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Inequity Aversion, Incentives and Promotions

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Abstract
This paper delves into the critical examination of equality and fairness within incentive programs and promotions. The study places a spotlight on the concept of inequity aversion, underscoring its pivotal role in evaluating the effectiveness of such initiatives. The core focus is on individuals' responses to perceived unfairness in reward distribution. The research explores diverse strategies for constructing incentive programs that judiciously account for people's aversion to inequity. Additionally, the study scrutinizes the potential influence of promotions on employees' attitudes towards equity and fairness within organizational frameworks. It underscores the imperative of aligning promotion rules with overarching equity objectives. In essence, the paper underscores the paramount importance of integrating equity and fairness considerations into the development of incentive programs and promotions, offering actionable recommendations for businesses aspiring to cultivate reward systems that are both equitable and efficacious.
Keywords: *Inequity Aversion, Principal, Agent, Endogenous, Exogenous*

1. Introduction
Inequity aversion is a sociological theory which describes a person's general dislike for any change in his position/ status/ well-being with respect to his direct colleagues. Inequity aversion is of two types: positive inequity aversion or advantageous inequity aversion and negative inequity aversion or disadvantageous inequity aversion. Positive or advantageous inequity aversion is often observed in situations where people feel that they are being rewarded unfairly. This may lead to them developing feelings of guilt/ shame/compassion towards their comrades. In this paper, we will consider positive inequity aversion as compassion individuals feel towards others when they perceive that they are being favoured unfairly. For example, suppose an employee receives a bonus that is much higher than their colleagues. In that case, they may feel uncomfortable due to compassion for others and choose to share their bonus with others to alleviate their discomfort. Negative or disadvantageous inequity aversion is when people feel that they are being deprived unfairly when compared to their fellow-workers. For instance, if a worker feels that they are being paid less than their colleagues who perform similar duties, they may be motivated to demand a higher salary or seek other forms of compensation. The same individual can exhibit either positive or negative inequity aversion, depending on the situation. In general, negative inequity aversion is more easily observable in day-to-day life. For this reason, we assume an individual's negative inequity aversion to exceed their positive inequity aversion. In other words, individuals are assumed to feel more envy than compassion whenever there is inequity which is a reasonable assumption in several real-life scenarios. We introduce the paper which expands on the literature, assumptions made to develop the model and the model been introduced. It describes the practical significance of the model and its appropriateness in explaining empirical data. We talk about promotions. We intuitively discuss the

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effects of the number of prizes on equilibrium efforts by relaxing an assumption. We summarize the paper's findings, discuss its applications and highlight its shortcomings for future research.

2. Literature Review

The groundbreaking article "Rank Order Tournaments as Optimal Labour Contracts" by Lazear-Rosen introduced the idea of inequity aversion. Inequity aversion was first introduced in this paper in a very basic manner. It was discussed how an individual's surroundings have a significant impact on how they view their well-being and how salaries are a superior form of payment than piece rates based on an individual's industrial production. In a 2005 study, Christian Grund and Dirk Sliwka further investigated the idea of inequity aversion and discovered that, for a given incentive structure, inequity-averse agents work harder than merely self-interested agents. On the other hand, first-best efforts cannot be used when prizes are endogenous. The American Economic Review published an essay by Benny Moldovanu and Aner Sela titled "The Optimal Allocation of Prizes in Contests". The article discusses the best method for giving out prizes in competitions in order to engage the most participants and keep them motivated. The authors got to the conclusion that it is optimal to only award one "first" reward out of the whole amount of the prize pool when cost functions are linear or concave in effort. It is feasible that more than one positive prize is optimal when the cost functions are convex. Additionally, successful prize distribution plans from the actual world are shown in the instances. In a study titled "Inequity Aversion and Team Incentives" by Pedro Rey-Biel, the model by Fehr and Schmidt (1999) is used to address a unique instance of an exploitative employer that persist in today's society [1-4].

A "selfish" employer can use contracts that produce inequities off-equilibrium, or when employees do not meet his demands, to profit from employee resentment or guilt. This paper aims to build on the concepts discussed in these papers and develop a mathematical model to answer some of the questions that persist in the society today [5].

