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## Preselection and Expert Advice

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# Preselection and Expert Advice\*

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## Abstract

We study the effects of preselection on an expert's incentive to give truthful advice. In a decision environment in which certain decisions yield more precise estimates about the expert's expertise, a mediocre expert's advice is biased. We show that this bias can be undone by the introduction of a preselection stage, where the decision maker himself sometimes studies the case, and thereby alters the expert's perception of the problem. We identify a parameter range in which the decision maker's choice is inefficient if it is not possible to commit to a certain preselection level.

**Keywords:** Reputation, cheap talk, safe haven.

**JEL classification:** D82; D83

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# 1 Introduction

In many decision environments, ex post information about the decision quality depends on the chosen alternative. The value of a project can typically only be observed if it is implemented, but not if the project is not carried out. Wrong hiring decisions become more easily obvious if a bad candidate is hired than if a good candidate is not hired. In a lobbying setting, Leaver (2004) shows that an interested party has an incentive to reveal the state of the world only for one type of decision in order to induce biased decision making. In the academic publication process, the quality of a manuscript can be estimated more precisely if it is published rather than if it is rejected, because published papers are usually more frequently read than unpublished ones and readers have the opportunity to publish comments. Since this application is well-known in the academic community, we will use it as the leading example in our analysis.

Decision makers often seek the advice of experts before making a choice. Experts in turn tend to be concerned about being perceived as well informed. Reputational concerns and their effects on expert advice have been studied by e.g. Holmström (1999) and Scharfstein and Stein (1990).<sup>1</sup> Suurmond, Visser and Swank (2004) have shown that reputational concerns of experts in combination with decision-dependent ex post information lead to biased advice, but may increase information acquisition incentives.<sup>2</sup> In their model, the status quo is a safe haven that has some appeal for dumb experts, who do not possess valuable information. Thus, there is no direct benefit from truth-telling by dumb experts.

If experts have at least some valuable information, then the decision maker may want to adopt a decision making procedure that renders truthful advice more likely. In this paper, we explore the role of *preselection* for the incentive to give sincere advice. Preselection means that the decision maker may have a glance at the decision alternatives and discard some of them without consulting the expert. Preselection is a prominent mechanism in practice. In firms, a set of projects is pre-screened on one management layer and only a subset is proceeded to the next one. In hiring procedures, often a committee selects candidates from the pool of applicants before (a group of) experts evaluates the candidates. In our leading example of academic publishing, many journals apply desk-rejection rules. Sometimes the editor decides to reject the paper without seeking the advice of a referee. Our approach applies to many other decision environments.

Preselection affects a referee's incentive to provide sincere advice, because it alters his per-

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<sup>1</sup>In Sobel (1985), Bénabou and Laroque (1992), Morris (2001) and Lagerlöf and Frisell (2007), there is an instrumental preference for a reputation for honesty, which increases the sender's impact on the decision in later periods.

<sup>2</sup>In Milbourn et al. (2001), career concerns boost the expert's information acquisition incentives even without a distortion in reports.

ception of the problem. With a preselection stage, a manuscript's expected quality, conditional on being forwarded to the referee, is higher than in the case without preselection. In addition, the "safe haven" alternative (in this case rejecting the paper) becomes less safe, because now the editor has some private prior information. For referees who care about being perceived as well informed by the editor, this tends to make the recommendation to reject the paper less tempting. We show that it is indeed possible to induce more sincere messages with an appropriate preselection rule.

The application of a desk-rejection rule allows the editor to better use the mediocre referee's private information. Consequently, a good manuscript is recommended for publication with a higher probability. As a downside, it also becomes more likely that a bad manuscript is recommended for publication because the mediocre referee's information is imperfect. The former effect increases the decision quality, but the latter is opposite. Moreover, at the preselection stage, the editor himself adds mistakes if his own information is not perfect.<sup>3</sup> It is possible that he desk-rejects a paper that is in fact good.

Hence, the organization of information processing affects the likelihood with which both types of mistake, rejecting a good paper or accepting a bad one, occur. The optimal preselection rule depends on how the editor trades off one against the other. The tougher the preselection stage is, the higher is the average quality of papers which reach the refereeing stage, but the lower is the average quality of a report in favor of publication. It becomes more likely that a bad paper is published. As a consequence, the average quality of published papers may decrease when the journal applies a desk-rejection rule. If the editor cares sufficiently about forgoing to publish a good paper, the increase in the quality of a report recommending a rejection dominates the decrease in the quality of a report recommending a publication. However, if his own signal is too weak, then a good paper will be rejected too often at the preselection stage. Then, both types of mistake are more likely to occur with a preselection stage than without. Hence, if the editor's signal is not strong enough, it is better to forgo sincere advice by the mediocre referee and not to preselect at all.

In our analysis of the effects of preselection on the referee's advice and on the quality of the decision in Section 2.1, we take the editor's information acquisition and decision making strategy as given. The analysis in this section is of separate interest, as the editor might be committed to the rule.<sup>4</sup> In principle, the rule could also be executed by a non-strategic player,

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<sup>3</sup>It is reasonable to assume that the editor has only limited time for pre-screening a paper before consulting a referee, thus obtaining only imperfect information about its quality. Note also, that otherwise, the advice of a referee would be superfluous.

<sup>4</sup>Applying our model to the organization of a firm, an additional management layer has similar effects on reporting behavior on lower levels as a desk-rejection rule in the academic refereeing process. The firm organization is possibly not easily adjusted to each particular problem, such that the preselection rule is best

like an electronic editorial system. However, in many cases, the editor has full discretion with respect to information acquisition and publication decisions. We therefore study the editor’s equilibrium behavior in Section 2.2, assuming that information acquisition is costly at both stages, the preselection stage and the refereeing stage. Applying a preselection rule allows the editor to sometimes save the cost of refereeing. However, the referee’s strategic adjustment of his reporting behavior may be detrimental for the decision quality. In Section 2.3, we evaluate the equilibrium outcome and show that there are parameter constellations for which the editor is strictly better off if he can commit to a certain preselection level. In Section 2.4, we study the effects of the preselection rule on the referee’s participation and information acquisition behavior when both are costly. The final section concludes.

## 2 Model

As noted in the introduction, we use the academic publishing process as our leading example. An editor must decide about the publication of a manuscript. The manuscript’s unobservable quality  $s \in \{g, b\}$  may be either good or bad. Assume, for simplicity, that both states are equally likely. The editor derives state-dependent utility from accepting or rejecting the manuscript, as given in the following table:<sup>5</sup>

	$s = g$	$s = b$
accept	$u_{ag}$	$u_{ab}$
reject	$u_{rg}$	$u_{rb}$

Table 1: The editor’s payoffs

The editor would like to accept good papers and to reject bad papers, i.e.

$$\begin{aligned} u_{ag} &> u_{rg}, \\ u_{rb} &> u_{ab}. \end{aligned}$$

At a cost  $\xi$ , the editor can buy a signal, which reveals the true paper quality with probability  $1 - \varepsilon$ . Let  $\eta$  denote the probability with which the editor acquires a signal. We call  $(\eta, \varepsilon)$  a *preselection rule*. We will say the preselection rule becomes “tougher”, if c.p.  $\eta \uparrow$  or  $\varepsilon \downarrow$  (or both). We denote the editor’s information with  $s_e \in \{\emptyset, g, b\}$ , where  $\emptyset$  means that the editor did not acquire a signal. Next, the editor can either decide to accept or reject the paper without thought of as exogenous.

<sup>5</sup>Information acquisition costs have to be subtracted.

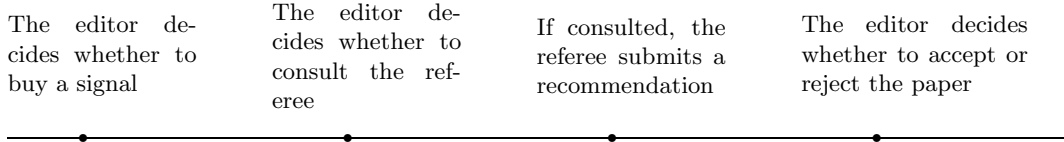


Figure 1: Timing of actions

further information acquisition, or to consult a referee in which case the editor has to pay  $c$ .<sup>6</sup> For the time being, we take the referee's participation for granted. We show in Section 2.4 that if the cost of reviewing for the referee is sufficiently low, it is optimal to always participate.

If the manuscript enters the refereeing process, the referee receives a signal about its quality. The referee may be either mediocre or smart, where  $q$  is the ex ante probability that he is smart. The referee privately knows his type. For simplicity, we assume that a smart referee privately observes the paper quality  $s$  perfectly. A mediocre referee privately observes an imperfect signal  $s_r \in \{g, b\}$  about  $s$  which is correct with probability  $p_r \geq 1/2$ . The referee recommends either to accept the paper for publication ( $x = g$ ) or to reject the paper ( $x = b$ ).<sup>7</sup> Denote by  $\gamma_\theta$  the probability that a referee of type  $\theta \in \{smart, mediocre\}$  sends a positive report ( $x = g$ ) after observing a positive signal and similarly denote by  $\beta_\theta$  the probability that a referee of type  $\theta$  sends a negative report ( $x = b$ ) after observing a negative signal.  $\gamma_\theta = \beta_\theta = 1$  corresponds to type  $\theta$  giving sincere advice. After obtaining the referee's advice, the editor decides whether to publish the manuscript. The sequence of actions is illustrated in Figure 1.

The editor uses all the observable information and his belief about the referee's reporting strategy  $(\hat{\gamma}_\theta, \hat{\beta}_\theta)$  to update his assessment of the paper's quality. If the manuscript is published, its true quality becomes obvious. If it is rejected, there is no opportunity for further learning about the quality. The editor forms an opinion about the referee's expertise, which is measured in terms of the probability that the referee is smart. Let us denote this probability by  $\pi = \text{prob}\{smart|x, s_e, s, \hat{\gamma}_{smart}, \hat{\beta}_{smart}, \hat{\gamma}_{mediocre}, \hat{\beta}_{mediocre}\}$ . Thus,  $\pi$  depends on the editor's ex post information. Denote with  $\pi_{gg}$  the probability which the editor assigns to the referee being smart, given that he recommended publication ( $x = g$ ) and the manuscript turned out to be good ( $s = g$ ), and with  $\pi_{gb}$  if it turned out to be bad. Accordingly, denote with  $\pi_{b\theta}$  the probability which the editor assigns to the agent being smart, given that he recommended

<sup>6</sup>The cost  $c$  could either arise from the need to search for a referee or be a transfer to the referee. The payment does not condition on the referee's report and is hence not relevant for the referee's reporting strategy.

<sup>7</sup>In addition, referees may increase the quality of a manuscript by providing feedback to the authors. Indeed, Laband (1990) presents evidence that this is the case. However, in this paper, we focus on the screening role of referees.

a rejection ( $x = b$ ) and that the editor has not observed any further information ( $s_e = \emptyset$ ).  $\pi_{bg}$  denotes the probability which the editor assigns to the agent being smart, given that he recommended a rejection and the editor has observed a good signal.

