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Self-selecting random or cumulative pay? A bargaining experiment

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ABSTRACT

An incentive scheme in a multi-task experiment may trigger different types of behavior in participants. This experimental study allows participants to decide between being paid to complete a random task or being paid an average across all tasks completed in a bargaining game where the buyer and seller have partly conflicting interests and are asymmetrically informed. We find that both past experience and individual characteristics have a significant effect on the payment scheme selected and the final trading result. Although the payment method is likely to be correlated with risk preferences, it may also be influenced by ego-defensive concerns. Analysis of the self-selected Random Lottery Incentives scheme (RLI) and the Cumulative Scheme (CS) shows both individual and social effects: sellers who prefer CS over RLI receive a larger share of the surplus, and (female) buyers choosing RLI play with a lower degree of trust with the aim of closing better deals.

1. Introduction

In bargaining games, the strategic behavior of the negotiating parties is essential for their gains and efficiency. What is often underestimated is the importance of the payment mode in shaping strategic behavior and its heterogeneity, in particular when one may be more attracted to incentive schemes that better suit one's personality. Indeed, specific payment methods in bargaining games are likely to affect the choice of strategies, and to favor those who perceive a specific incentive mechanism as more appropriate to their attitudes and the task at hand.

This work focuses on the characteristics and strategic behavior of experienced participants in a bargaining game where the buyer and seller have partly conflicting interests and are asymmetrically informed. Before negotiating the takeover, participants have the option to switch from the former Random Lottery Incentive scheme to a Cumulative Scheme (RLI and CS hereafter). In this particular setup, it can be investigated how past experience and individual characteristics affect switching, and how choosing RLI or CS influences strategic behavior.[1]

The key argument is that agents are heterogeneous and may behave differently when they are able to select the payment scheme which better suits their intrinsic attitudes and characteristics.

The majority of previous contributions investigate the reactions of participants to exogenously imposed payment schemes, rather than self-selected ones, and the effect of these reactions on productivity and final payoff without considering the importance of sorting, which may lead to the overestimation of the role of incentives (Lazear, 2000).[2] The experiment of Eriksson et al. (2009) confirms the relevance of self-selection and the risk of overestimating the variability of effort when imposing a competitive payment scheme on very risk-averse or under-confident subjects. In fact, allowing participants to choose the payment scheme reduces the variance of effort.

Since individual characteristics are crucial for such self-selection, the behavioral effects of choosing the payment scheme may differ from the imposed one, especially when individual characteristics vary across participants. We are particularly interested in the role of *incentives* and *motivations*, as described by Bardsley et al. (2009); whereby *motivation* determines the behavior of subjects although it is not controllable by experimenters, because assessing how idiosyncratic preferences conform to the payment scheme imposed by the experimenter, for example, is difficult. This work aims to contribute to the understanding of the role of *motivation* (former play experience and individual characteristics) when subjects are allowed to switch incentive scheme.

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[1] To date, methodological studies in the experimental literature mainly focus on the validity of RLI and CS as unbiased incentive schemes (see Holt, 1986; Cubitt et al., 1998; Beattie and Loomes, 1997; Bardsley et al., 2009, among others). When comparing the two payment schemes, results appear to be quite mixed. Lee (2008) underlines that risk aversion, induced via CS, decreases absolute risk aversion. On the other hand, RLI is a method which avoids wealth effects and is usually considered to be the better incentive scheme, especially when comparing actual behavior with benchmark solutions for one-off play. Laury (2006) elicits choices under different payment schemes, including RLI and CS, and finds that no significant differences arise. Further discussion on incentive mechanisms in experimental settings is discussed by Azrieli et al. (2012); Cox et al. (2014), and Harrison and Swarthout (2014).

[2] Few empirical studies address this issue. In a controlled laboratory environment, (Dohmen and Falk, 2011) investigate which personal characteristics, beyond individual productivity differences, provoke workers to self-select into variable instead of fixed-pay contracts.

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This experiment implements a bargaining game, which is a modified version of the Acquiring-a-Company game (Samuelson and Bazerman, 1985). After playing 31 periods of such bargaining, where experienced participants are constantly assigned to the seller or the buyer role, they are asked to choose whether or not to switch from RLI (based on one random period selected at the end of the experiment) to CS for the following stage of 12 successive periods.[3] Participants are unaware of the payment mode selected by their trading partner. This may help to answer questions such as: How does behavior affect the distribution of the final surplus from trade? Is trade equality influenced by the self-selected incentive scheme?

The analysis proceeds in three steps. First, the individuals' determinants involved in switching one's payment scheme are assessed by relying on information about past behavior and performance in the first stage of 31 periods, as well as on basic individual characteristics. Switching may of course be hindered by inertia, while CS by definition suffers from wealth effects. However, we prefer these drawbacks to letting participants repeatedly experience CS in the first stage, which generates a wealth effect, before allowing them to switch the payment scheme. In the current experimental setup, experienced participants are unaware of the random period selected for payment in the first stage until the completion of all stages.

Second, we investigate whether and how the chosen payment scheme affects behavior and outcomes.

Third, the analysis focuses on the distribution issue, in particular how, under asymmetric information and different incentive schemes, sellers and buyers share the surplus of trade, and whether or not social equality is enhanced by endogenous incentive selection.

