

Self Selection and market power in risk sharing contracts[☆]Kislaya Prasad^{a,1}, Timothy C. Salmon^{b,*}^a Robert H. Smith School of Business, University of Maryland, College Park, MD 20742, United States^b Southern Methodist University, Department of Economics, 3300 Dyer Street, Suite 301 Umphrey Lee Center, Dallas, TX 75275-0496, United States

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ABSTRACT

Although the theory of optimal contracts and the principal agent model are now well established in the literature, empirical support for this theory has been mixed at best. We use economic experiments to test contract theory and assess the empirical relevance of two possible confounding factors that may explain why the theory has not received stronger empirical support. First, parameters of interest may be biased if agents self-select into projects with differing risk profiles based on risk preferences. Second, differing levels of market power on either side of the market could shift contract terms in ways contrary to theoretical predictions. In general, we find support for classical contract theory augmented to accommodate market power and self-selection based on risk preferences. We also find evidence for a third confound in the form of the characteristics of agents not party to the transaction affecting the terms of the contract.

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1. Introduction

The conflict between risk and incentives is central to contract theory, which posits a fundamental trade-off: the optimal incentive intensity must necessarily be a compromise between the twin goals of providing optimal incentives and sharing risks efficiently. The classic analysis of the theoretical problem dates back to Mirrlees (1974), Mirrlees (1975) and Holmstrom (1979). Starting from these results, an extensive theoretical literature has developed (see Bolton and Dewatripont (2005)). However, as Chiappori and Salanie (2000) point out, empirical validation of the theory has lagged behind, and empirical support has been mixed at best. Prendergast (2002) summarizes the state of affairs: “Empirical work testing for a negative trade-off between risk and incentives has not had much success: the data suggest a positive relationship between measures of uncertainty and incentives rather than the posited negative trade-off.” In this paper, we use economic experiments to test contract theory and assess the empirical salience of two possible confounding factors that may explain why the theory has not received stronger empirical support. First, parameters of interest can be biased if agents self-select into projects with differing risk profiles based on risk preferences. So we examine if such self-selection occurs in an environment where contract negotiations and task allocation must both be accomplished. Second, differing levels of market power on the two

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* Corresponding author. Tel.: +1 214 768 3547; fax: +1 214 768 1821.

E-mail addresses: kprasad@rhsmith.umd.edu (K. Prasad), tsalmon@smu.edu (T.C. Salmon).

¹ Tel.: +1 301 405 9637; fax: +1 301 405 9655.

sides of the market could shift contract terms in ways contrary to theoretical assumptions. So we examine the empirical relevance of market power as a determinant of contract terms and task allocation.

The problem can be illustrated by considering the example of sharecropping. Tenants bear all of the risk with fixed rent contracts, while risks are shared with sharecropping contracts. A standard prediction of incentive theory is that sharecropping contracts are more likely to be associated with more risky crops.² However, contrary to the predictions of incentive theory, Allen and Lueck (1992) show that the fraction of output that goes to sharecroppers is *positively* related to measures of riskiness. Studies of executive pay and franchising find similarly disturbing results. Chiappori and Salanie (2000) propose a possible explanation: if the more risk-tolerant individuals choose both more risky crops and more risky (fixed rent, rather than sharecropping) contracts then this could explain the existence of the positive relationship. The basic power of the theory regarding contract structure would then remain intact. Akerberg and Botticini (2002) attempt to address this issue using a data set on agricultural contracts from early Renaissance Tuscany with wealth as a proxy for risk aversion. Using an instrumental variables approach to control for self-selection, they find support for risk-sharing.³ While this study is useful, it is not fully convincing due to the fact that wealth is at best an imperfect measure of risk aversion.

Our work is aimed at addressing this issue directly. We seek to determine if we can find evidence in favor of the existence of self-selection into tasks by risk preferences in a way that could lead to the confounding results discussed above. At the same time we also examine whether other elements not accounted for in the theory, but which might be present in the field, could also affect contract terms. To this end we consider a standard principal–agent game in which the principal controls two types of tasks, safe and risky. He is attempting to contract with agents to perform each task. We measure the degree of risk-aversion of agents from their choices between lotteries using a technique developed in Holt and Laury (2002), and examine whether more risk averse agents end up on safer projects. Players in our experiment negotiate contracts, and the data on contracts allows for a direct test of contract theory. We can test whether terms of contracts vary in predicted ways with the measured degree of risk aversion of principals and agents. Finally, given the negotiated contracts, agents are allowed to choose investment or effort and we examine the extent to which these are consistent with incentives.

A second question addressed in this paper relates to how negotiated contracts react to the presence of market power. The standard assumption used in contract theory is that negotiated contracts are optimal for the principal (subject to agent individual rationality and incentive constraints). While this is the outcome of some stylized bargaining models, it is not clear that this should always be expected to be the outcome of market negotiations. We hypothesize that the terms of the contracts should be dependent on the relative market power of the two sides of the negotiation. If the terms of the contract become more generous to the agents than the principal–optimal level due to the agents possessing some market power, then this could also confound the expected relationship between contract terms and riskiness of the underlying contract. To test this hypothesis, we use experiments in which we vary the numbers of agents on either side of the of the transaction to create market power on one or the other side of the market.

Our baseline situation has one principal bargaining with two agents in an attempt to contract with them to perform two tasks, one per agent, with varying levels of riskiness. Here the number of projects and agents is equal. We then change the market configuration by adding two treatments. In one we add an additional agent, leading to a situation in which there is more supply of labor than there is demand. In another treatment we add a second principal to the mix, leading to a total of four tasks but only three agents. This situation involves having more demand for labor than there is supply. The expectation is that the treatment with more agents than tasks will push the contract terms to be less favorable to the agents, and the treatment with more tasks than agents should push the terms of the contracts to be more favorable to the agents. Market power is also likely to affect self-selection pressures. In the case of classical principal–optimal contracts the more risk-averse agent ends up with the less risky project and the less risk-averse agent gets the risky project. Our excess labor treatment, where market power rests with the principal, should most closely approximate this case. When the participation constraints of the agents no longer bind due to the increased generosity of the contracts in the other treatments, pressure to select into tasks by risk preferences could ease.

In general, our results indicate that classical contract theory holds up well once we account for self-selection and market power. We find evidence of self-selection by risk-preferences, and find that market power affects both contract terms as well as the extent of self-selection. There are two significant implications from our results for empirical research. First, our results reiterate the need to adequately control for endogenous matching. The second implication is related to the importance of market power in driving contract terms. While there certainly are previous demonstrations – back to Holt et al. (1986) or even Smith (1962) – of the effectiveness of market power or, more generally, market forces in driving prices, this insight has been largely missing from the contract negotiation literature. Our results clearly demonstrate their importance in this arena and make it clear that in modeling contract formation, principal–optimal contracts should not always be assumed due to the potential presence of some market power among agents.

² In the context of the model of Holmstrom and Milgrom (1987), “the optimal piece rate is $1/[1 + rC''(e)\sigma^2]$, where r is the degree of absolute risk aversion, $C(e)$ is the cost of effort of the agent, and σ^2 is the variance of the measurement error on performance” (Prendergast, 2002, p. 1076). Tests of the theory are based on the observation that the optimal incentive intensity is inversely related to the variance of the project. Note that the formula holds exactly only for the case of linear contracts in the normal–exponential model.

³ We note that there have been some experimental papers examining self selection according to social preferences of subjects such as Königstein and Ruchala (2007) and Lazear et al. (2005).

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