The referee cares about  $\pi$ . This could be for instrumental reasons, as the editor may for instance be a key player in the profession and his opinion may be relevant on the job market. It could also be the case that the referee just enjoys being thought of as smart. Assume that the referee is risk neutral<sup>8</sup> and has the ex post utility:

$$U = \pi.$$

The referee does not care about the editor's choice per se. He is only interested in leaving a good impression. If in addition the referee cares about the quality of the decision (from which we abstract in this paper, but which is certainly relevant in reality), there is an additional incentive to tell the truth. The magnitude of the effect that we are pointing at in this paper then depends on the relative importance of the referee's payoff components.

The equilibrium concept we use is Perfect Bayesian Nash Equilibrium. We restrict attention to equilibria in which the referee behaves sincerely if he is smart, i.e.  $\gamma_{smart} = \beta_{smart} = 1$ .<sup>9</sup> In the following,  $(\gamma, \beta)$  refers to the mediocre referee's reporting behavior and  $(\hat{\gamma}, \hat{\beta})$  to the editor's belief about it.

## 2.1 The referee's recommendation

In our analysis of the mediocre referee's behavior, we take the editor's strategy as given. For the time being, we can think of the editor as a non-strategic player (or as a player committed to a certain behavior). We assume that he acquires information with probability  $\eta$  and desk-rejects the paper upon the observation of a negative signal. Otherwise, he asks for the referee's recommendation. If the referee sends a positive report, the manuscript is published. If he sends a negative report, the manuscript is rejected. In Section 2.2, we identify conditions under which this behavior is indeed optimal. We will also show that the editor may gain from the possibility to commit to a certain preselection rule, hence there may even be a demand for a commitment device.

As we assume a fixed editor behavior in this section, the term "equilibrium" refers to a combination of  $(\gamma, \beta)$  and  $(\hat{\gamma}, \hat{\beta})$  which are mutually consistent and respect Bayes' Law. Lemma 1 characterizes the potential equilibria with and without preselection. The case without preselection is captured by  $\eta = 0$ .

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<sup>8</sup>Risk aversion does not qualitatively change the results.

<sup>9</sup>Note that in this class of equilibria, the probability that the editor assigns to the referee being smart if he recommended publication and the manuscript is of bad quality is zero.

**Lemma 1** Consider any preselection rule  $(\eta, \varepsilon)$ . In any equilibrium in which the smart referee is sincere, either  $\gamma = 1$ ,  $\beta = 1$ , or both.

**Proof.** Suppose  $\gamma < 1, \beta < 1$  in equilibrium.

$\gamma < 1$  requires:<sup>10</sup>

$$\text{prob}\{s = g | s_r = g\} \pi_{gg}(\gamma, \beta) \leq \pi_{b\emptyset}(\gamma, \beta) - \text{prob}\{s_e = g | s_r = g\} (\pi_{b\emptyset}(\gamma, \beta) - \pi_{bg}(\gamma, \beta)). \quad (1)$$

$\beta < 1$  requires:

$$\text{prob}\{s = g | s_r = b\} \pi_{gg}(\gamma, \beta) \geq \pi_{b\emptyset}(\gamma, \beta) - \text{prob}\{s_e = g | s_r = b\} (\pi_{b\emptyset}(\gamma, \beta) - \pi_{bg}(\gamma, \beta)). \quad (2)$$

Because  $\text{prob}\{s = g | s_r = g\} > \text{prob}\{s = g | s_r = b\}$ , the LHS of (1) is greater than the LHS of (2), and because  $\text{prob}\{s_e = g | s_r = g\} > \text{prob}\{s_e = g | s_r = b\}$  and  $\pi_{b\emptyset} > \pi_{bg}$ , the RHS of (1) is smaller than the RHS of (2). Hence, both conditions cannot be satisfied simultaneously.

Q.E.D.

Lemma 1 asserts that there is no equilibrium in which the mediocre referee is insincere for both signals. Either there is a bias towards rejection ( $\gamma < 1, \beta = 1$ ), a bias towards acceptance ( $\gamma = 1, \beta < 1$ ), or truthtelling ( $\gamma = 1, \beta = 1$ ). The next lemma shows that the three potential equilibria cannot coexist.

**Lemma 2** Consider any preselection rule  $(\eta, \varepsilon)$ . In the class of equilibria in which the smart referee is sincere, a unique equilibrium exists.

**Proof.** Denote with  $\text{prob}\{x = g | \hat{\gamma}, \hat{\beta}\}$  the probability with which the mediocre referee recommends publication if he plays the strategy  $(\hat{\gamma}, \hat{\beta})$ . Note that  $\text{prob}\{x = g | \hat{\gamma} = 0, \hat{\beta} = 1\} = 0$  and  $\text{prob}\{x = g | \hat{\gamma} = 1, \hat{\beta} = 0\} = 1$ . In Figures 2 and 3,  $\text{prob}\{x = g | \hat{\gamma}, \hat{\beta}\}$  increases gradually from 0 to 1, first by fixing  $\beta = 1$  and gradually increasing  $\gamma$ , and then fixing  $\gamma = 1$  and gradually decreasing  $\beta$ .

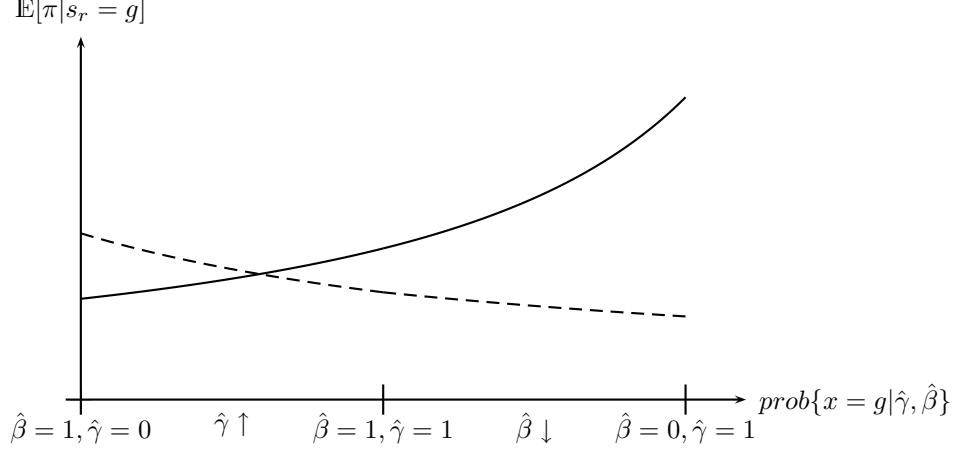
Suppose  $s_r = g$ . The mediocre referee's expected utility from recommending publication,  $\text{prob}\{s = g | s_r = g\} \pi_{gg} = \text{prob}\{s = g | s_r = g\} \frac{q}{q + (1-q)(\hat{\gamma}p_r + (1-\hat{\beta})(1-p_r))}$ , is strictly decreasing in  $\hat{\gamma}$ , increasing in  $\hat{\beta}$ , and hence decreasing in  $\text{prob}\{x = g | \hat{\gamma}, \hat{\beta}\}$ . Similarly, the expected utility from recommending a rejection is strictly increasing in  $\text{prob}\{x = g | \hat{\gamma}, \hat{\beta}\}$ . Hence, there exists at most one equilibrium with  $0 < \gamma < 1$ . Such an equilibrium exists iff  $\mathbb{E}[\pi | x = g, s_r = g, \hat{\gamma}, \hat{\beta}]$  and  $\mathbb{E}[\pi | x = b, s_r = g, \hat{\gamma}, \hat{\beta}]$ , intersect in the first region, i.e. to the left of  $(\hat{\beta} = 1, \hat{\gamma} = 1)$ . Figure 2 illustrates an example of this case.

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<sup>10</sup>The referee's assessment  $\text{prob}\{.\}$  is conditional on being asked a report (and hence conditional on  $(\eta, \varepsilon)$ ). We suppress this information for the sake of better readability.



Figure 2: Expected utility when recommending publication (dashed), recommending rejection (solid), upon observing  $s_r = g$  given beliefs  $(\hat{\gamma}, \hat{\beta})$ ,  $p_r = 0.55$ ,  $q = 1/2$ ,  $\eta = 0$ .



Analogously, there exists at most one equilibrium with  $0 < \beta < 1$ . An equilibrium with  $\beta \in (0, 1)$  exists iff  $\mathbb{E}[\pi|x = g, s_r = b, \hat{\gamma}, \hat{\beta}]$  and  $\mathbb{E}[\pi|x = b, s_r = b, \hat{\gamma}, \hat{\beta}]$  intersect in the second region, i.e. to the right of  $(\hat{\beta} = 1, \hat{\gamma} = 1)$ .

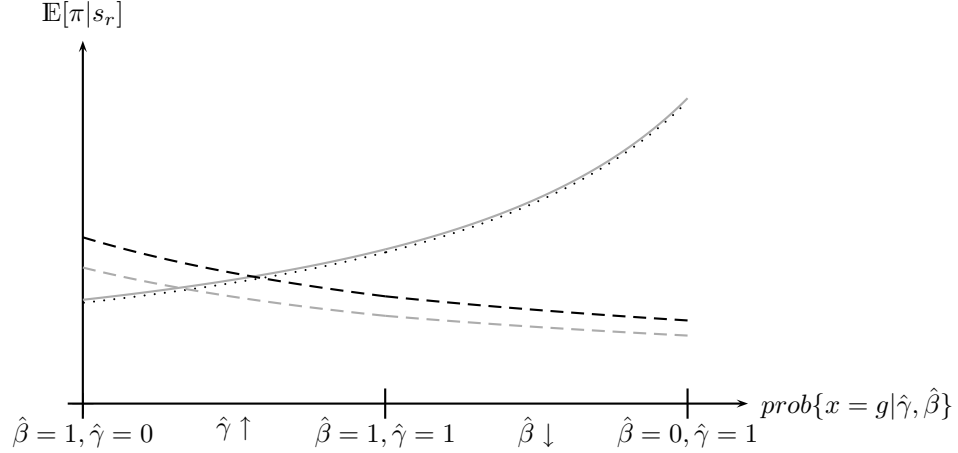
We need to show that equilibria with  $0 < \gamma < 1$  and equilibria with  $0 < \beta < 1$  do not coexist in order to complete the proof.

Suppose there exists an equilibrium with  $\gamma < 1$ . The expected utility from recommending publication is higher in case  $s_r = g$  than in case  $s_r = b$ , and the expected utility from recommending a rejection is higher in case  $s_r = b$  than in case  $s_r = g$  (if  $\eta = 0$ , as in Figure 3, they are the same). Hence,  $\mathbb{E}[\pi|x = g, s_r = b, \hat{\gamma}, \hat{\beta}]$  and  $\mathbb{E}[\pi|x = b, s_r = b, \hat{\gamma}, \hat{\beta}]$  intersect to the left of the intersection between  $\mathbb{E}[\pi|x = g, s_r = g, \hat{\gamma}, \hat{\beta}]$  and  $\mathbb{E}[\pi|x = b, s_r = g, \hat{\gamma}, \hat{\beta}]$ , i.e. in the region where  $\beta = 1$ . It follows that there exists no equilibrium with  $\beta < 1$ . Figure 3 illustrates the argument.

