ENDOGENOUS FAVOURITISM WITH STATUS INCENTIVES: A MODEL OF OPTIMAL INEFFICIENCY

Oindrila Dey•
Department of Economics
FLAME University, Pune

Swapnendu Banerjee•
Department of Economics
Jadavpur University, Kolkata

Sougata Poddar•
University of Redlands, CA 92373, USA

Abstract:

The paper identifies conditions under which 'inefficient' favouritism emerges as an optimal outcome even when the principal does 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 with multiple agents, 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 high.

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

JEL Classifications*: D86, L14, L20*

•Corresponding Author: Department of Economics, Flame University, Pune, INDIA, .Email:d.oindrila@gmail.com Phone: +91 98303 22684.
•Email: swapnendu@hotmail.com
• Email: sougata_poddar@redlands.edu

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.

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

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[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)

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 ex-ante 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 favourite takes the efficient decision[4] the principal has to provide larger incentives to the favourite agent. Favourite is also provided a status incentive in case of success. 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. These features help in generating the intriguing result that with ex-ante symmetric agents the introduction of status acts as a catalyst for the principal to indulge in favouritism, under certain conditions. Thus, different to Kwon (2006), 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.

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[3]For instance see Pérez-González (2006), Kramarz and Skans (2007), Bennedsenet al. (2007), Bandiera et al. (2009).

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

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[5]our study intends to analyze how status incentives interact with favourisitim, which has not gained much attention in recent times. Interestingly, we find that when the principal ensures efficient decision taking by the agents, the optimal effort of the non-favourite agent is linked with the effort of the favourite. Therefore, in this paper a profound analysis of the interplay between monetary and status incentives and the emergence of (inefficient) favoritism have been provided.

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 work shows that even after endogenizing both the cost of conflict and the incentive contracts, favoritism with inefficient decision making, under certain conditions, overrules efficient favouritism for high value of status and high returns. 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 when the return of the firm and the valuation for status are sufficiently high.

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

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[5]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).

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).[6] 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.[7] 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 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"[8]. Since the firm implements only one project and each agent wants to implement her own project, there is a potential conflict of interest among the

[6]The optimal mechanism in an organization with one principal and two agents has been studied by Baliga and Sjostrom (2001). But, different from our study, 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.

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

[8]See Kwon (2006) for more.

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. The components in contract of the agents are described as follows:

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 π or 0.

Together with the monetary incentive the principal offers a status incentive[9] only when the revenue is π to the agent whose project is implemented or whose suggested project is implemented (depending upon situations, viz, favouritism or fairness). Under favouritism, it is assumed that the status is conferred only to the favourite one, i.e., the agent who has been delegated with the decision right and the agent enjoys the status $\theta\epsilon[0,1]$. However, under fairness, the status $\theta\epsilon[0,1]$ is offered to the agent whose project is implemented and a lower status $\lambda\theta$ where $\lambda\epsilon[0,1)$ to the other agent who has put in some effort to come up with a good or bad project or her good project has not been selected in the random process of selection. Note that if same status is given to all the employees in an organization, then status is not valued at all. The valuation of the status accounts from its scarcity[10].

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

[9]Status incentives may be are provided in the form of medals, trophies or letter of appreciation.
[10] See Besley and Ghatak (2008) for a similar approach.

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 good project she gets zero. Thus, truthful communication cannot be ensured with high intrinsic motivation and m_b captures the *desire for powe*r 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. 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. Before proceeding further let us re-define favouritism and fairness in the context of this paper.

Definition: Favouritism and Fairness

a) *Favouritism:* One of the two agents, say agent 1, is assigned with the right to decide on whose project would be implemented and she is marked as the favourite of the principal. The favourite chooses the implementable project in such a way that maximizes her expected utility. The favourite also gets the opportunity of getting a status incentive if the project succeeds. The status is not provided to the non-favourite under any situation.[12]

b) *Fairness:* Both the agents are given equal decision rights. 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. The agent whose project

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

[12] This assumption helps to preserve the 'scarcity value' of status together with the fact that it is given out only to the favourite, which validly justifies the term 'favouritism' defined in the paper.

is implemented gets a higher status whereas the agent whose project is not implemented also gets a status but of a lower one.[13]

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, first we consider the 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. Since, here the principal can observe the level of effort taken by each agent; therefore she provides a high status θ to the agent who puts in high effort and zero status to the agent putting low effort.[14] Therefore under the first-best the optimization problem becomes

[13] This assumption 'fairly' acknowledges that the agents put in effort for a good project though one project can be implemented, thus, making the situation under fairness significantly different from the case of favouritism. Also, the assumption of providing different levels of status preserves the relative valuation for status.

