern towards the patient's health, they find strong evidence that future physicians care about their patients' consumption opportunities.

Finally, Attema et al. (2021) investigate *the formation* of physician altruism. To this end, they introduce an incentivized experimental choice task to elicit patient-regarding altruism of a large sample of German medical students (N=733) at different stages in their medical studies. Attema et al. (2021) estimate altruism (and efficiency) parameters using a constant elasticity of substitution (CES) utility function. While medical students put a substantial weight on the patients' health benefits, the estimates reveal substantial heterogeneity in altruism across study cohorts: altruism is highest for freshmen, significantly declines for students in the course of medical studies, and tends to increase again for last year students, who assist in clinical practice. Also, patient-regarding altruism is higher for female medical students and positively associated to Falk et al. (2018) general altruism self-reported measure. Linking preference estimates to occupational survey measures yields that altruistic medical students have lower income expectations and are more likely to choose surgery and pediatrics as their preferred specialty.

4.3.2. Experiments with a neutral framing

Another body of literature studies provider altruism using experiments without a medical framing. While specific altruism towards patients may not be directly inferred from these experiments because of the neutral framing, the flip side is that it also minimizes potential bias and experimental demand effect without imposing normative implications of the subjects' decisions (e.g., helping patients). We begin with studies that adopt designs most closely resembling the traditional dictator game (DG), and then we describe studies reflecting more recent advances in experimental designs, namely the modified dictator game.

Experiments using traditional dictator games. Jacobsen et al. (2011) conducted an 'artefactual field experiment' (in the sense of Harrison and List 2004) where they asked two samples of 88 nursing and 73 real-estate broker students in Norway to play a DG with *Amnesty International* as the recipient. They found that nursing students donated about 75 percent of their endowments, compared to 61 percent of real-estate broker students. When Jacobsen et al. (2011) allowed subjects a 'costly exit' from the game (in the sense of Dana et al. 2006, 2007), nursing students were more likely to choose to opt out, but even accounting for exit behavior, they were more generous than real-estate broker students.

Smith et al. (2013) conducted a set of 'artefactual field experiments' in Kenya, South Africa, and Thailand, where they asked 1,064 final-year nursing students to play a DG. Nursing students chose one of eleven possible ways to split their initial allocation of money, set in a way that the maximum payoff was equivalent to the nurse's daily starting salary. Nursing students played three DGs in which they decided how to divide money between themselves and either a fellow student, or a patient, or a poor person. Nursing students in all the three countries gave about 30 percent of their endowment, and showed greater generosity to patients and the poor than to fellow students. Similar results were found by Kolstad (2011) who also asked two samples of medical and nursing students in Tanzania to play a DG game with a medical or nursing student as recipients.

Another 'artefactual field experiment' was conducted in Ethiopia by Serra et al. (2011) who asked 219 nursing students and 90 medical students to play a Generalized Trust Game (GTG). In essence, a proposer decided what proportion of their cash endowment to send to a responder. The amount sent was tripled by the experimenter before being passed to the responder, who also received the same initial endowment. Then, the responder was asked to send any portion of the tripled amount to another proposer present at the same time. A

measure of 'generalized trustworthiness' was constructed as the sum of four amounts returned by each responder in four rounds of the game, divided by the sum of the four amounts that could have been sent to each responder. Serra et al. (2011) found some correlation between this measure of generalized trustworthiness in the experimental GTG and the self-reported intention to work in the non-profit healthcare sector.

Given the different strategic structures of the GTG and the DG games, it is unclear whether the results of Serra et al. (2011) could really be interpreted in terms of altruism of nursing and medical doctors. It is also unclear whether the strategic situation modeled in the GTG game and the stated intention of working for the non-profit healthcare sector really captures the same underlying attitudes and constructs. To date, however, the study by Serra et al. (2011) is the one of the few providing at least some evidence of the external validity of social preferences games in the health context. Another exception is Brock et al. (2016), who played an DG with 71 health workers in Tanzania and report that those who are more generous in the laboratory provide better care in their normal work environment. More systematic evidence is clearly needed on this key point (Galizzi and Navarro-Martinez 2019).

