Endogenous favouritism with status incentives: A model of optimum inefficiency

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ENDOGENOUS FAVOURITISM WITH STATUS INCENTIVES: A MODEL OF OPTIMAL INEFFICIENCY

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Abstract:

The paper identifies conditions under which 'inefficient' favouritism emerges as an optimal outcome even when the principal do not exhibit ex-ante preferential bias for any particular agent. We characterize how the optimal incentive scheme is influenced in the presence of status incentives. Using a moral hazard framework with limited liability in a multi-agent framework, it is shown that in presence of higher valuation for status incentive inefficient favouritism is more likely to dominate over fairness. Moreover, inefficient favouritism emerges as the optimal outcome when revenue of the firm is sufficient low.

Keywords: *Favouritism, status-incentives, principal-agent, moral hazard, optimal contract.*

JEL Classifications*: D86, L14, L20*

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1. Introduction

Favouritism is undesirable but still is widely practiced within organizations. In recent times, an influential strand of research in theoretical economics has analyzed the role of favouritism in creating inefficiency within the system. In many of the cases it is believed that favouritism creates the foundation for internal office politics and conflict due to desire for power, which adversely affect the work environment. In turn, the productivity of the workers is also affected.

The emerging literature on positive view of favouritism[1] tries to explain the reason for existence of favouritism and finds that directly favouring an agent over others (more deserving ones) can actually evolve as an optimal decision rule to the principal. Most studies on favouritism, including studies in business and sociology, identify the individual's personal preference for a certain agent (or a group of agents) as the primary source of favouritism. But in this paper we analyze the emergence of favouritism, even when the decision maker does not have any pre-determined preferential bias. In addition to this we also examine whether status as an incentive reinforces the optimal emergence of favouritism. Thus, our analysis proceeds close to Kwon (2006) to show that favouritism can be structural also in the presence of status incentives and limited liability constraint.

Often, favouritism is considered as an obvious outcome of subjective performance evaluation[2] which happens to be the best measure when objective performance measure becomes difficult to execute. Again, emergence of favouritism in the form of depriving an agent outside a network and thus, leading to inefficient decision making in the organization has gained attention in recent studies[3]. Unlike this whole lot of papers, this work provides the underlying micro-economic foundation behind the decision of preferring an agent out of a pool of two agents and analyzes whether the decision is optimal for an impartial principal. Similar to Kwon (2006), we assume that the principal observes the team performance of the agents. The principal can choose her favourite agent by delegating the decision right to any one of the agents. To ensure that the

[1] Few of the important papers in this area are Prendergast and Topel (1996), Prendergast (2002), Arya and Glover (2003), Kwon (2006), Bramoullé and Goyal(2009), Duran(2009), Chen(2010), Ponza and Scoppa (2011), Berger et al.(2011).
[2] See Prendergast (2002)
[3] For instance see Pérez-González (2006), Kramarz and Skans (2007), Bennedsen et al. (2007), Bandiera et al. (2009).

favourite takes the efficient decision[4] the principal has to provide larger incentives to the favourite agent. However, under fairness, the principal provides equal decision rights to both the agents and then, to induce efficient decision the principal has to provide higher incentive to both the agents. Therefore, if it is costly enough to induce efficient decision then the principal would participate in favouritism from incentive perspective only. This is similar to the basic intuition of Kwon (2006). However, in addition to this, our work has introduced the limited liability constraint, which limits the power of the principal to punish the agents beyond a certain point, when the outcome is poor. At the same time, we assume that the principal has an additional instrument to elicit effort together with the monetary incentive, viz. status incentive. Thus, different to Kwon (2006), these features help in generating the intriguing result that in a symmetric model[5], under certain situations, an ex-ante unbiased and rational principal would optimally offer a contract such that the favoured agent chooses her own bad project and therefore inducing the ex-post inefficient outcome to be optimal.

The role of non-financial incentives (like status) in eliciting correct level of effort has also gained importance in recent studies in economics. Unlike the influential and growing literature which studies the importance of status as a non-pecuniary incentive to elicit the desired outcome[6] our paper intends to analyze how status incentives interact with favourisitim, which has not gained much attention in recent times. We incorporate status in such a way that it is conferred to the team as a whole. But the valuation of the status falls when an agent achieves status due to the effort put in by the other agent. Interestingly, we find that when the principal ensures efficient decision taking by the agents, the optimal effort of the favourite agent is linked with the effort of the non-favourite. The favourite tends to free ride, by decreasing her own effort in response to an increase in other agent's effort, till the level her guilt from conscience does not bite hard. At the optimal, the efforts are strategic substitutes, if the return of the firm and the valuation of status are low; otherwise the efforts move in the same direction. Therefore, in this paper a profound analysis of the interplay between monetary and status incentives and the emergence of (inefficient) favoritism have been provided.

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[4] By efficient decision we mean that the favourite will push the non-favourite's project when her own project is bad. It is explained in details in section 2.

[5] The agents are symmetric ex-ante.

[6] See Frank (1985), Hopkins and Kornienko (2004),Moldovanu et al. (2007), Brown et al.(2007), Besley and Ghatak (2008), Auriol and Renault (2008), Dhillon and Herzog-Stein 2009, Dubey and Geanakoplos (2010), Dey and Banerjee (2014).

It has been shown by Rotemberg and Saloner (1994, 1995, 2000) that favouritism may not arise at all if there is no explicit cost associated with the act of favouritism or if the principal can optimally adjust the monetary incentives of the favoured agent. Yet, our paper shows that even after endogenizing both the cost of conflict and the incentive contracts, favoritism with inefficient decision making unambiguously overrules efficient favouritism. Unlike, Athey and Roberts (2001) we analyze the effect of the incentive contracts on decision-making and compare it with fairness to find that inefficient favouritism is likely to dominate fairness.

The rest of the paper is arranged in the following manner: Section 2 constructs the model which is a modified version of Kwon (2006) in presence of status incentives. The benchmark case (observable effort) is analyzed in Section 3. Section 4 provides the optimal contracts when the principal resolves the potential conflict among the agents either by indulging in favouritism or through fairness. The endogenous emergence of favoritism is also studied in this section. Finally, in Section 5 we conclude the findings of the paper.

2. The Model

Let us assume that a firm consists of a risk neutral principal and a team of two risk neutral and status conscious agents (agent1 and agent 2).The principal hires the agents to provide profitable projects (or ideas). The projects can either be good (g), or bad (b).[7] The agent puts effort denoted by $e_i \in [0,1]$ (where $i \epsilon \{1,2\}$) which can be taken as the probability of generating a good project. Therefore the project can be good with probability e_i and bad with probability $1 - e_i$ and this is in the sense of first order stochastic dominance. The effort of the agent is costly and the cost of effort is given by $\frac{{e_i}^2}{2}$. If the good project is implemented then it generates a payoff $\pi > 0$ and zero otherwise. For simplicity, we can denote the realized projects by $S = (s_1, s_2)$ where $s_i \epsilon \{g, b\}$. Therefore, if agent 1 has a bad project and agent 2 has a good project then $S = (b, g)$. The firm is assumed to have limited resources and hence can implement only one project. [8] Each agent's individual effort, project or whose project is implemented are unobservable and not third party verifiable. The principal can observe only the team performance

[7] The optimal mechanism in an organization with one principal and two agents has been studied by Baliga and Sjostrom (2001). But, different from our paper, the ideas are given exogenously to one of two agents in their model. At the optimal it is recommended to follow the agent who has the idea.

