Does Information about Arbitrators' Win/Loss Ratios Improve Their Accuracy? *

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Abstract

This paper examines how providing litigants with information about arbitrators' Win/Loss ratios affects arbitrators' incentives in deciding the cases before them in an impartial and unbiased manner. We show that if litigants are informed about arbitrators past decisions then arbitrators might want to make an incorrect decision when a correct decision would raise the suspicion that they are biased. Therefore, providing information about arbitrators' past decisions might create adverse incentive effects and reduce the accuracy of arbitration. We compare the accuracy of arbitrators' decisions under different arbitrator selection procedures and discuss the implications for the design of arbitration rules by arbitration and dispute resolution providers and by court administered arbitration programs.

1 Introduction

An important distinction between private and public dispute resolution mechanisms concerns the way in which the relevant decision maker – arbitrator or adjudicator – is selected. Whereas litigants have little influence over the assignment of a judge to their lawsuit, in arbitration their approval of the arbitrator is often necessary. This paper examines the conditions under which private selection of arbitrators would improve arbitration's accuracy. In particular, we study how informing litigants about arbitrators' past decisions would affect the selection of arbitrators and their incentive to decide cases before them in an impartial and unbiased manner.

Dispute resolution providers' codes and arbitration rules exhibit significant concern for arbitrator neutrality. All three largest American arbitration providers (American Arbitration Association (AAA), Judicial Arbitration and Mediation Services (JAMS), and the National Arbitration Forum (NAF)) provide in their Due Process protocols for the neutrality of selected arbitrators.[1] Moreover,

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[1]See Appendix 3, Preliminary Report: Consumer Arbitrations Before the American Arbitration Association, Searle Civil Justice Institute (2009).

review of the qualifications that must be met by arbitrators on these providers' rosters,[2] as well as on other international institutions,[3] reveals that they all guarantee that their arbitrators are free from bias and prejudice.

Yet, when litigants can be classified into well specified and identifiable groups, they might be subject to arbitrator bias. Group identification may be due to the side taken in a dispute (e.g., employers vs. employees, consumers or suppliers vs. sellers, etc.) or to some other group characteristic such as ethnic origin (Fizel, 1996) or gender (Bemmels, 1988). Nevertheless, the extent to which litigants are subject to arbitrator bias may be mitigated if each party can veto the arbitrator, since an arbitrator who is believed to be biased in favor of one of the litigants would be vetoed by his counterpart.

The rules that arbitration organizations employ for the selection of arbitrators provide the litigants with different degrees of control over the selection process.[4] Some of the rules employed by arbitration providers allow the arbitration provider full discretion in selecting the arbitrator from its roster.[5] Under these procedures, the parties cannot veto the arbitrator unless they show good cause for doing so. Other selection procedures allow the parties more control over the selection of arbitrators, either by allowing them to veto an arbitrator without cause or by asking the parties to rank arbitrators according to their preferences.[6]

Similar policy considerations are also relevant for court administered arbitration programs. Under these programs, litigants are required to participate in mandatory (yet non-binding) arbitration when they have not contractually agreed to submit their dispute to binding arbitration. In 2009 twenty eight states and ten federal districts have operated such programs, which allow judges to order the parties to participate in non-binding arbitration (Schmitz, 2009). Like consensual arbitra-

[2]See, e.g., *Qualification Criteria for Admittance to the AAA National Roster of Arbitrators*, available on http://www.adr.org/si.asp?id=4223; JAMS' *Arbitrator Ethics Guidelines*, avialable on http://www.jamsadr.com/arbitrators-ethics; *NAF Code of Conduct for Arbitrators*, available at http://www.adrforum.com/users/naf/resources/CodeOf ConductForArbitrators1.pdf.

[3]See, for example, the CPR (the International Institute for Conflict Prevention & Resoloution) *The Code of Ethics for Arbitrators in Commercial Disputes*, available on http://www.cpradr.org/ClausesRules/ArbitrationEthics/tabid/80/Default.aspx; Articles 9-12 of the Swiss Chamber's Court of Arbitration and Mediation's *Rules of International Arbitration*, available at https://www.sccam.org/sa/download/SRIA_english.pdf; Article 5.2 of the LCIA (London Court of International Arbitration) *Rules of Arbitration*, avaialble on http://www.lcia.org/ARB_folder/arb_english_main.htm; Articl 14 of the SCC (Stockholm Chamber of Commerce) *Arbitration Rules*, available on http://www.sccinstitute.com/filearchive/3/32181/Arbitration%20Rules_2010_eng_final.pdf.

[4]Most arbitration providers allow the parties to structure their own arbitrator selection procedures instead of relying on the provider's default rule. In structuring their selection procedures the parties are not constrained to procedures that are offered by the provider, and they may also name the arbitrator that would decide their dispute in their arbitration agreement. Yet, if the agreement does not name the arbitrator or specifies a method for appointing the arbitrator then the provider's selection rules apply. Since arbitration may be held before a single arbitrator or before a panel of (usually) three arbitrators, the selection mechanism also depends on the form of arbitration to be held. We focus on single arbitrator selection only.

[5]The roster of arbitrators consists of arbitrators that satisfy the provider's requirements and have registered with it. See for example Rule 52(a) of the AAA Expedited Procedures for Commercial Finance Rules; Rule R-10 of the AAA Insurance Arbitration Rule; Article 9(3) of the ICC Rules of Arbitration; Article 5.5 of the LCIA Rules of Arbitration.

[6]Most arbitration providers allow each party to challenge an appointed arbitrator *for cause*. Such challenges are often decided by the arbitration provider. We focus here on the possible veto that may be exercised by each party *without cause* (and thus without being subject to any further review).

tion, mandatory arbitration programs also differ in their arbitrator selection rules.[7]

The question is whether litigants should be allowed to veto arbitrators and whether they should be informed about an arbitrator's past Win/Loss ratio when deciding whether to veto her. To allow litigants meaningful selection, arbitration providers furnish the litigants with information about potential arbitrators' education, professional experience, and qualifications.[8] Yet, since arbitration decisions are often confidential, and since the arbitrator is usually not required to explain or justify her decision, litigants' only information about an arbitrator's prior decisions is often summarized in his Win/Loss ratio. Moreover, arbitration usually has two types – conventional arbitration, in which the arbitrator decides the case as she sees fit, and final offer arbitration, in which each party submits an offer to the arbitrator who must then select one of these offers. Clearly, the arbitrator's decision in final offer arbitration provides no information beyond the offer chosen. Similarly, most mandatory arbitration programs do not provide information about arbitrators' past decisions, althogh some commentators have advocated they should provide such information (e.g., Hensler, 1990). Some arbitration providers, either in private arbitration or in mandatory arbitration, maintain publicly available data on prior arbitration decisions, but this is still the exception and not the rule.[9]

It would seem that providing litigants with such information would facilitate better screening of biased arbitrators. However, our analysis demonstrates that although such information may indeed improve the *selection* of impartial arbitrators, it might nevertheless introduce adverse *incentive* effects. Since the only way an arbitrator can establish a reputation for being impartial is by avoiding a series of decisions that might seem biased against a specific group, she might want to make an incorrect decision when a correct decision may raise the suspicion that she is biased.

For example, an arbitrator in employment disputes would not want to make too many decisions in favor of employers, because he would then be perceived as prejudiced against employees, who would veto him in the future. The arbitrator would therefore have an incentive to decide some cases against employers, even if he knows these decisions to be wrong.

We analyze two types of cases: One, where arbitrators may be biased against either one of the two identifiable groups. For example, in employment disputes some arbitrators may be biased against employers, whereas others may be biased against employees. We call this the 'two-sided' bias case. In the other case, bias may be only against one identifiable group. For example, in some

[7] See, e.g., California, which allows litigants to veto proposed arbitrators without cause: see Rule 3.815 of the California Rules of Court; as opposed to New York, which mandates random selection of the arbitrator without allowing the parties any veto rights: see s. 28.4 of the New York Code, 22 NYCRR .