Experiments using the modified dictator game design. Another body of experimental literature uses a modified DG approach to study social preferences including altruism among various populations, in particular healthcare providers. These games mimic the traditional DG in that subjects are asked to allocate real money between themselves and another person. However, instead of allocating a fixed sum of money (or experimental tokens representing money), the modified DG presents subjects with allocation decisions in which the 'price of giving' varies across decision problems—sometimes the subject may need to sacrifice more than a token (the experimental currency)—to give a single token to other (the recipient); in other decisions, it may cost only a fraction of a token. The modified DG is first implemented by Andreoni and Miller (2002) using pen and paper. Choi et al. (2007) first pioneered a web-based graphic interface in which the choices are represented as a budget line, and each point represents a possible allocation. Allocation decisions are made through an intuitive 'point-and-click'. The slope of the line captures the price of giving tokens to other.

This method allows researchers to collect a rich data set capable of measuring both altruism and equality-efficiency orientation at the level of the individual subject, as subjects are able to make numerous choices over a wide range of budget lines in a short amount of time. The degree of altruism is reflected in the amount subjects give on average, whereas equality-efficiency orientation is captured by how subjects respond to the price of giving. Increasing the fraction of the budget spent on other as the price of giving increases indicates social preferences weighted towards equality (reducing the difference in payoffs between self and other), whereas decreasing it when the price of giving increases indicates social preferences weighted towards efficiency (increasing the total payoffs to self and other). This method has been used to study social preferences including altruism in various populations, including the general U.S. population (Fisman et al. 2017), undergraduate students (Fisman et al. 2015a) and elite law students (Fisman et al. 2015b).

Li et al. (2017) and Li (2018) use the modified DG and graphic interface to study altruism among a nationwide sample of about 500 US medical students through an online experiment. During the experiment, the medical student subjects are asked to allocate real money on two-dimensional budget lines, with the y-axis representing payoff to self and the x-axis representing the payoff to an anonymous other drawn from a broadly representative sample of the US population. Each subject makes 50 allocation decisions with a similar form in which the slope of the budget lines—representing the 'price of giving'—varies. The experiment does not have a medical framing, and hence can be understood as measuring general altruism rather than in a specific medical setting. Following this general literature, altruism and efficiency parameters are estimated using a constant CES utility function. Intuitively, altruism parameter is modeled as the weight the subject places on own (vs. other's) utility or payoff. Similar to prior studies, Li et al. (2017) find substantial heterogeneity in altruism among medical students. The average altruism parameter is estimated to be 0.63, which is on par with those

estimated in other studies as well, in particular Brosig-Koch et al. (2017). Further, Li et al. (2017) also find that medical students are substantially less altruistic and more efficiency-focused than the sample drawn from the general U.S. population who participated in a near-identical experiment in Fisman et al. (2017).

A notable contribution of this literature is the external validity of the experimental behavior and parameters. Using the same data as Li et al. (2017), Li (2018) find that higher altruism significantly predicts lower likelihood of choosing high-income specialties, as well as higher self-reported likelihood of practicing medicine in an underserved area, conditioning on a rich set of sociodemographic characteristics and characteristics related to medical education. Further, altruism is more predictive of specialty choice than other key characteristics including parental income, student loan and Medical College Admission Test score. In addition, studies using identical or similar experiments in other populations also find that the experimental measure of altruism and efficiency-equality orientation meaningfully predict subjects' decisions outside of laboratory, including career choice and voting behavior.

5. Discussion and conclusions

We have overviewed the main theoretical notions and empirical findings on altruism of healthcare professionals, and of physicians in particular. The operational definition of altruism in the literature in behavioral and experimental economics typically revolves around the allocation of amounts of money in strategic games such as the dictator game. Here, altruism is defined as the empirical deviation from the purely self-interested allocation of money.

The theoretical literature in health economics takes account of the peculiarity of the health domain and of the healthcare context, in particular, and it embeds the notion of physician altruism within the doctor–patient relationship. The altruism of physicians (and, more generally, of healthcare professionals) is more specifically defined as the weight within the doctors' utility function attached to patient's health benefit, besides self-interested monetary considerations. This notion is broadly consistent with the parallel, but distinctly widespread view in economics that physicians (and more generally, public servants) are characterized by some degree of 'intrinsic motivation', which leads them to self-select into those jobs, and to exert high effort regardless of 'extrinsic' financial motives.