[8] Sometimes organizations may also prefer to choose only one project to inject the sense of competition among the agents.

which is the realized revenue, i.e., π or 0. One common example of this situation is a company stock owner observing the increase in stock price of the company but not realizing which manager is accountable for the increase[9].

Since the realized revenue is verifiable, therefore the contract can be contingent on the revenue and can take the following form: $C = \{(w_g, w_b), (v_g, v_b)\}$, where w_j ($j \epsilon \{b, g\}$) is the wage payment to agent 1 and v_j is the wage payment to agent 2 when the revenue is πor 0.

Together with the monetary incentive the principal offers a status incentive[10] to the team of agents when the revenue is π. But the valuation of the status differs across agents. If the agent's own good project is implemented then she enjoys the status $\theta \epsilon [0,1]$, but if the other agent's good project is implemented then the valuation of the status falls on the account of guilt from conscience. Thus, the utility from status incentive for the agents whose project is not implemented can be expressed through the following function:

$$h_i(\theta) = Max\{\theta - \lambda e_j, 0\} \text{ where } i, j \epsilon \{1,2\}; i \neq j \text{ and } \lambda \epsilon [0,1].$$

If $\lambda < 0$ it indicates that when the other agent's good project is implemented then status is overvalued. This situation captures the free riding tendency of the agent. To fix ideas we assume that the agents do not enjoy any premium if other's project is implemented. Observe that when $e_j > \widehat{e_j} = \frac{\theta}{\lambda}$ then the valuation of status reduces to zero. Therefore, the valuation of the status is positive only when the optimal effort by the other agent is lower than $\widehat{e_j}$.

The agents also enjoy a non-pecuniary intrinsic pleasure m_g when her own good project is implemented, while she enjoys m_b if her bad project is implemented where $m_g > m_b > 0$,. Again, for simplicity we assume away the situation when the agent enjoys this private benefit if her project is not implemented. The difference $d_m \equiv m_g - m_b$ can be interpreted as the agents' intrinsic motivation[11]. If the intrinsic motivation is sufficiently large then agents will exert effort even when there is no monetary incentive. However, even if the intrinsic motivation is large, each agent will prefer implementing her own bad project over other's good project. Implementing her own bad project will fetch her $m_b > 0$, whereas, for implementing other's

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[9] See Kwon (2006) for more.

[10] Status incentives may be are provided in the form of medals, trophies or letter of appreciation.

[11] See Benabou and Tirole (2003) to understand the difference between intrinsic and extrinsic motivation.

good project she gets zero. Thus, truthful communication cannot be ensured with high intrinsic motivation and m_b captures the *desire for power* of the agent. A large m_b also indicates that an agent will promote even her bad project while denigrating the others. Note that the principal does not have a pre-determined preferential bias for any of the two agents. Hence there is no exogenous favouritism in the model. We normalize the outside option of the agents to zero. It is assumed that the agents have no wealth, thus a limited liability constraint operates.

Definition: Favouritism and Fairness

Since the firm implements only one project and each agent wants to implement her own project, hence there is a potential conflict of interest among the agents. This conflict of interest can be resolved in the following two ways:

a) *Favouritism:* The principal delegates the decision right (i.e., to select one project) to one of the two agents. Hence, the agent with the decision right is marked as the principal's favourite.
b) *Fairness:* The principal provides equal decision rights to both the agents.

In case of favouritism, favourite chooses the implementable project in such a way that maximizes her own expected utility. Under fairness, if two agents agree on a decision, then the agreed-upon decision is implemented, however if they disagree then each one's project faces an equal probability of being selected.

Timeline

There are two main stages in the game: (i) the contracting and the effort stage, (ii) the decision and the payment stage. In the beginning of the first stage, the principal decides whether to choose favouritism or fairness. Then the contract is signed between the principal and the agents. By the middle of first stage each agent chooses her unobservable effort e_i simultaneously, to generate the profitable project. At the end of the stage the projects are realized either good (g) or bad (b). At the beginning of stage two, the projects are chosen (through favouritism or fairness, decided at the beginning of stage one). Then the revenue is realized. By the end of this stage wages are paid according to the contract.

3. Effort Observable

As a benchmark, at first we consider the first-best case where effort is observable and hence contractible. To find out the first best effort level we maximize the expected joint surplus of the principal and the agent, i.e. $S(e_1, e_2)$. Therefore under the first-best the optimization problem becomes

$$\text{Max}_{e_1,e_2}\, S(e_1,e_2) = (e_1 + e_2 - e_1 e_2)(\pi + m_g) + (1 - e_1)(1 - e_2)m_b + e_1(2\theta - \lambda e_1) + e_2(2\theta - \lambda e_2) - \frac{e_1^2}{2} - \frac{e_2^2}{2} \quad (1)$$

When at least one agent comes up with a good project and it is implemented then the principal receives π and one of the agents enjoys the intrinsic pleasure m_g with probability $(e_1 + e_2 - e_1 e_2)$. If both the agents generate bad project with probability $(1 - e_1)(1 - e_2)$, the principal receives zero revenue and one of the agents enjoy m_b. When agent i exerts effort to produce good project (with probability e_i) and her project is implemented, irrespective of the quality of whether agent$j$'s project succeeds or not, agent i enjoys θ as utility from status, whereas agent j (where $i, j = 1,2$ and $i \neq j$) receives $\theta - \lambda e_i$. To explain this a bit, if $S = (g, b)$ then agent 1 gets θ and agent 2 gets $-\lambda e_1$. This can happen with probability $e_1(1 - e_2)$. Again this can happen if $S = (g, g)$and agent 1's project is implemented with probability $e_1 e_2$. Adding these two events we get the required expression $e_1(2\theta - \lambda e_1)$. Same argument holds when agent 2's project is implemented irrespective of the quality of agent 1's project. Subtracting the respective disutility of efforts of the agents we get the joint expected surplus. The first order conditions are

$$\frac{\partial S(e_1,e_2)}{\partial e_1} = (1 - e_2)(\pi + m_g) + 2(\theta - \lambda e_1) - e_1 = 0 \quad (2)$$

$$\frac{\partial S(e_1,e_2)}{\partial e_2} = (1 - e_1)(\pi + m_g) + 2(\theta - \lambda e_2) - e_2 = 0 \quad (3)$$

From (2) and (3) the first best level is

$$e_1^{FB} = e_2^{FB} = e^{FB} = \frac{2\theta(1+2\lambda)+(\pi+d_m)[1-2(\theta-\lambda)-(\pi+d_m)]}{(1+2\lambda)^2-(\pi+d_m)^2} \quad (4)$$

We need to impose *'either'* of the following two conditions to ensure that $e^{FB} \leq 1$.[12]

Condition 1: $\pi \geq 1 + 2\lambda - d_m$ and $\theta > \lambda + \frac{1}{2}$

[12] It suffices to assume that $|\pi + d_m| > |1 + 2\lambda|$ for the second order condition to hold.

Condition 2: $\pi \leq 1 + 2\lambda - d_m$ and $\theta < \lambda + \frac{1}{2}$

4. Effort unobservable

4.1. Favouritism

To model favouritism, without loss of generality, we assume that the principal selects agent 1 as the favourite and delegate full decision right. We solve using backward induction. To start with we solve the favourite's decision choice in stage-2 given the realized projects. Then the optimal choice of effort is studied in first stage. Finally, we derive the optimal wage contract.