[14] It should be noted that if same status is given to all the employees in an organization, then status is not valued at all. The valuation of the status accounts from it's scarcity.

$$\text{Max}_{e_1,e_2}\, S(e_1,e_2) = (e_1 + e_2 - e_1e_2)(\pi + m_g) + (1-e_1)(1-e_2)m_b + (e_1 + e_2 - e_1e_2)\theta - \frac{e_1^2}{2} - \frac{e_2^2}{2} \quad (1)$$

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 $(e_1 + e_2 - e_1e_2)$. 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. To explain this a bit, if $S = (g, b)$ then agent 1 gets θ and agent 2 gets zero status. This can happen with probability $e_1(1-e_2)$. Again with probability e_1e_2 the event $S = (g, g)$ can happen and in that case agent 1's project can be implemented with probability $\frac{1}{2}$. Then the probability of the implementation of agent1's project when $S = (g, g)$ is $\frac{1}{2}e_1e_2$. Same argument holds when agent 2's project is implemented irrespective of the quality of agent 1's project. Adding these four events we get the required expression $(e_1 + e_2 - e_1e_2)\theta$. Subtracting the respective disutility of efforts of the agents we get the joint expected surplus. The first order conditions are

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

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

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

$$e_1^{FB} = e_2^{FB} = e^{FB} = \frac{(\pi + d_m + \theta)}{1 + (\pi + d_m + \theta)} \quad (4)$$[15]

Not surprisingly the first best efforts increases with the payoff from successful project completion, the intrinsic motivation of the agent and the utility from status conferred.

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 delegates the 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 $w_g + \theta$ if she implements agent 2's good project. Therefore, if $w_g - w_b + \theta \geq m_b$, 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 non-observability (ex-ante efficiency) here, the principal is concerned with

[15] It can be easily checked that $e^{FB} < 1$.

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

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

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

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

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

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

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 implements agent 2's good project and therefore enjoys the high wage (w_g) and together with the status (θ), as she is the favourite of the principal. 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 but no status incentive, being the non-favourite one. 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 $v_g + m_g$. 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.

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

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

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). 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. [16]

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

Optimal Contract

$$\text{Max}_{w_g,w_b,v_g,v_b,e_1,e_2}\ U_I^P = (e_1 + e_2 - e_1e_2)\big(\pi - w_g - v_g\big) - \ (1 - e_1)(1 - e_2)(w_b + v_b) \quad (10)$$

Subject to

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

$$w_g \geq 0, w_b \geq 0 \quad (11)$$

and

$$v_g \geq 0, v_b \geq 0 \quad (12)$$

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)

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

[16]From the above observations, we can also 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.

'and'

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

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

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

'and'

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

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[17]. 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 $v_g \geq v_b$. It can be verified that in absence of limited liability the principal can implement the first best contract such that it is also the ex-post efficient one.[18]

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

[17]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.

[18] If there is no limited liability constraint and the ex-post efficiency constraint $w_g - w_b + \theta \geq m_b$ 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 $w_g^* - w_b^* = \frac{e^{FB}[1-m_b+\theta]-(\theta+d_m)}{1-e^{FB}}$ from (8) and $v_g^* - v_b^* = \frac{e^{FB}}{1-e^{FB}} - m_g$ from (9). To satisfy the ex-post efficiency constraint we need $\frac{e^{FB}[1-m_b+\theta]-(\theta+d_m)}{1-e^{FB}} + \theta \geq m_b$. Therefore, after simplification we can write that if $e^{FB} \geq m_g$ which is always true. Thus, in absence of limited liability the principal can implement the first best outcome under favouritism.

provides the optimal contract design when the principal intends to implement the ex-post efficient decision.

