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Doctor-patient differences in risk preferences, and their links to decision-making: a field experiment

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Doctor-patient differences in risk preferences, and their links to decision-making: a field experiment.

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Abstract

We conduct a field experiment among patients and doctors, with the aim to test i) whether the two groups have similar risk preferences; and ii) whether differences in risk preferences between doctors and patients are associated with the likelihood of patients seeking a second medical opinion. We measure risk preferences using an adaptation of the Holt and Laury (2002) test to the healthcare context (Galizzi et al., 2013). We find no evidence that the two groups of doctors and patients systematically differ in their preferences towards risk. We find, however, robust evidence that differences between doctors' and patients' risk preferences associate with patients' decision to look for a second opinion: the more diverse preferences are, the more likely patients are to seek a second opinion.

Key words: field experiments, risk preferences, doctor-patient relationship, second opinion.

JEL classification: I1, C93, D81

1. Introduction

The doctor-patient relationship is key in medical decision-making (Ubel, 2002a; Ubel et al., 2011; Stavropoulou, 2012). Decisions related to health behaviour, access to health care, and medical treatments are, to a large extent, shaped by the way patients interact with their physicians, or perceive their relationship with them (Quill and Bordy, 1996; Ubel, 2002b; Gurmankin et al., 2002; Stavropoulou, 2011). Even subtle asymmetries between patients' and doctors' perceptions, attitudes, and preferences can have a major impact on decision-making (Beisswanger et al., 2003; Fagerlin et al., 2005a,b; Zikmund-Fisher et al., 2004).

Together with preferences over health states and time preferences, preferences towards risk are perhaps the most salient attitudes in the health context (Gafni and Torrance, 1984; Redelmeier and Heller, 1993; Dolan and Gudex, 1995; Dolan et al., 1996, Dolan, 1997; Cairns, 1992, 1994; Cairns and Van Der Pol, 1997; Van Der Pol and Cairns, 2001). A number of studies have documented the links between risk preferences and health behaviour, including risky habits such as heavy drinking (Barsky et al., 1997; Anderson and Mellor, 2008), smoking (Viscusi, 1990; Goto et al., 2009; Dohmen et al., 2011), and poor nutritional quality (Galizzi and Miraldo, 2013); as well as the uptake of medical tests (Picone et al., 2004).

A parallel stream of literature has explored *intra-individual differences* in preferences *across different domains*, and typically found that risk preferences are largely domain-specific (Hanoch et al., 2006; Barseghyan et al., 2011; Einav et al., 2012). Domain-dependent tests, in fact, have been proposed to effectively differentiate risk attitudes across different domains (e.g. DOSPERT, Weber et al., 2002; Blais and Weber, 2006). Risk preferences differ across the health and financial domains even when they are measured using a multiple price list (MPL) test with essentially the same structure across domains (Galizzi et al., 2013). What is more, even within the same health domain, risk preferences can actually differ across different contexts (Van Der Pol and Ruggeri, 2008; Butler et al., 2012).

An area where risk preferences remain relatively unexplored is within the context of the doctor-patient interaction. In particular, little is currently known about the similarities and *differences in risk preferences between patients and doctors* and their links to healthcare decision-making. Even though the medical literature provides broad evidence on the key role of doctor-patient risk communication on healthcare decisions (Fisk, 1999; Dudley, 2001; Bjerrum et al., 2002; Smith, 2003; Peele et al., 2005; Fagerlin et al., 2005c; Zikmund-Fisher, 2005) there is scant evidence on whether patients and their doctors have generally similar patterns of risk preferences, and on whether differences in such preferences matter in the context of healthcare decision-making.

This gap in the evidence is largely due to the lack of primary data that directly measure, in a comparable way, risk preferences among patients and doctors. In light of what discussed above, moreover, in order to, realistically, have some predictive power on healthcare decisions, risk preferences have to refer to the context of healthcare, rather than to monetary decisions. As also noticed for the case of time preferences, however, no secondary data currently exist that relate elicitation of health-related risk preferences to healthcare decisions (Bradford, 2010).