[8] See, for example, JAMS' list of neutrals on
http://www.jamsadr.com/professionals/xpqProfResults.aspx?xpST=ProfessionalResults

[9] Notably, section 1281.96 of the California Code of Civil Procedure requires any private arbitration company that administers or is otherwise involved in a consumer arbitration to collect and publish information about each consumer arbitration she handeled in the preceding five years. See also arbitration decisions reported by various state and private institutions such as the State of Minnesota Bureau of Mediation services <http://www.bms.state.mn.us/arbitration_awards.html>; FINRA arbitration <http://finraawardsonline.finra.org/>; The State of Washington's Public Employment Relations Commission <http://www.perc.wa.gov/intarbawards.asp>; and international arbitration providers such as the World Trade Organization <http://www.worldlii.org/int/cases/WTOARB/>; the International Chamber of Commerc (ICC) <http://www.iccdrl.com/default.asp> of the International Center for Settlement of Investment Disputes (ICSID) <http://icsid.worldbank.org/ICSID/FrontServlet?requestType=CasesRH&actionVal=ListCases>.

types of cases arbitrators may be biased against African-Americans. We call this the 'one-sided' bias case.

For each case we compare three possible selection and information regimes: A 'No Veto' regime, in which the arbitrator is randomly selected from the roster of arbitrators and neither litigant may veto it; A 'Veto with No Information' regime, in which the litigants are offered a list of three randomly selected arbitrators, and each litigant can veto one of them. Under this regime, the litigants do not observe arbitrators' past decisions; And, a 'Veto with Information' regime, which is similar to the former regime, yet allows litigants to observe the arbitrators' past decisions. An optimal regime is one that maximizes the probability of accurate and impartial decisions. Our analysis identifies the conditions under which allowing the parties to veto proposed arbitrators and providing them with information about arbitrators' past performance would prove optimal.

Our findings inform the debate over arbitration as an alternative to public adjudication. By analyzing the conditions under which private selection would prove optimal, we delineate the proper boundaries for arbitration. Moreover, our findings have implications for the design of arbitration rules by arbitration providers, by other organizations that rely on arbitration for the resolution of disputes among their members, and by court ordered arbitration programs. Our results suggest that using Win/Loss ratios to measure individual arbitrators' bias may prove problematic. Such measures may have adverse incentive effects over arbitrators' decisions that would make arbitration less accurate. Our results also imply that 'balanced' Win/Loss ratios may, in fact, represent strategic 'incorrect' decisions by arbitrators. Thus, their value in proving that a certain arbitration mechanism is unbiased is questionable.

The adverse reputation effect of information about past behavior is not unique to arbitration. Prior literature has recognized the adverse effects of potential *bad reputation* when only the agents' **actions** (but not the 'state of the world') can be publicly observed. In such environments agents may take actions they believe to be inferior in order to avoid adverse inference about their true types, especially when such inference would be followed by social and economic sanctions. This dynamics may constrain free speech and distort expert advice if it is considered politically incorrect (Loury, 1994; Morris, 2001). It may also distort the actions taken by professionals and experts such as lawyers, doctors or car mechanics, who may avoid taking actions that promote their private interests, even if those actions are best for their clients (Ely and Välimäki, 2003). In all such circumstances, an agent may paradoxically deviate from the action that maximizes both his client's and his own welfare, only to demonstrate his commitment to pursue the client's interests over his own. This paper applies this general insight to the specific context of arbitration. As we show, in the presence of 'bad reputation' effects information about an arbitrator's past Win/Loss ratio is not only less informative than it initially seems, but it also reduces the accuracy of arbitrator decisions.

The paper proceeds as follows: Section 2 reviews the prior literature on arbitration selection and incentives. Section 3 presents our model for the behavior of arbitrators who want to establish a reputation for not being biased and analyzes arbitrator selection and behavior under alternative selection regimes. Section 4 compares the accuracy of arbitration under the tree alternative regimes. Sections 3 and 4 focus on cases where arbitrators may each be biased in favor of the defendant

or in favor of the plaintiff. The case where arbitrators may only be biased in favor of one of the parties (e.g. the defendant) is discussed in section 5. Section 6 reviews an interesting example of internet domain name claim arbitration practiced by the Internet Corporation for Assigned Names and Numbers ('ICANN'), where our analysis can be applied. Section 7 concludes. All proofs are relegated to the appendix.

2 Prior Literature

Arbitrator bias presents a significant handicap for the effectiveness of arbitration as a dispute resolution mechanism. Therefore, a large part of the legal and economic literature on arbitration has focused on the fairness and neutrality of arbitration outcomes in contexts such as employment arbitration (Sherwyn, Estreicher and Heise, 2005), securities brokerage dispute arbitration (Choi, Fisch and Pritchard, 2008), investment treaty arbitrations (Franck, 2009), Consumer arbitration (Searle Report, 2009), and Major Baseball League arbitration (Scully, 1978).

Generally, the literature has tried to measure arbitration bias by analyzing either arbitration awards or arbitrators' Win/Loss rates.[10] These were studied in two types of cases: one where one litigant is a 'repeat player' while the other is a 'one-shot player,'[11] and the other where either both litigants are repeat or one-shot players.

In contexts where only one of the litigants is a repeat player it is expected that arbitrators would tend to decide in favor of the repeat player, in order to be selected again to arbitrate future disputes. Indeed, Tullock (1980, p. 127) asserts that private selection would motivate arbitrators to "choose a decision which is most likely to lead to his being selected for arbitration in the future." Tullock conjectures that this may lead arbitrators to bias their decisions in contexts such as consumer arbitration, where one of the parties (the retailer) uses arbitration more often and has better information about potential arbitrators. This conjecture finds some support in empirical research.[12]

When both players are one shot players, arbitrators are expected to try to avoid being perceived as biased in favor of one of the parties. In such cases, Ashenfelter and Bloom (1984) and Ashenfelter (1987) report that arbitrator decisions exhibit no consistent bias. They explain that arbitrators tend to avoid extreme decisions and decide disputes based on their prediction of how other arbitrators would have decided the case.

Other authors have speculated that arbitrators would tend to "split the difference" and award each party a partial victory. As Posner (2005, p. 1261) suggests "this will make it difficult for the parties on either side of the class of suits in question to infer a pattern of favoritism." However, the evidence on this conjecture is mixed. Farber (1981), for example, finds no such tendency. Bloom (1986) reports behavior that is consistent with "splitting the difference" but suggests an alternative

[10]Note that under Final-Offer-Arbitration win-loss rates may be misleading. They may be biased due to more conservative offers by one party compared to the other. See Scully (1986) and Ashenfelter and Bloom (1983).

[11]For a first discussion of repeat players and one shot players in litigation see Galanter (1974).

[12]Choi, Fisch and Pritchard (2008) find that control over the selection of arbitrators increases arbitrators' incentives to cater to the interests of brokers, who are repeat players in securities brokerage disputes. See also Kondo (2009), and our discussion of ICANN below.

explanation for his findings. More recent empirical reserach finds no support for this conjecture.[13]

Our model formalizes the reputation effects by using a game theoretic model that incorporates both the arbitrator and the litigants' decisions. The model allows us to compare alternative selection and information regimes, and to examine the welfare effects induced by the combination of selection and incentive effects induced by those regimes, and in particular by the provision of information about arbitrators' Win/Loss ratios.

3 A Model of Arbitrator Incentives and Bias

A dispute involves two litigants. For convenience, litigants are identified as Plaintiff and Defendant. In practice, the identification of the parties may of course be independent of their procedural roles as plaintiff or defendant, as for example in the case of disputes between Employers and Employees, where the suit may be filed by either side. We therefore use the plaintiff–defendant identification for convenience only.

Every dispute has a correct decision in which the defendant is either liable or not. We assume that the defendant is liable with probability p. That is, the defendant and plaintiff each believe themselves as well as other defendants and plaintiffs to be right (or to be able to win the case if it is decided in an impartial manner) with probabilities $1-p$ and p, respectively. For simplicity, we consider the symmetric case where $p \equiv \frac{1}{2}$.[14] Each litigant obtains a payoff of 1 if it wins the dispute, and -1 if it loses.