Suppose there exists an equilibrium with  $\beta < 1$ . As  $\mathbb{E}[\pi|x = g, s_r = g, \hat{\gamma}, \hat{\beta}]$  and  $\mathbb{E}[\pi|x = b, s_r = g, \hat{\gamma}, \hat{\beta}]$  intersect to the right of the intersection between  $\mathbb{E}[\pi|x = g, s_r = b, \hat{\gamma}, \hat{\beta}]$  and  $\mathbb{E}[\pi|x = b, s_r = b, \hat{\gamma}, \hat{\beta}]$ , i.e. in the region where  $\gamma = 1$ . It follows that there exists no equilibrium with  $\gamma < 1$ . Q.E.D.

As we have established equilibrium uniqueness, we are now ready to study the effects of a change of the preselection rule. We assume that the editor is committed to the preselection rule and that the rule is correctly anticipated.

Figure 3: Expected utility when recommending publication upon observing  $s_r = g$  (black, dashed),  $s_r = b$  (gray, dashed), recommending rejection, upon observing  $s_r = g$  (black, dotted),  $s_r = b$  (gray, solid) given beliefs  $(\hat{\gamma}, \hat{\beta})$ ,  $p_r = 0.55$ ,  $q = 1/2$ ,  $\eta = 0$ .



### 2.1.1 No preselection

Let us first analyze the benchmark case without preselection  $\eta = 0$ , i.e. all papers enter the refereeing process without prior screening. The equilibrium depends on the fraction of smart and mediocre types.

**Lemma 3** Consider  $\eta = 0$  (no preselection). For any  $p_r < 1$ ,  $\exists \bar{q}(p_r)$  : If  $q > \bar{q}(p_r)$ , then  $\gamma = 0$ ,  $\beta = 1$ .

**Proof.** The referee faces the best incentives to report  $x = g$  if the editor assumes  $\hat{\gamma} = 0$ ,  $\hat{\beta} = 1$ , i.e. that only the smart type recommends publication.

In this case,  $\pi_{gg} = 1$ . Having observed  $s_r = g$ , reporting  $x = g$  yields the expected utility  $p_r$ . If he has observed  $s_r = b$ , his expected utility from recommending  $x = g$  is even lower,  $1 - p_r$ . Reporting  $x = b$  yields utility  $\frac{q}{q+2(1-q)}$ . Hence, the agent has an incentive to report  $x = g$  only if

$$p_r \geq \frac{q}{q+2(1-q)} \Leftrightarrow q \leq \frac{2p_r}{1+p_r}.$$

Thus, if  $q > \frac{2p_r}{1+p_r} := \bar{q}(p_r)$ , the agent always reports  $x = b$ .

Q.E.D.

If the fraction of smart referees  $q$  is sufficiently large, then the mediocre type has an incentive to opt for rejection. Because the smart type recommends a rejection in the case that the

manuscript is of bad quality, and there is only a small fraction of mediocre types who always recommend a rejection, rejection does not harm reputation severely. Suggesting a publication still may yield a higher reputation, but only with a lower probability. Rejection is the safe haven alternative for the mediocre types.

Regardless of the fraction of the respective types, the following lemma establishes that there is no sincere equilibrium without preselection.

**Lemma 4** *Consider  $\eta = 0$  (no preselection). No equilibrium with  $\gamma = 1$  exists.*

**Proof.** In any putative equilibrium with  $\hat{\gamma} = 1$ , the editor's belief that the referee is smart when observing  $x = b$ ,  $\pi_{b\theta}$ , is at least  $q$ . When observing  $x = g$  and  $s = g$ , the editor's belief that the agent is smart, i.e.  $\pi_{gg}$ , is at most  $\frac{q}{1-(1-p_r)(1-q)}$ .  $\pi_{b\theta}$  is obtained with probability one in the case of a rejection, and  $\pi_{gg}$  is obtained with probability  $p_r < 1$  in the case of a publication. It is easy to verify that  $q > \frac{p_r q}{1-(1-p_r)(1-q)}$ . Hence, there is no equilibrium in which the mediocre referee always reveals a good signal truthfully. Q.E.D.

From Lemmata 1 and 4, it follows that in the equilibrium without preselection, the mediocre referee recommends a rejection whenever observing a bad signal.

**Corollary 1** *Consider  $\eta = 0$  (no preselection). In equilibrium,  $\beta = 1$ .*

**Proposition 1** *Consider  $\eta = 0$  (no preselection). In equilibrium there is a bias towards rejection with  $\gamma < 1$  and  $\beta = 1$ .*

**Proof.** Follows from Lemma 4 and Corollary 1. Q.E.D.

Note that this result is sensitive to the assumption that the manuscript is good with prior probability 1/2. If the prior probability is very high, as it may for instance be if the paper's authors are from top universities, the bias may be in the opposite direction.<sup>11</sup>  $\pi_{gg}$  is independent of the prior probability with which the manuscript is good, and the probability that the manuscript is good conditional on  $s_r$  is increasing.  $\pi_{b\theta}$  is the lower the less likely the paper is good ex ante. Hence, recommending a publication becomes more attractive relative to recommending a rejection. Consider the extreme case, in which the paper is of high quality with certainty. In this case,  $\gamma = 1, \beta = 0$  is optimal for the mediocre referee. For a lower, but still high expected paper quality, we still have  $\beta < 1$ . However, on average, a prior of 1/2 may already be very optimistic. For lower values, the bias towards rejection is even more pronounced.

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<sup>11</sup>Hence, our analysis suggests that an increase in the ex ante expected paper quality may yield a disproportionately high increase in the publication probability of the paper. Evidence in line with this argument is presented by Blank (1991), who finds that authors from near top universities have a higher publication probability under single-blind rather than double-blind refereeing procedures.

We stick to the assumption that the manuscript is good with probability  $1/2$  for the rest of the paper, yielding a recommendation biased towards rejection without preselection. The following section shows how a simple preselection mechanism may induce sincere reporting.

### 2.1.2 Preselection

Introducing a preselection stage changes the picture. We assume that the editor looks at the paper with a certain probability ( $\eta > 0$ ), in which case he obtains an informative signal (i.e. a signal coinciding with the true state of the world with probability  $1 - \varepsilon > \frac{1}{2}$ ). If the editor obtains a bad signal, the manuscript does not enter the refereeing process. Preselection alters the referee's perception of the manuscript's quality. The average quality of papers entering the refereeing process increases. In addition, recommending a rejection loses its safe haven character, as the referee is uncertain whether the editor has no information or a positive signal.

**Proposition 2** *For any  $(p_r, q)$ , there is a class of preselection rules  $(\eta, \varepsilon)$  for which truthtelling is an equilibrium.*

The proof can be found in the appendix.

The incentives to recommend a publication become stronger for higher  $\eta$  and lower  $\varepsilon$ , as the manuscript's quality as perceived by the mediocre referee increases. However, note that the editor cannot induce truthtelling with a too tough preselection rule. In this case, a bias towards publication arises. For instance, if the editor always acquires perfect information ( $\eta = 1, \varepsilon = 0$ ), the mediocre referee knows that all manuscripts which he obtains are good. Therefore, he recommends publication in equilibrium regardless of his own signal. There always exist intermediate preselection rules such that truthtelling is an equilibrium.

### 2.1.3 Decision quality

Without a further specification of the editor's preferences, we can already discuss several quality measures. We continue to assume that the editor is committed to a certain preselection rule.<sup>12</sup> First, we turn to the effects of the editor's preselection rule on the quality of the referee reports.

**Proposition 3** *Consider  $\eta < 1, \varepsilon > 0$ . A tougher preselection stage ( $\eta \uparrow, \varepsilon \downarrow$ , or both) weakly decreases the quality of reports in favor of publication.*

**Proof.** A paper enters the refereeing stage only if the editor's signal indicates good paper quality. Thus, the average paper quality forwarded to the referee is higher the tougher the

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<sup>12</sup>Commitment may for instance stem from hierarchical information management.

preselection rule. In particular, the referee now faces a greater risk from recommending rejection, since it is likely that the editor has a good signal. In equilibrium this yields a weakly higher probability that the mediocre referee recommends publication, i.e.  $\gamma \uparrow$ , or  $\beta \downarrow$ . Since the mediocre referee is endowed with a weaker signal than the smart type, the expected quality of positive reports decreases the more likely it stems from the mediocre type. Q.E.D.

Through the impact on the referee's behavior, preselection influences the journal's quality in a non-trivial way.

**Corollary 2** *Consider the case  $q > \frac{2p_r}{1+p_r}$ . The probability that an accepted paper is good is non-monotonic in the preselection rule.*

Without preselection, the probability that an accepted paper is good is one, because only smart referees recommend a publication. With the toughest preselection rule ( $\eta = 1, \varepsilon = 0$ ), it is one, because every paper that enters the refereeing process is good and recommended for publication. In between, the probability that an accepted paper is good is smaller than one.

Let us next turn to the mistakes which the editor's decision may involve, accepting the paper if it is bad and rejecting the paper if it is good. For our general specification of the editor's preferences, it is in his interest to avoid both mistakes. How he trades off the probabilities with which they occur depends on the concrete preference specification to be studied in the next sections. However, for any such specification which satisfies  $u_{ag} > u_{rg}$  and  $u_{rb} > u_{ab}$ , the decision quality as measured in terms of the editor's expected utility ceteris paribus decreases in the probability with which each type of mistake occurs.

Consider again the case  $q > \frac{2p_r}{1+p_r}$ . With a preselection stage, the editor incurs the mistake to accept a bad paper (weakly) more often. We can easily find preselection rules for which the other type of mistake (rejecting the paper if it is good) occurs with a lower probability than without a preselection stage. If both mistakes occur (weakly, at least one strictly) more often under a preselection rule, then the decision quality is unambiguously lower under that rule.

**Proposition 4** *Consider  $q > \frac{2p_r}{1+p_r}$ , implying  $\gamma = 0$  without preselection.*

(i)  $\exists \varepsilon', \varepsilon'', 0 < \varepsilon' < \varepsilon'' < \frac{1}{2}$  : If  $\varepsilon \in [\varepsilon', \varepsilon'']$ , introducing a preselection stage with  $\eta \geq \eta'(\varepsilon)$ ,  $\eta'(\varepsilon) \leq 1$  yields a strictly lower decision quality than no preselection.

(ii)  $\exists \tilde{\varepsilon}, \tilde{\varepsilon} \leq \frac{1}{2}$  and  $\tilde{\eta}(\varepsilon), \tilde{\eta}(\varepsilon) > 0$  such that any preselection rule  $(\eta, \varepsilon)$ ,  $\eta < \tilde{\eta}(\varepsilon)$  and  $\varepsilon > \tilde{\varepsilon}$  yields a strictly lower decision quality than no preselection.