Due to the presence of intrinsic benefit, the favourite agent will always want to implement her own project irrespective of its quality, in the absence of any other additional incentive. But if the principal designs a performance based contract, such that the incentive payment is large then agent 1 may select agent 2's project, if it is good. Suppose $S = (b, g)$, then if agent 1 implements her own bad project then she receives $w_b + m_b$, whereas she receives $w_g + \theta - \lambda e_2$ if she implements agent 2's good project. Therefore, if $w_g - w_b + \theta - \lambda e_2 \geq m_b$, then agent 1 will implement agent 2's good project. However, when $S = (g, b)$ then implementing her own good project fetches her $w_g + \theta + m_g$ and w_b for implementing agent 2's project. In this situation, implementing good project requires $w_g - w_b + \theta + m_g \geq 0$ which is always true. Therefore other than the usual concern of effort unobservability (ex-ante efficiency) here, the principal is concerned with another type of efficiency which is whether the best project is implemented in second stage (ex-post efficiency).

To explain this explicitly, following Kwon (2006) we proceed through a methodical proof and provide the following lemma which will help to characterize the optimal contract.

Lemma 1 (Kwon, 2006)

If $w_g - w_b \geq m_b$ and $S = (b, g)$, the favourite agent (agent 1 in this case) implements agent 2's project. In all other cases, the favourite implements her own project.

Proof: See appendix.

Thus, the principal has to decide about the optimal contract carefully such that the potential conflict of interest among the agents does not influence the favourite's decision choice.

4.1.1. Ex-post efficient decision

Note if $w_g - w_b \geq m_b$, then the favourite will choose agent 2's project over her own project if it is weakly better. Thus, if the principal wants to implement ex-post efficiency, she has to ensure that

$$w_g - w_b \geq m_b \tag{5}$$

Let us assume that $w_g - w_b \geq m_b$. Then each agent's expected utility is as follows:

$$U_1^A = e_1\left(w_g + \theta + m_g\right) + (1 - e_1)e_2\left(w_g + \theta - \lambda e_2\right) + (1 - e_1)(1 - e_2)(w_b + m_b) - \frac{{e_1}^2}{2} \tag{6}$$

$$U_2^A = e_1\left(v_g + \theta - \lambda e_1\right) + (1 - e_1)e_2\left(v_g + \theta + m_g\right) + (1 - e_1)(1 - e_2)v_b - \frac{{e_2}^2}{2} \tag{7}$$

Observe that, since agent 1 has the right to implement the project, hence the expected utility of agent 1 and 2 are not symmetric. Expression (6) shows that, when agent 1 generates good project with probability e_1, she implements her own good project and she enjoys the monetary incentive (w_g) together with the status incentive (θ) and the intrinsic benefit (m_g). When the project of agent 1 is bad but agent 2's project is good (with probability $(1 - e_1)e_2$) then agent 1implements agent 2's good project and therefore enjoys the high wage (w_g) and status (θ) but the valuation of status is reduced by λe_2 due to her guilt from conscience. When both the agents produce bad projects, (with probability $(1 - e_1)(1 - e_2)$), then the agent 1 implements her bad project and receives the low monetary incentive (w_b) and the lower intrinsic pleasure (m_b) of implementing her own bad project. The disutility from exerting effort is subtracted from her expected utility function. The expression (7) shows that if agent 1 has a good project (which is with probability e_1) then agent 2 gets high pecuniary incentive v_g and $\theta - \lambda e_1$ as the net utility from status. Since her own project is not implemented she does not obtain any additional benefit from intrinsic motivation. If $S = (b, g)$ and agent 2's good project is implemented and therefore she gets $v_g + \theta + m_g$. Finally if both agents' projects are bad then agent 1 implements her bad project and therefore agent 2 only gets v_b. This explains the expressions above.

Agents choose the optimal effort level by maximizing their respective expected utility. Thus, from the first order conditions of (6) and (7) we get the *incentive compatibility constraints* which show that effort levels which maximize the private payoff of the agents.

$$\frac{\partial U_1^A}{\partial e_1} = \left(w_g - w_b + \theta + d_m\right)(1 - e_2) + e_2 m_g + \lambda e_2^2 - e_1 = 0 \tag{8}$$

$$\frac{\partial U_2^A}{\partial e_2} = (1 - e_1)\left(v_g - v_b + \theta + d_m + m_b\right) - e_2 = 0 \tag{9}$$

The favourite agent's optimal effort depends on the external monetary incentive $(w_g - w_b)$, internal private motivation (d_m) and utility from status (θ). It also depends on disutility from guilt from conscience (λe_2) when the favourite selects the good project of agent 2. Yet it does not depend on desire for power (m_b) as the agent already has the power. However, in contrast to (8), the effort choice of the non-favourite agent depends on m_b, as the agent does not have the power to take the decision. Again, if agent 2's project is selected then only effort influences her expected utility. Thus, when she optimizes effort it does not depend on λ. [13]

Given this structure we can now put forward the principal's optimization exercise to derive the contract.

Optimal Contract

$$\text{Max}_{w_g, w_b, v_g, v_b, e_1, e_2}\; U_I^P = (e_1 + e_2 - e_1 e_2)\left(\pi - w_g - v_g\right) - (1 - e_1)(1 - e_2)(w_b + v_b) \tag{10}$$

Subject to

a) *Limited liability constraints* requiring that the agents be left with a non negative level of wealth :

$$w_g \geq 0, w_b \geq 0 \tag{11}$$

and

$$v_g \geq 0, v_b \geq 0 \tag{12}$$

b) *Individual Rationality constraints* stating that for participation in the job it is necessary that the agents is offered at least their outside options (reservation utility)

[13] From the above observations, we can also reach predict the implication as pointed out in Kwon (2006).
If m_b of both the agent are not identical and is such that ${m_b}^2 \geq {m_b}^1$ then it is better to choose the agent 2 as the non-favourite since she would elicit higher effort.

$$U_1^A = e_1(w_g + \theta + m_g) + (1 - e_1)e_2(w_g + \theta - \lambda e_2) + (1 - e_1)(1 - e_2)(w_b + m_b) - \frac{{e_1}^2}{2} \geq 0 \quad (13)$$

'and'

$$U_2^A = e_1(v_g + \theta - \lambda e_1) + (1 - e_1)e_2(v_g + \theta + m_g) + (1 - e_1)(1 - e_2)v_b - \frac{{e_2}^2}{2} \geq 0 \quad (14)$$

c) *Incentive compatibility constraints* ensuring that the effort levels maximize the private payoff of the agents:

$$e_1{}^* = (w_g - w_b + \theta + d_m)(1 - e_2) + e_2 m_g + \lambda e_2^2 \quad (15)$$

'and'

$$e_2{}^* = (1 - e_1)(v_g - v_b + \theta + d_m + m_b) \quad (16)$$

where $e_i{}^* \in [0,1]$ and $i \epsilon \{1,2\}$. Since the outside option is set equal to zero, which is sufficiently low, therefore participation constraint will not bind in this case[14]. The assumption of risk neutrality along with limited liability makes the incentive compatibility constraint costly and hence gives rise to moral hazard incentive for the agents. Also observe that $w_b \geq 0$ and $v_b \geq 0$ are the relevant limited liability constraints and the other ones are slack constraints, since $w_g \geq w_b$ and $v_g \geq v_b$.

Before we state the proposition explaining the optimal contract we need to make the following technical assumption.

