NBER WORKING PAPER SERIES

ARBITRATION WITH UNINFORMED CONSUMERS

Mark L. Egan
Gregor Matvos
Amit Seru

Working Paper 25150
http://www.nber.org/papers/w25150

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
October 2018

We thank Lauren Cohen, Alexander Dyck, Shane Greenstein, Ben Iverson, Jesse Shapiro, Andrew Tuch, and the seminar participants at Bocconi University, Columbia Business School, the Consumer Financial Protection Bureau, Einaudi Institute for Economics and Finance, Harvard Business School, the Kellogg School of Management at Northwestern, Penn State, Stanford Graduate School of Business, the University of Texas at Austin, the University of Wisconsin School of Business, the Workshop on Financial Intermediation and Regulation at Queens University, and the Yale School of Management Jr. Finance Conference. The views expressed herein are those of the authors and do not necessarily reflect the views of the National Bureau of Economic Research.

Arbitration with Uninformed Consumers
Mark L. Egan, Gregor Matvos, and Amit Seru
NBER Working Paper No. 25150
October 2018
JEL No. D14,D18,G24,G28,G3

ABSTRACT

We examine whether firms have an informational advantage in selecting arbitrators in consumer arbitration, and the impact of the arbitrator selection process on outcomes. We collect data containing roughly 9,000 arbitration cases in securities arbitration. Securities disputes present a good laboratory: the selection mechanism is similar to other major arbitration forums; arbitration is mandatory for all disputes, eliminating selection concerns; and the parties choose arbitrators from a randomly generated list. We first document that some arbitrators are systematically industry friendly while others are consumer friendly. Firms appear to utilize this information in the arbitrator selection process. Despite a randomly generated list of potential arbitrators, industry-friendly arbitrators are forty percent more likely to be selected than their consumer friendly counterparts. Better informed firms and consumers choose more favorable arbitrators. We develop and calibrate a model of arbitrator selection in which, like the current process, both the informed firms and uninformed consumers have control over the selection process. Arbitrators compete against each other for the attention of claimants and respondents. The model allows us to interpret our empirical facts in equilibrium and to quantify the effects of changes to the current arbitrator selection process on consumer outcomes. Competition be- tween arbitrators exacerbates the informational advantage of firms in equilibrium resulting in all arbitrators slanting towards being industry friendly. Evidence suggests that limiting the respondent's and claimant's inputs over the arbitrator selection process could significantly improve outcomes for consumers.

Mark L. Egan
Harvard Business School
Baker Library 365
Boston, MA 02163
eganmarkl@gmail.com

Gregor Matvos
McCombs School of Business
University of Texas, Austin
2110 Speedway, Stop B6600
CBA 6.724
Austin, TX 78712
and NBER
Gregor.Matvos@mccombs.utexas.edu

Amit Seru
Stanford Graduate School of Business
Stanford University
655 Knight Way
Stanford, CA 94305
and NBER
aseru@stanford.edu

I Introduction

Arbitration is a private mechanism for resolving disputes outside of the court system. In arbitration the contracting parties present their case to a private arbitrator who then issues a legally-binding resolution to the dispute. When consumers purchase a product or service, the purchase often contains a pre-dispute arbitration provision which legally mandates that the consumer must resolve any related dispute using arbitration. Moreover, the provision prohibits the consumer from suing the seller in court. Such arbitration clauses have become increasingly common in the U.S. and are currently used by *all* brokerage firms, the largest insurance companies (e.g., AIG, Aetna, Inc., Blue Cross and Blue Shield, Travelers and USAA), the largest financial firms (e.g., American Express Bank of America, Barclays Bank, Chase Bank and Citi Group) and largest Fintech firms (e.g., PayPal, Venmo and Square). Arbitration clauses are also pervasive among non-financial firms such as online retailers (e.g., Amazon, Ebay and Walmart.com), music service providers (e.g., Apple, Spotify and Shazam), wireless providers (e.g., Verizon, AT&T, T-Mobile and Sprint), and sharing economy firms (e.g., Uber, Lyft, Airbnb), covering trillions of dollars of transactions.[1] In short, a large share of potential disputes between consumers and firms in the US, for purchases ranging from a toothbrush to a house, are settled through mandatory arbitration, rather than the court system.