The proof can be found in the appendix.

Part (i) of Proposition 4 identifies parameter ranges for which truthtelling is an equilibrium, but the editor's information is so weak such that overall, the decision quality is strictly lower

than in the case without preselection. Part (ii) identifies preselection rules for which the impact on the mediocre referee's behavior is not strong enough to compensate the additional mistakes made by the editor.

As argued above, the preselection rule ( $\eta = 1, \varepsilon = 0$ ) yields the highest possible decision quality. Note that in this extreme case the refereeing stage is superfluous as the decision maker is already perfectly informed. For imperfect preselection rules, however, one type of mistake weakly increases as compared to the case without preselection if the mediocre referee is induced to give a recommendation that he would otherwise not give. Whether introducing a preselection stage is beneficial depends on how the editor trades off the types of mistakes. Increasing the number of desk rejections ( $\eta \uparrow$ ) has repercussions on truthtelling, but also the desk rejection decision might be wrong (if  $\varepsilon > 0$ ). The former effect increases the ex ante probability that the decision is correct but the latter is opposite. With a low level of preselection, the editor may lose the mediocre referee's valuable information. High preselection levels imply the risk that the editor's signal is wrong and good papers may be desk-rejected. On the other hand it may not be worth to induce truthtelling by the mediocre referee. This is in particular true if the probability that the referee is mediocre is small, and the editor's signal is not too precise. Moreover, if the preselection rule is so weak that it has no effect on the mediocre referee's strategy, its effect on the decision quality is unambiguously negative.

## 2.2 The editor's strategy

In this section, we identify parameter ranges for the editor's preferences, his signal quality and information acquisition costs such that in any equilibrium (i) the editor asks for the referee's recommendation if  $s_e \in \{\emptyset, g\}$ , but not if  $s_e = b$ , and (ii) desk-rejects the manuscript upon observing a bad signal and follows the referee's advice if he acquires it. We start with the analysis of the editor's publication behavior.

### The editor's publication behavior

The editor maximizes his expected payoff taking all the available information into account. He accepts the paper for publication if and only if:

$$\begin{aligned}
 & \text{prob}\{s = g \mid \text{editor's info}\}u_{ag} + (1 - \text{prob}\{s = g \mid \text{editor's info}\})u_{ab} \\
 & \geq \text{prob}\{s = g \mid \text{editor's info}\}u_{rg} + (1 - \text{prob}\{s = g \mid \text{editor's info}\})u_{rb} \\
 \Leftrightarrow & \frac{u_{rb} - u_{ab}}{u_{ag} - u_{rg}} \leq \frac{\text{prob}\{s = g \mid \text{editor's info}\}}{1 - \text{prob}\{s = g \mid \text{editor's info}\}}. \tag{3}
 \end{aligned}$$

In order to derive the value of refereeing, we need to specify the editor's publication behavior without access to the referee's recommendation. We assume that the editor has more to lose

from a wrong decision on a bad paper than from a wrong decision on a good one. In particular, we assume that observing a good signal  $s_e = g$  is not enough to convince the editor to accept the paper. Under Condition 1, the editor prefers rejecting to accepting the paper upon the observation of a good signal,  $s_e = g$ .

**Condition 1**  $\frac{u_{rb}-u_{ab}}{u_{ag}-u_{rg}} > \frac{1-\varepsilon}{\varepsilon}$ .

Note that Condition 1 implies that the editor also rejects the paper if he has no or bad information, or if he receives the referee's recommendation to reject the paper.

Upon receiving the referee's recommendation to accept the paper, the editor's assessment of the probability that the paper is of good quality is lowest if his own signal is bad ( $s_e = b$ ) and he believes that the mediocre type always recommends to accept the paper ( $\hat{\gamma} = 1, \hat{\beta} = 0$ ). The editor follows the referee's recommendation to accept the paper for any  $s_e$  and any  $\hat{\gamma}, \hat{\beta}$ , if he does so for  $s_e = b$  and  $\hat{\gamma} = 1, \hat{\beta} = 0$ , i.e. if Condition 2 is satisfied.

**Condition 2**  $\frac{u_{rb}-u_{ab}}{u_{ag}-u_{rg}} \leq \frac{\varepsilon}{(1-\varepsilon)(1-q)}$ .

The interval with the lower bound defined by Condition 1 and the upper bound given by Condition 2 exists if Condition 3 holds.

**Condition 3**  $q > \frac{1-2\varepsilon}{(1-\varepsilon)^2}$ .

We summarize these findings in the following lemma.

**Lemma 5** *Assume that Conditions 1-3 are satisfied. In any equilibrium in which the smart referee is sincere, the editor behaves as follows: In case that he does not ask for the referee's recommendation, the editor rejects the paper. He follows the referee's recommendation if he has asked for it.*

### The editor's information acquisition behavior

Assume in the following that Conditions 1-3 are satisfied. If the editor does not ask for the referee's recommendation, his expected payoff is:

$$\text{prob}\{s = g|s_e\}u_{rg} + \text{prob}\{s = b|s_e\}u_{rb}. \quad (4)$$

If he asks for the referee's advice, the editor's payoff (neglecting the refereeing cost) is:

$$\begin{aligned} & \text{prob}\{s = g|s_e\}(\text{prob}\{x = g|s = g\}u_{ag} + (1 - \text{prob}\{x = g|s = g\})u_{rg}) \\ & + \text{prob}\{s = b|s_e\}(\text{prob}\{x = g|s = b\}u_{ab} + (1 - \text{prob}\{x = g|s = b\})u_{rb}). \end{aligned} \quad (5)$$

Subtracting (4) from (5) yields the value of refereeing:

$$prob\{s = g|s_e\}prob\{x = g|s = g\} (u_{ag} - u_{rg}) \quad (6)$$

$$- prob\{s = b|s_e\} (1 - prob\{x = b|s = b\}) (u_{rb} - u_{ab}). \quad (7)$$

If the manuscript is in fact good, asking for the referee's recommendation and then following the advice has the effect that the manuscript is published with probability  $prob\{x = g|s = g\} > 0$  rather than with probability zero. Hence, refereeing yields a redistribution of probability mass from the event of rejecting a good paper to the event of publishing it, which is good (see (6)). Accordingly, if the manuscript is in fact bad, "delegating" the decision to the referee has the effect that the manuscript is rejected with probability  $prob\{x = b|s = b\} < 1$  instead of with probability one. Hence, refereeing also yields a redistribution of probability mass from the event of rejecting to the event of publishing a bad paper, which is bad (see (7)).

In the case that the editor's signal is bad,  $s_e = b$ , the value of refereeing is:

$$\varepsilon prob\{x = g|s = g\} (u_{ag} - u_{rg}) - (1 - \varepsilon) (1 - prob\{x = b|s = b\}) (u_{rb} - u_{ab}) \quad (8)$$

If the editor does not have a signal,  $s_e = \emptyset$ , the value of refereeing is:

$$\frac{1}{2} prob\{x = g|s = g\} (u_{ag} - u_{rg}) - \frac{1}{2} (1 - prob\{x = b|s = b\}) (u_{rb} - u_{ab}) \quad (9)$$

If the editor has a good signal,  $s_e = g$ , the value of refereeing amounts to:

$$(1 - \varepsilon) prob\{x = g|s = g\} (u_{ag} - u_{rg}) - \varepsilon (1 - prob\{x = b|s = b\}) (u_{rb} - u_{ab}) \quad (10)$$

It is easy to see that (8) < (9) < (10). The size of the redistribution of probability mass induced by refereeing is independent of the editor's information. However, the positive effect (6) occurs with a higher probability if the editor has not yet observed an opposing signal, and, accordingly, the negative effect (7) occurs with a lower probability. Hence, given the publication behavior, refereeing is unambiguously more valuable if the editor does not yet possess information than if he already observed a bad signal and it is even more valuable if the editor observed a good signal.

Hence, for any  $(\hat{\gamma}, \hat{\beta})$ , there exist values for  $c$  in between (8) and (9) such that it is optimal for the editor to ask for the referee's recommendation if  $s_e \in \{g, \emptyset\}$ , and to desk-reject the manuscript if  $s_e = b$ . Moreover, if Condition 4 holds in addition to Conditions 1 and 2,  $c$  assumes a value that ensures that the editor behaves as described above in any equilibrium. Existence of such a value is guaranteed by Conditions 4A-D.<sup>13</sup>

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<sup>13</sup>Note that (8) < (9) for any  $\gamma, \beta$ . Under Condition 4A, (8) is decreasing in  $\gamma$ , and under Condition 1, both (8) and (9) are decreasing in  $-\beta$ . Condition 4B ensures that (8) assumes a lower value at  $\gamma = 0, \beta = 1$  than (9)



**Condition 4** (A)  $\frac{u_{rb}-u_{ab}}{u_{ag}-u_{rg}} > \frac{\varepsilon p_r}{(1-\varepsilon)(1-p_r)}$ , (B)  $\frac{u_{rb}-u_{ab}}{u_{ag}-u_{rg}} < \frac{\frac{1}{2}-\varepsilon q}{\frac{1}{2}-\frac{1}{2}q}$ , (C)  $p_r < 1 - \varepsilon$ ,  
(D)  $q > \frac{\frac{1}{2}-\varepsilon}{\frac{1}{2}(1-\varepsilon)-\varepsilon^2}$ , (E)  $c \in [q\varepsilon(u_{ag} - u_{rg}), \frac{1}{2}(u_{ag} - u_{rg}) - \frac{1}{2}(1 - q)(u_{rb} - u_{ab})]$ .

The last step to show the existence of an equilibrium in which the editor behaves as supposed in Section 2.1 is to verify that the editor indeed (sometimes) acquires a signal, i.e.  $\eta > 0$ . Notice that the editor uses the signal as his further information acquisition decision depends on its realization, hence the information has a value. For a given referee behavior, there must be a cost of information acquisition  $\xi'$  such that the editor is just indifferent between acquiring and not acquiring information. If  $\xi = \xi'$ , any  $\eta \in [0, 1]$  is optimal for the editor.

We summarize the results regarding the editor's strategy in Proposition 5.

**Proposition 5** *Let Conditions 1-3 be satisfied.*

(i) *There are parameter ranges for  $c$  and  $\xi$  such that an equilibrium exists in which the editor preselects with probability  $\eta > 0$ , desk-rejects the manuscript if he observes a negative signal, and asks for the referee's recommendation if he observes a positive signal or no information. He follows the referee's advice.*

(ii) *In addition, let Condition 4 be satisfied. In any equilibrium, the editor desk-rejects the manuscript if he acquires information and observes a negative signal, and asks for the referee's recommendation if he observes a positive signal or no information. He follows the referee's advice.*

Conditions 1-3 are sufficient for the existence of equilibria in which the editor behaves as described above.<sup>14</sup> Heuristically speaking, the conditions with respect to the editor's preferences identified in this section require that the editor suffers more from publishing a bad manuscript rather than from forgoing to publish a good manuscript. In addition, this asymmetry must be weak enough such that he is still responsive to information.