PROPOSITION 1

I. When the principal indulges in ex-post efficient favouritism then the optimal monetary incentives and efforts are characterized as follows:

a) The optimal payments are as follows $w_g^* = m_b - \theta$ *and* $w_b^* = 0$ *and* $v_g^* = \frac{\pi - m_b + \theta}{2} - \frac{m_g[1+(1-m_g)^2]}{2(1-m_g)^2}$ *and* $v_b^* = 0$. *The optimal efforts are* $e_1^* = m_g$ *and* $e_2^* = (1-m_g)(v_g^* + m_g)$.

b) At the optimum the limited liability constraint binds and the expected utility of the principal is $U_I^P = (e_1^* + e_2^* - e_1^* e_2^*)\left(\frac{\pi - m_b + \theta}{2} + \frac{m_g[1+(1-m_g)^2]}{2(1-m_g)^2}\right)$.

Proof: See appendix.

The first part of the proposition provides the optimal payment structure and the optimal effort chosen by the agents corresponding to it. This is the second best outcome because of the presence of limited liability. 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 moral hazard is not a problem and all agents will elicit their first best effort. In contrast to Kwon (2006), in absence of limited liability the first best effort also takes care of the ex-post efficiency issue and no additional condition is required. Under this situation, it is optimal for the principal to set $w_g^* - w_b^* = m_b - \theta$ to guarantee ex-post efficient decision. Since, the principal's expected utility function decreases with increase in w_b, therefore the principal sets $w_b^* = 0$ such that the limited liability constraint binds. The optimal wage of the favourite is a function of her desire for power and status. Higher the desire for power, given status, more wage has to be given out to ensure ex-post efficiency. At the optimal, status and money pay are strategic substitutes. Now, once the ex-post efficiency constraint is satisfied, to make sure that the non-favourite agent also elicits effort, the principal has to compensate agent 2 with positive monetary payment, in case of good outcome. The optimal wage for agent 2 shows that higher is the value for motivation (m_b, m_g), lower wage can be offered. The fact that the non-favourite is not offered any status incentive, her craving for status (high value of θ) has to be compensated with high money wage. Again, when outcome is bad then it is optimal for the principal to set $v_b^* = 0$. The effort function of the favourite is dependent only on her motivation out of implementing her own good project. Agent 1 being the favourite will get the high status with higher wage even when the project of the other agent is good. Therefore only own level of motivation affects agent1's effort. The optimal effort by the agent 2 reduces with the increase in effort by agent 1 since the more the probability of agent 1 succeeding the less is the chance that agent 2's project will be implemented even if agent 2 has a good project. The third part of the proposition provides the optimal expected payoff of the principal.

4.4.1.2. Ex-post inefficient decision

An ex-post inefficient decision implies that the favourite will always want to implement her own project without even taking into account the quality of the project generated by the non-favourite. To proceed in deriving the optimal contract with ex-post inefficiency we need the following we assume that $w_g - w_b + \theta < m_b$ holds such that the favourite (agent 1 in this case) will always implement her own project.

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:

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

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

The expression (17) shows that since the favourite implements only own project, 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 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.

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

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

Since, the favourite (agent 1) implements own project only; the non-favourite (agent 2) will set her effort at the minimum at the optimal. However, agent 1's effort increases with 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

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

Subject to

a) *Limited liability constraints* :

$w_b \geq 0$ and $v_b \geq 0$ (22)

b) *Individual Rationality constraints:*

$U_1^A \geq 0$ and $U_2^A \geq 0$ (23)

c) *Incentive compatibility constraints*:

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

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

PROPOSITION 2

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

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

$ii)\ v_g = v_b = 0$

III. The corresponding optimal effort level is given by

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

IV. 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 principal offers a positive wage to the favourite when the project succeeds (i.e. the realized revenue is π). This success 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;[19] it is wise to offer the non-favourite (agent 2) the minimum wage, which is equal to zero. When a bad project is implemented the principal offers zero wage to both agents. This is once again due to the fact that the limited liability constraint binds at the optimum. Also note that the project outcome is dependent on the effort put in by agent 1 only since agent 2 doesn't put in any effort. Finally, the principal's expected payoff, under this situation, is positive and it increases with the increase in the level of return, favourite agent's intrinsic motivation and her valuation for status.

