THREE ESSAYS ON BEHAVIOURAL CONTRACT THEORY

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by

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SYNOPSIS

After the emergence of experiments in economics the economic literature has grown rapidly and have moved away quite a lot from individual rationality that puts a lot of emphasis on pure self-interestedness. Even though stalwarts like Samuelson, Friedman and Hayek had suggested that economics is unamenable to scientific experiments, experimental results have shown that our dinner is not always dependent on the self-interestedness of 'the butcher, the brewer, or the baker'. There is something more to it. The effects of psychological, emotional, cultural, cognitive and social factors which almost remained out of the purview of 'classical economic theory' should be integrated with individual or institutional decision making. The concept of *homo economicus* can be made more robust by incorporating human psychological behaviours. People show positive traits like compassion, love, care for others and also negative traits like envy, jealousy, spite etc. Evidence of this can also be found in the experimental literature.

The present study is a standard principal-agent model with moral hazard. The existing literature mostly deals with self-regarding principal and other-regarding agent(s). But since principal and agents are both social animals it is not very unusual for them to show more than just self-regardingness. Recent literature and experiments have also suggested the presence of social comparison in human decision making. This common human behaviour is well articulated by distinguished professor of behavioural economics and Nobel Memorial Prize winner of 2017, Richard H. Thaler in his celebrated work *Misbehaving: The Making of Behavioural Economics*. He criticizes the notion of assuming an 'economic man' as a 'social moron' and a 'rational fool'. In principal agent models this holds true as well. As is previously mentioned that experiments on dictator game, ultimatum games have also shown the existence of social comparisons in decision making. In existing literature, the agents are assumed to be other-regarding whereas the principal is assumed to be a 'rational fool' only concerned about his own monetary payoff. Till date the only paper that specifically addressed other-regarding

principal is Banerjee and Sarkar (2017). They characterize in detail the optimal contracts when first an other-regarding principal interacts with a self-regarding agent. They show that the optimal contract differs considerably when the principal is 'inequity averse' vis-a-vis the self-regarding case. They also analyze in some detail the interaction of an other-regarding principal with an other-regarding agent. In their paper the principal can be both 'in-equity averse' and/or 'status-seeking' and they concentrate on discrete efforts only. There is still scope for further research with a more general structure with continuous effort and output levels. The structure can also be made more generalized. We try to study how the optimal contract changes with an other-regarding principal and agent(s). We also study a comparison between individual production (single agent hired) and team production (two agents hired) under the presence of social preferences.

Initially we have formulated a simplified principal-agent model with discrete outcomes and continuous effort choices. The principal (employer) has hired an agent (employee) to work in a project. The agent puts in effort into the project. The outcome of the project is verifiable whereas the effort of the agent is not. This creates a moral hazard problem. Since the effort is non-verifiable therefore the agent is paid according to the outcome of the project. High output indicates higher effort was exerted. But high effort does not always guarantee high output even though the chance of realizing higher output increases. The optimal incentive contract is calculated for self-regarding principal and agent as a benchmark case. It is found that for lower outside option, principal optimally shares the gross payoff equally if the project succeeds when both are self-regarding. For higher outside option participation constraint binds and the success wage increases with increased outside option of the agent. Then principal is assumed as spiteful and agent is assumed to be self-regarding. Spitefulness is in the sense that the principal always likes to be ahead of the agent in terms of payoff. It gives her an additional utility by being ahead. Here, it is found that the wage offered and the optimal effort will be lower than the self-

regarding benchmark setup. A self-regarding agent is weakly better off with a less spiteful principal. Then finally the principal and the agent both are considered to be other-regarding in nature. The principal is spiteful who likes being ahead and the agent suffers from a disutility by being behind in terms of payoff from the principal. Under this structure optimal wage is weakly decreasing with respect to principal's spitefulness. The optimal wage is positively related with the inequity averseness of the agent. These results are quite intuitive as a highly spiteful principal will offer lower wage since he likes being ahead of the agent. An inequity-averse agent on the other hand will prefer to reduce the payoff difference so with increased inequity-averseness success wage will increase. This success wage is compared with the previous two cases and it is found that this success wage lies between the benchmark case (both self-regarding) and only principal other-regarding case. When the principal and the agent have exactly opposite other-regardingness, we get the self-regarding benchmark results. A few other alternative specifications for the other-regarding function are done as extensions and the main results qualitatively remain same.