The empirical literature that has attempted to capture and measure provider and physician altruism can be divided into three main streams. To start with, some studies have tried to isolate altruistic motives by directly asking physicians and healthcare professionals about their own motivations, using interviews and surveys. These findings suggest that altruism appears to be one of the main components of self-reported motivations not only by doctors, by also by medical students, nurses, nursing students, and dentists. Common to this literature is that evidence of altruism is only indirect and mediated, and that responses are not incentivized, in the sense that decisions are not explicitly linked to either real financial rewards, or to real patient health benefits. Two alternative approaches have been attempted to gather evidence that is more closely linked to real decisions by providers and physicians.

A second stream in the literature has directly interrogated public records on drugs prescriptions. The identification strategy in these cases has been to take advantage of insurance copayment schemes in the real world where the patients are directly responsible for a share of the costs of pharmaceutical drugs prescribed by their doctors. The share of the costs is typically lower for generic versions of the drugs, and the doctors have no financial incentives in prescribing one or another version of the drugs, so that different patterns of prescriptions allow one to estimate the extent to which physicians behave 'altruistically'. The evidence from this small stream of literature does not clearly support the hypothesis of provider altruism and presents rather mixed findings. The non-experimental nature of such an empirical analysis, however, does not allow for a tight control for several patient- or doctor-specific factors that can also potentially relate to different drug

prescription patterns. Therefore, in order to account for individual heterogeneity and provide reliable findings, this approach typically requires millions of independent doctor–patient records.

A final stream in the literature has directly measured altruism using experiments. They can be further classified into two subcategories. The first subcategory adopts a medical framing and attempts to closely replicate the conditions of the theoretical models in laboratory experiments: typically medical students and physicians take decisions under controlled conditions that have real monetary incentives and real consequences for patient benefits. The general findings of this controlled set of experiments strongly support the theoretical predictions that physicians largely behave 'altruistically' in their healthcare decisions.

The second subcategory adopts a neutral non-medical framing. Samples of real nurses (or nursing students) have played traditional dictator games. The general message is that in those games nurses seem to behave altruistically, and tend to do so more often than comparable samples of non-healthcare professionals. More recently, studies have used more advantageous modified DG design to more accurately measure altruism parameter at the individual level. They find substantial heterogeneity in measured altruism among U.S. medical students, with the average subject placing more weight on self as opposed to other's payoff, though with non-zero weight on other's payoff. Further, the altruism parameter among medical students is shown to meaningfully and strongly predict specialty choice and self-reported likelihood of practicing medicine in the underserved area, confirming the external validity of this design.

In sum, while the general message is that rigorous evidence is rapidly accumulating in support of the hypothesis of physicians and providers altruism, more research is needed to systematically map and integrate the empirical findings from various streams of the literature and to identify which patterns of evidence are robust across different contexts, settings, domains, and methodologies.

Further, several gaps still remain that need to be filled in order for this research to meaningfully inform health policy. First, while this literature generally finds that providers exhibit a certain degree of altruism, there has been little research on the relationship between altruism (either measured in experiments or using observational data) and patient outcomes. Establishing such a relationship is important in informing the impact of provider altruism and social welfare. Second, assuming higher altruism is associated with improved patient care and health outcomes, evidence is still scarce on what external factors, if any, could alter altruism among healthcare providers. This is critical in designing policies that promote altruism among providers.

References

Allaby MAK (2003) Doctors for the poor in urban Nepal. Tropical Doctor 33(2):83-85

Allard M, Jelovac I, Léger P (2011) Treatment and Referral Decisions under Different Physician Payment Mechanisms. Journal of Health Economics 30:880–893

Andreoni J (1988) Privately provided public goods in a large economy: The limits of altruism. Journal of Public Economics 35:57-73

Andreoni J (1989) Giving with Impure Altruism: Applications to Charity and Ricardian Equivalence. Journal of Political Economy 97(6):1447–1458

Andreoni J, Bernheim BD (2009) Social image and the 50–50 norm: a theoretical and experimental analysis of audience effects. Econometrica 77:1607–1636

Andreoni J, Harbaugh WT, Vesterlund L (2008) Altruism in experiments. The New Palgrave Dictionary of Economics, 2008 edition

Andreoni J, Miller JH (2002) Giving according to GARP: An experimental test of the consistency of preferences for altruism. Econometrica 70:737-753

Arrow KJ (1963) Uncertainty and the welfare economics of medical care. American Economic Review LIII(5):941-973

Attema AE, Galizzi MM, Groß M, Hennig-Schmidt H, Karay Y, Wiesen D (2021) The formation of physician altruism. EsCHER Working Paper No. 2021001