A central feature of arbitration is the ability of both parties to explicitly exert control in the arbitrator selection process. For example, in securities arbitration, each party is presented with a randomly generated list of arbitrators and can influence the arbitrator selection process by striking a limited number of arbitrators from the list. This is a notable difference compared to judicial proceedings, where judges are assigned to cases. Practitioners strongly believe that choosing an arbitrator can significantly affect the case outcome: "the selection of an appropriate arbitrator or arbitration tribunal is nearly always the single most important choice confronting parties in arbitration" (Protocols for Expeditious, Cost-Effective Commercial Arbitration, 2010). Despite the prevalence of arbitration in resolving consumer disputes, and beliefs in the industry, there is little empirical analysis of the arbitrator selection process and its impact on consumer outcomes.[2] The focus of this paper revolves around two issues related to arbitrator selection. We first study whether there are indeed systematic differences across arbitrators: Are some arbitrators systematically more industry friendly and others more consumer friendly? Evidence from practitioners and the arbitrator selection mechanisms themselves suggest that there are inherent differences across arbitrators.

Second, we want to understand whether firms have an informational advantage over consumers

[1] Estimates suggest that 50% of credit card loans ($500bn) and 44% ($3.1tn) of insured deposits are subject to mandatory arbitration (CFPB, 2015). This is a conservative lower bound on how many dollars transacted in the economy are subject to arbitraton agreements. As noted above, arbitration agreements are also commonplace in residential real estate, payday loans, prepaid cards, cable TV, internet, and car rental contracts among others (Silver-Greenberg and Gebeloff 2015).

[2] The full quote reads "It has been said that 'the arbitrator is the process.' This is not mere hyperbole: while the appropriate institutional and procedural frameworks are often critical to crafting better solutions for business parties in arbitration, the selection of an appropriate arbitrator or arbitration tribunal is nearly always the single most important choice confronting parties in arbitration" (Protocols for Expeditious, Cost-Effective Commercial Arbitration, 2010)

in choosing arbitrators, as well as which types of firms hold the greatest advantage. One would expect firms that engage in arbitration repeatedly to carry a substantial advantage over consumers, who only partake in the process once. For example, in our data set, the average firm in securities arbitration had previously entered 81 different arbitration cases while the average firm involved in non-securities consumer arbitration had been involved in 133 cases.[3] Such experience may improve firms' ability to eliminate arbitrators who are more likely to deliver unfavorable outcomes.[4] Anecdotal evidence suggests that this is indeed the case as brokerage firms often maintain proprietary internal arbitrator rankings, or arbitrator "strike lists," to help guide their arbitrator selection process.[5]

This paper has two goals. We first establish facts on these issues related to arbitrator selection. We then develop and calibrate a stylized model of arbitrator selection that fits these facts and allows us to quantify the effects of changes in arbitrator selection process on consumer outcomes.

We study arbitration in the securities industry using a new data set of roughly 9,000 claims. The securities industry lends itself to studying arbitration because of the institutional setting and data availability. Our data on securities arbitration comes from the Financial Industry Regulatory Authority's (FINRA) Arbitration Awards Database, which we merge the data using unique case level identifiers with FINRA's BrokerCheck data. The merged data allow us to observe detailed information on the claimant (consumer), respondent (firm), arbitrators, dispute details, and the awards. In addition to the data, the institutional environment has several useful features. Pre-Dispute Arbitration Agreement (PDAA) are required in virtually all broker-dealer contracts, so there is no selection of firms or consumers into arbitration clauses.[6] All disputes are resolved under the auspices of FINRA, which provides a uniform pool of arbitrators, as well as rules governing arbitration, so the choice of venue is also fixed.[7] Important for the research design, FINRA randomizes the list of potential arbitrators from which the parties select the arbitration tribunal. Each party can then influence the arbitrator selection process by striking a limited number of arbitrators from this list. Versions of this "strike" selection system are very common and present across the largest consumer arbitration forums such as the American Arbitration Association (AAA) and the the Judicial Arbitration and Mediation Services, Inc. (JAMS).

Arbitration in the brokerage industry is also interesting per se. Roughly 20 million U.S. households hold a brokerage account, comprising \$20tn of assets (2016 Survey of Consumer Finances). The cases involve significant monetary amounts: mean and median damages requested are \$785,000 and \$175,000 respectively, providing substantial incentives for the parties in arbitration. The reg-

[3]Among financial advisory firms involved in arbitration, the average firm appeared in 81 cases in our securities arbitration data base. Similarly, among those firms involved in consumer arbitration, the average firm was involved in 133 cases in our American Arbitration Association data set.