An arbitrator is assumed to live for two periods and may arbitrate at most two different disputes, one in each period (an arbitrator need not be employed in every period in which she lives). An arbitrator can be either *strategic* or *non-strategic*. If she is non-strategic then she may be either *pro-defendant* or *pro-plaintiff*. A pro-defendant arbitrator always decides in favor of the defendant, and a pro-plaintiff arbitrator always decides in favor of the plaintiff, independently of the correct decision or the arbitrator's prospects of being employed in the future.[15] In contrast, a strategic arbitrator decides the cases before her so as to maximize the sum of her lifetime payoffs:[16] she obtains a payoff of $b > 0$ each time she is employed, and on top of that a payoff of 1 for each time she decides correctly, and a payoff of 0 for each time she decides incorrectly (strategic arbitrators are assumed to know the correct decision in the case before them). Observe that upon being employed for the first time and thus securing a payoff of b, an (inexperienced) strategic arbitrator prefers to make a wrong decision followed by a correct decision, which would generate an additional payoff of $1+b$, than to make just one correct decision, which generates an additional payoff of 1. Thus, whereas

[13] See Keer and Naimark (2001) and the Searle Civil Justice Institute Report on Commercial Arbitration (2009).

[14] A different value of $p \neq 0, 1$ would make the model asymmetric and hence more complicated to analyze, but would not qualitatively change our results.

[15] In a more general model, biased arbitrators may also behave strategically. Our results would continue to hold in this case as long as biased arbitrators still behave in a way that is more biased than unbiased strategic arbitrators, so that the posterior belief following a decision in favor of the party one is suspected to favor puts a larger weight on the arbitrator being biased in this direction.

[16] For simplicity, we assume that arbitrators do not discount their future payoffs. This assumption has no effect on our results.

a non-strategic arbitrator is always biased, a strategic arbitrator may choose to make an incorrect decision if she believes it will improve her chances to be employed again in the next period.

In this section and the next we analyze the two-sided case where arbitrators may each be biased in favor of the defendant or in favor of the plaintiff. For simplicity, we assume that a measure one of young arbitrators appears in every period. One half of the young arbitrators are believed to be pro-defendant with probability β_D and strategic with probability $1-\beta_D$ and the other half are believed to be pro-plaintiff with probability β_P and strategic with probability $1-\beta_P$ where β_D and β_P are distributed according to a continuous cumulative distribution function F on the unit interval.

It is useful to denote an arbitrator's type more simply by just $\beta \in [-1,1]$ with the understanding that if $\beta > 0$, then β denotes the probability that the arbitrator is pro-defendant, and if $\beta < 0$, then $-\beta$ denotes the probability that the arbitrator is pro-plaintiff. The cumulative distribution of β is thus given by

$$\hat{F}(\beta) = \begin{cases} \frac{1}{2} + \frac{F(\beta)}{2} & \text{if } \beta > 0 \\ \\ \frac{1}{2} - \frac{F(-\beta)}{2} & \text{if } \beta \leqslant 0 \end{cases}.$$

The density of β is symmetric around zero.[17]

In section 5 we discuss the case of 'one sided' bias, where **all** the arbitrators are suspected of being pro-defendant with probability β_D and strategic with probability $1-\beta_D$ and β_D is distributed according to a continuous cumulative distribution function F on the unit interval. In this case, the cumulative distribution of arbitrators' types is $\hat{F}(\beta) = F(\beta)$ for every β. We compare the results under such distribution with the case of 'two sided' bias.

As explained in the introduction, we consider three veto and information regimes: 'No Veto,' 'Veto + Unobservable Arbitrators' Decisions,' and 'Veto + Observable Arbitrators' Decisions'. In every period, one or more pairs of litigants appear, and, depending on the applicable regime, they are assigned an arbitrator or a panel of three arbitrators from which they select one. Thus, each regime induces a game between the litigants and the arbitrators. We focus on symmetric stationary pure strategy perfect Bayesian equilibria of this game.

3.1 No Veto

Consider first the simple regime where litigants are offered an arbitrator who is chosen randomly from the roster of arbitrators. Thus, a plaintiff-defendant pair is assigned an arbitrator whose type is equally likely to be either β_D or β_P where β_D and β_P are distributed according to F on the unit interval. Neither litigant can veto the proposed arbitrator. The arbitrator decides the case. Then another plaintiff-defendant pair is assigned an arbitrator and so on.

The 'No Veto' regime induces a trivial game with litigants and arbitrators as players. Under this regime there is no screening of arbitrators. Thus, biased (pro-plaintiff and pro-defendant) arbitrators

[17] We assume that the parties may not settle the case. This would be the case if defendants and plaintiffs each believe that the distribution $\hat{F}$ is slightly biased in their favor.

decide according to their bias, and strategic arbitrators decide correctly because they have nothing to gain from deciding otherwise.

3.2 Veto with Unobservable Arbitrators' Decisions

Consider now a regime where litigants are offered a list of three arbitrators from which they may each veto at most one arbitrator. The remaining arbitrator decides the case.[18]

As in the 'No Veto' regime, this 'Veto + Unobservable Information' regime also induces a game with the litigants and arbitrators as players. In this game, the litigants each decide which arbitrator to veto based on their prior beliefs about the arbitrators' types, and the remaining arbitrator renders a decision.

The arbitrators' behavior in equilibrium is the same as under the 'No Veto' regime. Namely, if employed, biased arbitrators decide according to their bias, and strategic arbitrators decide correctly. As in the 'No Veto' regime, the fact that arbitrators' decisions are unobservable implies that strategic arbitrators have nothing to gain from deciding incorrectly. However, under this regime, arbitrators with high $|\beta|$ or those who are more likely to be biased are also more likely to be vetoed and screened out.

To see this, observe that the expected payoff to the defendant from an arbitrator of type $\beta \in [-1,1]$ is:

$$\beta + (1-\beta)(1-2p) = 1 - 2p + 2p\beta,$$

and the expected payoff to the plaintiff from an arbitrator of type $\beta \in [-1,1]$ is:

$$-\beta + (1-\beta)(1-2p) = 1 - 2p - 2\beta + 2\beta p.$$

The former function is increasing and the latter function is decreasing in β. Hence, when offered to veto one arbitrator from a panel of three possible arbitrators, the defendant vetoes the arbitrator with the smallest β, and the plaintiff vetoes the arbitrator with the highest β. Thus, under the 'Veto + Unobservable Information' regime, in any equilibrium of the game the arbitrator with the intermediate β in the panel of three arbitrators is selected to decide the dispute.

Furthermore, as mentioned above,

Proposition 1. *Under the 'Veto + Unobservable Information' regime, in any equilibrium of the game the probability that an arbitrator of type β is vetoed is increasing in $|\beta|$.*

Intuitively, the fact that the arbitrators with the "middle β" is selected from each panel of arbitrators already suggests that arbitrators with "extreme" values of β would be less likely to be selected. A little more formally, notice that an arbitrator is selected from a panel if one of the other two arbitrators on the panel has a lower β and the other has a higher β. The probability of this is given by the function

$$2\widehat{F}(\beta)\left(1-\widehat{F}(\beta)\right),$$

[18] If more than one arbitrator is not vetoed, then the arbitrator is chosen randomly from those who were not vetoed.

which is increasing on the interval $[-1, 0]$ and decreasing in the interval $[0, 1]$.

3.3 Veto with Observable Arbitrators' Decisions

The third regime we consider is similar to the regime described in the previous subsection, except that under this 'Veto + Observable Information' regime litigants are informed about arbitrators' past decisions. This information allows the litigants to refine their beliefs about arbitrators' types based on their past decisions.

As in the previous subsection, this 'Veto + Observable Information' regime induces a game with the litigants and arbitrators as players. In this game, the litigants each decide which arbitrator to veto based on their prior beliefs about the arbitrator *and* the arbitrator's past decisions. The remaining arbitrator renders a decision.

In this regime, it is important to distinguish between "old" arbitrators for whom this would be the last decision, and "young" arbitrators who may be called to arbitrate yet another dispute. Old arbitrators may either be "experienced" or "inexperienced", depending on whether they arbitrated a dispute when they were young. We assume that arbitrators are randomly selected into panels. In particular, old and young arbitrators have the same chance of being selected to appear in any panel. Without loss of generality, this chance or probability may be normalized to one.

It is important to emphasize that whereas old strategic arbitrators cannot do better than decide correctly, young strategic arbitrators may bias their decisions in order to increase the probability that they would be employed again. This 'reputation driven' bias gives rise to the equilibrium below.