Assumption 1

$\theta + m_g < 1$

Now the interesting question is whether principal would choose a monetary incentive for her favourite in such a way that the decision is ex-post efficient or not. The following proposition provides the optimal contract design for the principal when the principal intends to implement the ex-post efficient decision.

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[14]It is also possible, though cumbersome to extend this model when the outside option is high such that the participation constraints bind. Therefore, for the sake of simplicity we have assumed to the set the outside option to be equal to zero. For elaborate explanation of the application of moral hazard with limited liability refer Innes (1991), Besley and Ghatak (2005), among others.

PROPOSITION 1

a) *If there is no limited liability constraint then favouritism achieves first best effort and ex-post efficiency if* $m_b \leq e^{FB}[1+(\theta-\lambda e^{FB})]-(d_m+\theta)$ *and the optimal contract is such that* $w_g^* - w_b^* \geq m_b$. *But the presence of status makes it difficult to implement first best.*

b) *If* $m_b > e^{FB}[1+(\theta-\lambda e^{FB})]-(d_m+\theta)$ *and the limited liability constraint operates then* $w_g^* = m_b$ *and* $w_b^* = 0$. *The optimal efforts are* $e_1^* = \theta + m_g - e_2^*(\theta - \lambda e_2^*)$ *and* $e_2^* = \frac{\theta}{2\lambda} - \frac{[1-\sqrt{(1-\theta B)^2+4\lambda B^2(1-m_g-\theta)}]}{2\lambda B}$, *where* $B \equiv (\pi + d_m + \theta)$. *If* $\theta B > 2$ *such that condition 1 holds then* $e_2 \epsilon\, [\frac{\theta}{2\lambda}, \widehat{e_2} = \frac{\theta}{\lambda}]$ *and* e_1 *increases with* e_2. *If condition 2 holds then* $e_2 \epsilon [0, \frac{\theta}{2\lambda}]$ *and efforts are strategic substitutes.*

c) *At the optimum the limited liability constraint binds and the expected utility of the principal,* $U_I^P = 0$.

Proof: See appendix.

The first part of the proposition provides the condition for implementing the first best effort under favouritism when there is no limited liability constraint. If all the agents are risk neutral and the principal can impose an unlimited punishment on the agents when the realized revenue is low then there is no moral hazard problem and all the agents will elicit their first best effort only. But to ensure that the first best effort also takes care of the ex-post efficiency issue we need the additional condition on desire for power to be sufficiently low. In contrast to Kwon (2006), here the first best is difficult to implement even when there is no limited liability constraint. With the increase in valuation for status or disutility from guilt from conscience it is more difficult to induce ex-post efficiency by implementing the first best effort. The logic is that status incentive partially reduces the burden on monetary incentive and hence $(w_g^* - w_b^*)$ is small. Therefore, for any given m_b, it is difficult to satisfy the ex-post efficiency constraint. The second part of the proposition provides the optimal contract when the limited liability constraint operates and the condition for achieving the first best outcome is not satisfied. Under this situation, it is optimal for the principal to set $w_g^* - w_b^* = m_b$ to guarantee ex-post efficient decision. Since, the principal's expected utility function decreases with increase in w_b, therefore principal sets $w_b^* = 0$ such that the limited liability constraint binds.

The effort function of the favourite is dependent on the effort level elicited by agent 2. When $e_2 \epsilon [0, \frac{\theta}{2\lambda}]$ then agent 1 reduces her effort with the increase in effort by agent 2. When $e_2 \epsilon [\frac{\theta}{2\lambda}, \widehat{e_2}]$ the effort of the favourite increases with the non-favourite's effort. Thus, $e_2 = \frac{\theta}{2\lambda}$ is the critical point corresponding to which the agent 1 exerts lowest possible effort, $e_1^{min} = m_g + \theta(\frac{\theta}{2\lambda} + 1)$. The intuition behind this result is as follows: for the range of $e_2 \epsilon [0, \widehat{e_2}]$ the valuation for status is non-zero. Till $e_2 = \frac{\theta}{2\lambda}$ the favourite's benefit from status outweighs the disutility from guilt from conscience and hence the agent free rides. But the guilt from conscience start hitting hard beyond $e_2 = \frac{\theta}{2\lambda}$ and the net utility from status is falling, then there is a complementary relation between e_1 and e_2. At the optimal, if $\theta B > 2$, which implies that π and θ are sufficiently large such that condition 1 holds, then $e_2^* > \frac{\theta}{2\lambda}$, this is because status works as a better incentive[15] for agent 2 as well as high π creates greater motivation since $v_g^* = \pi - m_b$. However, when condition 2 holds, such that π and θ are sufficiently small then $e_2^* \leq \frac{\theta}{2\lambda}$.

The third part of the proposition states that since the principal cannot offer negative wage under any situation (as limited liability constraint operates) therefore the expected payoff of the principal is zero, unlike Kwon (2006).

4.1.2. Ex-post inefficient decision

An ex-post inefficient decision implies that the favourite will always want to implement her own project without even comparing the quality of the project with the one generated by the non-favourite agent. To proceed in deriving the optimal contract with ex-post inefficiency we need the following lemma.

Lemma 2

[15] As the "guilt from conscience" does not influence the effort choice of the agent 2.

If $w_g - w_b + \theta < m_b$, *the favourite agent (agent 1 in this case) will always implement her own project.*

Proof: See appendix.

So, if the principal intends to give up ex-post efficiency and the limited liability constraint operates then the expected payoff of the agents can be written as follows:

$$U_1^A = e_1(w_g + \theta + m_g) + (1 - e_1)(w_b + m_b) - \frac{{e_1}^2}{2} \tag{17}$$

$$U_2^A = e_1(v_g + \theta - \lambda e_1) + (1 - e_1)v_b - \frac{{e_2}^2}{2} \tag{18}$$

The expression (17) shows that since the favourite implements only her project, therefore she receives the high monetary payment and status only when she produces good project (with probability e_1), otherwise receives $w_b + m_b$. The expected utility of agent 2 is now dependent on agent 1's effort only as her project is never selected as expressed in (18). From the first order conditions of (17) and (18) we get the *incentive compatible effort level* of the agent under this situation.

$$\frac{\partial U_1^A}{\partial e_1} = (w_g - w_b + \theta + d_m) - e_1 = 0 \tag{19}$$

$$\frac{\partial U_2^A}{\partial e_2} = -e_2 = 0 \tag{20}$$

Since, the favourite implements her own project only; the earning of status incentive depends just on her effort level. Hence the optimal effort level increases with valuation of status. It is also obvious that agent 2 will set her effort at the minimum at the optimal. However, agent 1 is highly motivated by her own intrinsic motivation together with the status and money incentive.

To analyze the optimal contract under this situation we write the principal optimization exercise as follows:

Optimal Contract

$$\text{Max}_{w_g, w_b, v_g, v_b, e_1, e_2} \, U_{II}^P = e_1(\pi - w_g - v_g) - (1 - e_1)(w_b + v_b) \tag{21}$$

Subject to

a) *Limited liability constraints* :

$$w_b \geq 0 \text{ and } \; v_b \geq 0 \tag{22}$$

b) *Individual Rationality constraints:*

$$U_1^A \geq 0 \text{ and } \quad U_2^A \geq 0 \tag{23}$$

c) *Incentive compatibility constraints*:

$$e_1{}^{**} = \left(w_g - w_b + \theta + d_m\right) \text{ and } \; e_2{}^{**} = 0 \tag{24}$$

The following proposition provides the optimal contract design for the principal when principal intends to implement ex-post inefficient decision.