[4]This potential information gap between the parties distinguishes consumer arbitration from commercial arbitration, such as arbitration between employers and unions, that has been studied previously (Ashenfelter and Bloom, 1984; Bloom, 1986; Bloom and Cavanagh, 1986a, Ashenfelter, 1987).

[5]As reported per conversations with industry litigation experts and consultants.

[6]FINRA Dispute Resolution Task Force (2015).

[7]In general, terms of use presented by the firm specify the arbitration forum, and can potentially designate the allowed pool of arbitrators.

ulator, FINRA, established the Dispute Resolution Task Force to investigate concerns that the arbitration procedures lead to outcomes favoring the industry, and more recently the Consumer Financial Protection Bureau (CFPB) proposed a new rule regulating mandatory arbitration clauses in certain financial products.

We begin our analysis by documenting that some arbitrators are systematically industry friendly while others are consumer friendly. Observable case characteristics explain a substantial amount of the variation in arbitration awards. We find that observable details regarding the allegations, complexity of the case, and the offending adviser explain 37% of the variation in arbitration awards. However, when we control for the presiding arbitrator (arbitrator fixed effects), we are able to explain more than 60% of the variation in arbitration awards. In other words, some arbitrators consistently grant lower awards while others consistently grant higher awards; thus, some arbitrators are consistently industry friendly while others are consistently consumer friendly. Our estimates suggest that, all else equal, if a one standard deviation more industry friendly adviser is chosen to arbitrate a case, the damages awarded to the consumer will be 12pp smaller. In the case that the consumer requests the median amount, $175,000, this would translate to the consumer receiving $21,000 less. Overall, our estimates are consistent with the idea that the choice of arbitrator can have a meaningful impact on case outcomes.

Next, we find evidence suggesting that firms take advantage of these systematic differences when selecting arbitrators. We find that arbitrators who are industry friendly, in terms granting lower awards, are more likely to be selected again in the future relative to arbitrators who are consumer friendly. Arbitrators who are industry friendly –defined relative to the mean arbitrator bias – are roughly forty percent more likely to be selected in a given year than their consumer friendly counterparts. This finding is consistent with Kondo (2006) who finds that pro-industry arbitrators were more frequently selected in National Association of Securities Dealers (NASD) arbitrations. The selection mechanism we document has a large impact on the pool of arbitrators who actually oversee cases and, ultimately, decreases award amounts by about 2pp or roughly $16,000, on average. This result suggests that firms are better at selecting arbitrators than consumers. Because the pool from which the parties select arbitrators is randomly generated by FINRA, industry friendly arbitrators are more likely to be chosen, as the data suggests, only if firms are better at eliminating consumer friendly arbitrators. Thus, our findings suggest that firms have an informational advantage over consumers on arbitrator friendliness towards parties.

We delve more deeply into the mechanism behind firms' advantages in arbitration. If firms' advantages in arbitration are indeed driven by their ability to choose which arbitrators to eliminate, then restricting the number of arbitrators each party can eliminate should reduce the impact of firms' informational advantages. We exploit the 2007 change in FINRA rules governing arbitration, which reduced the number of arbitrators that each party could strike. We find that the effect of the firms' informational advantages decline after the reform by more than half. Next, we investigate in more detail whether firms' advantages are indeed driven by their experience in arbitration. We confirm that firms, which are more experienced, select arbitrators that are relatively more industry friendly than less experienced firms. We also investigate the role of expertise on the consumer side. While most consumers are typically involved in only one case, they can potentially compensate for their lack of personal experience by hiring an experienced attorney. We find that consumers who use attorneys who specialize in arbitration fare better in arbitration and select arbitrators that are relatively more consumer friendly. These results suggest that the level of sophistication / experience plays a potentially critical role in the arbitrator selection process.

To better understand and interpret our findings in equilibrium and to quantify the effects of the current arbitrator selection process, we develop and calibrate a stylized model of arbitrator selection. Arbitrators compete to be selected on the arbitration panel by choosing their slant: how industry or consumer friendly they will act. In the baseline version of the model, sophisticated firms observe arbitrators' slant and use this information to eliminate arbitrators from the randomly generated list, while uninformed consumers strike arbitrators randomly. A key result of the model is that even though the underlying population of arbitrators may be unbiased, competition among arbitrators for arbitration opportunities can drive all arbitrators to intentionally slant their case decisions. In fact, under a benchmark in which arbitrators only want to maximize their monetary payoffs, no arbitrator wants to be the least industry friendly arbitrator. This induces extreme competition between arbitrators resulting in all arbitrators being maximally industry friendly. Therefore competition between arbitrators exacerbates the informational advantage of firms in equilibrium.