3. Assumptions

The model was proposed, and inferences were drawn while assuming the following conditions to hold:

3.1 The strength of envy is greater than the strength of compassion

We have assumed that an individual is capable of both envy and compassion. When the individual feels favored unfairly, they feel compassion and when they are disadvantaged, they feel envy. An individual cannot feel envy and compassion at the same time. We have assumed the strength of envy to be more than the strength of compassion to account for the environment broadly observed in competitive settings.

3.2 The output function is an increasing concave function of effort

The output function has been assumed to be a function of both effort and ability. Ability is represented by a random component that has normal distribution with mean as zero. Thus, equilibrium effort of individuals in a competition is the sole deciding factor of the principal's average output. Output increases; but the rate at which it increases, decreases with effort. This is due to the diminishing marginal productivity phenomenon. Thus, the output function is an increasing concave function in effort.

3.3 The cost function is increasing convex function of effort

The cost function has been assumed to be a pure function of effort. Costs increase; but the rate at which they increase, increases with effort. This is due to increasing marginal costs incurred by workers. Thus, the output function is an increasing concave function in effort.

4. The Model

This model is adopted from Fehr and Schmidt (1999) assuming a tournament between 2 agents.

Output of agent i exerting effort of ei,

$$\mathbf{qi = h(ei) + \varepsilon i}$$

Cost of agent i exerting effort of ei,

$$\mathbf{C(ei)}$$

w1 - wage given to the winner of the tournament
w2 - wage given to the winner of the tournament

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$$\Delta w = w1 - w2$$

Utility of agent i:

$$ui = wi - \alpha \max\{wj - wi; 0\} - \beta \max\{wi - wj; 0\} - C(ei)$$

α - inequity aversion due to envy
β - inequity aversion due to compassion
α > β Utility of the winner - i

$$uwi = w1 - \beta \Delta w - C(ei) = w2 + (1 - \beta)\Delta w - C(ei) \quad \beta < 1$$

Utility of the loser j:

$$uLj = w2 - \alpha\Delta w - C(ei).$$

5. Exogenous and Endogenous Prize Structures

Exogenous Prize Structure is a prize structure where the prize is fixed and does not depend on the performance of the participants. In Endogenous Prize Structure, the prize depends on the performance of the participants. Detailed analysis of these prize structures highlighted two phenomena that control the principal's profits in an inequity-averse work environment.

5.1 Incentive effect

An incentive is a stimulus aimed at increasing productivity of the workers and consequently the principal's net profits. An incentive can be positive or negative. Positive incentives include rewards and bonuses while negative incentives refer to penalties or demotions. Incentive effect is the effect that an incentive has on an individual's behaviour. Unlike incentives, incentive effect is always positive [2]. That is, potential demotion and a potential bonus both boost productivity of workers. The more effective incentive depends on the context and the work environment. In presence of inequity aversion, the incentive effect comes into play because of the strength of envy being greater than compassion. Individuals are motivated to surpass their peers due to their dislike for being surpassed. This leads to an increase in equilibrium efforts and the consequent increase in equilibrium profits. This effect is observed for both endogenous and exogenous prize structures. However, it can be neutralized by choosing an appropriate exogenous prize structure where inequity costs exceed profits due to incentive effect.

5.2 Participation effect

The participation effect refers to the difference in attitudes of those who actively participate in a process towards a particular project in comparison to those who are simply expected to execute the decided tasks. In particular, the participation effect suggests that people who are involved in a decision-making process are more likely to be committed to the outcome and to support its implementation. In situations where inequity aversion is a factor, the participation effect comes into the picture only when the prize structure is endogenous. This is because unlike in when the prize structure was given (exogenous prize structure), the principal has the additional task of attracting participants to participate in the tournament when the prize structure is endogenous. This requires the principal to cover for inequity costs due to the agents' inequity aversion. The principal has to choose a wage spread such that the incentive effect is high and at the same keep inequity to the minimum. This leads to the participants putting in second best efforts to maximize principal's profit. Thus, this leads to a fall in principal's profits due to decreased equilibrium efforts and increased inequity costs. The principal here is worse-off when compared to purely selfish agents' case. Therefore, participation effect always reduces welfare