PROPOSITION 2

a) When the principal indulges in ex-post inefficient favouritism then the optimal monetary incentive scheme is characterized as follows:

$i)\; w_g = \frac{\pi - d_m - \theta}{2} > 0 \; and \; w_b = 0.$

$ii)\; v_g = v_b = 0$

b) The corresponding optimal effort level is given by

$e_1{}^{**} = \left(w_g + \theta + d_m\right)$ and $e_2{}^{**} = 0$

c) The corresponding expected utility of the principal can be written as follows

$U_{II}^P = \frac{(\pi + d_m + \theta)^2}{4} > 0.$

Proof: See appendix.

The limited liability constraint binds at the optimum as the expected utility of the principal decreases with the increase in w_b and v_b. The principal offers a positive wage to the favourite when the realized revenue is π. The optimal wage of the favourite reduces with the increase in valuation for status as well as her private motivation. Since, agent 2 does not provide any effort at the optimum[16], therefore, it is wise to offer the non-favourite agent the minimum wage, which is equal to zero. The outcome is dependent on the effort put in by the agent 1 only. The

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[16] Though agent 2 provides zero effort still we assume that the principal keeps this agent to avoid exigencies which can arise with a small probability and it is exogenous to the model.

principal's expected payoff, under this situation, is positive and it increases with the increase in level of return, favourite agent's intrinsic motivation and her valuation for status. Thus, unlike the ex-post efficient scenario, the principal enjoys a strictly positive expected utility when she gives up ex-post efficiency.

Hence, we can state one of the crucial results of the paper in the following proposition.

PROPOSITION 3

In a symmetric model with favouritism, an ex-ante unbiased and rational principal would always induce ex-post inefficient decision of the favourite agent.

Proof: From discussion above.

For a given level of desire for power (m_b) the principal has to provide higher expected wage to the favourite agent to induce ex-post efficiency compared to ex-post inefficiency. Again, since agent 2 also provides positive effort under the ex-post efficient situation, the principal has to provide non-zero wage to agent 2 to elicit costly effort, hence the cost for inducing ex-post efficiency is costlier to the principal, whereas under inefficiency agent 2 will not put any positive effort anyway and therefore the principal need not provide any incentive to elicit costly effort from agent 2. Therefore from a purely incentive perspective it is optimal for the principal to give up the ex-post efficiency and promote ex-post inefficiency under favouritism.

4.2. Fairness

Under fairness both the agents enjoy equal decision rights. If the agents agree on a decided project then that very project is implemented, otherwise each agent's project faces equal probability of being selected by the principal. Since the principal focuses on fair basis of selection, therefore logically she would never want to implement an ex-post inefficient decision. This can also be shown formally with the help of the following lemma that random choice of project is strictly worse than favouritism.

Lemma 3

If the optimal contract under fairness is such that $w_g - w_b + \theta < m_b$ and $v_g - v_b + \theta < m_b$ then favouritism strictly dominates over fairness.

Proof: See appendix.

Therefore, we proceed by assuming $w_g - w_b \geq m_b$ and $v_g - v_b \geq m_b$. Agent 2 will definitely agree to implement agent1's project if it is strictly better than her own project as it would fetch her $v_g \geq v_b + m_b$. Agent 1's decision rule also follows the above argument. But, if the qualities of the project of both the agents are equal then each agent would want to implement her own project and hence, either one's project will face equal probability of being selected. Then the agents' expected utility functions are as follows:

$$U_1^{Af} = e_1 e_2 \left[\frac{1}{2}\left(w_g + m_g + \theta\right) + \frac{1}{2}\left(w_g + \theta\right)\right] + e_1(1 - e_2)\left(w_g + m_g + \theta\right) + (1 - e_1)e_2\left(w_g + \theta - \lambda e_2\right) + (1 - e_1)(1 - e_2)[\tfrac{1}{2}(w_b + m_b) + \tfrac{1}{2} w_b] - \frac{{e_1}^2}{2} \quad (25)$$

$$U_2^{Af} = e_1 e_2 \left[\frac{1}{2}\left(v_g + m_g + \theta\right) + \frac{1}{2}\left(v_g + \theta\right)\right] + e_2(1 - e_1)\left(v_g + m_g + \theta\right) + (1 - e_2)e_1\left(v_g + \theta - \lambda e_1\right) + (1 - e_1)(1 - e_2)[\tfrac{1}{2}(v_b + m_b) + \tfrac{1}{2} v_b] - \frac{{e_2}^2}{2} \quad (26)$$

From the first order conditions of (25) and (26) we get the *incentive compatibility constraints* showing the effort levels which maximize the private payoff of the agents.

$$\frac{\partial U_1^{Af}}{\partial e_1} = (1 - e_2)\left(w_g - w_b + \theta + d_m\right) + \frac{e_2}{2} d_m + \frac{m_b}{2} + \lambda e_2^2 - e_1 = 0 \quad (27)$$

$$\frac{\partial U_2^{Af}}{\partial e_2} = (1 - e_1)\left(v_g - v_b + \theta + d_m\right) + \frac{e_1}{2} d_m + \frac{m_b}{2} + \lambda e_1^2 - e_2 = 0 \quad (28)$$

Therefore, other than $m_b,\ d_m$ the incentive of agent i increases with λe_j, where $i, j = 1,2, i \neq j$. The intuition is as follows: when the guilt from conscience is high then the agent increases her own effort. High desire for power as well as intrinsic motivation increases the chance of implementing one's own project if it is a good project.

Optimal Contract

Let us consider the following optimization exercise.

$$\text{Max}_{w_g, w_b, v_g, v_b, e_1, e_2}\ U_f^P = (e_1 + e_2 - e_1 e_2)\left(\pi - w_g - v_g\right) - (1 - e_1)(1 - e_2)(w_b + v_b)$$

(29)

Subject to

a) *Limited liability constraint* :

$w_b \geq 0$ and $v_b \geq 0$ (30)

b) *Individual Rationality constraint*

$U_1^{Af} \geq 0$ and $U_2^{Af} \geq 0$ (31)

c) *Incentive compatibility constraint*:

$e_1{}^f = (1 - e_2)\left(w_g - w_b + \theta + d_m\right) + \frac{e_2}{2} d_m + \frac{m_b}{2} + \lambda e_2^2$ and

$e_2{}^f = (1 - e_1)\left(v_g - v_b + \theta + d_m\right) + \frac{e_1}{2} d_m + \frac{m_b}{2} + \lambda e_1^2$ (32)

In the following proposition we provide the optimal contract under fairness.

PROPOSITION 4

a) If there is no limited liability constraint then under fairness first best outcome can be achieved if $m_b \leq \frac{e^{FB}\left[1 - \frac{d_m}{2} - \lambda\right] - \frac{m_b}{2}}{1 - e^{FB}} - (d_m + \theta)$ *and the optimal contract is such that* $w_g^* - w_b^* \geq m_b$. *But if guilt from conscience is sufficiently high then first best is not implementable.*

b) When the limited liability operates and first best is not implementable, the optimal monetary incentive scheme is characterized as follows:

i) $w_g^f = m_b > 0$ *and* $w_b^f = 0$

ii) $v_g^f = m_b > 0$ *and* $v_b^f = 0$

c) The corresponding optimal effort levels of the agents are given by

$e_1{}^f = e_2{}^f = e^f = \frac{w_g + \theta + d_m + \frac{m_b}{2}}{\theta + (1 - \lambda) + w_g + \frac{d_m}{2}}$. The effort level increases with the valuation of status as well as with the guilt from conscience.

d) The principal's expected profit function can be written as

$$U_f^P = \left(\frac{w_g + \theta + d_m + \frac{m_b}{2}}{\theta + (1-\lambda) + w_g + \frac{d_m}{2}}\right)\left[2 - \left(\frac{w_g + \theta + d_m + \frac{m_b}{2}}{\theta + (1-\lambda) + w_g + \frac{d_m}{2}}\right)\right](\pi - 2m_b)$$

Proof: See appendix.