Bardsley N (2008) Dictator game giving: altruism or artefact? Experimental Economics 11:122–133

Benz M, Meier S (2008) Do people behave in experiments as in the field? Evidence from donations. Experimental Economics 11:268-281

Berg J, Dickhaut JW, McCabe KA (1995) Trust, reciprocity, and social history. Games and Economic Behavior 90:166-93

Bicchieri C, Xiao E (2010) Do the Right Thing: But only if Others Do so. Journal of Behavioral Decision Making 22:191-208

Blackall GF, Melnick SA, Shoop GH, George J, Lerner SM, Wilson PK, Pees RC, Kreher M (2007) Professionalism in medical education: the development and validation of a survey instrument to assess attitudes toward professionalism. Medical Teacher 29(2-3):e58-e62

Bolton GE, Ockenfels A (2000) ERC: A theory of equity, reciprocity, and competition. American economic review 90(1):166-193

Brock JM, Lange A, Leonard KL (2016) Generosity and prosocial behavior in healthcare provision evidence from the laboratory and field. Journal of Human Resources 51(1):133-162

Brosig-Koch J, Hennig-Schmidt H, Kairies-Schwarz N, Wiesen D (2017) The effects of introducing mixed payment systems for physicians: Experimental evidence. Health Economics 26(2):243-262

Brosig-Koch J, Hennig-Schmidt H, Kairies-Schwarz N, Wiesen D (2016) Using artefactual field and lab experiments to investigate how fee-for-service and capitation affect medical service provision. Journal of Economic Behavior & Organization 131:17-23

Byambadalai U, Ma CtA, Wiesen D (2022) Changing preferences: An experiment and estimation of market-incentive effects on altruism. Boston University Working paper https://people.bu.edu/ma/preferences-market_March2022.pdf.

Camerer C (2003) Behavioral Game Theory: Experiments in Strategic Interaction. Princeton University Press

Camerer C, Thaler R (1995) Anomalies: Ultimatums, dictators and manners. Journal of Economic Perspectives 9:209-219

Cappelen AW, Nielsen UH, Sørensen EØ, Tungodden B, Tyran J-RK (2013) Give and Take in Dictator Games. Economics Letters 118(2):280–283

Carpenter JP, Myers CK (2010) Why volunteer? Evidence on the role of altruism, reputation, and incentives. Journal of Public Economics 94:911-920

Chalkley M, Malcolmson JM (1998) Contracting for health services when patient demand does not reflect quality. Journal of Health Economics 17(1):1-19

Charness G, Rabin M (2002) Understanding social preferences with simple tests. Quarterly Journal of Economics 117:817-69

Chard D, Elsharkawy A, Newbery N (2006) Medical professionalism: the trainees' views. Clinical Medicine 6(1):68

Choi S, Fisman R, Gale DM, Kariv S (2007) Revealing preferences graphically: An old method gets a new tool kit. American Economic Review 97:153–158

Choné P, Ma CtA (2011) Optimal health care contract under physician agency. Annals of Economics and Statistics 102:229-256

Crea G, Galizzi MM, Linnosmaa I, Miraldo M (2019) Physician altruism and moral hazard:(no) Evidence from Finnish national prescriptions data. Journal of Health Economics 65:153-169

Dana JR, Cain D, Dawes R (2006) What you don't know won't hurt me: costly (but quiet) exit in dictator game. Organizational Behavior and Human Decision Processes 100:193-201

Dana JR, Weber R, Kuang J (2007) Exploiting moral wiggle room: experiments demonstrating an illusory preference for fairness. Economic Theory 33:67-80

De Cooman R, De Gieter S, Pepermans R, Du Bois C, Caers R, Jegers M (2008) Freshmen in nursing: Job motives and work values of a new generation. Journal of Nursing Management 16(1):56-64

Du Toit J, Jain S, Montalli V, Govender U (2014) Dental students' motivations for their career choice: an international investigative report. Journal of Dental Education 78(4):605-613

Eley D, Eley R, Bertello M, Rogers-Clark C (2012) Why did I become a nurse? Personality traits and reasons for entering nursing. Journal of Advanced Nursing 68(7):1546-1555

Ellis RP, McGuire TG (1986) Provider behavior under prospective reimbursement. Journal of Health Economics 5:129-151