The result that competition among arbitrators with uninformed consumers leads to biased arbitration stands in stark contrast to the situation in which both parties are informed: in that situation, competition across arbitrators is a desirable property of the arbitrator selection system, leading to less biased outcomes and statistical exchangability of arbitrators. The idea behind statistical exchangeability is that "since the parties play a role in the selection of the arbitrator who will decide their dispute, arbitrators who are known to favor one of the parties will be eliminated. This selection process created incentives for arbitrators to maintain characteristics that make them 'statistically exchangeable' with other arbitrators" (Ashenfelter et al., 1992, p1408). This argument is very powerful when both parties are equally informed about which arbitrators to eliminate, for example in the setting of employer/union arbitration, and is a desirable property of arbitration. However, we show that the same competitive forces that lead to statistical exchangability when both parties are informed lead to biased outcomes when one party holds an informational advantage.

We calibrate the model and use the estimates to quantitatively evaluate arbitrator bias and the current arbitrator selection system. The model allows us to estimate the underlying distribution of arbitrator beliefs, i.e. the awards that arbitrators would have chosen absent incentives provided by the arbitration selection mechanism. The estimates suggest that randomly selecting arbitrators –as opposed to selecting them using the current mechanism where firms have informational advantage over consumers –would increase investor awards by 5pp, or $40,000 on average. The model also illustrates that an individual consumer's value of being informed about arbitrators is more valuable when all consumers are informed. In other words, each individual consumer does not internalize how being informed changes arbitrators incentives to be more consumer friendly, opening a door for potential regulation. One example of such regulation is the prohibition on arbitration clauses that rule out class action claims, such as the proposed CFPB rule (Arbitration Agreements, 12 C.F.R. § 1040 2017).

We then use the calibrated model to investigate alternative arbitrator selection schemes. Policy proposals that aim to improve arbitration outcomes are frequently designed without considering the informational advantage that firms hold. We compute the consequences of several design changes and show that many existing policies that are intended to reduce bias when both parties are equally informed, actually exacerbate bias when only firms are informed. For example, in 2016 FINRA proposed to increase the size of the arbitration pool while simultaneously giving the involved parties more control over the arbitrator selection process. Our estimates suggest that increasing the size of the arbitration pool would result in higher (less industry friendly) awards while giving firms more control over the selection process would result in lower (more industry friendly) awards. Overall, we estimate that the rule change will have a small but negative effect on arbitration awards. Increasing arbitrator fees is also frequently seen as a proposal. Our estimates suggest that doubling fees would lead to further biased outcomes, and decrease awards by 4pp ($31,000), on average. Increasing arbitrator fees further incentivizes arbitrators to act industry friendly if firms hold an informational advantage. One implication of our model is that lower powered incentives for arbitrators, potentially coupled with a flat wage, could decrease the pro-industry bias in arbitration.

Our empirical analysis and model focus on arbitration in the securities industry. We conclude the paper by showing that the insights from our setting extend to consumer arbitration more broadly. First, we discuss how the mechanism we illustrate in our model extends to other settings and other arbitrator selection systems. Second, we construct two additional data sets covering consumer arbitration cases administered by the two largest arbitration forums, AAA, and JAMS. These forums are used for consumer arbitration across over 8,000 financial firms (e.g., Wells Fargo, Citibank and American Express) and non-financial companies (e.g., AT&T, Macy's and United Healthcare). We replicate our main findings in these settings, with the caveat that data are relatively sparse and span a wide range of industries and cases, leading to noisier and less reliable estimates of arbitrator bias and selection. Nevertheless, our general sense from this analysis is that our results may apply to consumer arbitration beyond just financial services.

The paper is structured as follows. Section II provides institutional background on consumer arbitration in general and more narrowly on securities consumer arbitration. Section III details the construction of our consumer arbitration data set in the securities industry. Section IV documents systematic differences between arbitrators, showing that industry friendly arbitrators are more likely to be chosen, and provides reduced form evidence that the information gap between firms and consumers is responsible for these results. Section V introduces a model of arbitrator selection where arbitrators endogenously slant their arbitration decisions to increase their probability of being selected. Section VI describes our structural estimation/calibration and discusses the corresponding estimation results and policy counterfactuals. In Section VII we show that our findings extend to consumer arbitration more broadly and and discuss the contribution of the paper relative to the literature. Lastly, Section VIII concludes.