The first part of the proposition provides the condition for implementing the first best outcome under fairness. In contrast to Kwon (2006), here the first best is not implementable if the disutility from guilt from conscience is sufficiently high.

The second part of the proposition provides the optimal contract when first best outcome is not achievable. Similar to proposition 1 it is optimal for the principal to set $w_g^f - w_b^f = m_b$ as well as $v_g^f - v_b^f = m_b$to guarantee ex-post efficient decision. The principal also sets $w_b^f = v_b^f = 0$ such that the limited liability constraints bind. Since the agents face symmetric situation therefore optimal effort elicited by the agents are also equal. Observe that the optimal effort is independent of π. This is because under fairness motivation is generated from the in-build competitiveness among the agents. Hence, incentives need not be linked with the outcome of the project. But the last part of the proposition states that though limited liability constraint binds still expected payoff of the principal is positive, unlike proposition1.

Corollary

If $\pi > \pi^* = \frac{2[3m_b + 2(\theta + d_m)]}{2[\theta + (1-\lambda) + m_b] + d_m} - (\theta + d_m)$ then the optimal effort of the favourite under ex-post inefficient favouritism is greater than any one agent's effort under fairness.

Proof: See appendix.

Since e^f is not influenced by change in return of the project, therefore when the realized outcome is sufficiently large such that $\pi > \pi^*$ then ${e_1}^{**} > e^f$. But this is not a sufficient condition to conclude that the expected payoff of the principal would be greater under favouritism then fairness. For that we need to check under which condition $U_{II}^P - U_f^P > 0$. The following proposition provides the conditions under which the principal's expected payoff under favouritism is greater than fairness.

PROPOSITION 5

a) *For higher valuation of status incentive, ex-post inefficient favouritism is more likely to dominate over fairness.*
b) *A critically low return of the project is sufficient enough to induce ex-post inefficient favouritism over fairness.*

Proof: See appendix.

For $U_{II}^{P} - U_{f}^{P} \geq 0$ we need $e_1^{**}(\pi - e_1^{**} + \theta + d_m) \geq e^f(2 - e^f)(\pi - 2m_b)$. When the valuation of status is high then the above condition is more likely to hold. An increased valuation for status helps in reducing the optimal monetary incentive; hence the principal's expected payoff under favouritism increases. Since, under fairness ex-post efficiency constraints bind, the optimal money wage is independent of θ. Therefore, under fairness increased valuation for status does not help in reducing the wage. Thus, if the valuation for status increase it is more likely that favouritism would dominate fairness.

The second part of the proposition provides the sufficient condition to indulge the principal to choose ex-post inefficient favouritism over fairness. If $\pi \leq \hat{\pi} = \frac{{e_1}^{**2}}{e^f(2-e^f)}$ (> 0), then the on the event of success the net profit under fairness $(\pi - 2m_b)$ is sufficiently small as compared to the net profit on the event of success under favouritism ($\frac{\pi+d_m+\theta}{2}$) . Low return of the project also indicates that under favouritism the principal has to offer lower wage. But if $\pi > \hat{\pi} = \frac{{e_1}^{**2}}{e^f(2-e^f)}$ then m_b should be large enough to ensure that favouritism is optimal. When m_b is large such that $m_b > \widetilde{m_b} = \frac{\pi}{2} - \frac{(\pi+d_m+\theta)^2}{8e^f(2-e^f)}$ then it is difficult to satisfy the ex-post efficiency constraint. Hence, ex-post inefficient favouritism emerges as the optimal outcome.

5. Conclusion

In this paper we explore situations under which it is beneficial for the ex-ante impartial principal to indulge in ex-post inefficient favouritism in the presence of status incentives. Here, by favouritism we mean that out of the pool of two agents, the principal delegates one agent with the full decision right of implementing a project (which can be generated by either of the two agents). Ex-post inefficient favouritism arises when the favoured agent implements a bad project (preferably her own) when a good project is being proposed. We compare this situation with the fair decision rule, where the principal provides equal decision rights to both the agents, and we find that under certain conditions implementing ex-post inefficient favouritism emerges as an optimal decision choice for the principal. Thus, this paper contributes to the literature which captures the positive view of favouritism to show that under certain situations the principal (and hence an organization) is better off indulging in favouritism in some form or the other. Unlike Prendergast and Topel (1996), Prendergast (2002), Berger et al. (2011) we do not assume that the principal receives an additional benefit from indulging in favouritism. Rather similar to Kwon (2006) our paper proceeds to show that favouritism can arise even if the principal is ex-ante impartial with the important distinction that when valuation of status incentive is high the principal would always induce ex-post inefficient decision of the favourite agent. Together with that we also find that if the return of the firm is sufficiently low inefficient favouritism emerges endogenously and it dominates over fairness.

This paper also, in a way, contributes to the influential and growing literature which studies the importance of status as a non-pecuniary incentive as our paper demonstrates that the presence of status makes inefficient favouritism more likely to dominate over fairness. When the valuation for status is high then the principal can optimally reduce the monetary wage and yet assure the participation of the agent. At the same time a sufficiently reduced monetary wage will ensure that the ex-post efficiency constraint is not satisfied. Therefore, under favouritism the inefficient decision is more likely to emerge as an optimal outcome when the valuation for status is high. Therefore, unlike other studies, this paper links status incentives with favouritism. By incorporating status incentive in the modified moral hazard framework with limited liability with multiple agents, we also find that under which conditions the principal guarantees efficient decision taking by the agents. We also find that, due to the presence of status incentives, the optimal effort of the favourite agent is linked with the effort of the non-favourite. The favourite tends to free ride, by decreasing her own effort in response to an increase in other agent's effort, till the level of her guilt from conscience does not bite hard, otherwise the efforts move in the same direction. Therefore the model provides a rich analysis of the interplay between monetary and status incentives and the emergence of (inefficient) favoritism in a multi agent framework. In future, we intend to carry out a laboratory experiment to examine how the interaction of monetary and status incentives play out in affecting the level (and the type) of favouritism.