The profits of the principal in the endogenous prize structure:

- Always decrease with an increase in compassion between agents due to both incentive and participation effects working in the same direction
- Increase with an increase in envy if agents are considerably compassionate as the incentive effect overpowers the participation effect
- Decrease with an increase in envy if agents are less compassionate as the participation effect overpowers the incentive effect

6. Promotions

Pay-off in a competitive setting doesn't necessarily need to be a higher wage. Higher social standing/

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title can also motivate employees to participate in a tournament. And like in the previous competition for higher wage, inequity aversion is observed here as well. We take two types of promotions under consideration in this paper – vertical promotion and lateral promotion. In vertical promotion, an individual working in a group is promoted to a higher position in the group. For example, when a person working on a project is promoted to lead the team as their leader. Lateral promotion, on the other hand, is when an employee is promoted to lead a different team. In vertical promotions, the strength of envy or compassion is higher than in case of lateral promotions. This is because there is continued interaction between the same group of people even after promotion [1-3]. This does not happen in case of horizontal promotion. This is in line with empirical data and general common sense. For simplicity, we assume inequity aversion absent in case of lateral promotion.

An individual's expected utility is given by,

$$\mathbf{EUi(ei) = w2 - g\,(0)\,w\,(1 + \tau\,(\alpha - \beta)) = (C\,(e^*))/\,(h\,(e^*))\,\alpha\Delta w + G(h(ei) - h(ej))\,[\Delta w\,(1 - \tau\beta + \tau\alpha)] - C(ei)}$$

Where τ is the probability of employee i being promoted, from this it follows that 1-τ is the probability of him not being promoted. Rest of the notations are the same as defined.

In case of vertical promotion, i.e., when α, β are not zero, on maximizing utility with respect to e**,** the following expression is obtained:

$$\mathbf{g\,(0)\,w\,(1 + \tau\,(\alpha - \beta)) = (C\,(e^*))/\,(h\,(e^*))}$$

Thus, equilibrium efforts are the first best efforts, similar to the ones obtained in case of endogenous prize structure. The principal's profits are maximized and so, she prefers this form of promotion when the prize structure is endogenous.

$$\mathbf{max_e\ 4h(e) - 4C(e) - 4U_0 - 2\tau\,(\alpha + \beta)}\ \frac{C'(e)}{h'(e)(1 + \tau\,(\alpha - \beta))g(0)} + \mathbf{k_L}$$

$$\mathbf{h'(eSB) - (\tau\,(\alpha + \beta))/\,(2(1 + \tau\,(\alpha - \beta)\,g\,(0))\,(C''(e)h'(eSB) - C'(eSB)h''(eSB))/((h'(eSB))2) = C'(eSB)}$$

When the prize structure is exogenous, second-best efforts are obtained. Thus, the principal is worse off than in the case of purely selfish agents. One option available to the principal here is the option of lateral promotion. While lateral promotion would relieve the burden of inequity costs, the principal now has to deal with potential loss in human capital. While the employee can be promoted to lead another team, they may not possess the skills required to lead the other team. This would reduce the output and thus affect the principal's profits.

For this reason, the principal has to carefully analyse the trade-off between reduced inequity costs and reduced output and choose the option that maximises the net profit. Lateral promotions are preferred when prize structure is endogenous and loss in human capital is minimal. Vertical promotions are preferred when prize structure is fixed or when the prize structure is endogenous but there is considerable loss in human capital, with potential loss in human capital as described.