In this article we attempt to fill this gap by explicitly investigating: i) whether patients and their doctors have similar risk preferences; and ii) whether differences in risk preferences

between doctors and their patients associate with what patients plan to do after medical consultation. We do so by conducting an “artefactual field” or “extra-lab” experiment (in the sense of Harrison and List, 2004, List, 2006; and Charness, Gneezy, and Kuhn, 2013, respectively) to gather first-hand data on both research questions. Field experiments have been increasingly employed in exploring risk preferences (Andersen et al., 2008; Charness, Gneezy, and Imas, 2013), and in comparing them across different groups of subjects (Croson and Gneezy, 2009; Harrison et al., 2009; Masclet et al., 2009).

In our experiment we use a novel adaptation of the Holt and Laury (2002) MPL test to the healthcare context to measure risk preferences from both patients and *their matched doctors*. We first test whether the two groups have generally similar risk preferences. We then look at each doctor-patient match and test whether doctor-patient differences in risk attitudes associate with patients’ intention to seek a second medical opinion.

We choose this healthcare outcome not only because it is immediate to understand and easy to record in the field, but also because of its pivotal role in medical decision-making (O’Connor et al., 2007) and of its interlinks with the on-going discussion on patients’ choice (Department of Health, 2008; Dixon et al., 2010).

Our main results show no systematic difference in risk preferences in the healthcare context between the doctors and patients. Differences in risk preferences within doctor-patient matches, however, significantly associate with patients’ intention to ask for a second medical opinion.

The rest of the article is organised as follows. Section 2 contains a brief description of the methods while Section 3 reports the main results. The final section concludes by briefly discussing the main findings in the context of the literature.

2. Methods and data

2.1 Study Design

We conducted a field experiment among patients and doctors in a university hospital in Athens (Laiko Hospital), Greece, between September 2010 and November 2011. Patients were asked to complete a questionnaire survey. They answered the first part of the survey while they were waiting in the outpatients’ clinics to see their doctor, and the second part immediately after their consultation. The doctors the patients had seen were also approached and took part in the study by filling a separate questionnaire. By the end of the study period we matched 78 patients with 42 doctors. The study was approved by Laiko’s Hospital Research Ethics Board on the 6th of August 2010 (protocol number ES 462).

2.2 Questionnaire and variables

Patient questionnaires

The first part of the questionnaire included a number of socio-demographic questions, such as the respondents’ age (*Age*), gender (*Female*), marital status (*Married*), education level (*Educ*), perception of their current financial situation (*FinConstr*), and whether they have children or not (*Children*). Patients were also asked about their health status, both by reporting their self-assessed health (*SAH*) and whether or not they had a chronic condition (*Chronic*). See Table 1 for a description of the variables in the questionnaire.

[Table 1 in here]

Risk preferences were measured using an adaptation of the Holt and Laury (2002) MPL test to the healthcare context whose full details can be found in a companion paper (Galizzi et al., 2013). In essence, together with the Gneezy and Potters (1997) and the Eckel and Grossman (2002) tests, the Holt and Laury (2002) method is one of the most popular incentive-compatible tests used in experimental economics to measure risk preferences for monetary outcomes (Charness, Gneezy, and Imas, 2013). It consists of presenting subjects a series of questions, each reproducing a choice between two lotteries, say, A and B. Lotteries give a low payoff with some probability, and a high payoff with the complementary probability. Lottery A is typically characterized by a lower variance, in terms of smaller difference between monetary payoffs, than the other lottery B. The series of proposed pairs of lotteries only differ with respect to the probabilities of occurrence for the high payoff. Thus, for low probabilities, lottery A typically has the higher expected payment, while lottery B gives the higher expected returns for high probabilities. Galizzi et al. (2013) have adapted this MPL method to the healthcare context, by asking subjects to choose between two possible hypothetical treatments, A and B, entailing different numbers of days in full health, as presented in Table 2.

