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Plastic surgery or primary care? Altruistic preferences and expected specialty choice of U.S. medical students☆

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ABSTRACT

Understanding physicians' decisions when faced with conflicts between their own financial self-interest and patients' economic or health interests is of key importance in health economics and policy. This issue is especially salient in certain medical specialties where less altruistic behavior of physicians can yield significant financial gains. This study examines experimentally measured altruistic preferences of medical students from schools around the U.S., and whether these preferences predict those students' expected medical specialty choice. The experimental design consists of a set of computer-based revealed preference decision problems, which ask the experimental subjects to allocate real money between themselves and an anonymous person. These data are used to derive an innovative measure of altruism for each participant. I then examine the association between altruism and expected specialty choice, after controlling for an extensive set of covariates collected from an accompanying survey questionnaire. Medical students with a lower degree of altruism are significantly more likely to choose high-income specialties, conditioning on an extensive set of covariates. This altruism measure is more predictive of income of specialty choice than a wide range of other characteristics, including parental income, student loan amount and Medical College Admission Test (MCAT) score. On the other hand, the altruism measure does not predict choosing primary care specialties. I also find that altruism predicts students' self-reported likelihood of practicing medicine in an underserved area.

Physician altruism, the concern for patients' well-being beyond self-interest, is considered an important component of medical professionalism (Arrow, 1963). Two distinct characteristics of healthcare markets, namely information asymmetry between physicians and patients/insurers and the inherent uncertainty in the relationship between healthcare treatments and health outcomes (Arrow, 1963; McGuire, 2000), make it difficult to design optimal contracts to effectively govern physician behavior (Choné and Ma, 2011; Robinson, 2001). Therefore, altruism of physicians is key to ensuring patient welfare. Unfortunately, empirical understanding of physicians' altruistic preferences has been largely lacking despite its considerable importance (Godager and Wiesen, 2013; McGuire, 2000). Very few studies successfully quantify the altruistic preferences of physicians or health care providers (Godager and Wiesen, 2013; Galizzi et al., 2015), which is not surprising given the emprical complexities in physician decision-making and the resulting challenges in quantifying physician and patient benefits using field data, which is crucial in identifying physician altruism.

Further, even less understood is the extent to which underlying altruistic preferences relate to physicians' career choice, of which specialty choice is arguably one of the most important. There is substantial variation in income and practice scope across medical specialties in the U.S. (Bodenheimer, 2005). Table A1 presents the national average annual income for physicians in several common specialties based on national physician surveys (Kane and Carol, 2014a; Profiles Database, 2014). The difference in compensation across specialties is drastic: physicians in Neurological Surgery, the top-earning specialty, make on average almost three times as much as those in Family Medicine who are at the bottom of the specialty income distribution. Moreover, such income gap across specialties has been widening in the past decade (David et al.,

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2014). Debates over the sources and legitimacy of the specialty income gap notwithstanding, from a policy standpoint, such drastic income gap may have undesirable consequences (David et al., 2014), and not the least of which is the potential sorting of medical students to specialties based on altruistic preferences. It is important to understand the extent to which such sorting exists to inform effective policymaking that (1) incentivizes physician professionalism in specialty-specific context (Berenson and Rice, 2015), and (2) potentially changes the specialty composition of the U.S. physician workforce, especially given the disproportionately high number of specialists versus primary care physicians (Kahn et al., 2006).

This study builds on existing work in applying an approach recently developed in experimental economics (Andreoni and Miller, 2002; Fisman et al., 2007; Choi et al., 2007) to measuring altruistic preferences of future physicians—medical students (Li et al., 2017). The distinct advantage of studying altruistic preferences of future physicians as opposed to physicians in practice (the latter being an important topic in itself) is that it provides a "baseline" measure of altruism for individuals who select into the medical profession, prior to exposure to more nuanced incentives during medical practice which may affect preferences in ways that are difficult to predict. In this experiment, medical student subjects are asked to allocate real money between themselves and an anonymous person (known as the dictator game), symbolizing the tradeoff between self-interest and the other's benefit. Compared to alternative approach such as standard surveys, dictator games are considered appealing in studying social preferences because subjects are asked to make decisions involving real monetary tradeoffs, whereas subjects tend to report more altruistic behavior in standard surveys as it is socially desirable (Bekkers, 2007). The experimental design differs from the traditional dictator game in that the allocation decisions are implemented on a web-based graphical interface, where subjects make a series of 50 allocation decisions on two-dimensional budget lines instead of splitting a lump sum of money. Specifically, in each allocation decision, the set of monetary payoffs is given by the budget line $p_s\pi_s + p_o\pi_o = 1$, where π_s correspond to the payoffs to *self* (the medical student subject), π_o correspond to the payoff to *other*, an anonymous individual from the American Life Panel (ALP) broadly representative of the U.S. population, and $p = p_s/p_o$ is the relative price of giving. A crucial advantage of this design is that it allows differentiation between two conceptually distinct components of social preferences: the tradeoff between *self* and *other* (altruism) and the tradeoff between efficiency and equality. Both tradeoffs are estimated at the individual level via a constant elasticity of substitution (CES) utility function of the following form:

$$u(\pi_s, \pi_o) = [\alpha(\pi_s)^\rho + (1-\alpha)(\pi_o)^\rho]^{1/\rho}$$

where α is the altruism parameter representing the relative weight on payoff to *self* versus *other*, and ρ represents the equality-efficiency tradeoff, or the sensitivity of budget allocation to p_s/p_o, the relative price of giving. Further details on the experimental design and estimation procedure are provided in Section 2. The experiment was conducted on a sample of 503 medical students from schools around the U.S. The experimental approach is supplemented with a survey that allows linkage between the measured preferences of medical students and their desired future specialty choice conditioning on an extensive set of individual characteristics.

Our previous work (Li et al., 2017) applies the abovementioned approach in measuring social preferences of medical students. We document substantial heterogeneity in experimentally measured $\hat{\alpha}_n$ and $\hat{\rho}_n$ among a national sample of medical students. We also compare, mostly descriptively, the value of these parameters by tier of medical school and a binary measure of specialty choice. Specifically, we find that medical students choosing high-income specialties, defined as having an annual average income above $300,000, are less altruistic than those choosing low-income specialties. The current study uses the same data set as in Li et al. (2017) and makes two incremental contributions. First, I address the distinct research question of whether experimentally measured altruism is an independent predictor of medical students' self-reported career choice, especially specialty choice, beyond observable characteristics and other preferences related to specialty choice (Bazzoli, 1985; Borges and Savickas, 2002; Jolly et al., 2013; McKay, 1990). In doing so, I examine three outcome measures of career choice: income of specialty choice (both dichotomous and continuous), choice of primary care specialties, and likelihood of practicing medicine in an underserved area. I include rich survey-collected covariates not analyzed in Li et al. (2017), and explicitly compare the predictive power of $\hat{\alpha}_n$ with that of several key characteristics commonly regarded as important predictors of specialty choice in the literature. I also conduct a number of robustness checks of these relationships. Second, adding to the experimental economics literature that uses modified dictator games and CES utility function to estimate social preferences, I conduct further analysis of the experimental data to assess and validate the modeling and estimation approach used to generate estimates of α and ρ. This is important as alternative approaches for analyzing the experimental data at hand exist (McFadden, 2001; Rust, 1987). I demonstrate the appropriateness of the current approach to estimating the preference parameters of interest, while deferring formal comparison between alternative estimation approaches to future research.

I find that lower altruism significantly predicts choosing high-income specialties after controlling for an extensive set of covariates. The half of the sample who behaved less altruistically in the experiment are on average about 20 percentage points more likely than their counterparts to choose high-income specialties, relative to a sample mean of 49%. The same group also chooses specialties that earn on average around $40,000 more. The results are robust to controlling for self-reported preferences for high income and prestige in specialty choice. Further, restricting the sample to those who exhibited a high level of consistency in experimental behavior strengthens, though does not qualitatively change, the relationship between specialty choice and altruism. Importantly, the experimentally measured altruism preference parameter appears to have more explanatory power about specialty choice than several other characteristics commonly considered important predictors of specialty choice, including parental income, Medical College Admission Test (MCAT) score and the amount of student loan. Interestingly, altruism does not significantly predict choosing a primary care specialty. Additionally, altruism significantly predicts medical students' self-reported likelihood of practicing medicine in an underserved area, conditional on covariates.

This study builds on several strands of literature. The classical literature on the theory of physician behavior explicitly incorporates patient benefit in modeling physician utility function (e.g. Ellis and McGuire, 1986, 1990; Ma and McGuire, 1997. See McGuire (2000) for a review). Notably, Ellis and McGuire (1986) use α to denote the rate at which the physician is wiling to trade off one dollar of hospital profit for one dollar of patient benefit, a related but conceptually distinct concept from α as defined in the CES utility function above. I note this distinction while maintaining the notations above to keep them consistent with existing literature using the same methodology. More recent literature in this area formally models heterogeneity in physician altruism (Choné and Ma, 2011; Jack, 2005; Liu and Ma, 2013). This study is also related to a large body of interdisciplinary literature on the impact of personality, values and economic factors on specialty choice. In this literature,