Comparing the ex-post efficient and ex-post inefficient cases we find that the optimal effort of agent 1 is higher in the ex-post inefficient case but the optimal effort of agent 2 is higher under the ex-post efficient situation. Therefore, it is difficult to predict unambiguously under which of the above mentioned situations the principal would be better off. To check if ex-post efficient favouritism emerges as the optimal outcome we need to check whether $U_I^P \geq U_{II}^P$ holds. A comparative static analysis, shows that with an increase in both π and θ the rate of increase in U_{II}^P is higher that U_I^P. Therefore, making the inequality less likely to hold. Thus, we can state one of the crucial results of the paper in the following proposition.

PROPOSITION 3

In a symmetric model with favouritism and ex-ante unbiased and rational principal, inducing ex-post inefficient decision from the favourite agent becomes more profitable at the margin if the valuation for status and the return of the project increases.

[19]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.

Proof*:* See appendix.

The incorporation of status generates inefficiency into the system. High craving for status can push agent 1 to work for lower wage. Thus if agent 1 is highly motivated and also values status highly then the principal can make the favourite work at lower wage. Also since the principal is not paying anything to the non-favourite (in case of ex-post inefficiency), it becomes profitable for the principal at the margin to induce ex-post inefficiency since that will be less costly for the principal. Similarly, for high return for the project 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 both the agents put in effort to come up with a good project, the principal offers a high status (θ) to the agent whose project is implemented and a lower status ($\lambda\theta$) to the other agent. This gesture gives out an essence of fairness without adding further cost to the principal[20]. As 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.

[20] It is assumed that conferring status is costless.

Lemma 2

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

Proof: See appendix.

Therefore, to focus on the other interesting case, we proceed by assuming $w_g - w_b + \lambda\theta \geq m_b$ and $v_g - v_b + \lambda\theta \geq m_b$. Agent 2 will definitely agree to implement agent1's project if it is strictly better than her own project as it would fetch her $v_g + \lambda\theta \geq v_b + m_b$. 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:

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

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

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.

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

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

Therefore, other than m_b, d_m the incentive of agent i increases with θ , but decreases with e_j, where $i, j = 1,2, i \neq j$. The intuition is simple: with the increase in effort by agent i which increases agent i's probability of landing up with a good project, the possibility of agent j's project being accepted goes down at the margin leading to a fall in agent j's effort. High desire for power as well as intrinsic motivation increases the effort of each agent.

Optimal Contract

Let us consider the following optimization exercise.

$$\text{Max}_{w_g, w_b, v_g, v_b, e_1, e_2}\, U_f^P = (e_1 + e_2 - e_1 e_2)\left(\pi - w_g - v_g\right) - (1-e_1)(1-e_2)(w_b + v_b) \quad (29)$$

Subject to

a) *Limited liability constraint* :

$$w_b \geq 0 \text{and } v_b \geq 0 \quad (30)$$

b) *Individual Rationality constraint*

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

c) *Incentive compatibility constraint*s:

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

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

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

PROPOSITION 4

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

i) $w_g^f = m_b - \lambda\theta > 0$ *and* $w_b^f = 0$

ii) $v_g^f = m_b - \lambda\theta > 0$ *and* $v_b^f = 0$

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

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

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

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

Proof: See appendix.

The first 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 $w_g^f - w_b^f = m_b - \lambda\theta$ as well as $v_g^f - v_b^f = m_b - \lambda\theta$ to guarantee ex-post efficient decision. The principal also sets $w_b^f = v_b^f = 0$ such that the limited liability constraints bind. At the optimal the money incentive increases with the decrease in λ, indicating that if the low status is provided to the agent whose project is not implemented the agent has to be compensated with high money wage. 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-built competitiveness among the agents. Hence, incentives need not be linked with the outcome of the project. Also, if equal status is given out to both the agents then there is no effect of status on optimal effort. The last part of the proposition provides the optimal expected payoff of the principal which is positive.