Proposition 2. *Under the 'Veto + Observable Information' regime there exists a threshold value* $\overline{\beta}(b) \in [0, 1]$ *such that young strategic arbitrators with types* $|\beta| \leq \overline{\beta}(b)$ *decide correctly, and young strategic arbitrators with types* $|\beta| > \overline{\beta}(b)$ *decide against their suspected bias. Old strategic arbitrators decide correctly. The threshold* $\overline{\beta}(b)$ *is decreasing in b. It is equal to one if b is sufficiently small, and it is equal to zero if b is sufficiently large.*

Proposition 2 stands in contrast to the perceived wisdom that arbitrators' concern for reputation would motivate them to deliver more accurate decisions. Here, some arbitrators decide *incorrectly* because they want to demonstrate that they are unbiased. Their incentive to avoid bad reputation induces them to deliver incorrect decisions. Moreover, as the arbitrators' fee increases, more arbitrators are induced to deliver incorrect decisions.

Furthermore, the fact that young strategic arbitrators may decide against their suspected bias, independently of the correct decision, implies that the litigants would not necessarily veto the arbitrator with the smallest or largest β as they do under the 'Veto + Unobservable Information' regime. The 'middle' type is not necessarily the one who would be chosen to arbitrate.

For example, the defendant is indifferent between an arbitrator β who decides correctly if strategic, and an arbitrator $\hat{\beta} = 1 - p + p\beta > \beta$, who decides against it if strategic.[19] This implies that

[19] The expected payoff that such arbitrators β and $\widehat{\beta}$ generate to the defendant are:

$$\beta + (1 - \beta)(1 - 2p)$$

the defendant prefers arbitrator $\beta < \bar{\beta}(b)$ to any arbitrator β' that is such that $\bar{\beta}(b) < \beta' < \hat{\beta}$ and therefore decides against the defendant if she is strategic. If the panel consists of the following three types: β, β', and $\beta'' = 1$, then the plaintiff would veto β'', and the defendant would veto β'. Therefore β , who has the lowest type, would be chosen to arbitrate the dispute.[20]

4 The Optimal Arbitrator Selection Regime

As explained in the Introduction, we measure the welfare that is associated with each veto and information regime by the probability that the selected arbitrator renders a correct decision in equilibrium. This is the welfare measure that policy makers or prospective litigants who wish to maximize their total welfare would be interested in. We compare the three selection regimes according to their induced probability of a correct arbitrator's decision.

The analysis in the previous section implies that the relative accuracy of the three regimes depends on the relative strength of the following two effects: (1) *The selection effect*, which refers to the fact that the availability of information about arbitrators' past decisions facilitates the selection of experienced **impartial** arbitrators; and (2) *The incentive effect*, which refers to the fact that the provision of information may cause young strategic arbitrators to decide incorrectly in order to avoid a reputation for being biased.

We first compare the 'No Veto' and 'Veto + Unobservable Information' regimes.

Proposition 3. *The expected probability of a correct decision under the 'Veto + Unobservable Information' regime is higher than under the 'No Veto' regime.*

By Proposition 1, under the 'Veto+Unobservable Information' regime the probability that an arbitrator is vetoed increases in her probability of being biased, $|\beta|$. This implies that the 'Veto + Unobservable Information' regime induces a better selection of arbitrators and so generates a higher probability of a correct decision, compared to the random selection under the 'No Veto' regime. Since the 'Veto+Unobservable Information' regime generates no negative incentive effect, Proposition 3 immediately follows.

The question is whether also giving litigants information about arbitrators' past decisions, in addition to allowing them veto rights over arbitrators, would further increase the probability of a correct decision.

As mentioned above in the context of the 'veto + observable information' regime, we assume that each arbitrator, young or old, has an equal chance of being selected to appear in a panel of three arbitrators from which the arbitrator who is chosen to decide a dispute is selected, regardless of its type or history.[21]

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and

$$\widehat{\beta} - \left(1 - \widehat{\beta}\right),$$

respectively. These two functions have equal values if $\hat{\beta} = 1 - p + p\beta$.

[20] Examples where the largest type is chosen can also be easily constructed.

[21] If old arbitrators have a much higher chance of being selected into panels than young arbitrators, then old arbitrators would almost all be inexperienced, and the probability of a correct decision under the two regimes would be very similar.

Proposition 4. *If b is small then the 'Veto + Observable Information' regime generates a higher probability of a correct decision than the 'Veto + Unobservable Information' regime.*

The intuition for this result is the following. If b is sufficiently small, then by Proposition 2 almost all young strategic arbitrators decide correctly under the 'Veto + Observable Information' regime, and so arbitrators behave almost identically under the two regimes, which implies that the 'Veto + Observable Information' regime generates no adverse incentive effect. This implies that the superior selection that is afforded by the 'Veto + Observable Information' regime generates a higher probability of a correct decision.

If, on the other hand, b is sufficiently large, then the reputation effect implies that most of the young strategic arbitrators decide incorrectly, which reduces welfare, but identifies them as unbiased and so improves overall selection. The question is whether this improved selection is enough to compensate for the adverse incentive effect. The answer to this question depends on the exact distribution of arbitrators' types. The next proposition shows that there are cases where the negative incentive effect is stronger than the positive selection effect, thus rendering information about past decisions undesirable.

Proposition 5. *Suppose that the distribution of arbitrators' types F is concentrated on a single type β_0 and that b is so large that all young strategic arbitrators with types $\beta > 0$ decide against their suspected bias under the 'Veto + Observable Information' regime (Proposition 2). Then the probability of a correct decision is strictly higher under the 'Veto + Unobservable Information' regime than under the 'Veto + Observable Information' regime, for any value of $\beta_0 \in (0,1)$.*

5 One-Sided Bias

Suppose now that the cumulative distribution of arbitrators' types $\hat{F}(\beta)$ is 'one-sided'. For concreteness, suppose that **all** the arbitrators are suspected of being pro-defendant with probability β_D and strategic with probability $1-\beta_D$, and that β_D is distributed according to a continuous cumulative distribution function $\widehat{F}$ on the unit interval.

In this case, unless only the 'discriminated' party is allowed to veto arbitrators, any selection mechanism would result in biased decisions. The equilibria under the 'No Veto' and the 'Veto + Unobservable' regimes are qualitatively unchanged. Thus, the probability of a correct decision under 'No Veto' is given by the expectation of β. Under the 'Veto + Unobservable Information' regime the arbitrator with the intermediate value of β is still selected from each panel of three arbitrators to decide every dispute. This implies that arbitrators with intermediate values of β are selected to decide disputes, and so the probability of a correct decision is equal to the expectation of intermediate β's from panels that consist of three independently drawn β's. A well known result

If young arbitrators have a much higher chance of being selected into panels than old arbitrators then young arbitrators will not expect to be chosen again and so will decide correctly if strategic. Again, the probability of a correct decision under the two regimes would be very similar.

in the theory of 'order statistics' (David and Nagaraja, 2003) implies that the expectation of the intermediate β is equal to the median of the distribution $\widehat{F}$. Thus, we have the following result:

Proposition 6. *Under one-sided bias, if the median of $\widehat{F}$ is smaller (larger) than the expectation of $\widehat{F}$ then the 'Veto + Unobservable Information' regime generates a higher (lower) probability of a correct decision than the 'No Veto' regime.*

Intuitively, if the median of $\widehat{F}$ is smaller than the expectation of $\widehat{F}$, as would be the case for example if $\widehat{F}$ is concave, then "most" arbitrators have small β's. In this case, the 'Veto + Unobservable Information' regime is superior because it allows the litigants to veto arbitrators with high β's who are biased with a high probability. If, on the other hand, the median of $\widehat{F}$ is larger than the expectation of $\widehat{F}$, as would be the case for example if $\widehat{F}$ is convex, then "most" arbitrators have large β's. In this case, the 'Veto + Unobservable Information' regime is inferior because it allows the litigants to veto arbitrators with small β's who are more likely to be unbiased.