The initial model of spiteful principal and inequity-averse agent is then generalized with continuous output level. The principal is other-regarding in nature. Here other-regardingness can be of two types: inequity-averseness and status-seeking (spiteful). Both are considered for the analysis. This chapter is done following Englmaier and Wambach (2010). It is found that if the principal is non-linearly other-regarding then the optimal contract wage schedule is unlikely to be linear when effort is contractible. This result is different from the result found in Englmaier and Wambach (2010) where the wage contract is linear when effort is contractible. In Englmaier and Wambach (2010) the principal is assumed to be self-regarding. But here since the analysis is done with an other-regarding principal, it has been observed that the wage schedule will be linear if and only if the principal is linearly other-regarding. So, the Englmaier and Wambach (2010) result of linear wage contract holds with contractible effort only under

this condition. It is also found that the wage offered by a status-seeking principal will be less than the wage offered by a self-regarding principal which will be lesser than the wage offered by a spiteful principal. When effort is non-contractible, optimal contract for risk-averse agent is strictly increasing even if when the principal is spiteful. It is also found that given the output level, the wage schedule is decreasing with respect to the spitefulness parameter of the principal and increasing with respect to the inequity averseness parameter of the agent. An agent with infinite concern regarding the inequity-averseness will be offered an equal share of the success output by the principal. Holmstrom (1979) stated that an agent's wage should ideally depend on the output level of the project since it is an indicator for the effort exerted by the agent. If the output contains any component which is not an indicator of effort choice of the agent, then the optimal wage should not be dependent on that part. This sufficient statistics result of Holmstrom (1979) hold when both the principal and the agent have exactly opposite other-regarding preferences with same other-regarding functions. Otherwise, optimal wage schedule contains non-relevant information regarding the effort choice.

We also formulate a multi-agent extension or a generalization of the previous model where two agents are hired for working in two separate projects. Outcomes of the projects are verifiable by the principal but efforts of the two agents are not. The same Englmaier and Wambach (2010) model is followed for the analysis. The question of optimality of relative performance contract or team contract arises here. When two agents are hired for two separate projects then if the wage of one agent increases when the output of the other project rises then this type of contract is called team contract. But when a rise in one project's output leads to a fall in the wage of the other agent employed in the other project then it is called a relative performance contract. If output of one project has no impact on the wage of the other agent from the other project, then it is an unrelated contract. The relation between one project and the wage offered in the other project is referred to as cross wage effect. In this chapter both the

principal and the agents are assumed to be other-regarding. The principal is other-regarding vis-à-vis the agents. The agent is inequity-averse vis-à-vis the principal and also vis-à-vis the other agent (peer comparison). Peer comparison also arises in this analysis because they are employed in two separate projects so they can be offered different wages. Different wages can cause a wage comparison and inequity-aversion. The analysis suggests that with not so high cross wage effect, a not so high status seeking principal or an inequity averse principal will offer a contract which is increasing with respect to its own output. Englmaier & Wambach (2010) showed the optimality of 'team contracts' when principal is self-regarding and agents were other-regarding and projects are technologically independent. The same result is generalized here with inequity averse principal under an additional condition of not so high own wage effect. On the other hand, under the same additional condition, with a sufficiently status-seeking principal a relative performance contract can be optimal if the agents' wages are far apart. It is also found that the wages offered to the agents rise when the agents are more concerned about their payoff difference vis-à-vis the principal. If the agents are not highly concerned about their payoff difference vis-à-vis the principal, then an increase in status-seekingness of the principal will lower the wages for both the agents. Agents are better off with a more inequity-averse principal. It has also been shown that the principal optimally removes the entire payoff difference between the agents by offering the agents equal wages if the agents are too much concerned about their own payoff differences. This is similar to the result found in Englmaier & Wambach (2010). With an increase in peer comparison, the wage gap of the two agents is optimally reduced by the principal.

We further extend our analysis with a model where the principal compares between individual production and team production. The principal has a choice to hire one agent (individual production) or two agents (team production). This chapter is a generalization of Che and Yoo (2001). The same structure is followed for inequity-averse principal and agent(s).

Che and Yoo (2001) has found that individual production is always optimum if synergy is not present in team. But here our result deviates when we introduce other-regardingness for principal and agent(s). Our findings suggest that an inequity-averse principal dealing with an inequity-averse agent will prefer team production over individual production even without synergy if and only if both of their inequity concerns are not very low. The principal having a high inequity-aversion and the agent having a very low inequity aversion will not suffice for the optimality of team production over individual production. For team production to be optimal without synergy both of their inequity-averseness should be non-trivially positive. It is also found that with a sufficiently high project outcome, the optimal wage increases with a rise in inequity-averseness parameter of the agent(s). The analysis is done for static and dynamic framework both. The dynamic framework is relevant as many times industrial contracts last for more than once. The repeated interaction throws some light on how the contract performs in the long run. It is observed that the principal is better off under repeated setting than under the static setting. The wage offered in the repeated setup is comparatively lower than the wage offered under static setup. It is also observed that under repeated interaction the principal is more likely to choose team production over individual production irrespective of the fact whether the team has synergy or not.

Lastly, we present the summary of the important results found in our study and the scope for further research in the concluding section of the dissertation.

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