Appendix

Proof of Lemma 1

For ex- post efficient decision taking we need $w_g - w_b + \theta - \lambda e_2 \geq m_b$ when $S = (b, g)$. When $S = (g, b)$ then the condition for ex-post efficiency becomes $w_g - w_b + \theta + m_g \geq 0$, which is always true. Observe, $w_g - w_b \geq m_b$ ensures that $w_g - w_b + \theta - \lambda e_2 \geq m_b$, since $\theta - \lambda e_2 \geq 0$. Thus, if $w_g - w_b \geq m_b$, it is sufficient to guarantee ex- post efficiency in decision taking. **QED.**

Proof of Proposition 1

(a) If there is no limited liability constraint and the ex-post efficiency constraint $w_g - w_b \geq m_b$ is non- binding the principal will implement the first best outcome as the agents are risk neutral. To enforce first best effort principal would set $w_g^* - w_b^* = \frac{e^{FB}[1-m_b+(\theta-\lambda e^{FB})]-(\theta+d_m)}{1-e^{FB}}$ from (8) and $v_g^* - v_b^* = \frac{e^{FB}}{1-e^{FB}} - (m_g + \theta)$ from (9). To satisfy the ex-post efficiency constraint we need $\frac{e^{FB}[1-m_b+(\theta-\lambda e^{FB})]-(\theta+d_m)}{1-e^{FB}} \geq m_b$. Therefore, after simplification we can write that if $m_b \leq e^{FB}[1 + (\theta - \lambda e^{FB})] - (d_m + \theta)$ then only the principal can induce first best outcome. Observe that $\frac{\partial LHS}{\partial \theta} = e^{FB} - 1 < 0$ and $\frac{\partial LHS}{\partial \lambda} = -e^{FB^2} < 0$, therefore the presence of status incentive makes it difficult to implement first best outcome.**QED.**

(b) Now if $m_b > e^{FB}[1 + (\theta - \lambda e^{FB})] - (d_m + \theta)$ and the limited liability constraint operates then first best outcome is not implementable. Under this situation to ensure ex-post efficiency it is optimal for the principal to set $w_g^* - w_b^* = m_b$. Substituting this in (15) we get $e_1 = (\theta + m_g) - e_2(\theta - \lambda e_2)$. It is straightforward to show that at $e_2 = \frac{\theta}{2\lambda}$, e_1 reaches its minimum. Thus the relation between $e_1$and e_2 can be depicted with the help of the following diagram.

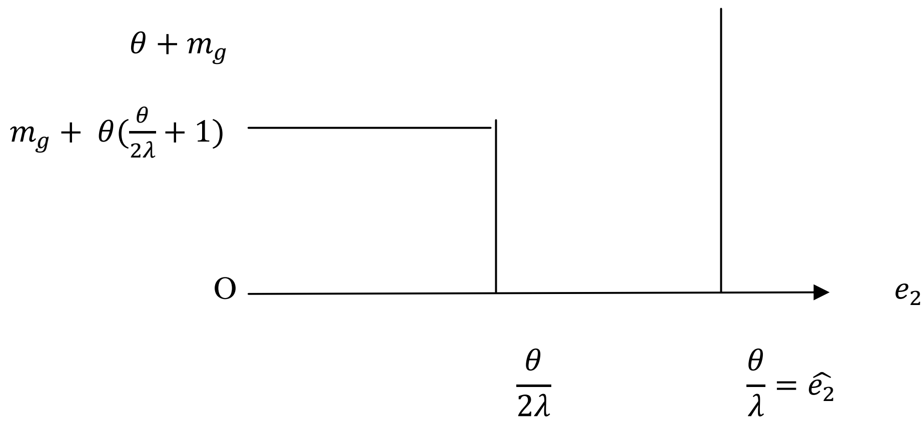

Fig: 1: Relationship between efforts

When $e_2 \epsilon [0, \frac{\theta}{2\lambda}]$ the net utility from status $\epsilon [\frac{\theta}{2}, \theta]$, whereas if $e_2 \epsilon [\frac{\theta}{2\lambda}, \widehat{e_2}]$ then the net utility from status lies between 0 and $\frac{\theta}{2}$. Therefore, with the increase in e_2, e_1 falls till $\frac{\theta}{2\lambda}$ and increases thereafter as the guilt from conscience dominates in that range. Substituting $e_1 = (\theta + m_g) - e_2(\theta - \lambda e_2)$ in the objective function of the principal and solving for e_2 yields $v_g^* - v_b^* = \pi - m_b$. Substituting these expressions in the binding incentive compatibility constraint (16) we get $\lambda {e_2}^2 B + (1 - \theta B)e_2 - (1 - \theta + m_g)B = 0$, where $B \equiv \pi + d_m + \theta$. We can solve for the positive root of the equation to find $e_2^* = \frac{\theta}{2\lambda} - \frac{[1 - \sqrt{(1-\theta B)^2 + 4\lambda B^2(1 - m_g - \theta)}]}{2\lambda B} \geq 0$ (which is ensured by assumption 1.)Now, if $\theta B(\theta B - 2) + 4\lambda B^2(1 - m_g - \theta) > 0$ then $e_2^* > \frac{\theta}{2\lambda}$. This happens (i) if $\theta B > 2$ or (ii) if $\theta B < 2$ and $4\lambda B(1 - m_g - \theta) > \theta(2 - \theta B)$. From condition 1 we get $2\theta \geq 1 + 2\lambda$, i.e., $(1 + 2\lambda)$ can maximum be equal to 2θ. Substituting this to the other part of the condition 1 we get $\pi \geq 2\theta - d_m$. For $\theta = 1$, we get $\pi + d_m \geq 2$, which indicates that $(\pi + d_m + \theta) \geq 2$. Therefore, if (i) holds, it indicates that π and θ is sufficiently large, which takes care of condition 1. Similarly from condition 2 we can deduce$(\pi + d_m + \theta) < 2$, which implies $\theta(\pi + d_m + \theta) < 2$.Therefore, if condition 2 holds than $\theta B < 2$. But for (ii) to hold we also need $4\lambda B(1 - m_g - \theta) > \theta(2 - \theta B)$. If $(m_g + \theta) \to 1$ such that assumption 1 is also valid, then the above two inequalities are mutually inconsistent. Thus, to avoid complexities we rule out this situation as $4\lambda B\left(1-m_g-\theta\right) > \theta(2-\theta B)$ is not universally true for all range of values when $\theta B < 2$. Hence, when π and θ are sufficiently low such that condition 2 holds then $\theta B < 2$. Now if, $4\lambda B\left(1-m_g-\theta\right) \leq \theta(2-\theta B)$ then $e_2^* \geq \frac{\theta}{2\lambda}$. **QED.**

(c) The expected payoff of the principal can be written as $U_I^P = (e_1+e_2-e_1e_2)[\pi-(w_g-w_b)-(v_g-v_b)]-(w_b+v_b)$. Since U_I^P reduces with w_b and v_b hence it is optimal for the principal to offer the minimum possible wage when the outcome is bad. Thus, the limited liability constraints bind at the optimum. Substituting the optimal values of $({w_g}^*-{w_b}^*)$ and $({v_g}^*-{v_b}^*)$ in the objective function we find the expected utility of the principal under this situation is zero.**QED.**

Proof Lemma 2

The decision of the favourite is ex-post inefficient if $w_g-w_b+\theta-\lambda e_2 < m_b$. Now, if $w_g-w_b+\theta < m_b$ then definitely $w_g-w_b+\theta-\lambda e_2 < m_b$, since $\lambda e_2 \geq 0$. Therefore, $w_g-w_b+\theta < m_b$is the sufficient condition to introduce ex-post inefficient decision taking in the model. **QED.**

Proof of Proposition 2

The incentive compatibility constraints provide the optimal effort levels. Substituting $e_1^{**} = w_g-w_b+\theta+d_m$ in expected utility of the favourite we get $w_b = -\left(m_b+\frac{e_1^2}{2}\right) < 0$. Since limited liability constraints operate, hence the principal cannot punish the agent by offering negative wage. At best the principal can offer zero bonus to the agent when the outcome of the project is bad. From (20) we find that agent 2 put in no effort, hence the principal offers just the minimum bonus (zero) under both good and bad outcome. From (19) we can write $w_g = e_1 - d_m - \theta$. Plugging this in the objective function and solving for e_1, we get $e_1^{**} = \frac{\pi+d_m+\theta}{2}$. Therefore, $w_g^{**} = \frac{\pi-d_m-\theta}{2}$ and $U_{II}^P = \frac{(\pi+d_m+\theta)^2}{4}$. **QED.**

Proof of Lemma 3

If $w_g-w_b+\theta < m_b$ and $v_g-v_b+\theta < m_b$ then each agent would like to implement her own project. Under fairness, the project is selected with equal probability. To examine whether choosing the project with equal probability is optimal or not we perform the following exercise.