Under one-sided bias, informing the parties about arbitrators' past Win/Loss ratio becomes less attractive than it was under two-sided bias. Under one-sided bias, being identified as unbiased generally reduces the probability of being selected to decide future disputes because unbiased arbitrators are more likely to be vetoed by the defendant. Therefore, the availability of more information does not induce a positive selection effect, as in the two-sided case. When b is small and arbitrators behave identically under both veto regimes there is no difference between them. However, as b increases, the concern of young strategic arbitrators about possible bad reputation under the 'Veto + Observable Information' regime causes them to distort their decisions. Consequently, the overall probability of a correct decision decreases.

6 The ICANN Example

An interesting example that demonstrates the importance of arbitrator selection rules for the perceived bias of the arbitration mechanism is provided by the debate over domain name arbitration under the Internet Corporation for Assigned Names and Numbers ('ICANN'). ICANN controls and coordinates the registration of domain names on the internet. It employes a dispute resolution procedure called the Uniform Domain Name Dispute Resolution Policy ('UDRP') to resolve claims by trademark holders who allege that a certain domain name infringes on their trademark rights. The UDRP was created to resolve the problem of "cybersquatting," namely the practice of registering a domain name that corresponds to a trademark before the trademark owner, thereby effectively blocking the owner's access to the internet under its own "brand name."

Under the UDRP, the complainant files a claim with one of ICANN's approved dispute resolution providers . The claim is either resolved by a single arbitrator who is selected by the dispute resolution provider, or (if one of the parties so requests) by a three arbitrator panel, consisting of one arbitrator appointed by each litigant, and a third arbitrator appointed from a list submitted to the parties' review, in a way that 'reasonably balances the preferences of both parties.'[22]

[22]Section 6(e) of the Rules for Uniform Domain Name Resolution Policy, as approved by the ICANN Board of Directors

After the institution of the UDRP in 1999, various concerns have been raised with respect to its fairness and impartiality. Critics have claimed that the system promotes forum shopping and that it is systemically biased in favor of trademark holders. Since trademark holders are invariably the complainants in domain name disputes, they select the dispute resolution provider with which to file their complaints. This has allegedly led to a consistent bias of UDRP arbitration outcomes in favor of trademark holders.[23]

These claims were substantiated by a statistical study conducted by Michael Geist (Geist, 2002). Geist showed that there is a significant difference in outcomes when comparing complainant win percentages in single-member-panel versus three-member-panel cases. The data showed that complainants won just over 83% of the time with single-memberpanel cases, and that the percentage dropped to 60% in three-member panel cases. The study also raised significant doubts as to arbitration providers' claim that single-member panel arbitrators are selected randomly, as it showed that some arbitrators had significantly larger caseloads, and that those arbitrators were much more likely to rule in favor of complainants, compared to other arbitrators.

Although these findings were challenged by ICANN and some of its arbitrators (see, e.g., Donahey, 2001), they have never been refuted. In response, commentators suggested that selection of the arbitration provider should be made by the domain registrar and not by the complainant, that three arbitrator panels should be mandatory, and that arbitration outcomes should be more transparent (See Geist, 2002; Thornburg, 2001).

How does our analysis impact this debate? It depends on whether the ICANN example fits better into our one- or two-sided version of the model. If the arbitration provider is chosen by complaintants then it is likely that the one-sided model should apply. Then, as we showed in Section 5, under one-sided bias, allowing the parties to veto proposed arbitrators would not necessarily result in more impartial decisions compared to random selection. Veto would prove optimal if and only if most arbitrators are unlikely to be biased, or, more formally, if the median arbitrator type is lower than the mean.

If, however, the arbitration provider is not selected by the litigants and some arbitrators may be biased in favor of defendants (say because of a strongly held belief that the internet should be 'completely free') then the two-sided model is more appropriate. In this case, it is better to permit veto (Proposition 3). The provision of information about arbitrators' past decisions should then be carefully considered. If the extrinsic reward for arbitration is small, bad reputation is held at bay, and the superior screening that is afforded by additional information would generate more accurate decisions (Proposition 4). However, if the extrinsic reward is large then bad reputation might dominate and the provision of information might lead to worse outcomes (Proposition 5). Moreover, in such circumstances, the informative value gained from an arbitrator's past Win/Loss ratio is questionable, since a balanced Win/Loss ratio might be the outcome of **less** accurate decisions, due to the arbitrator's effort to demonstrate her impartiality.

on 30 October 2009. Although these rules replace the former rules that were approved in 1999 and were in force until March 2010, the selection procedures, including this specific rule, were not amended.

[23]For the long list of references on this debated see Kesan and Gallo, 2005, footnote 36.

7 Conclusion

It is often suggested that allowing litigants to select their arbitrators renders arbitration more accurate. Compared to judges, whose career concerns do not depend on the litigants' perceptions about their possible bias, arbitrators want to increase their chances of being selected to decide future disputes, and therefore want to acquire a good reputation for being unbiased.[24] However, in some circumstances, such as those described in this paper, reputation may also have adverse effects, because arbitrators may decide incorrectly in order to avoid acquiring a bad reputation.

As we demonstrated, arbitrators' incentive to maintain a balanced Win/Loss ratio so as to dispel any suspicion of bias might motivate them to deliver less accurate decisions. Indeed, Win/Loss ratios provide very limited and truncated information. They do not allow litigants to examine the accuracy of arbitrators' past decisions. If such accuracy could be observed, then information would prove unequivocally beneficial, and it would result in better selection and incentive effects. Unfortunately, information about the accuracy of an arbitrator's decision is hardly ever available, especially absent any appeal over it.

Reputation has also positive incentive effects, as *biased* arbitrators try to acquire good reputation. If policy makers – either in contractual or in mandatory arbitration – can control the arbitrators' fee, then setting it low would prevent bad reputation, but would also weaken the incentive to acquire good reputation, which we have not modeled in this paper. Conversely, setting a high arbitrator fee would strengthen the incentive to acquire both good and bad reputation.

Thus, a wise choice of the arbitrators' fee has to depend on whether the population of arbitrators consists mostly of unbiased or biased arbitrators. If arbitrators are mostly unbiased, then the main problem that faces policy makers is how to ensure that arbitrators are not subject to 'bad reputation' problems that cause them to distort their decisions. As shown above, the best that policy makers can do under such circumstances is to set the fee as low as possible and employ a regime of 'Veto + Observable Information.' If, however, arbitrators are mostly biased, then the main problem is 'good reputation,' or how to encourage biased arbitrators to appear as unbiased. The classic results of the literature on reputation suggest that in such cases it is best to set the fee to be high, and again to employ a regime of 'Veto + Observable Information'.

Finally, there are contexts in which arbitrators may feature one-sided bias in favor of one party only. This is the case, for example, if the arbitration provider is selected by one party, such as under ICANN's UDRP. Then, random selection as in the 'No Veto' regime may result in more accurate decisions compared to private selection under a Veto regime. This would be the case if the probability of bias is high for most arbitrators, and therefore the median probability that an arbitrator is biased is higher than the mean. Conversely, if most arbitrators are likely to be unbiased and the median is smaller than the mean, then private selection would prove more desirable.

[24] The classical references for the positive effects of reputation are Kreps and Wilson (1982) and Milgrom and Roberts (1982).

Appendix: Proofs

Proof of Proposition 1. We compute the probability that an arbitrator of type $\beta \in [-1,1]$ is employed under the 'Veto + Unobservable Information' regime. Given three different arbitrators' types $\beta_0 < \beta_1 < \beta_2$ the plaintiff would veto arbitrator β_2, the defendant would veto arbitrator β_0, and so arbitrator β_1 would be employed. The probability that for a given β, out of two other β's there is exactly one β that is smaller and one one β that is larger is:[25]

$$P^{\circ}(\beta) = 2\hat{F}(\beta)\left(1 - \hat{F}(\beta)\right).$$

For any monotone function $\hat{F}$, the probability $P^{\circ}(\beta)$ is increasing for $-1 \leq \beta \leq 0$, decreasing for $0 \leq \beta \leq 1$, and maximized at $\beta = 0$ where it equals $\frac{1}{2}$. ■

Proof of Proposition 2. Denote the probability that an arbitrator with type β who is believed to decide correctly if strategic is employed in equilibrium by $P^I(\beta)$. The proof consists of two parts. We first show that if the probability $P^I(\beta)$ is increasing on the interval $[-1,0]$ and decreasing on the interval $[0,1]$ with a discontinuous jump up at $P^I(0)$ then arbitrators' equilibrium strategies are as described in the statement of the proposition, and second, we show that if arbitrators' strategies are as described in the statement of Proposition 2, then the probability $P^I(\beta)$ has the properties described above.