Fagermoen MS (1997) Professional identity: values embedded in meaningful nursing practice. Journal of advanced nursing 25(3):434-441

Falk A, Becker A, Dohmen T, Enke B, Huffman D, Sunde U (2018) Global evidence on economic preferences. Quarterly Journal of Economics 133(4):1645-1692

Farley PJ (1986) Theories of the price and quantity of physician services: A synthesis and critique. Journal of Health Economics 5:315–333

Fehr E, Gächter S (1997) Reciprocity as a contract enforcement device: Experimental evidence. Econometrica 65:833-860

Fehr E, Gächter S (2000) Cooperation and punishment in public goods experiments. American Economic Review 90(4):980-994

Fehr E, Schmidt K (1999) A theory of fairness, competition, and cooperation. Quarterly Journal of Economics 114:173-68

Fischbacher U, Gächter S (2010) Social preferences, beliefs, and the dynamics of free riding in public good experiments. American Economic Review 100:541-556

Fisman R, Jakiela P, Kariv S (2015a) How did distributional preferences change during the great recession? Journal of Public Economics 128:84-95

Fisman R, Jakiela P, Kariv S, Markovits D (2015b) The distributional preferences of an elite. Science 349(6254):p.aab0096

Fisman R, Jakiela P, Kariv S (2017) Distributional preferences and political behavior. Journal of Public Economics 155:1-10

Forsythe R, Horowitz JL, Savin NE, Sefton M (1994) Fairness in Simple Bargaining Experiments. Games and Economic Behavior 6:347-369

Franzen A, Pointner S (2013) The external validity of giving in the dictator game: A field experiment using the misdirected letter technique. Experimental Economics 16:155-169

Galizzi MM, Navarro-Martinez D (2019) On the external validity of social preference games: a systematic lab-field study. Management Science 65(3):976-1002

Galizzi MM, Wiesen D (2017) Behavioural experiments in health: An introduction. Health Economics 26(S3):3-5

Galizzi MM, Wiesen D (2018) Behavioral Experiments in Health Economics. In Oxford Research Encyclopedia of Economics and Finance

Ge G, Godager G (2021) Predicting strategic medical choices: An application of a quantal response equilibrium choice model. Journal of Choice Modelling 39:100282

Ge G, Godager G, Wang J (2022) Exploring physician agency under demand-side cost sharing—An experimental approach. Health Economics 31:1202–1227

Godager G, Wiesen D (2013) Profit or patients' health benefit? Exploring the heterogeneity in physician altruism. Journal of Health Economics 32(6):1105-1116

Godager G, Hennig-Schmidt H, Iversen T (2016) Does performance disclosure influence physicians' medical decisions? An experimental study. Journal of Economic Behavior & Organization 131:36-46

Gutiérrez JLG, Puente CP, Rodríguez RM, López AL, Furlong LV (2006) Nursing motives for helping scale (N-MHS): reliability and validity. Spanish Journal of Psychology 9(1):103-112

Guala F, Mittone L (2010) Paradigmatic Experiments: The Dictator Game. The Journal of Socio-Economics 39:578-584

Guerre E, Perrigne I, Vuong Q (2000) Optimal nonparametric estimation of first-price auctions. Econometrica 68(3):525-574

Gui B, Sugden R (2005) Why interpersonal relations matter for economics? In: Gui B, Sugden R (Eds.), Economics and Social Interaction: Accounting for interpersonal relations. Cambridge: Cambridge University Press

Harrison GW, List JA (2004) Field experiments. Journal of Economic Literature 42:1009-1055

Hellerstein JK (1998) The importance of the physician in the generic versus trade-name prescription decision. Rand Journal of Economics 29(1):108-136

Hennig-Schmidt H, Selten R, Wiesen D (2011) How payment systems affect physician's provision behaviour – an experimental investigation. Journal of Health Economics 30(4):637-646

Hennig-Schmidt H, Wiesen D (2014) Other-regarding behavior and motivation in health care provision: an experiment with medical and non-medical students. Social Science and Medicine 108:155-165

Herrmann B, Thoni C, Gächter S (2008) Anti-social punishment across societies. Science 319:1362-1367

Jack W (2005) Purchasing health care services from providers with unknown altruism. Journal of Health Economics 24(1):73-93

Jacobsen KJ, Eika KH, Helland L, Lind JT, Nyborg K (2011) Are nurses more altruistic than real estate brokers? Journal of Economic Psychology 32(5):818-831