7. Relaxing Assumptions

The output function defined is a function of the two variables effort and ability. Effort represented by e_i, as in effort exerted by individual i and ability represented by ε_i. We assumed ε_i (random factor) to have sampling distribution and have the average value of zero. Thereby making effort to be the primary influencing factor in the case of output. We also assumed the cost function of each employee to be a pure function of effort. This function is convex in nature, i.e., cost of effort increases with effort and so does the rate at which it increases. In this section, we explore the possibility of cost function being a separable function of effort and ability and the impact it has on the number of prizes the principal should offer. The combined cost function of all individuals can be classified into three types based on their abilities. The cost function (varying with

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effort) can be linear or convex or concave. When the cost function is linearly varying with effort, the individuals considered are mostly of similar ability. These individuals exert more effort with increased competitive stimuli. Therefore, having one single prize would motivate them to increase their equilibrium efforts and consequently the principal's outputs. When the cost function is a convex function, there is a considerable difference in abilities among the individuals considered. Some are more capable than others. These highly capable employees can either be more in number than the lesser capable ones or their contribution may be more than the lesser capable ones. In such a work environment, these efficient employees improve their productivity with increased competition. Increased competition here, decreases the productivity of middle/low ability workers but increases the productivity of high ability workers. Since it is the high ability workers having a dominating effect on the output function, the principal should offer one single prize to motivate them to increase their equilibrium efforts as this would increase the principal's outputs. When the cost function is a concave function, there is again a difference in abilities among the individuals considered. Some are more capable than others, and this time the net impact of middle/ low ability workers on the net output is more. The highly capable employees are either lesser in number than the lesser capable ones or their total contribution is lesser. Since increased competition, decreases the productivity of middle/low ability workers, the principal should offer two or more prizes to increase their equilibrium efforts. Increase in the number of prizes has a negative effect on the productivity of high ability workers. They no longer have the incentive to use their full potential and contribute even lesser. However, as the mediocre/underperformers' performance here is the deciding factor, the marginal effect of their productivity exceeds the marginal effect of the overperformers' productivity and the principal's profits are increased.

Conclusion

In this paper, we discussed different prize structures and the effect that the prize structure has on individuals' efforts and principal's profits. When the prize structure is exogenous, inequity-averse agents exert more effort than purely self-interested agents. The principal's profit is more than in the case of purely self-interested agents. With such a prize structure, Vertical promotions lead to higher efforts and more profits. When the prize structure is endogenous, the inequity-averse agents exert less effort than purely self-interested agents. The principal's profit is lesser here than in the case of purely self-interested agents due to inequity costs. Lateral promotions are preferred with this prize structure to avoid inequity costs as long as the loss in human capital (difference in skill) is negligible. Some of the practical applications of the analysis done in this paper are found in corporate work environments. Research indicates that, in workplace competitions, the relative strength of envy and compassion between workers can have a significant impact on the motivation and effort levels of employees. Employers and managers can observe the bonding between the employees and use this knowledge to design competitions that are perceived as fair and at the same time boost the effort levels of the participants. When it comes to employment offers**,** the results we arrived at point to the fact that when the prize structure is endogenous, the principal's profits are lower. This is observed when companies offer employment to potential employees. The person sitting for the employment offer in question may or may not choose to participate in the competition for the job. To make the prospect of working in the organization attractive, the employer has to trade-off between offering a high salary and assuring the candidate of a secure and uncompetitive work environment. However, the framework proposed in this paper cannot be applicable in situations where agents' probability of victory is less than 0.5. This is because we have assumed a tournament between 2 individuals only where both agents are competing for one prize. An example of this would be a sports

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tournament where n agents are competing for one prize and n is greater than 2. The paper only theoretically discusses the potential effect of multiple prizes and does not delve into mathematical aspects of it giving rise to some ambiguity.

References

[1]. Grund, C. and Sliwka, D. (2006). Envy and Compassion in Tournaments. Journal of Economic Behavior and Organization, 61(2), pp.255-276.
[2]. Moldovanu, B., and Sala, A. (2002). Optimal allocation of prizes in contests. American Economic Review, 92(3), pp. 542-558.
[3]. Lazear, E. P., & Rosen, S. (1981). Rank-order tournaments as optimum labor contracts. Journal of Political Economy, 89(5), pp. 841-864.
[4]. Fehr, E., & Schmidt, K. M. (1999). A theory of fairness, competition, and cooperation. The Quarterly Journal of Economics, 114(3), pp. 817-868.
[5]. Rey-Biel, P. (2009). Inequity aversion and team incentives. Journal of Economic Psychology, 30(4), pp. 675-686.