II Institutional Details: Consumer Arbitration

II.A Consumer Arbitration in the U.S.

Arbitration is a private alternative to civil courts for resolving disputes and is a type of alternative dispute resolution mechanism. The United States has a relatively pro-arbitration history dating back to the the Federal Arbitration Act in 1925 (Southland Corp. v. Keating, 465 US 1, 1984). In the Federal Arbitration Act, congress provided a framework for enforcing arbitration decisions and arbitration awards. Arbitration differs from the civil court system along several important dimensions. First, arbitration is typically binding without appeals and courts have had limited ability to vacate or modify arbitration awards (Hall Street Associate, LLC vs. Mattel, Inc., 552 US 576, 2008). Second, as described further below, the parties involved in a given dispute select the arbitrators while courts select judges. Third, arbitration can either be voluntary or involuntary. When purchasing goods and services, consumers often agree to pre-dispute arbitration agreements which mandate that any related disputes must be resolved through arbitration.

Why use arbitration? Advocates of arbitration often argue that arbitration is usually quicker, less expensive, and more informal than litigation (US Chamber of Commerce Institute for Legal Reform, 2005). On the other hand, critics of arbitration often argue that arbitration is more opaque with limited recourse and question the objectivity of the arbitrators.[8].

Consumer arbitration is ubiquitous in the US. The Consumer Financial Protection Bureau's Arbitration Study (2015) estimates that 50% of credit card loans ($500bn) and 44% of of insured deposits ($3.1tn) are subject to mandatory arbitration. Arbitration is common in most consumer financial products, such as automobile loans, brokerage accounts, payday loans, etc, and in many other non-financial products such as cable TV, cell-phone, internet, and car rental contracts among others (Silver-Greenberg and Gebeloff 2015). Arbitration is also prominent in employment contracts. More than half (54%) of non-union private-sector employers have mandatory arbitration procedures, affecting an estimated 60 million American workers (Colvin 2018).

Arbitration proceedings are governed by an administrator/forum who determines the procedural rules. Administrators often provide the a list of potential arbitrators and govern the arbitrator selection process. Our analysis focuses on securities arbitration between customers and brokerage firms. Securities arbitration is exclusively administered by the Financial Industry Regulatory Authority (FINRA). The two other dominant forums for consumer arbitration are the American Arbitration Association (AAA) and Judicial Arbitration and Mediation Services, Inc. (JAMS).[9]

[8]For example, the Minnesota Attorney General sued the National Arbitration Forum (NAF) regarding its consumer credit-card arbitration practices for the NAF's conflicting ties with the credit-card industry (State of Minnesota Office of the Attorney General, 2009).

[9]For example, AAA is listed as potential forum in over 80% of credit card, checking account, prepaid card, and mobile wireless arbitration clauses studied by the Consumer Financial Protection Bureau (2015). The National Arbitration Forum previously administered consumer arbitrations but ceased administering consumer arbitration in 2009.

A unique feature of arbitration across these forums is that both the consumer claimant and firm respondent have control over the arbitrator selection process. Although the specifics vary across arbitration forums, the arbitrator selection process typically involves ranking and striking potential arbitrators. For example, in FINRA and JAMS arbitration, the administrator sends a list of potential arbitrators to the claimant and respondent. Each party can remove/strike a fixed number of arbitrators from the consideration set/list, and then must rank the remaining arbitrators, assigning one to the most preferred arbitrator. The arbitrator with the lowest combined (most preferred) rank is appointed as the arbitrator. The second unique feature of arbitration is that arbitrators are only compensated if they are selected for a case. We describe the specific details of the arbitrator selection process and arbitrator compensation for FINRA arbitrations below and for AAA and JAMS arbitration in Section VII.

II.B FINRA (NASD) Arbitration

Here we briefly discuss the institutional details of the arbitration proceedings and the arbitrator selection process used by FINRA, or, prior to 2007, the National Association of Securities Dealers NASD.[10] While the securities industry uses arbitration to resolve claims between various parties, we focus on consumer arbitration– arbitration in which consumers file a claim against a brokerage firm. We also describe the requirements for becoming a FINRA arbitrator, how arbitrators are compensated, and the arbitrator selection process. As we show in Section VII, the arbitration selection mechanism and arbitrator incentives used in FINRA arbitration are common across *consumer* arbitration settings. These mechanisms differ from those employed to arbitrate union contracts, international business, or country treaties, which are not the focus of this paper.