Our results reveal that both past experience and individual characteristics, such as gender, are crucial factors in selecting the payment method. The modified version of the Acquiring-a-Company game seems especially suitable so as to be able to explore how gender affects choosing whether or not to switch from RLI to CS, as this choice likely depends on one's role as buyer or seller. While the seller is not confronting risk when deciding, the less informed buyer faces a serious risk of incurring losses when offering a price to the seller. One may therefore expect less gender differences for the buyer role due to the stronger cognitive demands in this role than for the seller role.

Other scholars focus on the relationship between gender and monetary incentives, and find that females fail to reveal their type and are less sensitive than males to the monetary incentives of competitive mechanism (Migheli, 2015 considers monetary incentives in tournaments), and, in general, that females tend to shy away from competition (Niederle and Vesterlund, 2007). This preference difference towards a more competitive environment is weakened with experience. Consistent with (Cotton et al., 2013), we find that the performance gap between males and females is not relevant; it is only their ability that serves as a significant predictor of performance. Our results show that sellers overwhelmingly choose the RLI scheme according to their risk preferences, although female sellers are more attracted to the CS scheme than male sellers. Buyers who are actually facing stochastic risk and experiencing loss aversion choose RLI when playing more aggressively, and in particular, female buyers seem to display a higher loss aversion (Brooks and Zank, 2005). After choosing the payment scheme, sellers are generally more willing to accept the deals when paid according to CS, while buyers are likely to earn more when choosing the RLI scheme which triggers lower price offers to sellers. Social inequality is at its lowest when CS sellers meet with RLI buyers.

Another possible explanation for self-selecting in a particular payment scheme is related to ego-defensive concerns: the denial of imminent losses or bad choices may induce the decision maker to select a payment scheme which delays responsibility (Speisman et al., 1964). This is related to cognitive dissonance theory (Festinger, 1962), whereby admitting a former failure may seriously question belief in ones own confidence and competence. This suggests that one might avoid admitting failure by blaming bad luck, which, however, requires one to select a random period payment instead of an average payment.[4]

This experiment could provide answers to other related fields characterized by conflicting interests and forms of asymmetric information, such as the principle-agent model and monitoring incentives. We could also interpret the two payment schemes as two possible monitoring incentives, where the cumulative pay requires permanent control whereas random task rewards allow selective monitoring. Two different types of agents, involving more and less risk for the buyer and the seller, respectively, could either be paid by a scheme implying less monitoring, rewarding the effort in negotiation by a single randomly chosen task (RLI), or via a highly monitored task (CS). Demougin and Fluet (2001) find that in some cases, the cheapest way to induce more effort is to lower monetary incentives and increase monitoring. We consider this to be true when the risk associated with the agent task is moderate. Indeed, we expect that those agents benefitting from more information and lower payment variance will switch more often to CS (sellers), while those with a higher risk task may choose with regard to other standards. Employees are characterized by heterogeneous ability, and we assume the contract design in order to allocate the right workers for specific work by means of incentives, (see Stefanec, 2010).

This paper is organized as follows. Section 2 describes the game model. Section 3 focuses on the experimental approach and Section 4 illustrates the results. The main conclusions of the paper are reported in Section 5.

2. Game model

The game we adopt in this work is based on a modified version of the Acquiring-A-Company game proposed by Samuelson and Bazerman (1985). The firm owned by the seller has value v (known only by seller), randomly generated according to the uniform distribution (0, 1). However, the seller evaluates the firm only qv, with $0 < q < 1$. The distribution of v and the value of q are common knowledge, while the value of the firm v is known only by the seller. If trade occurs at price p, the buyer earns $v - p$ and the seller . The decision process in each period is as follows:

(i) Knowing v, the seller sends the value message $\hat{v} = \hat{v}(v)$ which might be true ($\hat{v} = v$) or false ($\hat{v} \neq v$);
(ii) after receiving message $\hat{v}$, the buyer proposes the price $p = p(\hat{v})$; and
(iii) after receiving the price offer, the seller accepts it ($\delta(p) = 1$) or rejects it ($\delta(p) = 0$).

Conditional on acceptance, the seller earns $\delta(p)(p - qv)$ and the buyer $\delta(p)(v - p)$: when trading, that is, when $\delta(p) = 1$, the total surplus $v(1 - q)$ is always positive. When not trading, that is, when $\delta(p) = 0$, both the buyer and seller earn nothing.

Since $\delta(p) = 1$ is only optimal for $p \geq qv$, a risk-neutral buyer expects to earn:

$$\int_0^{pq} (v - p)dv = (0.5 - q)\frac{p^2}{q^2}, \tag{1}$$

which increases (decreases) with p for $q < 0.5$ ($q > 0.5$). Since $v < 1$ implies $vq < q$, it is never optimal for the buyer to offer a price higher

[3] Experienced participants can choose to switch their pay based on a large number of periods. More experience should guarantee that gender effects become weaker (Di Cagno et al., 2017) and participants less used to this type of game can learn and fill the experience gap with the others (Casari et al., 2007).

[4] Psychologically, a similar effect is related to the disposition effect (see Shefrin and Statman, 1985 and Weber and Camerer, 1998, among others).