Suppose that the probability $P^I(\beta)$ is increasing on the interval $[-1,0]$ and decreasing on the interval $[0,1]$ with a discontinuous jump up at $P^I(0)$. Consider the situation of an inexperienced strategic arbitrator $\beta \in (0,1)$ (who is suspected of being pro-defendant) and who is believed to decide in favor of the plaintiff with a positive probability $\rho > 0$.[26] The posterior belief about this arbitrator if she decides in favor of the plaintiff is:

$$\beta' = 0$$

and the posterior belief about this arbitrator if she decides in favor of the defendant is:

$$\beta'' = \frac{\beta}{\beta + (1-\beta)(1-\rho)}.$$

If arbitrator β realizes that the plaintiff is right, then the fact that the probability P^I is decreasing implies that she cannot do better than to decide in favor of the plaintiff because this would increase both her payoff from making the correct decision and the probability of being employed again. But if the defendant is right, then the payoff to the arbitrator if she decides in favor of the defendant is

$$1 + b + P^I(\beta'')(1+b)$$

[25] The fact that F is continuous implies the the probability of a tie is zero and so can be ignored.

[26] In any "reasonable" equilibrium, a decision of an arbitrator who is suspected of being pro-defendant in favor of the plaintiff would be interpreted as a signal that the arbitrator is unbiased. Thus, for an inexperienced strategic arbitrator who is suspected of being pro-defendant to always decide in favor of the defendant cannot be part of a "reasonable" equilibrium.

and her payoff if she decides in favor of the plaintiff is

$$b + P^I(0)(1+b).$$

The arbitrator would therefore decide correctly in favor of the defendant if and only if:

$$1 + b + P^I(\beta'')(1+b) \geq b + P^I(0)(1+b)$$

if and only if:

$$P^I(\beta'') \geq P^I(0) - \frac{1}{1+b}.$$

This inequality defines a threshold $\overline{\beta}$ such that arbitrators with small types $\beta \leq \overline{\beta}$ decide correctly, and arbitrators with large types $\beta > \overline{\beta}$ decide in favor of the plaintiff. If b is small, then $P^I(0) - \frac{1}{1+b} < 0$ and so every arbitrator type would decide correctly. If b is large enough, then the discontinuity of the probability function P^I at zero implies that

$$P^I(\beta'') < P^I(0)$$

for every $\beta'' > 0$ and so all the strategic inexperienced arbitrators with $\beta > 0$ always decide in favor of the plaintiff.

We now show that if arbitrators' strategies are as described in the statement of the proposition, then the probability P^I has the properties described above. Denote the cumulative distribution function of young and old arbitrators' types by F^y and F^o, respectively. Observe that $F^y = \widehat{F}$ is continuous, the fact that inexperienced strategic arbitrators' decisions may reveal themselves to be unbiased implies that F^o contains a mass point at 0. Recall that we assume that young and old arbitrators have an equal chance to be selected for the list of three arbitrators from which litigants choose the arbitrator who would ultimately decide their dispute.

We show that $P^I(\beta)$ is decreasing on the interval $[0,1]$. The argument that shows that it is increasing on the interval $[-1,0]$ is analogous.

Fix an equilibrium with a given threshold $\overline{\beta}$. Recall that the defendant is indifferent between an arbitrator of type $\beta > 0$ who decides correctly if strategic and an arbitrator of type $1 - p + p\beta = \frac{1+\beta}{2}$ who decides for the plaintiff if strategic, and the plaintiff is indifferent between an arbitrator of type $\beta > 0$ who decides correctly if strategic and an arbitrator of type $p + \beta(1-p) = \frac{1+\beta}{2}$ who decides for the plaintiff if strategic. First, consider the case where

$$\frac{1+\beta}{2} \leq \overline{\beta}$$

or where[27]

$$0 \leq \beta \leq 2\overline{\beta} - 1.$$

[27] If $2\overline{\beta} - 1 \leq 0$ or $\overline{\beta} \leq \frac{1}{2}$, then proceed to the next case.

An arbitrator of type $\beta^* \in \left[0, 2\overline{\beta} - 1\right]$ would be selected to decide the dispute from a list that includes two other arbitrators if the type of one of these other arbitrators (young or old) is lower and so would be vetoed by the defendant (with probability $.5F^o(\beta^*) + .5F^y(\beta^*) \equiv G(\beta^*)$) and the type of the other arbitrator (young or old) is higher and so would be vetoed by the plaintiff (with probability $1 - .5F^o(\beta^*) - .5F^y(\beta^*) = 1 - G(\beta^*)$). Thus, the probability that arbitrator β^* is selected to decide the dispute is:

$$2G(\beta^*)(1 - G(\beta^*)).$$

The derivative of this function with respect to β^* is $2g(\beta^*)(1 - 2G(\beta^*)) < 0$ because G is an average of two cumulative distribution functions and hence increasing, and symmetry and the fact that F^o has a mass point at 0 imply that $G(0) > \frac{1}{2}$.

Next, consider the case where $\beta > 0$ is such that:

$$\beta \leq \overline{\beta} < \frac{1+\beta}{2}$$

or where

$$2\overline{\beta} - 1 \leq \beta \leq \overline{\beta}.$$

An arbitrator of type $\beta^* \geq 0$ that belongs to this interval would be selected to decide the dispute from a list that includes two other arbitrators if either one of the other two arbitrator's types is old and belongs to interval $[-1, \beta^*)$ or young and belongs to the set $[-1, \beta^*) \cup \left[\overline{\beta}, \frac{1+\beta^*}{2}\right]$ and so is vetoed by the defendant (with probability $.5F^o(\beta^*) + .5F^y(\beta^*) + .5F^y\left(\frac{1+\beta^*}{2}\right) - .5F^y(\overline{\beta}) \equiv G(\beta^*)$) and the type of the other arbitrator is either old and belongs to the interval $(\beta^*, 1]$ or young and belongs to the set $(\beta^*, \overline{\beta}] \cup \left[\frac{1+\beta^*}{2}, 1\right]$ and so is vetoed by the plaintiff (with probability $.5(1 - F^o(\beta^*)) + .5\left(F^y(\overline{\beta}) - F^y(\beta^*) + 1 - F^y\left(\frac{1+\beta^*}{2}\right)\right) = 1 - G(\beta^*)$). Thus, the probability that arbitrator β^* is selected to decide the dispute is $2G(\beta^*)(1 - G(\beta^*))$, which is decreasing as before.

Finally, consider the case where

$$\overline{\beta} < \beta.$$

This case is again simpler and the proof is similar to the first case analyzed above.

To conclude the proof of the proposition, we need to show that the probability $P^I(\beta)$ has a discontinuous jump up at $P^I(0)$. Let $H(\beta) \equiv .5F^o(\beta) + .5F^y(\beta)$ and denote the mass point of H at 0 by $h > 0$. The probability that an arbitrator of type 0 is selected to decide the dispute out of a list of three arbitrators is:

$$\frac{1}{2}(1 - h^2) + \frac{1}{3}h^2$$

The probability that an arbitrator of type $\beta \searrow 0$ is selected to decide the dispute is:

$$2\left(\frac{1}{2} + \frac{h}{2}\right)\left(\frac{1}{2} - \frac{h}{2}\right) = \frac{1 - h^2}{2}.$$