[Table 2 in here]

As for the Holt and Laury (2002) test, the main idea is that a risk-neutral patient should switch from the “safe” option (treatment A) to the “risky” option (treatment B) only when the expected utility in terms of days in full health is greater in treatment B than in A. A risk patient that is neutral in the healthcare context should choose treatment A in rows 1-4, before switching to B in row 5, and selecting that treatment in all the remaining rows. A patient strongly risk averse in the healthcare context could instead prefer treatment A also in rows after 5, while a strongly risk lover should switch before. Thus, by observing all the choices made by a subject and the lotteries in correspondence to which a switch has occurred, it is possible to measure the individual attitudes towards risk.

We define *SwitchP* a variable denoting the specific point in our test at which a given patient switched from lottery A to lottery B. *SwitchP* thus spans from 1 to 10, taking higher values the more risk averse the patient is.

The second part of the questionnaire was given to the patients after they had seen their doctor. It aimed at measuring aspects of the consultation as well as the patient’s intention to see another doctor for a second opinion. In particular, a question asked patients whether they intended to see another doctor to seek for a second advice (*SecOpin*). Answers ranged from “definitely not”, through “probably not”, “not sure”, “probably yes”, to “definitely yes”.

To measure other aspects of the doctor-patient relationship that could be related to the intention to seek a second opinion, we used items from the Primary Care Assessment Survey (PCAS), a well-known patient-completed questionnaire that has been widely used in primary care research and successfully tested for validity and reliability (Safran et al., 2006; Rodriguez et al., 2006). In particular, we used the PCAS items to build a score for the level of trust between the patient and the doctor, according to the PCAS validated guidelines (The Health Institute, 1998). The final score measures trust between the patient and the doctor (*TrustScore*), on a scale from 0 to 100, with higher scores indicating higher levels of trust.

Finally, as a further control, patients were asked whether that was the first time they were visiting the doctor they had just seen (*FirstVis*).

Doctor questionnaire

The doctors were essentially given just the first part of the questionnaires also answered by patients, with minor amendments where necessary.

For each patient, and similarly to *SwitchP*, we created a variable *SwitchD* indicating the point at which each patient's doctor switched from lottery A to lottery B in the MPL test for risk aversion in healthcare decisions. Again, higher values for *SwitchD* indicate more risk averse doctors.

Matched characteristics

We matched each patient with the doctor they consulted in the outpatient clinics. To further control for observable heterogeneity in the patient-doctor profiles, we created a set of indicators capturing the difference in the observable characteristics between the patient and their matched doctor. The variables are *GenderMatch* (i.e. doctors and patients are of the same gender), *AgeDiff* (i.e. the difference in year of age between doctors and patients).

We then created another variable, *AbsRiskDiff*, as the absolute value of the difference between the switching point in the binary lotteries test of the doctor (*SwitchD*) and the corresponding switching point of the matched patient (*SwitchP*) (i.e. $AbsRiskDiff = abs[SwitchP - SwitchD]$). By its very construction, however, the variable is not insightful on the direction of the difference in risk preferences, i.e. whether the patient is more or less risk averse than the matched doctor. For this purpose, we created a dummy variable, *PMoreAverse*, taking value equal to 1 if the patient is more risk averse than the doctor, and 0 otherwise, and we also included it in the regression analysis. A full description of these is also summarised in Table 1.

2.3 Analysis

As discussed, we focus on i) assessing differences in risk preferences between patients and doctors; and ii) the relationship between doctor-patient differences in risk preferences and patients' intention to ask for a second opinion.

We address the former question by means of standard non-parametric tests. In particular, as the Shapiro-Wilks test for normality rejects the null hypothesis that the switching points are normally distributed at standard significance level ($W=0.0431$, $p<0.05$), we test possible differences in means between patients and doctors with a Mann-Whitney test.

For the second question, we modelled the relationship using a standard ordered logit regression. The dependent variable is modeled as a discrete ordered variable (*SecOpin*) taking values 1, 2, 3, 4 and 5 for subjects reporting "definitely not", "probably not", "not sure", "probably yes", to "definitely yes" to seek a second medical opinion, respectively.