FINRA (formerly NASD) maintains a roster of more than 7,000 eligible arbitrators. Generally, arbitrators must have at least five years of any paid work experience and at least two years of college. “Non-public” arbitrators are individuals with experience working in the financial industry, while “public” arbitrators do not have recent (within the past five years) work experience in the financial industry.[11] FINRA describes the pool of arbitrators as ranging from “from freelancers to retirees to stay-at-home parents.”[12] As we document in Section III.B.2, arbitrators are often current or former financial advisers. Prior to hearing cases, an arbitrator must have completed FINRA’s 12 hour Basic Arbitrator Training Program.

Arbitrators are compensated for the cases they arbitrate. FINRA arbitrators are currently paid $300 per hearing (chairpersons earn an additional $125 per day), which can last at most 4 hours, with at most two hearings a day–the hearings can be from the same case. In addition, arbitrators are entitled to reasonable local expenses. Therefore, the minimal compensation for an arbitrators is $75 per hour, and can be substantially larger for shorter hearings. This is almost twice the median

[10]Full details on the arbitration proceeding details can be found on the Financial Industry Regulatory Authority website: https://www.finra.org/arbitration-and-mediation/code-arbitration-procedure.

[11]In 2015 FINRA revised the definition of “public arbitrators” to exclude those individuals who ever worked in the financial advisory industry.

[12]https://www.finra.org/arbitration-and-mediation/become-finra-arbitrator [Accessed on 6/25/2018]

hourly compensation of $39.8 of financial analysts and financial advisers who comprise a substantial amount of the arbitration pool.[13] Given the differences in compensation, it is not surprising that FINRA maintains a large roster of potential arbitrators. Critically, arbitrators are only paid if they are selected onto a panel; they do not receive benefits or other payments simply for being on the roster.

In 1998, the NASD adopted the Neutral List Selection System (NLSS). The NLSS generally works as follows.[14] For each case, an automated process generates a list of public and a list of non-public arbitrators on a rotational basis based on the geographic location of the hearing site (FINRA 10308(b)(4)(A)). Both parties observe the generated lists of public and non-public arbitrators as well as an Arbitrator Disclosure Report for each potential arbitrator. The Arbitrator Disclosure report contains each potential arbitrator's education, employment history, skills, training, conflict information, and any publicly available arbitration awards the arbitrator granted. ("Arbitrator Appointment FAQ", 2018).Two aspects are critical to the process. First, to generate the list, NLSS selects arbitrators randomly for each pool. Second, each party then reviews and ranks the list of arbitrators according to the following rules. A party may strike one or more arbitrators from either list for any particular reason. The number of allowable strikes has changed over time; we describe this change in the arbitration selection process below. The number of strikes has ranged from four strikes by each side from a list of 10 potential arbitrators, to unlimited strikes. The struck arbitrators are immediately deemed ineligible to precede over the arbitration hearings. The parties then sequentially rank the remaining arbitrators by assigning a ranking of one to their first choice, two to their second choice, etc. Arbitrators are then appointed based on their cumulative ranking which is constructed by adding the rankings of both parties. For cases with one arbitrator, NASD appoints the public arbitrator with the lowest cumulative rank. For cases with three arbitrators, NASD appoints the two public arbitrators and the non-public arbitrator with the lowest cumulative rankings. This selection process is based on the premise that arbitrators differ in terms of how favorable they might be to either party and this process creates incentives for arbitrators to maintain characteristics that make them 'statistically exchangeable' with other arbitrators".

In general, an arbitration panel consists of one or three arbitrators. The composition of the arbitration panel depends on the claim amount. Under the current guidelines, claims under $50k generally have one public arbitrator, claims $50-100k consist of one public arbitrator but can have up to three arbitrators, and claims over $100k generally consist of two public arbitrators and one non-public arbitrator.