The former probability is strictly larger than the latter for every $h > 0$. ■

Proof of Proposition 3. The probability that an employer of type $\beta \in [-1,1]$ is employed under the 'No Veto' regime is independent of β.
We compute the probability that an arbitrator of type $\beta \in [-1,1]$ is employed under the 'Veto + Unobservable Information' regime. Given three different arbitrators' types $\beta_0 < \beta_1 < \beta_2$ the plaintiff would veto arbitrator β_2, the defendant would veto arbitrator β_0, and so arbitrator β_1 would be employed. The probability that for a given β, out of two other β's there is exactly one β that is smaller and one one β that is larger is:[28]

$$P^{\circ}(\beta) = 2\hat{F}(\beta)\left(1 - \hat{F}(\beta)\right).$$

For any monotone function $\hat{F}$, the probability $P(\beta)$ is increasing for $-1 \leq \beta \leq 0$, decreasing for $0 \leq \beta \leq 1$, and maximized at $\beta = 0$ where it equals $\frac{1}{2}$.
This means that less biased arbitrators with a lower type $|\beta|$ are more likely to be employed under the 'Veto + Unobservable Information' regime compared to the 'No Veto' regime, and highly biased arbitrators with a higher type $|\beta|$ are more likely to be employed under the 'No Veto' regime compared to the 'Veto + Unobservable Information' regime. ■

Proof of Proposition 4. If b is small, then arbitrators behave identically under the two regimes. The superior selection that is afforded by the 'Veto + Observable Information' regime implies that it generates a higher probability of a correct decision. ■

Proof of Proposition 5. Strategic arbitrators decide correctly under the 'Veto + Unobservable Information' regime. Since all arbitrators appear as either of type β_0 or $-\beta_0$, one of these types is always selected to decide the dispute. If the arbitrator is unbiased then she decides the case correctly. Since biased arbitrators also decide correctly half of the time (by the assumption that $p = 0.5$), the probability of a correct decision under this regime is

$$1 - \beta_0 + \frac{\beta_0}{2} = 1 - \frac{\beta_0}{2}.$$

Under the 'Veto + Observable Information' regime, young arbitrators may have two equally likely types β_0 and $-\beta_0$. Since the decision that young arbitrators make reveals their bias, old arbitrators have five possible types: inexperienced and hence of type β_0 or $-\beta_0$, pro-plaintiff, pro-defendant, and unbiased. If old arbitrators are inexperienced with probability q then the probability that an old arbitrator has type β_0 or $-\beta_0$ is $\frac{q}{2}$, the probability that an old arbitrator is pro-plaintiff or pro-defendant is $\frac{(1-q)\beta_0}{2}$, and the probability that an old arbitrator is unbiased is $\frac{(1-q)(1-\beta_0)}{2}$. This means that there are $7^3 = 343$ different 3-arbitrator panels. We divide this set of panels into four subsets: panels with three young arbitrators, panels with two young and one old arbitrator, panels with

[28] The fact that F is continuous implies the the probability of a tie is zero and so can be ignored.

one young and two old arbitrators, and panels with three old arbitrators. Below, we calculate the probability that a given panel belongs to each subset, and determine the probability that a correct decision is made in each subset as follows.

A young arbitrator is selected to appear in a panel of three arbitrators that consists of three, two, and one young arbitrators with probabilities $\frac{1}{4}$, $\frac{1}{2}$, and $\frac{1}{4}$, respectively.[29]

In a stationary equilibrium, the probability that an old arbitrator is inexperienced is equal to the probability that a young arbitrator is not selected. We denote this probability by q and calculate it below. A young arbitrator (with type β_0 or $-\beta_0$) is chosen from a panel of three young arbitrators with probability $\frac{1}{3}$. A young arbitrator is chosen from a panel that consists of two young arbitrators and one old arbitrator with probability[30]

$$\frac{1}{4}+\frac{q}{12}+\frac{\beta_0\left(1-q\right)}{4}.$$

And a young arbitrator is chosen from a panel that consists of one young and two old arbitrators

[29]Notice that panels with one or two young arbitrators are three times more likely than a panel with three young arbitrators.

[30]Because with probability $\frac{1}{2}$ the two young arbitrator have identical types and then a young arbitrator is chosen with probability

$$\left(1-\frac{q}{2}\right)\frac{1}{2}+\frac{q}{2}\cdot\frac{1}{3}$$

and with probability $\frac{1}{2}$ the two young arbitrator have different types and then a young arbitrator is chosen with probability

$$\left(1-q\right)\frac{\beta_0}{2}+\frac{q}{2}\cdot\frac{1}{2}.$$

The overall probability is

$$\frac{1}{2}\left(\left(1-\frac{q}{2}\right)\frac{1}{2}+\frac{q}{2}\cdot\frac{1}{3}\right)+\frac{1}{2}\left(\left(1-q\right)\frac{\beta_0}{2}+\frac{q}{2}\cdot\frac{1}{2}\right)=\frac{1}{4}+\frac{q}{12}+\frac{\beta_0\left(1-q\right)}{4}$$

with probability[31]

$$\frac{q^2}{3}+q\left(1+\frac{\beta_0^2}{4}\right)-q^2\left(1+\frac{\beta_0}{2}\right)+\frac{\beta_0}{2}\left(1-\frac{\beta_0}{2}\right).$$

Therefore, a young arbitrator is chosen with probability

$$\frac{1}{4}\cdot\frac{1}{3}+\frac{1}{2}\left(\frac{1}{4}+\frac{q}{12}+\frac{\beta_0\left(1-q\right)}{4}\right)+\frac{1}{4}\left(\frac{q^2}{3}+q\left(1+\frac{\beta_0^2}{4}\right)-q^2\left(1+\frac{\beta_0}{2}\right)+\frac{\beta_0}{2}\left(1-\frac{\beta_0}{2}\right)\right).$$

In a stationary equilibrium, this probability is equal to the probability that an old arbitrator is experienced, which is equal to $1-q$. This allows us to solve for the equilibrium value of q, which is equal to:[32]

$$q=\frac{31-3\beta_0+\frac{3}{2}\beta_0^2-\frac{1}{2}\sqrt{3}\sqrt{3\beta_0^4-36\beta_0^3+200\beta_0^2-424\beta_0+876}}{6\beta_0+8}$$

A panel of three arbitrators consists of three young arbitrators with probability $\frac{1}{8}$ and the arbitrator who is selected from such a panel decides correctly with probability $\frac{1}{2}$.[33] A panel of three arbitrators consists of two young and one old arbitrators with probability $\frac{3}{8}$ and the arbitrator who

[31]With probability $\frac{q^2}{4}$ the two old arbitrators are inexperienced and have the same type as the young arbitrator, and in this case the young arbitrator is chosen with probability $\frac{1}{3}$. With probability $\frac{q^2}{2}$ the two old arbitrators are inexperienced and have two different types, and in this case the young arbitrator is chosen with probability $\frac{1}{2}$. When the two old arbitrators are inexperienced and have a different type from the young arbitrator, the young arbitrator is not chosen. With probability $2q\left(1-q\right)$ one of the old arbitrators is experienced, and the other is not. In this case, the young arbitrator is chosen with probability $\frac{1}{2}+\frac{1}{2}\cdot\frac{\beta_0}{2}$ because with probability $\frac{1}{2}$ the old inexperienced arbitrator has the same type as the young arbitrator and in this case the young arbitrator is chosen with probability $\frac{1}{2}$ regardless of the type of the experienced old arbitrator, and with probability $\frac{1}{2}$ the inexperienced old arbitrator has a different type from the young arbitrator and in this case the young arbitrator is chosen if and only if the experienced old arbitrator is either pro-plaintiff or pro-defendant (depending on the young arbitrator's type). Finally, with probability $\left(1-q\right)^2$ both the old arbitrators are experienced and in this case the young arbitrator is chosen if and only if one of the old arbitrators is pro-plaintiff or pro-defendant (depending on the young arbitrator's type) and the other is not, with probability $\frac{\beta_0}{2}\left(1-\frac{\beta_0}{2}\right)$.

Hence, the probability that the young arbitrator is chosen is

$$\frac{q^2}{4}\cdot\frac{1}{3}+\frac{q^2}{2}\cdot\frac{1}{2}+2q\left(1-q\right)\left(\frac{1}{2}+\frac{1}{2}\cdot\frac{\beta_0}{2}\right)+\left(1-q\right)\frac{\beta_0}{2}\left(1-\frac{\beta_0}{2}\right)=\frac{q^2}{3}+q\left(1+\frac{\beta_0^2}{4}\right)-q^2\left(1+\frac{\beta_0}{2}\right)+\frac{\beta_0}{2}\left(1-\frac{\beta_0}{2}\right).$$

[32]Plotting this as a function of β_0 reveals that it is a monotone function that decreases almost linearly from .671 at $\beta_0=0$ to .568 at $\beta_0=1$.