Following a stepwise approach, we analysed the direct relationship between the explanatory variables capturing risk preferences and the likelihood of seeking a second advice, and we progressively included more variables to control for socio-demographic characteristics, self-assessed health, and other observable aspects of the doctor-patient relationship.

3. Results

3.1 Summary statistics

We start by reporting the summary statistics for the two samples of patients and doctors in Table 3.

[Table 3 in here]

The statistics show that, with the obvious exceptions of the income (and education) levels, and the self-assessed health, doctors and patients in our sample have substantially comparable socio-demographic characteristics.

3.2 Differences in risk preferences between patients and doctor

Concerning the first question on whether risk preferences of patients and doctors were significantly different, we found that in our sample, $switchP=4.73$ (SD=2.24), while $switchD=4.79$ (SD=1.99). The Mann-Whitney test failed to reject the null hypothesis that $switchP=switchD$ ($z=-0.091$, $p=0.9277$), leading to conclude that no significant difference in risk preferences in the healthcare domain emerged between the two groups of doctors and patients.

3.3 Relationship between differences in risk preferences and search for a second opinion

Although risk preferences in healthcare do not seem to systematically differ across the two samples of doctors and patients, in principle differences may still exist when single doctors and patients are considered in matched pairs. Such inter-individual differences in risk preferences can potentially influence patients' subsequent healthcare decisions, such as the intention to access a second clinical opinion. We directly explore this second question, by running a set of ordered logit regressions, controlling progressively for socio-demographic variables, self-assessed health, doctor-patient matching characteristics and levels of trust.

Results are presented in Table 4. As it can be seen, the association between doctor-patient differences in risk preferences and patients' intention to search for a second opinion is significant and robust across all specifications. The larger the absolute difference in risk preferences ($AbsRiskDiff$), the more likely the patients are to seek a second opinion after leaving the consultation.

Interestingly, the direction of the difference, that is whether the patient is more or less risk averse than the doctor, does not play any consistently significant role ($PMoreAverse$). The direct effect of patients' risk preferences ($SwitchP$) on the likelihood to ask for a second opinion is similarly not robust, and marginally significant in one specification only.

[Table 4 in here]

As for the control variables, the patients who saw their consulting doctor for the first time were also keener to seek another opinion from a different doctor. Related to this is the, equally intuitive, finding that the higher the level of trust they report with their doctor, the less likely they intended to seek for a second opinion.

In addition, patients with a chronic condition, or patients of the opposite gender of their matched doctor, tended to be more likely to ask for a second opinion, although these effects were only marginally significant.

4. Discussion and conclusion

The present study aimed to shed more light on risk preferences across doctors and patients. To the best of our knowledge, this is one of the first field experiments to directly look at possible differences in risk preferences between the doctors and patients, and at whether these differences are associated with healthcare decisions. The rich data collected from both patients and doctors allowed us not only to measure risk preferences in the healthcare context but also to control for a number of socio-demographic, self-assessed health, and doctor-patient relationship aspects.

We find no evidence that the two groups of doctors and patients in our sample systematically differ in their preferences towards risk. We find robust evidence, however, that differences between matched pairs of doctors and patients is significantly associated with patients' decision to look for a second opinion.

The latter can have potential implications for health policy. The decision to seek a second medical opinion is, in fact, of key relevance not only because it is interlinked with the current debate on patients' choice but also because it affects how patients adhere to doctors' recommendations, with potential major consequences on patients' health status.

In several healthcare contexts individual characteristics, such as gender and ethnicity, inform how patients are allocated to their doctors and healthcare professionals (Weisman and Teitelbaum, 1985; Cooper-Patrick et al. 1999; Saha et al. 1999; Cooper et al. 2003). Our research contributes to this line of research suggesting that the allocation of patients to doctors could be more systematically informed by a broader set of characteristics, such as individual preferences for risk.

Our study also innovatively contributes to the experimental literature on risk preferences (Hey and Orme, 1994; Loewenstein et al., 2001; Holt and Laury, 2002; Blais and Weber, 2006; Andersen et al., 2008; Charness, Gneezy and Imas, 2013), and in particular on the differences in risk preferences *across different groups* (Croson and Gneezy, 2009; Harrison et al., 2009; Masclet et al., 2009).