We close the analysis of the editor's behavior with a short discussion of alternative parameter specifications. If the editor is biased towards publication and the cost of refereeing is moderate, he may only ask for the referee's recommendation after observing bad paper quality and publish the paper straight away if he observed a good signal. Then, the preselection stage has the effect to magnify the incentive for the mediocre type to always reject the paper. In general, in an equilibrium in which the editor acquires (costly) information at both stages, he must make use

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at  $\gamma = 1, \beta = 0$ , and hence that the smallest value for (9) is larger than the largest value for (8). Condition 4C guarantees mutual consistency of A and B, as well as compatibility with Condition 2. Condition 1 and Condition 4B can be satisfied simultaneously if 4D holds. Note that Condition 4D implies Condition 3.

<sup>14</sup>A broader range of parameters for which such equilibria exist can be identified, for instance by allowing a different publication behavior for  $s_e \in \{g, \emptyset\}$  and the case that the editor does not ask for the referee's advice.

of the information acquired at both stages. That is, entering the refereeing stage amounts to delegating the decision to the referee and for at least one realization of the editor's signal, there must be an immediate decision (publishing when  $s_e = g$  or rejecting when  $s_e = b$ ). Finally, the more extreme the editor's bias towards one decision, i.e.  $u_{rb} - u_{ab} \gg u_{ag} - u_{rg}$  (or vice versa), and/or the higher the information acquisition costs  $\xi$  and  $c$ , the less information the editor acquires. The focus of our paper is on preselection rules which sort out bad quality, which seem to be particularly relevant in practice, especially in academic publishing. We henceforth consider the parameter range for which this behavior is optimal.

### 2.3 Equilibria and efficiency

In this section, we show that there is a parameter range for the editor's preferences and information acquisition costs such that the equilibrium level of preselection is inefficient. The editor would be better off if he was able to commit to a lower preselection level. We first complete our equilibrium analysis by studying the set of equilibria that can arise for a given cost of information acquisition  $\xi$ , maintaining the assumption that Conditions 1-4 are satisfied.

The editor's expected utility before he acquires information (neglecting the cost for this information and taking as given his later information acquisition and publication behavior as derived in the previous section), is given by:

$$\begin{aligned}
EU_{IA} &= \text{prob}\{s_e = g\} \cdot \left( \begin{array}{l} \text{prob}\{s = g|s_e = g\} (u_{rg} + \text{prob}\{x = g|s = g\}(u_{ag} - u_{rg})) \\ + \text{prob}\{s = b|s_e = g\} (u_{ab} + \text{prob}\{x = b|s = b\}(u_{rb} - u_{ab})) \end{array} \right) \\
&\quad - c \\
&\quad + \text{prob}\{s_e = b\} \cdot (\text{prob}\{s = b|s_e = b\}u_{rb} + \text{prob}\{s = g|s_e = b\}u_{rg}) \\
&= \frac{1}{2} \cdot \left( \begin{array}{l} (1 - \varepsilon) (u_{rg} + (q + (1 - q)(\gamma p_r + (1 - \beta)(1 - p_r)))(u_{ag} - u_{rg})) \\ + \varepsilon (u_{ab} + (q + (1 - q)((1 - \gamma)(1 - p_r) + \beta p_r))(u_{rb} - u_{ab})) \end{array} \right) \\
&\quad - c \\
&\quad + \frac{1}{2} \cdot ((1 - \varepsilon)u_{rb} + \varepsilon u_{rg}).
\end{aligned}$$

If he does not acquire own information, the editor's expected utility (again taking as given his later information acquisition and publication behavior), is given by:

$$\begin{aligned}
EU_{NIA} &= \frac{1}{2} (u_{rg} + (q + (1 - q)(\gamma p_r + (1 - \beta)(1 - p_r)))(u_{ag} - u_{rg})) \\
&\quad + \frac{1}{2} (u_{ab} + (q + (1 - q)((1 - \gamma)(1 - p_r) + \beta p_r))(u_{rb} - u_{ab})) \\
&\quad - c.
\end{aligned}$$

We have:

$$\frac{\partial EU_{IA}}{\partial \gamma} = 1/2(1-q) \left( (1-\varepsilon)p_r(u_{ag} - u_{rg}) - \varepsilon(1-p_r)(u_{rb} - u_{ab}) \right) \quad (11)$$

$$\frac{\partial EU_{NIA}}{\partial \gamma} = 1/2(1-q) \left( p_r(u_{ag} - u_{rg}) - (1-p_r)(u_{rb} - u_{ab}) \right) \quad (12)$$

$$\frac{\partial EU_{IA}}{\partial \beta} = 1/2(1-q) \left( -(1-\varepsilon)(1-p_r)(u_{ag} - u_{rg}) + \varepsilon p_r(u_{rb} - u_{ab}) \right) \quad (13)$$

$$\frac{\partial EU_{NIA}}{\partial \beta} = 1/2(1-q) \left( -(1-p_r)(u_{ag} - u_{rg}) + p_r(u_{rb} - u_{ab}) \right) \quad (14)$$

Under Condition 1, we have (14) > (13) > 0. Hence, the editor's expected utility is falling in the probability with which the referee recommends publication upon observing a bad signal. Moreover, the difference in expected utilities when acquiring information and when not is increasing in this probability (see Figure 4). Under Condition 4A, it is also increasing in  $\gamma$ . We can distinguish three parameter ranges for the editor's preferences, as summarized in Table 2 (and depicted in Figure 4 for the second range).

Preference parameter range	Marginal effects of an increase in $\gamma$
$\frac{p_r \varepsilon}{(1-p_r)(1-\varepsilon)} < \frac{u_{rb}-u_{ab}}{u_{ag}-u_{rg}} < \frac{p_r}{1-p_r}$	$EU_{IA} \uparrow, EU_{NIA} \uparrow, EU_{IA} - EU_{NIA} \uparrow$
$\frac{p_r}{1-p_r} < \frac{u_{rb}-u_{ab}}{u_{ag}-u_{rg}} < \frac{p_r(1-\varepsilon)}{(1-p_r)\varepsilon}$	$EU_{IA} \uparrow, EU_{NIA} \downarrow, EU_{IA} - EU_{NIA} \uparrow$
$\frac{p_r(1-\varepsilon)}{(1-p_r)\varepsilon} < \frac{u_{rb}-u_{ab}}{u_{ag}-u_{rg}}$	$EU_{IA} \downarrow, EU_{NIA} \downarrow, EU_{IA} - EU_{NIA} \uparrow$

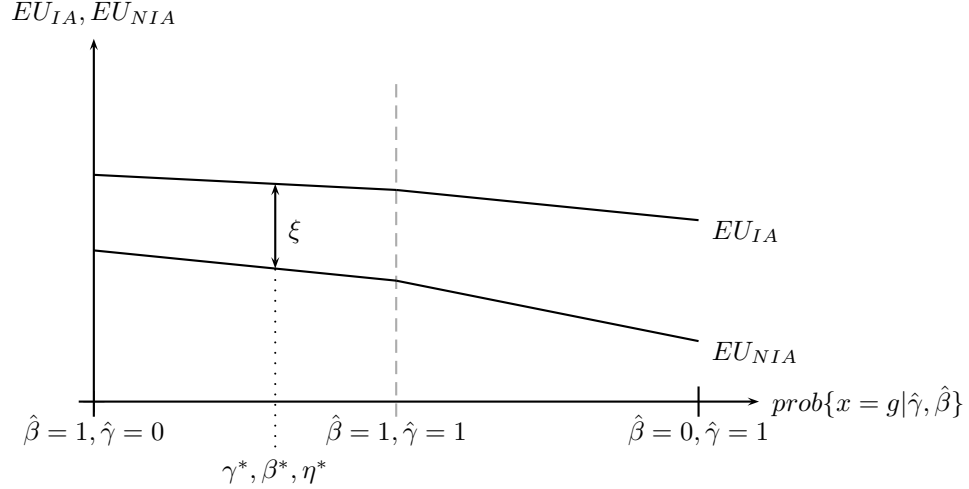
Table 2: Effects of an increase in  $\gamma$  on the editor's expected utility

Figure 4 illustrates  $EU_{IA}$  and  $EU_{NIA}$  for  $\frac{u_{rb}-u_{ab}}{u_{ag}-u_{rg}} > \frac{p_r(1-\varepsilon)}{(1-p_r)\varepsilon}$ .<sup>15</sup> Note that  $\gamma = 0, \beta = 1$  can occur in equilibrium only if  $q > \frac{2p_r}{1+p_r}$  (otherwise  $\gamma > 0$  already for  $\eta = 0$ ), and that  $\gamma = 1, \beta = 0$  can be reached in equilibrium only if  $\varepsilon = 0$ . If  $\varepsilon > 0$ , then  $\beta > 0$ .<sup>16</sup> Denote with  $\gamma(\eta = 1, \varepsilon), \beta(\eta = 1, \varepsilon)$  the referee's equilibrium strategy induced by  $\varepsilon$  and  $\eta = 1$ . If the editor's information acquisition cost  $\xi$  is low, keeping  $\gamma$  and  $\beta$  constant, the editor gains from acquiring information, because this allows him to sometimes save the refereeing cost  $c$ . As the referee anticipates the editor's information acquisition, the mediocre type will recommend a publication of the manuscript more often. Therewith, the referee's recommendation for publication becomes less valuable. This in turn tends to increase the value of the editor's information because now the downside of the preselection, forgoing the opportunity to change his attitude towards the manuscript, becomes less expensive. Thus, the incentive to acquire information is reinforced by the referee's strategic adjustment. Although the value of the editor's information increases the

<sup>15</sup>Note that this is compatible with Conditions 1-4 if  $q$  is high enough.

<sup>16</sup>Suppose  $\beta = 0$ . Then,  $\gamma = 1$  and only the smart type ever recommends a rejection. Thus, the mediocre type gains from deviating to also recommending a rejection. Hence, we must have  $\beta > 0$  in equilibrium.

Figure 4: The editor's expected utility when acquiring information ( $EU_{IA}$ ) and when not acquiring information ( $EU_{NIA}$ ) for  $\frac{u_{rb}-u_{ab}}{u_{ag}-u_{rg}} > \frac{p_r(1-\varepsilon)}{(1-p_r)\varepsilon}$ .



more often the mediocre referee recommends a publication, the editor's ex ante expected utility decreases (for the specified preference parameter range, both,  $EU_{IA}$  and  $EU_{NIA}$  decrease).<sup>17</sup> Hence, preselection has the negative side-effect to change the referee's behavior in an unfavorable way.

$EU_{IA} - EU_{NIA}$  increases in the probability with which the mediocre referee recommends a publication ( $\gamma \uparrow, \beta \downarrow$ ). If  $\xi$  is lower than  $EU_{IA} - EU_{NIA}$  at  $\gamma = 0, \beta = 1$ , then there exists a unique equilibrium. In this equilibrium, we have  $\eta = 1$ . If  $\xi$  is higher than  $EU_{IA} - EU_{NIA}$  at  $\gamma(\eta = 1, \varepsilon), \beta(\eta = 1, \varepsilon)$ , then again there exists a unique equilibrium. In this equilibrium, we have  $\eta = 0$ . For intermediate  $\xi$ , there exist three equilibria, one in which  $\eta \in (0, 1)$ , one in which  $\eta = 0$  and one in which  $\eta = 1$  (see Figure 4.). These findings are summarized in Proposition 6.