[33]Both young strategic arbitrators and young nonstrategic arbitrators always bias their decision in equilibrium. Their decision is correct with probability $\frac{1}{2}$.

is selected from such a panel decides correctly with probability[34]

$$\frac{3}{4}-\frac{q}{8}+\frac{q\beta_0}{8}-\frac{\beta_0}{4}.$$

A panel of three arbitrators consists of two old and one young arbitrators with probability $\frac{3}{8}$ and the arbitrator who is selected from such a panel decides correctly with probability[35]

$$\frac{q^2}{12}-\frac{q\beta_0}{2}-\frac{\beta_0^2}{2}-\frac{q}{4}+\frac{q^2\beta_0}{6}+\frac{q\beta_0^2}{2}+1.$$

Finally, a panel of three arbitrators consists of three old arbitrators with probability $\frac{1}{8}$. The arbitrator who is selected from such a panel decides correctly with probability[36]

[34]With probability $\frac{1}{2}$ the two young arbitrators have the same type and in this case one of them is chosen to arbitrate the dispute and decides correctly with probability $\frac{1}{2}$ regardless of the type of the old arbitrator. With probability $\frac{1}{2}$ the two young arbitrators have different types. With probability q the old arbitrator is inexperienced and in this case a young arbitrator is chosen to decide the dispute with probability $\frac{1}{2}$ and decides correctly with probability $\frac{1}{2}$ and with probability $\frac{1}{2}$ the old arbitrator decides correctly with probability $1-\frac{\beta_0}{2}$. With probability $1-q$ the old arbitrator is experienced and in this case with probability β_0 one of the young arbitrators is chosen to arbitrate the dispute and decides correctly with probability $\frac{1}{2}$ and with probability $1-\beta_0$ an old unbiased arbitrator is selected to arbitrate the dispute and decides correctly with probability 1. This yields the probability

$$\frac{1}{2}\cdot\frac{1}{2}+\frac{1}{2}\left(q\left(\frac{1}{2}\cdot\frac{1}{2}+\frac{1}{2}\left(1-\frac{\beta_0}{2}\right)\right)+(1-q)\left(\frac{\beta_0}{2}+1-\beta_0\right)\right)=\frac{3}{4}-\frac{q}{8}+\frac{q\beta_0}{8}-\frac{\beta_0}{4}$$

[35]If the two old arbitrators are both inexperienced (with probability q^2), then the correct decision is made with probability $\frac{1}{4}\left(1-\frac{\beta_0}{2}\right)+\frac{1}{2}\left(\frac{1}{2}\left(1-\frac{\beta_0}{2}\right)+\frac{1}{2}\cdot\frac{1}{2}\right)+\frac{1}{4}\left(\frac{2}{3}\left(1-\frac{\beta_0}{2}\right)+\frac{1}{3}\cdot\frac{1}{2}\right)=\frac{5}{6}-\frac{\beta_0}{3}$. If one old arbitrator is inexperienced and the other is experienced (with probability $2q(1-q)$) then the correct decision is made with probability $\frac{1}{2}\left(\frac{1}{2}\left(1-\frac{\beta_0}{2}\right)+\frac{1}{2}\cdot\frac{1}{2}\right)+\frac{1}{2}\left(\frac{\beta_0}{2}\cdot\frac{1}{2}+1-\beta_0+\frac{\beta_0}{2}\left(1-\frac{\beta_0}{2}\right)\right)=\frac{7}{8}-\frac{\beta_0}{4}-\frac{\beta_0^2}{8}$. Finally, if the two old arbitrators are both experienced (with probability $(1-q)^2$) then the correct decision is made with probability 1 if and only if both the old arbitrators are unbiased or one is unbiased and the other biased in the other direction than the young arbitrator on the panel, with probability $(1-\beta_0)^2+2\beta_0(1-\beta_0)$. In all other cases, the selected arbitrator always biases its decision and so decides correctly with probability $\frac{1}{2}$. The probability of a correct decision is therefore:

$$q^2\left(\frac{5}{6}-\frac{\beta_0}{3}\right)+2q(1-q)\left(\frac{7}{8}-\frac{\beta_0}{4}-\frac{\beta_0^2}{8}\right)+(1-q)^2\left((1-\beta_0)^2+2\beta_0(1-\beta_0)+\left(1-(1-\beta_0)^2-2\beta_0(1-\beta_0)\right)\frac{1}{2}\right)$$

or

$$\frac{q^2}{12}-\frac{q\beta_0}{2}-\frac{\beta_0^2}{2}-\frac{q}{4}+\frac{q^2\beta_0}{6}+\frac{q\beta_0^2}{2}+1$$

[36]If all three arbitrators are inexperienced (with probability q^3), then the correct decision is made with probability $1-\frac{\beta_0}{2}$. If two of the three old arbitrators are inexperienced (with probability $3q^2(1-q)$), then the correct decision is made with probability $\frac{1}{2}\left(1-\frac{\beta_0}{2}\right)+\frac{1}{2}\left(\beta_0\left(1-\frac{\beta_0}{2}\right)+1-\beta_0\right)=1-\frac{\beta_0}{4}-\frac{\beta_0^2}{4}$. If one of the old arbitrators is inexperienced (with probability $3q(1-q)^2$), then the correct decision is made with probability $\frac{\beta_0^2}{4}+\frac{\beta_0}{2}\left(1-\frac{\beta_0}{2}\right)^2+(1-\beta_0)\left(1-\frac{\beta_0}{2}\right)$. Finally, if all three old arbitrators are experienced (with probability $(1-q)^3$) then a biased decision is made with probability one if and only if at least two of the old arbitrators on the panel are biased in the same direction, with probability $2\left(\left(\frac{\beta_0}{2}\right)^3+3\left(\frac{\beta_0}{2}\right)^2(1-\beta_0)\right)$. In all other cases, the correct decision is made with probability 1. Thus, the probability of

$$q^3\left(1-\tfrac{\beta_0}{2}\right)+3q^2(1-q)\left(1-\tfrac{\beta_0}{4}-\tfrac{\beta_0^2}{4}\right)+3q(1-q)^2\left(\tfrac{\beta_0^2}{4}+\tfrac{\beta_0}{2}\left(1-\tfrac{\beta_0}{2}\right)^2+(1-\beta_0)\left(1-\tfrac{\beta_0}{2}\right)\right)$$

$$+(1-q)^3\left(1-\left(\frac{\beta_0}{2}\right)^3-3\left(\frac{\beta_0}{2}\right)^2(1-\beta_0)\right).$$

Summing up and plotting the probability of a correct decision under the 'Veto + Observable Information' and 'Veto + Unobservable Information' regimes as a function of β_0 reveals that the latter generates a higher probability of a correct decision than the former for any value of β_0 that lies strictly between 0 and 1. ■

Proof of Proposition 6. The proof follows from the fact that the expectation of the intermediate β is equal to the median of the distribution F (David and Nagaraja, 2003). ■

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a correct decision in this case is:

$$2\left(\left(\frac{\beta_0}{2}\right)^3+3\left(\frac{\beta_0}{2}\right)^2(1-\beta_0)\right)\frac{1}{2}+1-2\left(\left(\frac{\beta_0}{2}\right)^3+3\left(\frac{\beta_0}{2}\right)^2(1-\beta_0)\right)=1-\left(\frac{\beta_0}{2}\right)^3-3\left(\frac{\beta_0}{2}\right)^2(1-\beta_0).$$

And the overall probability of a correct decision is:

$$q^3\left(1-\tfrac{\beta_0}{2}\right)+3q^2(1-q)\left(1-\tfrac{\beta_0}{4}-\tfrac{\beta_0^2}{4}\right)+3q(1-q)^2\left(\tfrac{\beta_0^2}{4}+\tfrac{\beta_0}{2}\left(1-\tfrac{\beta_0}{2}\right)^2+(1-\beta_0)\left(1-\tfrac{\beta_0}{2}\right)\right)+$$

$$(1-q)^3\left(1-\left(\tfrac{\beta_0}{2}\right)^3-3\left(\tfrac{\beta_0}{2}\right)^2(1-\beta_0)\right).$$

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