The study is not, of course, without limitations. Doctors completed a questionnaire, which asked them about their own risk preferences, just like patients did. It is possible to argue that doctors may have different risk preferences regarding their own health from when they prescribe risky healthcare treatments to their patients. This is indeed an intriguing question, and similar patterns have in fact been documented in other doctor-patient contexts (Ubel et al., 2011). The question, however, is beyond the direct scope of the present study, and is left for further research.

Our study focused on one important, yet specific, aspect of the doctor-patient relationship: the possible differences in risk preferences. In doing so, we attempt to account for an array of other patients' and doctor-patient characteristics. We acknowledge, however, that, like any

medical decision, patient's intention to ask for a second opinion is a multifaceted issue. Several other preferences, attitudes, and behavioural factors can play a role and what actually happens during the consultation remains largely a black box. More research is vital in better understanding the role of preferences in doctor-patient interaction and their links with healthcare decisions.

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Tables

Table 1: Description of variables

Variable	Variable description
<u>Explanatory variables</u>	
<u>Individual characteristics for patients and doctors</u>	
<i>Age</i>	Age in years
<i>Female</i>	Female gender (0=no, 1=yes)
<i>Educ*</i>	Level of education (1=primary school...8=doctoral or post-graduate specialization degree)
<i>FinConstr</i>	Constrained by my financial state (1=leaving comfortably...4=find it very difficult)
<i>Married</i>	Married (0=no, 1=yes)
<i>Children</i>	Having children (0=no, 1=yes)
<i>SAH</i>	Self-assessed health (1= very good...5=very bad)
<i>Chronic *</i>	Presence of a chronic condition (0=no, 1=yes)
<u>Matched Characteristics</u>	
<i>TrustScore</i>	Patient reported level of trust with doctor (0=lowest level... 100=highest level of trust)
<i>FirstVis</i>	First time the patient visit the specific doctor (0=no, 1=yes)
<i>GenderMatch</i>	Doctor and patient are of the same gender (0=no, 1=yes)
<i>AgeDiff</i>	Age difference between doctor and patient (continuous variable, measured in years)
<u>Risk variables</u>	
<i>SwitchP</i>	Patients' risk aversion implied by switching point in the test (1=absolutely risk seeking...10=absolutely risk averse)
<i>SwitchD</i>	Doctors' risk aversion implied by switching point in the test (1=absolutely risk seeking...10=absolutely risk averse)
<i>AbsRiskDiff</i>	Absolute difference between switching points for doctors and patients (continuous variable from 0 to 10)
<i>PMoreAverse</i>	Patient more risk averse than doctor (0=no, 1=yes)
<u>Dependent variable</u>	
<i>SecOpin</i>	Intention to ask for second opinion (1=definitely not...5=definitely yes)
*Information obtained only for patients. In order to be consultants in outpatient clinics, all doctors must have at least one post-graduate medical specialization.	

Table 2: Galizzi, et al. (2013) adaptation of the Holt and Laury (2002) MPL test to measure risk preferences in the healthcare context.

ID	Treatment A				Treatment B				Your Choice	
	<i>P</i>	<i>Days in full</i>	<i>P</i>	<i>Days in full</i>	<i>P</i>	<i>Days in full</i>	<i>P</i>	<i>Days in full</i>	<i>A</i>	<i>B</i>

		<i>health</i>		<i>health</i>		<i>health</i>		<i>health</i>		
1	10%	200	90%	160	10%	385	90%	10	A	B
2	20%	200	80%	160	20%	385	80%	10	A	B
3	30%	200	70%	160	30%	385	70%	10	A	B
4	40%	200	60%	160	40%	385	60%	10	A	B
5	50%	200	50%	160	50%	385	50%	10	A	B
6	60%	200	40%	160	60%	385	40%	10	A	B
7	70%	200	30%	160	70%	385	30%	10	A	B
8	80%	200	20%	160	80%	385	20%	10	A	B
9	90%	200	10%	160	90%	385	10%	10	A	B