**Proposition 6** *Let Conditions 1 – 4 be satisfied.*

(i) *If the editor's information acquisition cost  $\xi$  is sufficiently small, then there exists a unique equilibrium in which the editor always acquires information.*

(ii) *If the editor's information acquisition cost  $\xi$  is sufficiently large, then there exists a unique equilibrium in which the editor never acquires information.*

<sup>17</sup>If the editor is less biased towards rejection, he may initially gain from the referee's strategic adjustment, see Table 2.

(iii) For intermediate values of the editor's information acquisition cost  $\xi$ , there exists an equilibrium in which the editor sometimes acquires information. This equilibrium coexists with two other equilibria: one in which the editor always acquires information, and one in which the editor never acquires information.

Having identified the set of equilibria, we continue with a discussion of the efficiency of equilibrium outcomes. Our efficiency criterion is the editor's ex ante expected utility.<sup>18</sup>

Consulting Figure 4 again, it is easy to see that compared to an equilibrium with  $\eta \in (0, 1)$  and  $\beta < 1$ , the editor can attain a higher expected utility if he is able to commit to a slightly lower preselection level.<sup>19</sup> In an equilibrium with  $\eta < 1$ , the editor realizes the expected utility  $EU_{NIA}$ .<sup>20</sup> If the editor can commit to a smaller  $\eta$ , the mediocre referee will choose a higher  $\beta$ , and the editor sometimes saves the cost  $\xi$ . Both effects increase the editor's expected payoff. However, as such an equilibrium coexists with two other ones, it is not clear whether the editor gains from the possibility to commit to a lower preselection level as compared to the best equilibrium outcome.

Concerning the parameter range for  $\xi$  for which unique equilibria exist, we find the following:

**Proposition 7** *Let Conditions 1-4 be satisfied.*

- (i) *If the equilibrium with  $\eta = 0$  is unique, the equilibrium outcome is efficient.*
- (ii) *If the equilibrium with  $\eta = 1$  is unique,  $\gamma(\eta = 1, \varepsilon) < 1$ , and  $\frac{u_{rb}-u_{ab}}{u_{ag}-u_{rg}} < \frac{p_r(1-\varepsilon)}{(1-p_r)\varepsilon}$ , the equilibrium outcome is efficient.*

**Proof.** (i) The cost of information acquisition is greater than its benefit for any referee reporting strategy. (ii) If the equilibrium with  $\eta = 1$  is unique,  $EU_{IA} - \xi > EU_{NIA} \forall \gamma, \beta$ . If  $\frac{u_{rb}-u_{ab}}{u_{ag}-u_{rg}} < \frac{p_r(1-\varepsilon)}{(1-p_r)\varepsilon}$ ,  $EU_{IA}$  is increasing in  $\gamma$ .  $\gamma$  cannot be increased beyond  $\gamma(\eta = 1, \varepsilon) < 1$ . Q.E.D.

If  $\frac{u_{rb}-u_{ab}}{u_{ag}-u_{rg}} > \frac{p_r(1-\varepsilon)}{(1-p_r)\varepsilon}$ , the referee's strategic adjustment of his reporting strategy is detrimental for the editor (see Figure 4), and may even dominate the positive effect of saving the refereeing cost. However, the editor cannot commit not to preselect in equilibrium, which results in an inefficient outcome.

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<sup>18</sup>If the referee obtains no transfer (i.e. if the refereeing cost  $c$  arises due to searching) and incurs no cost of refereeing, then maximizing the editor's expected utility is equivalent to maximizing ex ante expected welfare. The referee's ex ante expected utility is the ex ante expected editor's belief that he is smart, which is always equal to the prior  $q$ .

<sup>19</sup>Bear in mind that for the parameter range identified by Conditions 1-4,  $EU_{IA}$  and  $EU_{NIA}$  are decreasing in  $-\beta$ .

<sup>20</sup>In general, an equilibrium with  $\eta \in (0, 1)$  only coincidentally maximizes the editor's expected payoff, i.e. if  $\xi$  assumes a particular value.

**Proposition 8** *Consider  $\xi$  small enough such that  $\eta = 1$  in the unique equilibrium. There is a parameter range for the editor's preferences, for  $q'$  and an associated  $c(q')$  such that if  $q = q'$  and  $c < c(q')$  the editor attains a strictly higher expected utility than his equilibrium payoff if he is able to commit to  $\eta = 0$ .*

The proof can be found in the appendix.

## 2.4 Endogenous participation

In this section, we endogenize the referee's participation behavior. First, we take the preselection rule as exogenously given and derive the equilibrium composition of the pool of participating referees. Next, we study the effects of a change of the preselection rule on the referee's participation behavior. We will show that for low participation cost, the introduction of a preselection stage does not affect equilibrium participation. Hence, our previous analysis allows for endogenous participation under the presumption that the participation cost is low.

We assume that prior to receiving his signal about the manuscript's quality, the referee has the possibility to decline the editor's invitation to review the manuscript (we briefly discuss alternative timing at the end of this section). Denote by  $k$  the cost that the referee faces when agreeing to review the paper.<sup>21</sup>

The editor takes the referee's participation strategy into account when updating his belief about the referee's type. We denote with  $q^{part}$  the probability that a participating referee is smart. There always exists an equilibrium in which the referee never participates, because the out-of-equilibrium-event of observing participation is associated with adverse out-of-equilibrium-beliefs. We will ignore this type of equilibrium in the following. We continue to restrict attention to equilibria in which the smart type gives sincere advice.

In equilibrium, there is participation only if the smart type participates. Otherwise, a mediocre referee would reveal his mediocrity and incur a cost, and would be strictly better off to pool with the smart type by not participating.<sup>22</sup> Moreover, the smart type's expected utility from participation increases the more often he participates. Hence, in an equilibrium with participation, the smart type participates with probability one.

Lemma 6 describes the equilibrium participation behavior depending on the participation cost.

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<sup>21</sup>The participation cost could be higher for the mediocre referee because for him it is harder to write a report that looks as if its author is smart, or it could be higher for the smart type because his opportunity cost is higher. Allowing for such asymmetries does not qualitatively change the results.

<sup>22</sup>Note that this argument applies even if the mediocre referee incurs a lower participation cost.

**Lemma 6** Consider a preselection rule  $(\eta, \varepsilon)$ .

(i) For low  $k$ , the referee always participates.

(ii) For intermediate  $k$ , the referee always participates if he is smart and participates with a strictly positive probability if he is mediocre.

(iii) For  $k > 1$ , the referee never participates.

**Proof.** (i) In an equilibrium in which the smart type participates with probability one, the editor believes that a referee who does not participate is smart with probability zero. Payoff realizations in case of participation are bounded below by zero. If the smart referee participates, a participating mediocre referee obtains a strictly positive payoff with a strictly positive probability. Hence, participation has a strictly positive value such that the mediocre referee is willing to incur a positive cost of participation. Both types' expected utility is strictly increasing in  $q^{part}$ . As long as  $k$  is lower than the mediocre referee's expected utility given full participation, full participation is optimal.

(ii) Suppose that the smart referee participates, but the mediocre type does not. If the referee does not participate, he obtains zero utility. Deviating to participation and recommending a rejection yields  $\pi = 1$ .<sup>23</sup>  $k$  has to be smaller than 1, otherwise the smart type would not participate. Hence, the deviation is profitable. Thus, in any equilibrium in which the smart type participates, the mediocre type participates with a positive probability.

(iii) If  $k > 1$ , then participation does not pay even if the editor thinks that every participating referee is smart. Q.E.D.

A consequence of Lemma 6 is that the probability that a participating referee is smart is weakly higher than the ex ante probability that he is smart.

**Corollary 3**  $q^{part} \geq q$ .

The mediocre type's incentive to participate is driven by the opportunity to pool with the smart type. Without preselection, recommending a rejection is a safe haven alternative, which c.p. becomes less attractive if the editor preselects. Hence, if the referee's recommendation is biased towards rejection, preselection is detrimental for him and reduces his participation. If the preselection rule induces a bias towards accepting the paper, participation becomes more attractive the tougher the preselection rule is, that is the higher the chances are that this advice

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<sup>23</sup>If the editor observes a good signal and the recommendation to reject the paper, but he believes that only the smart type (who reports sincerely) participates, he will notice a deviation only if his own signal is perfect. In this case, if he believes that the deviation occurred (only) at the participation stage,  $\pi_{gb} = 0$ , and the mediocre referee's expected utility from participating is strictly smaller than one. Hence, for the case that  $\varepsilon = 0$ , and  $k$  close to one, the proposed deviation is not profitable (neither is it profitable to always recommend a publication). However, if the editor believes that the deviation occurred (only) at the reporting stage,  $\pi_{bg} = 1$ .

is correct. The tougher the preselection rule, the better the mediocre type can predict, and hence imitate, the smart referee's reporting behavior.

In the following, we show that increasing the preselection level can increase the quality of the pool of participating referees or have the opposite effect. *Ceteris paribus*, increasing the preselection level reduces the mediocre referee's expected utility if the probability that his advice is correct decreases and vice versa. The referee can in principle react to a change of the preselection rule at the participation stage and/or at the reporting stage. We show the possible participation effects for particularly illustrative parameter constellations where the preselection rule impacts only on participation, but not on the reporting behavior.

First, we show how increasing the preselection level increases the quality of the pool of participating referees, as measured by  $q^{part}$ . Take a preselection rule  $(\eta, \varepsilon)$  as given and suppose that  $q > \frac{p_r(1-\varepsilon)}{\varepsilon^2(1-p_r)+p_r(1-\varepsilon)}$ , which guarantees that  $\gamma = 0$  for full participation for any preselection level.<sup>24</sup> Corollary 3 implies that  $\gamma = 0$  for any participation behavior of the mediocre type. As the mediocre referee's utility is strictly increasing in  $q^{part}$ , there exists a unique equilibrium. Suppose that the participation cost is intermediate, such that if  $\eta = 0$ , we have  $q < q^{part} < 1$  in equilibrium.

Consider the effect of increasing the preselection level. Suppose that the participation level does not change. Because the reporting behavior does not change either, the editor's beliefs stay the same, but now the belief  $\pi_{bg}$  occurs with a strictly higher probability and  $\pi_{b\emptyset} > \pi_{bg}$  realizes with a lower probability. Hence, the mediocre referee's expected utility from participation decreases. Reducing participation, the  $\pi$ 's conditional on participation increase, restoring indifference between participation and non-participation in the new equilibrium at a lower participation level.