We suppose that the value of status and return to the project are sufficiently large such that the inefficient favouritism rules over the ex-post efficient one. Then we have to compare the expected payoff of the principal under inefficient favouritism and fairness to identify the optimal strategy of the principal. Since e^f is not influenced by change in return of the project, therefore when the realized outcome is sufficiently large such that $\pi > \pi^* = \frac{\theta(1-\lambda)+m_g+\frac{m_b}{2}}{1+m_g+\frac{m_b}{2}+\frac{\theta}{2}(1-\lambda)} - \frac{\theta+d_m}{2}$ 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

Assuming that the value for status and the return to the project is sufficiently high such that proposition 3 holds; the optimal decision for the principal are based on the following conditions. By comparing ex-post inefficient favouritism with fairness we get,

a) *For higher valuation of status incentive, ex-post inefficient favouritism is more likely to dominate over fairness if* $\lambda < \lambda^* = \frac{1}{8(1-e^f)\frac{\partial e^f}{\partial \theta}}$

b) *A critically high 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 $e_1^{**}(\pi - e_1^{**} + \theta + d_m) \geq e^f(2 - e^f)(\pi - 2m_b + 2\lambda\theta)$.We have already assumed that the valuation of the status is high such that inefficient favouritism rules over efficient one. Now, we observe that if the value for the low status conferred to one of the agents whose project has not been implemented is sufficiently low such that $\lambda < \lambda^* = \frac{1}{8(1-e^f)\frac{\partial e^f}{\partial \theta}}$ then the above inequality is more likely to hold. The intuition being: though the optimal effort of the agents increases with the decrease in λ, but the increase in optimal wage outweighs the benefit from decreased λ. The second part of the proposition provides the sufficient condition to indulge the principal to choose ex-post inefficient favouritism over fairness. The expected payoff of the principal increases at an increasing rate under inefficient favouritism cases compared to fairness. Hence, ex-post inefficient favouritism emerges as the optimal outcome.

4.3. Extension

Suppose that the return of the project and the status incentive is not sufficiently low such that at the optimum ex-post efficient favouritism rules over inefficient situation. Then we need the compare the situations of efficient favouritism and fairness to understand the optimal strategy for the principal. For $\boldsymbol{U_I^P - U_f^P \geq 0}$ we need $\boldsymbol{(e_1^* + e_2^* - e_1^* e_2^*)\left(\frac{\pi - m_b + \theta}{2} + \frac{m_g[1+(1-m_g)^2]}{2(1-m_g)^2}\right) \geq}$ $\boldsymbol{e^f(2 - e^f)(\pi - 2m_b + 2\lambda\theta)}$**.** We find the inequality holds when the return of the project is high as$\boldsymbol{U_I^P}$ increases at an increasing rate whereas $\boldsymbol{U_f^P}$. The optimal effort under fairness is independent of $\boldsymbol{\pi}$, so when $\boldsymbol{\pi}$ increases $\boldsymbol{e^f}$ remains unchanged. But $\boldsymbol{e_2^*}$ increases with , even though $\boldsymbol{e_1^*}$ remains unchanged. Also if $\boldsymbol{m_g} > \frac{\mathbf{1}}{\mathbf{2}}$ then the expected payoff of the principal increases at a decreasing rate with status under efficient favouritism and at an increasing rate under fairness. The optimal effort chosen by the favourite is $\boldsymbol{m_g}$. Large value of $\boldsymbol{m_g}$ indicates the effort by the favourite would be high and the non-favourite reduce her effort. Since, $\boldsymbol{e_1^*}$ is independent of $\boldsymbol{\theta}$, therefore the benefit from an increased $\boldsymbol{\theta}$ is partially outweighed when the $\boldsymbol{m_g} > \frac{\mathbf{1}}{\mathbf{2}}$.

We can write this results formally in the following proposition

PROPOSITION 6

*Assuming that the value for status and the return to the project is **not** sufficiently high such that proposition 3 holds; the optimal decision for the principal are based on the following conditions. By comparing ex-post efficient favouritism with fairness we get,*

a) *For higher valuation of status incentive fairness is more likely to dominate over ex-post efficient favouritism if* $m_g > \frac{1}{2}$
b) *A critically high return of the project is sufficient enough to induce ex-post efficient favouritism over fairness.*

Proof: See appendix.