Table 3: Descriptive statistics

<i>Variable</i>	Patients					Doctors				
	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max
<i>Switch</i>	77	4.73	2.24	1	10	42	4.79	1.99	1	10
<i>Age</i>	77	38.42	13.09	20	74	43	36.6	8.04	27	63
<i>Female</i>	78	0.55	0.50	0	1	47	0.40	0.50	0	1
<i>Educ</i>	78	5.86	1.91	2	8	47	8	0	8	8
<i>Married</i>	78	0.33	0.47	0	1	47	0.43	0.50	0	1
<i>Children</i>	78	0.37	0.49	0	1	47	0.23	0.43	0	1
<i>FinConstr</i>	78	2.51	0.80	1	4	41	2.05	0.63	1	3
<i>SAH</i>	78	2.24	1.10	1	5	47	1.70	0.78	1	4
<i>Chronic</i>	78	0.19	0.40	0	1					
<i>TrustScore</i>	76	55.53	18.34	25	100					
<i>FirstVis</i>	78	0.55	0.50	0	1					
<i>SecOpin</i>	74	2.11	1.23	1	5					
	Matched characteristics									

<i>AgeDiff</i>	69	1.67	16.48	-36	42
<i>GenderMatch</i>	77	0.49	0.50	0	1
<i>AbsRiskDiff</i>	69	1.93	1.69	0	7
<i>PMoreAverse</i>	70	0.33	0.47	0	1

Table 4: Impact of risk differences on patients' intention to ask for a second opinion

	Model 1	Model 2	Model 3	Model 4	Model_5
secOpin					
AbsRiskDiff	0.446** (0.14)	0.451** (0.15)	0.431** (0.15)	0.462** (0.17)	0.410* (0.18)
PMoreAverse	-1.351* (0.64)	-1.112 (0.75)	-1.067 (0.76)	-1.17 (0.81)	-1.214 (0.82)
SwitchP	0.323* (0.13)	0.262 (0.15)	0.263 (0.15)	0.248 (0.16)	0.221 (0.15)
Age		0.042 (0.03)	0.042 (0.03)	0.011 (0.05)	0.034 (0.05)
Female		0.552 (0.53)	0.506 (0.55)	0.374 (0.63)	-0.101 (0.67)
Educ		0.155 (0.18)	-0.038 (0.19)	0.06 (0.2)	0.02 (0.2)
Married		0.144 (0.76)	0.36 (0.78)	-0.255 (0.98)	-0.943 (1.06)
Children		-0.032 (0.97)	-0.383 (1.03)	0.185 (1.2)	0.347 (1.25)
FinConstr		-0.06 (0.32)	0.001 (0.32)	-0.114 (0.35)	-0.702 (0.44)
SAH		-0.242 (0.27)	-0.238 (0.28)	-0.515 (0.33)	-0.582 (0.37)
Chronic		0.598 (0.72)	0.709 (0.73)	1.441 (0.82)	1.818* (0.92)
FirstVis			1.682** (0.58)	1.597* (0.62)	1.475* (0.67)
AgeDiff				0.029 (0.03)	0.033 (0.04)
GenderMatch				-0.86 (0.57)	-1.233* (0.63)
TrustScore					-0.058** (0.02)
cut1					
_cons	1.409* (0.63)	3.465 (2.07)	3.265 (2.09)	1.401 (2.51)	-3.705 (3.07)
cut2					
_cons	2.886*** (0.71)	5.019* (2.12)	5.030* (2.16)	3.387 (2.55)	-1.383 (3.03)
cut3					
_cons	3.712*** (0.78)	5.898** (2.17)	5.976** (2.22)	4.185 (2.6)	-0.583 (3.05)
cut4					
_cons	5.116*** (0.95)	7.435** (2.29)	7.509** (2.33)	5.781* (2.69)	1.007 (3.11)

Estimated coefficients, standard errors in parenthesis

* p<0.05, ** p<0.01, ***p<0.001

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