Thus, we have the following:

**Proposition 9** *Consider  $\varepsilon > 0$ . If  $q > \frac{p_r(1-\varepsilon)}{\varepsilon^2(1-p_r)+p_r(1-\varepsilon)}$ , then increasing the preselection level reduces the mediocre referee's participation and has no effect on reporting behavior.*

Consequently, under the conditions stated in the proposition, conditional on receiving the referee's advice, the editor is strictly better off with a higher level of preselection. The probability that a recommendation to publish the paper is correct is unaffected, and the probability that a recommendation to reject the paper is correct is higher. Note that the increase in the probability of receiving no advice does not hurt the editor, because it is only uninformative advice which occurs with a lower probability. Hence, conditional on entering the refereeing stage, the editor is better off with a tougher preselection stage. The editor has to trade off these effects against a mistaken judgment at the preselection stage. The referee is better off with a tougher

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<sup>24</sup>See the proof of Proposition 8 in the appendix.



preselection rule. The mediocre type's utility is zero for any level of preselection, but the smart type's utility is higher if the mediocre type participates less often.

In order to see that the preselection level can have the opposite effect on the mediocre referee's participation behavior and can hence dilute the quality of the pool of participating referees, suppose that  $k$  is such that  $q^{part} > q$  and suppose that the preselection rule in place induces  $\beta < 1$ . The higher the level of preselection is, the higher is the probability that the manuscript is good conditional on being asked a report. Hence, as the mediocre referee's report is biased towards publication, ceteris paribus, his expected utility from participation increases. In order to keep the argument simple assume that  $\varepsilon = 0$  and that  $\eta > 1 - (1 - p_r)q$ , which ensures that  $\beta = 0$  for the initial level of preselection as well as for any higher level.<sup>25</sup> Facing a higher expected utility from participation, the mediocre referee increases his participation level. The editor's beliefs adjust to restore indifference in the new equilibrium with more participation.

**Proposition 10** *There are  $\varepsilon'$  sufficiently low and  $\eta' < 1$  sufficiently high such that if  $\varepsilon \leq \varepsilon'$  and  $\eta \geq \eta'$ , then increasing the preselection level increases the mediocre referee's participation.*

We conclude this section with a brief discussion of alternative timing structures. If the referee can decide again whether he wants to participate after having observed the signal  $s_r$  (but already having sunk  $k$ ), the picture does not change. Because any report yields a strictly positive expected payoff and non-participation yields zero utility, the referee does not change his mind after the realization of his signal.

If  $k$  (or another cost) arises at the reporting stage (say it is costly to read the paper, but also to write a report), then if the reporting cost is high enough such that full participation is not optimal, participation is contingent on the signal. The mediocre referee participates less often with the signal that is less favorable for his reporting strategy. If his report is biased towards rejecting the paper, participation is more valuable if his signal indicates bad paper quality. Hence, he participates less often having observed a good signal than having observed a bad signal. Note that if participation is conditional on the signal, then the decision not to participate contains information that the editor can use for updating his assessment of the paper's quality. As in the previous case, the direction of the effect of the preselection level on participation behavior depends on its impact on the mediocre referee's possibility to pool with

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<sup>25</sup>The probability that the manuscript is good conditional on being asked a report and having observed a bad signal is  $\frac{1-p_r}{1-p_r\eta}$ . The probability that the editor did not observe a signal is  $\frac{1-\eta}{1-p_r\eta}$ . When the mediocre type always recommends a publication,  $\pi_{gg} = q$ ,  $\pi_{b\emptyset} = 1$ , and, as  $\pi_{bg}$  occurs only off the equilibrium path, it is set to zero. Always recommending a publication is optimal for the mediocre referee if  $\frac{1-p_r}{1-p_r\eta}q > \frac{1-\eta}{1-p_r\eta}$ , which is equivalent to  $\eta > 1 - (1 - p_r)q$ . If  $\varepsilon \neq 0$ , then  $\beta > 0$  in equilibrium (see Footnote 16) and needs to be adjusted to the new preselection rule in order to restore indifference at the reporting stage.

the smart type. Hence the arguments above apply, except that the adoption of participation behavior to a new preselection rule is more sophisticated. The qualitative effect on the pool of participating referees is the same. However, due to the possibility to condition choices on more information, there are additional effects on the editor's information as sketched below. Consider again the case that  $q$  is sufficiently high (and  $\varepsilon$  high enough) such that  $\gamma = 0$  for any preselection level and any participation behavior. Suppose that the referee's cost for writing a report is such that under the presumption of full participation, the mediocre referee endowed with a good signal is just indifferent between participation and non-participation. Increasing the preselection level strictly decreases his expected utility from participation. He will react with reducing participation upon the observation of a good signal. The editor enjoys an increased report quality as he faces the smart type more often. In addition, the mediocre referee's report becomes "more truthful" in the sense that conditional on reporting, the probability that the report contains the truth increases. Finally, the editor is also able to retrieve the mediocre referee's good signal from the fact that he does not participate. These insights suggest that if the participation cost arises predominantly from writing a report, then it may be beneficial to allow the referee to condition his participation choice on information, i.e. to grant access to the paper prior to agreeing to review. Moreover, raising the reporting cost (e.g. by demanding a detailed statement) deters the mediocre type's participation and therewith allows a better usage of his information.

Lastly, suppose reading the paper is costly and suppose that it is possible to formulate a report without incurring a cost. Then,  $k$  is effectively an information acquisition cost. In an equilibrium in which the smart type participates, non-participation is dominated by participation and giving uninformed advice. As pointed out in Suurmond et al. (2004), acquiring information gives the smart type the opportunity to separate from the mediocre type. He will hence use this opportunity if it is not too costly. The mediocre type acquires information only if it has a value for him, i.e. if he plans to report truthfully.<sup>26</sup> In this case, the preselection rule impacts only on the information acquisition behavior. Again, the direction of the effect depends on the level of preselection and the associated reporting behavior. If for a given preselection rule, the mediocre referee does not acquire information and recommends a rejection, then increasing the preselection level increases the incentive to acquire information.<sup>27</sup> However, increasing the preselection level too much reduces the incentive to acquire information as the

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<sup>26</sup>Note that in Suurmond et al. (2004), the mediocre ("dumb") type cannot acquire useful information.

<sup>27</sup>The expected utility from recommending a publication given  $s_r = g$  increases, and the expected utility from recommending a rejection given  $s_r = b$  decreases. Hence, the value of truthtelling increases. If the value of unconditionally recommending a rejection stays above the value of unconditionally recommending a publication, then the value of information increases.

referee's inference that the manuscript is good becomes so strong that he always recommends a publication.

### 3 Discussion

Preselection is a prominent mechanism in decision procedures. Often, preselection rules are employed in order to save information acquisition costs at later stages.

Cherkashin et al. (2009) quantify the effect of a hypothetical introduction of a preselection stage at the *Journal of International Economics*. They consider desk-rejecting papers solely based on observable information, like the rank of the author's university. They find that if the 40% "worst" papers are desk-rejected, then only 8% are wrongfully rejected compared to the actual journal decision, using a refereeing process. They conclude that preselecting even without looking at the paper does not have a significant effect on the decision quality. A preselection rule that is exclusively based on public information as applied in the analysis of Cherkashin et al. (2009) does not affect the assessment of the quality of a paper which enters the refereeing stage and should not influence the referee's behavior. However, if additional private information is acquired at the preselection stage, the referees' reaction to a change of the preselection policy may have an additional effect on the decision quality that should be taken into consideration when implementing a desk rejection rule.

Apart from the academic publishing process, our analysis applies to many other decision problems. The crucial features of our model are (i) that information-processing agents care about their reputation for expertise and (ii) that some decisions are more easily identified as being wrong than others. In such a decision environment, agents may shy away from revealing information which is likely to induce a decision that hurts their reputation if it turns out to be wrong. The introduction of a preselection stage (or of an additional information processing layer) may affect the agent's reporting behavior at later stages and may also have consequences for participation and information acquisition behavior.

Used as a mechanism to induce truthful reporting, preselection has the advantage of being simple and involving no transfers. In many decision making environments, not the least the academic publication process or advice within firms, transfers are not used in order to achieve incentive compatibility. However, in an interesting extension to our model, transfers may be another instrument to alleviate the incentive problems.

## APPENDIX

### Proof of Proposition 2

Necessary and sufficient for the existence of an equilibrium in which  $\gamma = \beta = 1$  are the following conditions:

$$\begin{aligned} & \text{prob}\{s = g | s_r = g\} \pi_{gg}(\hat{\gamma} = 1, \hat{\beta} = 1) & (15) \\ \geq & \\ & \pi_{b\emptyset}(\hat{\gamma} = 1, \hat{\beta} = 1) - \text{prob}\{s_e = g | s_r = g\} (\pi_{b\emptyset}(\hat{\gamma} = 1, \hat{\beta} = 1) - \pi_{bg}(\hat{\gamma} = 1, \hat{\beta} = 1)), & (16) \end{aligned}$$

and

$$\begin{aligned} & \text{prob}\{s = g | s_r = b\} \pi_{gg}(\hat{\gamma} = 1, \hat{\beta} = 1) & (17) \\ \leq & \\ & \pi_{b\emptyset}(\hat{\gamma} = 1, \hat{\beta} = 1) - \text{prob}\{s_e = g | s_r = b\} (\pi_{b\emptyset}(\hat{\gamma} = 1, \hat{\beta} = 1) - \pi_{bg}(\hat{\gamma} = 1, \hat{\beta} = 1)). & (18) \end{aligned}$$

From Lemma 4 and Corollary 1, it follows that for  $\eta = 0$ , (15) < (16) and (17) < (18). For  $\eta = 1, \varepsilon = 0$ , (15) > (16) and (17) > (18). For any  $\varepsilon < 1/2$ , (15) and (17) are monotonously increasing in  $\eta$ , and (16) and (18) are monotonously decreasing in  $\eta$ .<sup>28</sup> There exists an  $\varepsilon'$  such that if  $\varepsilon < \varepsilon'$ , there exists  $\eta'(\varepsilon)$  such that (15)  $\geq$  (16)  $\Leftrightarrow \eta \geq \eta'(\varepsilon)$ . Moreover, (15) > (17) and (18) > (16) such that (15) = (16) implies (18) > (17). Hence, there exists a range  $[\eta'(\varepsilon), \eta''(\varepsilon)]$  such that if  $\eta \in [\eta'(\varepsilon), \eta''(\varepsilon)]$ , truthful revelation is an equilibrium. Q.E.D.

### Proof of Proposition 4

It is easy to see that the introduction of a preselection stage yields a (weakly) higher probability that a bad manuscript is accepted. Now, we identify preselection rules for which the probability that a good manuscript is rejected (either at the preselection stage or after the refereeing) is strictly higher if the preselection rule is used than without preselection.