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) and the favourite is conferred with a status if the outcome is good. The non-favourite is not offered with status incentives under any situations. 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 study 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 study 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 critically 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 high 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 work 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 conditions under which the principal implements efficient decision taking by the agents. We also find that, due to the presence of status incentives, the optimal effort of the non-favourite agent is linked with the effort of the favourite. 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 $w_g - w_b + \theta \geq m_b$when $S = (b, g)$. When $S = (g, b)$ then the condition for ex-post efficiency becomes $w_g - w_b + \theta + m_g \geq 0$. Observe, $w_g - w_b + \theta \geq m_b$ ensures that $w_g - w_b + \theta + m_g \geq 0$, since as $m_g \geq m_b \geq 0$. Thus, if $w_g - w_b + \theta \geq m_b$, it is sufficient to guarantee ex- post efficiency in decision taking.**QED.**

Proof of Proposition 1

(a) If 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 $w_g^* - w_b^* = m_b - \theta$. Substituting this in (15) we get $e_1{}^* = m_g$. It is straightforward to show that substituting $e_1{}^* = m_g$ in (16) we get $e_2{}^*$. Substituting $e_1{}^*$ and $e_2{}^*$in the objective function of the principal and solving for$v_g^* - v_b^*$ yields $v_g^* - v_b^* = \frac{\pi - m_b + \theta}{2} - \frac{m_g[1+(1-m_g)^2]}{2(1-m_g)^2}$.

(b) The expected payoff of the principal can be written as $U_I^P = (e_1 + e_2 - e_1 e_2)[\pi - (w_g - w_b) - (v_g - v_b)] - (w_b + v_b)$.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 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 $w_b = -\left(m_b + \frac{e_1^2}{2}\right) < 0$.Sincelimited 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 Proposition 3

For $U_I^P - U_{II}^P > 0$ we need $(e_1^* + e_2^* - e_1^* e_2^*)\left(\frac{\pi - m_b + \theta}{2} + \frac{m_g[1+(1-m_g)^2]}{2(1-m_g)^2}\right) > \frac{(\pi + d_m + \theta)^2}{4}$. Now we check how the inequality behaves with the increase in θ and π. Though the optimal effort e_1^{**} and e_2^* are functions of θ and π but by applying envelope theorem we can concentrate only on the direct effect of θ and π. The effect of change in θ on LHS of the condition is $\frac{\partial LHS}{\partial \theta} = e_1^* + e_2^* - e_1^* e_2^* \geq 0$. Similar application of envelope theorem on RHS yields $\frac{\partial RHS}{\partial \theta} = \frac{\pi + d_m + \theta}{2} \geq 0$. Further, we take the second order differentiation to find that$\frac{\partial^2 RHS}{\partial \theta^2} = \frac{1}{2} > 0$. Now $\frac{\partial^2 LHS}{\partial \theta^2} = \frac{(1-m_g)\frac{\partial e_2^*}{\partial \theta}}{2}$.

Where, $\frac{\partial e_2^*}{\partial \theta} = (1-m_g)\frac{\partial v_g}{\partial \theta}$ and $\frac{\partial v_g}{\partial \theta} = \frac{1}{2} > 0$. We substitute the value of $\frac{\partial e_2^*}{\partial \theta}$ to get $\frac{\partial^2 LHS}{\partial \theta^2} = \frac{(1-m_g)^2}{4}$. As $m_g \epsilon [0,1]$, we plug the extreme value of m_g to find whether the rate of change in LHS is greater than $\frac{1}{2}$. We get $\left.\frac{\partial^2 LHS}{\partial \theta^2}\right|_{m_g=0} = \frac{1}{4}$ and $\left.\frac{\partial^2 LHS}{\partial \theta^2}\right|_{m_g=1} = 0$, indicating that the rate of increase in U_I^P in lower than the increase in rate of U_{II}^P with the increase in θ.