Kaarboe OM, Siciliani L (2011) Multitasking, quality and pay for performance. Health Economics 20(2):225-238

Kahler JA, Soule DJ (1991) A survey of students' attitudes toward medical school and factors motivating them to become physicians. South Dakota Journal of Medicine 44(9):269-272

Kahneman D, Knetsch JL, Thaler RH (1986) Fairness as a Constraint on Profit Seeking: Entitlements in the Market. American Economic Review 76:728–41

Kolstad JR (2011) How to make rural jobs more attractive to health workers. Findings from a discrete choice experiment in Tanzania. Health Economics 20:196–211

Levine D (1998) Modeling altruism and spitefulness in experiments. Review of Economic Dynamics 1:593-622

Li J, Dow WH, Kariv S (2017) Social preferences of future physicians. Proceedings of the National Academy of Sciences 114(48):E10291-E10300

Li J (2018) Plastic surgery or primary care? Altruistic preferences and expected specialty choice of US medical students. Journal of Health Economics 62:45-59

List J (2007) On the Interpretation of Giving in Dictator Games. Journal of Political Economy 115:482-493

Liu T, Ma CA (2013) Health insurance, treatment plan, and delegation to altruistic physician. Journal of Economic Behavior & Organization 85(0):79–96

Lundin D (2000) Moral hazard in physician prescription behavior. Journal of Health Economics 19(5):639-662

Makris M, Siciliani L (2013) Optimal incentive schemes for altruistic providers. Journal of Public Economic Theory 15(5):675-699

Ma CA (1994) Health Care Payment Systems: Cost and Quality Incentives. Journal of Economics and Management Strategy 3:93–112

Ma CA, Riordan MH (2002) Health Insurance, Moral Hazard and Managed Care. Journal of Economics and Management Strategy 11:81–107

McGuire TG (2000) Physician Agency. In: Cuyler, Newhouse (eds.) Handbook of Health Economics, Vol. 1 A. North-Holland, Amsterdam (The Netherlands), pp 461–536

Nagel T (1970) The Possibility of Altruism. Oxford: Clarendon Press

Pawlikowski J, Sak JJ, Marczewski K (2012) Physicians' religiosity and attitudes towards patients. Annals of Agricultural and Environmental Medicine 19(3):503-507

Penner LA, Fritzsche BA, Craiger JP, Freifeld TR (1995) Measuring prosocial personality. In: Butcher J, Spielberger CD (eds) Advances in Personality Assessment. Springer-Verlag, New York, Vol. 10 pp 147-164

Rabin, M (1993) Incorporating fairness into game theory and economics. American Economic Review, 83(5):1281-1302.

Ratanawongsa N, Howell EE, Wright SM (2006) What motivates physicians throughout their careers in medicine? Comprehensive Therapy 32:210-217

Rotemberg JJ (2014) Models of caring, or acting as if one cared, about the welfare of others. Annu. Rev. Econ. 6(1):129-154

Scott A, Sivey P (2022) Motivation and competition in health care. Health Economics

Serra D, Serneels P, Barr A (2011) Intrinsic motivations and the non-profit health sector: Evidence from Ethiopia. Personality and Individual Differences 51(3):309-314

Siciliani L (2009) Paying for Performance and Motivation Crowding Out. Economics Letters 103(2):68—71

Smith R, Lagarde M, Blaauw D, Goodman C, English M, Mullei K, Pagaiya N, Tangcharoensathien V, Erasmus E, Hanson K (2013) Appealing to altruism: an alternative strategy to address the health workforce crisis in developing countries? Journal of Public Health 35(1):164-170

Wang J, Iversen T, Hennig-Schmidt H, Godager G (2020) Are patient-regarding preferences stable? Evidence from a laboratory experiment with physicians and medical students from different countries. European Economic Review 125:103411

Waibel C, Wiesen D (2021) An experiment on referrals in health care. European Economic Review 131: 103612

Woodward RS, Warren-Boulton F (1984) Considering the Effect of Financial Incentives and Professional Ethics on 'Appropriate' Medical Care. Journal of Health Economics 3:223–237

Zizzo DJ (2013) Do dictator games measure altruism? In: Bruni L., Zamagni S. (eds) Handbook on the Economics of Reciprocity and Social Enterprise, Edward Elgar