(i) The proof proceeds in four steps. In the first three steps, we focus on preselection rules with  $\eta = 1$ . Step (i) is to identify a range for  $\varepsilon$  such that  $\text{prob}\{x = b | s = g\}$  is higher in case of preselection and truthtelling by the mediocre agent (where, with slight abuse of notation,  $x = b$  refers to both, the recommendation of a rejection by the referee and the case of a desk rejection) than in the case without preselection where the mediocre type always recommends a

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<sup>28</sup>  $\pi(\cdot)$  is independent of  $\eta$ . We have that  $\text{prob}\{s = g | s_r = g\} = \frac{p_r(1-\eta\varepsilon)}{p_r(1-\eta\varepsilon) + (1-p_r)(1-\eta(1-\varepsilon))}$  and  $\frac{\partial \text{prob}\{s_e = g | s_r = g\}}{\partial \eta} = \frac{(p_r(1-\varepsilon) + (1-p_r)\varepsilon)(\eta(p_r(1-\varepsilon) + (1-p_r)\varepsilon) + 1 - \eta) - \eta(p_r(1-\varepsilon) + (1-p_r)\varepsilon)(p_r(1-\varepsilon) + (1-p_r)\varepsilon - 1)}{[\eta(p_r(1-\varepsilon) + (1-p_r)\varepsilon) + (1-\eta)]^2} > 0$ .

Monotonicity of (16), (17) and (18) follows analogously.

rejection. In Step (ii) we identify the range for  $\varepsilon$  such that truthtelling is an equilibrium. Step (iii) is to show that the intersection of the previously determined ranges is non-empty. Step (iv) is to recognize that for some  $\varepsilon$  in the identified range the conditions for truthtelling and decision quality are not binding. Hence, because of continuity, for  $\eta \neq 1$ , but close to one, the above argument continues to hold. A formal proof of Step (iv) is omitted.

*Step (i)*

Without preselection,  $\text{prob}\{x = b|s = g\} = 1 - q$ . With preselection and truthtelling,  $\text{prob}\{x = b|s = g\} = \varepsilon + (1 - \varepsilon)(1 - q)(1 - p_r)$ . We have  $p_r < \frac{q}{q+2(1-q)}$ , hence  $\varepsilon + (1 - \varepsilon)(1 - q)(1 - p_r) > \varepsilon + (1 - \varepsilon)(1 - q)\frac{2(1-q)}{q+2(1-q)}$ . Preselection yields a lower decision quality if

$$\varepsilon + (1 - \varepsilon)(1 - q)\frac{2(1 - q)}{q + 2(1 - q)} > 1 - q \quad (19)$$

$$\Leftrightarrow \varepsilon > \frac{1}{\frac{1}{1-q} + 2}. \quad (20)$$

*Step (ii)*

Recommending publication after observing a positive signal is consistent with equilibrium if

$$\frac{p_r(1 - \varepsilon)}{p_r(1 - \varepsilon) + (1 - p_r)\varepsilon} \cdot \frac{q}{1 - (1 - p_r)(1 - q)} \geq \frac{q\varepsilon}{q\varepsilon + (1 - q)((1 - \varepsilon)(1 - p_r) + \varepsilon p_r)} \quad (21)$$

$$\Leftrightarrow \varepsilon \leq \frac{1}{\sqrt{\frac{q}{p_r(1-q)} + 1} + 1}. \quad (22)$$

Recommending rejection after observing a negative signal is consistent with equilibrium if

$$\frac{q\varepsilon}{q\varepsilon + (1 - q)((1 - \varepsilon)(1 - p_r) + \varepsilon p_r)} \geq \frac{(1 - p_r)(1 - \varepsilon)}{(1 - p_r)(1 - \varepsilon) + p_r\varepsilon} \cdot \frac{q}{1 - (1 - p_r)(1 - q)} \quad (23)$$

$$\Leftrightarrow \varepsilon \geq \frac{1}{\frac{\sqrt{\frac{p_r}{1-q} - p_r(1-p_r)}}{1-p_r} + 1}. \quad (24)$$

*Step (iii)*

Next, we want to show that the lower bound identified in Step (i) is always larger for our relevant parameter range than that identified in Step (ii).

$$\frac{1}{\frac{1}{1-q} + 2} \geq \frac{1}{\frac{\sqrt{\frac{p_r}{1-q} - p_r(1-p_r)}}{1-p_r} + 1} \quad (25)$$

$$\Leftrightarrow p_r(1 - q) - (1 - p_r)p_r(1 - q)^2 + (1 - p_r)^2(2 - q)^2 \geq 0. \quad (26)$$

Our initial assumption was  $p_r < \frac{q}{2-q}$ , hence  $1 - p_r > \frac{2-2q}{2-q}$ , and  $(1 - p_r)(2 - q) > (2 - 2q)$ , such that the LHS of (26) is greater than

$$p_r(1 - q) - (1 - p_r)p_r(1 - q)^2 + (2 - 2q)^2 = p_r(1 - q) + (4 - (1 - p_r)p_r)(1 - q)^2 > 0. \quad (27)$$

Hence,  $\varepsilon' = \frac{1}{\frac{1}{1-q}+2}$ . It is straightforward to show that  $\frac{1}{\frac{1}{1-q}+2} < \frac{1}{\sqrt{\frac{q}{p_r(1-q)}+1}+1} = \varepsilon''$ .

(ii) Consider a preselection rule such that  $\gamma < 1$  in equilibrium. We have  $\text{prob}\{x = b|s = g\} = \eta\varepsilon + (1 - \eta\varepsilon)(1 - q)(1 - p_r\gamma)$ .

The effect of a marginal increment in  $\eta$  is  $\frac{\partial \text{prob}\{x=b|s=g\}}{\partial \eta} = \varepsilon - \varepsilon(1 - q)(1 - p_r\gamma) - (1 - \eta\varepsilon)(1 - q)p_r\frac{\partial \gamma}{\partial \eta}$  which is positive for  $\varepsilon$  high enough and  $\eta$  small enough. In particular,  $\gamma = \frac{\partial \gamma}{\partial \eta} = 0$ , i.e. a preselection rule which is not tough enough to induce a recommendation for publication by the mediocre referee guarantees  $\frac{\partial \text{prob}\{x=b|s=g\}}{\partial \eta} > 0$ . Q.E.D.

### Proof of Proposition 8

Let Conditions 1-4 be satisfied, let  $\frac{u_{rb}-u_{ab}}{u_{ag}-u_{rg}} > \frac{p_r(1-\varepsilon)}{(1-p_r)\varepsilon}$ , let  $q > \frac{2p_r}{1+p_r}$  and, for the ease of exposition, let the editor's preferences be given by:

	$s = g$	$s = b$
accept	1	$(1 - \alpha)$
reject	0	1

Consider a putative equilibrium with  $\eta = 1, \gamma \in (0, 1], \beta = 1$ . The equilibrium  $\gamma^*$  follows from the following equation:

$$\frac{p_r(1-\varepsilon)}{p_r(1-\varepsilon) + (1-p_r)\varepsilon} \frac{q}{q + (1-q)p_r\gamma} = \frac{q\varepsilon}{q\varepsilon + (1-q)(1 - (\varepsilon + (1-2\varepsilon)p_r)\gamma)}$$

Rearranging yields:

$$\gamma^* = \frac{p_r(1-\varepsilon)(1-q) - \varepsilon^2 q(1-p_r)}{(1-q)p_r(\varepsilon + p_r(1-2\varepsilon))}$$

We have

$$\begin{aligned} \gamma^* &> 0 \\ \Leftrightarrow q &< \frac{p_r(1-\varepsilon)}{\varepsilon^2(1-p_r) + p_r(1-\varepsilon)} \\ \gamma^* &< 1 \\ \Leftrightarrow q &> \frac{p_r(1-2\varepsilon)}{\varepsilon^2 + p_r(1-2\varepsilon)}. \end{aligned}$$

Consider  $q \geq \frac{p_r(1-2\varepsilon)}{\varepsilon^2 + p_r(1-2\varepsilon)}$ , verifying  $\gamma^* \leq 1, \beta^* = 1$  in any equilibrium.

The editor's expected equilibrium payoff for  $\eta = 1$  is:

$$\begin{aligned} &1/2 \cdot \begin{pmatrix} (1-\varepsilon)(u_{rg} + (q + (1-q)(\gamma p_r + (1-\beta)(1-p_r)))(u_{ag} - u_{rg})) \\ + \varepsilon(u_{ab} + (q + (1-q)((1-\gamma)(1-p_r) + \beta p_r))(u_{rb} - u_{ab})) \\ -c \end{pmatrix} \\ &+ 1/2 \cdot (1-\varepsilon)u_{rb} + \varepsilon u_{rg} \end{aligned}$$

With  $\beta = 1$ , we have

$$\begin{aligned}
& 1/2 \cdot \begin{pmatrix} (1-\varepsilon)(q+(1-q)\gamma p_r) \\ +\varepsilon((1-\alpha)+(q+(1-q)((1-\gamma)(1-p_r)+p_r))\alpha) \\ -c \end{pmatrix} \\
& + 1/2 \cdot (1-\varepsilon). \\
= & 1/2 \cdot \left( \gamma(1-q)((1-\varepsilon)p_r - \varepsilon(1-p_r)\alpha) + (1-\varepsilon)q + 1 - c \right)
\end{aligned}$$

The editor's ex ante expected utility when committing to  $\eta = 0$  is:

$$\begin{aligned}
= & 1/2(u_{rg} + (q+(1-q)(\gamma p_r + (1-\beta)(1-p_r)))(u_{ag} - u_{rg})) \\
& + 1/2(u_{ab} + (q+(1-q)((1-\gamma)(1-p_r) + \beta p_r))(u_{rb} - u_{ab})) \\
& - c. \\
= & 1/2(q+(1-q)(\gamma p_r + (1-\beta)(1-p_r))) \\
& + 1/2(1-\alpha + (q+(1-q)((1-\gamma)(1-p_r) + \beta p_r))\alpha) \\
& - c.
\end{aligned}$$

With  $\beta = 1$ , this yields

$$\begin{aligned}
& 1/2(q+(1-q)\gamma p_r) + 1/2(1-\alpha + (1-\gamma)(1-q)(1-p_r))\alpha - c. \\
= & 1/2(\gamma(1-q)(p_r - (1-p_r)\alpha) + q + 1) - c.
\end{aligned}$$

$$EU_{IA}(\gamma^*) < EU_{NIA}(\gamma = 0)$$

$$\begin{aligned}
& \Leftrightarrow 1/2 \cdot \left( \gamma^*(1-q)((1-\varepsilon)p_r - \varepsilon(1-p_r)\alpha) + (1-\varepsilon)q + 1 - c \right) < 1/2(q+1) - c \\
& \Leftrightarrow \gamma^*(1-q)(\varepsilon(1-p_r)\alpha - (1-\varepsilon)p_r) > c - \varepsilon q
\end{aligned}$$

Under Condition 4E, the RHS is positive. The LHS is positive as  $\alpha > \frac{(1-\varepsilon)p_r}{\varepsilon(1-p_r)}$ . Hence,  $EU_{IA}(\gamma^*) < EU_{NIA}(\gamma = 0)$  if

$$\gamma^* > \frac{c - q\varepsilon}{(1-q)((\varepsilon(1-p_r)\alpha - (1-\varepsilon)p_r))}.$$

For each  $q$ , we find  $c \geq q\varepsilon$  such that the above inequality is satisfied.

Q.E.D.

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