Also, performing the same exercise for change in π, we can find that the rate of increase in expected payoff of the principal under ex-post efficient favouritism is lower than the ex-post in efficient favouritism situation. **QED.**

Proof of Lemma 2

If $w_g - w_b + \lambda\theta < m_b$ and $v_g - v_b + \lambda\theta < m_b$ 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

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

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

The incentive compatibility constraints are $\frac{\partial U_1^{Af}}{\partial e_1} = 0 => {e_1}^f = p[(w_g - w_b) + d_m + \theta]$ and $\frac{\partial U_2^{Af}}{\partial e_2} = 0 => {e_2}^f = (1-p)[(v_g - v_b) + d_m + \theta]$.Since the agents are identical, therefore at the optimum $(w_g - w_b) = (v_g - v_b)$ = z (say). Then the principal's expected payoff is $U_f^P = (e_1 + e_2 - e_1 e_2)[\pi - (w_g - w_b) - (v_g - v_b)] - (w_b + v_b)$. 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 $\frac{\partial U_f^P}{\partial p} = 0 => p = \frac{1}{2}$. 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 ${e_1}^f = {e_2}^f = e^f = \frac{\theta(1-\lambda)+m_g+\frac{m_b}{2}}{1+m_g+\frac{m_b}{2}+\frac{\theta}{2}(1-\lambda)}$.$\frac{\partial e^f}{\partial \theta} = \frac{(1-\lambda)[1+\frac{m_g}{2}+\frac{m_b}{4}]}{\left(1+m_g+\frac{m_b}{2}+\frac{\theta}{2}(1-\lambda)\right)^2} > 0$. Again,$\frac{\partial e^f}{\partial \lambda} = \frac{-\theta-\frac{\theta}{2}m_g-\frac{\theta m_b}{2}}{\left(1+m_g+\frac{m_b}{2}+\frac{\theta}{2}(1-\lambda)\right)^2} < 0$. 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 $w_g^f = v_g^f = m_b - \lambda\theta$. Substituting the optimal values of all the variables we get the reduced form of the principal's expected profit function. **QED.**

Proof of Proposition 5

(a) For $U_{II}^P - U_f^P > 0$ we need $e_1^{**}(\pi - e_1^{**} + \theta + d_m) > e^f(2 - e^f)(\pi - 2m_b + 2\lambda\theta)$. 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 $\frac{\partial RHS}{\partial \theta} = 2\lambda e^f(2 - e^f) \geq 0$. From the second order condition of both sides of the inequality we get that if $\lambda \leq \frac{1}{8(1-e^f)\frac{\partial e^f}{\partial \theta}}$. Since $\frac{1}{8(1-e^f)\frac{\partial e^f}{\partial \theta}} \geq 0$, therefore to ensure that $U_{II}^P - U_f^P > 0$ for high value of θ we need the condition on λ.**QED.**

(b)Taking twice differential of the above inequality w.r.t π, it is easy to show that the rate of increase in U_f^P due to increase in π is lower than rate of change in U_{II}^P.Thus, with increase in return of the project $U_{II}^P > U_f^P$ is more likely to hold. **QED.**

Proof of Proposition 6

(a) For comparing between U_I^P and U_f^P we find that $\frac{\partial^2 U_I^P}{\partial \theta^2} = \frac{(1-m_g)}{2}\left(\frac{1}{2} - m_g\right) < 0$ if $m_g < \frac{1}{2}$. On the other hand, $\frac{\partial^2 U_f^P}{\partial \theta^2} = 4\lambda \frac{\partial e^f}{\partial \theta}[1 - e^f] > 0$ as $\frac{\partial e^f}{\partial \theta} = \frac{(1-\lambda)\left[1+\frac{m_g}{2}+\frac{m_b}{4}\right]}{\left(1+m_g+\frac{m_b}{2}+\frac{\theta}{2}(1-\lambda)\right)^2} > 0$ .Therefore, if $m_g < \frac{1}{2}$ holds then we can unambiguously say that the U_I^P increases at a decreasing rate, whereas U_f^P increases at an increasing rate with θ.

(b) We first find that $\frac{\partial^2 U_I^P}{\partial \pi^2} = \frac{(1-m_g)^5}{2}$ and $\frac{\partial U_f^P}{\partial \pi} = e^f(2 - e^f)$ and $e^f$is independent of π. Therefore, $\frac{\partial^2 U_f^P}{\partial \pi^2} = 0$, indicating that the U_I^P increases at a increasing rate, whereas U_f^P increases at a constant rate with π.

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