We assume that agent1's project is selected with probability p, where $0 \leq p \leq 1$. The expected utility of the agents can be written as

$$U_1^{Af} = p\left[e_1\left(w_g + \theta + m_g\right) + (1 - e_1)(w_b + m_b)\right] + (1 - p)[e_2\left(w_g + \theta - \lambda e_2\right) + (1 - e_2)w_b] - \frac{{e_1}^2}{2}$$

$$U_2^{Af} = p\left[e_1\left(v_g + \theta - \lambda e_1\right) + (1 - e_1)v_b\right] + (1 - p)[e_2\left(v_g + \theta + m_g\right) + (1 - e_2)(v_b + m_b)] - \frac{{e_2}^2}{2}$$

The incentive compatibility constraints are $\frac{\partial U_1^{Af}}{\partial e_1} = 0 \Rightarrow {e_1}^f = p[\left(w_g - w_b\right) + d_m + \theta]$ and $\frac{\partial U_2^{Af}}{\partial e_2} = 0 \Rightarrow {e_2}^f = (1 - p)[\left(v_g - v_b\right) + d_m + \theta]$.Since the agents are identical, therefore at the optimum $\left(w_g - w_b\right) = \left(v_g - v_b\right) =$ z (say). Then the principal's expected payoff is $U_f^P = (e_1 + e_2 - e_1 e_2)\left[\pi - \left(w_g - w_b\right) - \left(v_g - v_b\right)\right] - (w_b + v_b)$. Since U_f^P falls with w_b and v_b. Therefore, limited liability constraints bind at the optimum and $w_b = v_b = 0$. We can rewrite the reduced form of the principal's objective function as $U_f^P = (\pi - 2z)[(z + d_m + \theta)(2p^2 - 2p + 1)]$. From the FOC we get the $\frac{\partial U_f^P}{\partial p} = 0 \Rightarrow p = \frac{1}{2}$. The SOC indicates that at $p = \frac{1}{2}$ the principal's objective function reaches miminum since $\frac{\partial^2 U_f^P}{\partial p^2} = 4\,(\pi - 2z)(z + d_m + \theta) > 0$ if $(\pi - 2z) > 0$. It can be easily checked that $(\pi - 2z) = \frac{(z + d_m + \theta)[(1-p)^2 + p^2]^2}{2p^2(1-p)^2}$ >0. Now, since there are no other interior points of optimum, therefore we consider the corner points to find$U_f^P\big|_{p=0,1} = (\pi - 2z)(z + d_m + \theta)$ and $U_f^P\big|_{p=\frac{1}{2}} = \frac{(\pi - 2z)}{8}(z + d_m + \theta)$. Thus, the expected profit function attains maxima at $p = 0{,}1$. When $p = 1$ it implies that the principal is favouring agent 1 and when $p = 0$ the agent 2 is favoured. Thus, fairness is strictly worse than favouritism.**QED.**

Proof of Proposition 4

The incentive compatibility constraints provide the optimal efforts. Solving (27) and (28) we get $e_1{}^f = e_2{}^f = e^f = \frac{w_g+\theta+d_m+\frac{m_b}{2}}{\theta+(1-\lambda)+w_g+\frac{d_m}{2}}$. $\frac{\partial e^f}{\partial \theta} = \frac{2[2(1-\lambda)-d_m-m_b]}{(d_m+2(1+\theta-\lambda+w_g))^2} = \frac{2[2(1-\lambda)-m_g]}{(d_m+2(1+\theta-\lambda+w_g))^2} > 0$, by assumption 1. Again, $\frac{\partial e^f}{\partial \lambda} = \frac{\theta+d_m+\frac{m_b}{2}+w_g}{(1+\theta-\lambda+\frac{d_m}{2}+w_g)^2} > 0$. Now if there is no limited liability and $w_g^f = \frac{e^{FB}\left(1-\frac{d_m}{2}-\lambda\right)-\frac{m_b}{2}}{1-e^{FB}} - (\theta + d_m)$ then principal can ensure that $e^f = e^{FB}$. For the ex-post efficiency constraint to be satisfied we need $m_b \leq \frac{(1-\lambda)e^{FB}-\theta(1-e^{FB})-d_m\left(1-\frac{e^{FB}}{2}\right)-\frac{m_b}{2}}{1-e^{FB}}$. It is easy to say that for higher value of λ, this inequality will not hold, as $m_b > 0$ by model specification. Now, if first best is not implementable and limited liability constraints operate then to ensure ex-post efficiency the constraint will bind. At the optimum the limited liability constraints will also bind as the principal profit decrease with increase in w_b and v_b. Thus $w_g^f = v_g^f = m_b$ and $e^f = \frac{3m_b+2(\theta+d_m)}{2\theta+2(1-\lambda)+2m_b+d_m}$. Substituting the optimal values of all the variables we get the reduced form of the principal's expected profit function. **QED.**

Proof of Corollary

Comparing e^f with e_1^{**} we find that if $\pi \geq \frac{2[3m_b+2(\theta+d_m)]}{2[\theta+(1-\lambda)+m_b]+d_m} - d_m - \theta$ then $e_1^{**} \geq e^f$. If $m_b < \frac{(\theta+d_m)[2-d_m-2(\theta-\lambda)]}{2[3-(\theta+d_m)]}$ then the above condition is redundant and e_1^{**} is always greater than e^f. But, going by the model specifications, $\frac{(\theta+d_m)[d_m-2(1+\lambda-\theta)]}{2[3-(\theta+d_m)]} < 0$. Thus, we require π to be large for $e_1^{**} \geq e^f$. **QED.**

Proof of Proposition 5

(a) For $U_{II}^P - U_f^P > 0$ we need $e_1^{**}(\pi - e_1^{**} + \theta + d_m) > e^f(2 - e^f)(\pi - 2m_b)$. Though the optimal effort e_1^{**} and e^f are functions of θ but by applying envelope theorem we can concentrate only on the direct effect of θ on the LHS of the condition to find $\frac{\partial LHS}{\partial \theta} = e_1^{**} \geq 0$. Similar application of envelope theorem on RHS yields $\frac{\partial RHS}{\partial \theta} = 0$. Thus, $\frac{\partial LHS}{\partial \theta} \geq \frac{\partial RHS}{\partial \theta}$. **QED.**

(b) After simplification of the above condition we get the condition as $m_b > \frac{\pi}{2} - \frac{(\pi+\theta+d_m)^2}{8e^f(2-e^f)}$.

Now, if $\frac{\pi}{2} \leq \frac{(\pi+\theta+d_m)^2}{8e^f(2-e^f)}$, i.e., $\pi \leq \frac{e_1^{**2}}{e^f(2-e^f)} > 0$ then it is a sufficient condition to ensure $U_{II}^P > U_f^P$.**QED.**

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