II.B.1 2007 Reform: Reducing the Number of Strikes

The arbitrator selection process has undergone several changes but can be broadly captured into three periods: pre-1998, 1998-2007, and post 2007. Pre-1998, a NASD arbitration committee was responsible for selecting arbitrators. The NASD arbitration committee was permitted to use their

[13] https://www.bls.gov/oes/current/oes_nat.htm#13-0000

[14] See FINRA code 10308 for full details.

discretion when selecting arbitrators for a particular case (Nichols 1999). Concerns over whether or not the industry-sponsored arbitration was fair for consumers led to several investigations, including a congressional investigation in 1992.[15] The NASD responded to these concerns by implementing a new arbitrator selection procedure in November 1998.

In 1998, the NASD adopted the Neutral List Selection System (NLSS), which we described above: parties obtain randomly generated lists of arbitrators and can strike arbitrators from the lists. This arbitrator selection mechanism mirrors arbitration selection systems used in other forums, which we describe in Section VII. The arbitrator selection process was revised in 2007 as part of an overhaul to the system when FINRA succeeded NASD. One major change FINRA made to the arbitrator selection process was to limit the number of arbitrators that parties can strike from the randomly generated subset of arbitrators. Prior to 2007, each party was able to strike any number of arbitrators from the list while post-2007, each party could only strike at most 4 out of 10 arbitrators. We explore the effect of this rule change in Section VI.D.

Last, it is useful to examine recent arbitration rule changes proposed by FINRA. In 2016 FINRA proposed increasing the number of arbitrators in the pool to 15 and increasing the maximum number of strikes available to each party to 6.[16] In other words, the parties would be allowed to strike the same share of arbitrators as before, but from a larger list. We analyze the potential consequences of expanding the list of potential arbitrators in Section VI.D.

III Data

III.A Data Construction

We construct a novel data set containing the details and awards of roughly 9,000 securities arbitration cases. We focus our analysis on arbitration cases involving customer disputes with financial advisers as opposed to disputes among financial advisers and financial advisory firms. Thus, in our setting, the claimant/plaintiff is always a customer and the respondent/defendant is always a financial adviser. This allows us to examine a more homogeneous class of cases. Moreover, the focus of this paper is consumer arbitration, where the differences in sophistication between the parties are likely to be substantial. In the data set we observe the details of each arbitration case including the parties involved (claimant, respondent, and arbitrator), the nature of the allegations, and the outcome of the proceedings. We construct the data set primarily from two sources: FINRA's Arbitration Awards Online and FINRA's BrokerCheck website.

The proceedings and awards for FINRA and NASD arbitration hearings are publicly available online. FINRA's Arbitration Awards Online contains the details for over 50,000 arbitration hearings dating back to 1988. For each case that has been resolved through arbitration, FINRA publishes a

[15] The 1996 NASD Arbitration Policy Task Force (The Ruder Report) determined that consumers were concerned that the arbitrator selection process "reflected staff bias and prejudgment" and that investors had "limited input on the choice of arbitrators."

[16] http://www.finra.org/industry/rule-filings/sr-finra-2016-022?utm_source=MM&utm_medium=email&utm_campaign=DR_Monthly_070716_FINAL [Accessed on 6/25/2018]

detailed arbitration case/award document that lists the parties involved, allegations, and arbitration outcome/award. We collect the case/award documents for each arbitration case and systematically parse through each document. From the documents we are able to determine the names and other information regarding the customer/claimant, financial adviser/respondent, and arbitrator. As we discuss in the next section, we also use these documents to help determine the complexity of each case. The arbitration documents provide detailed accounts of the nature of the disputes.

We supplement the FINRA Arbitration Awards Online data with additional adviser-level information from FINRA's BrokerCheck website, which allows us to obtain additional data on the defendant, as well as case details. FINRA's BrokerCheck data contains the employment, registration, and disclosure history for all individuals registered with FINRA. We manually collect the details of each financial adviser to construct a data set of 1.2mm financial advisers as described in Egan, Matvos, and Seru (2016). If a financial adviser is involved in an arbitration proceeding, the arbitration proceeding shows up on his or her disclosure record as reported by BrokerCheck.[17] The disclosure record contains additional summary details on the case including the specific allegations, requested damages, and arbitration award, all of which we discuss in more detail below. Using unique case identifiers, we are able to perfectly match the arbitration records reported in BrokerCheck to the arbitration case details reported in the Arbitration Awards Online database.

III.B Summary Statistics: Cases and Arbitrators

Our data consists of 8,828 arbitration cases and 20,231 arbitrator by case observations. We define an arbitration case at the customer/adviser complaint level. Roughly 13% of consumer complaints in arbitration involve multiple financial advisers. In the same complaint and arbitration proceeding consumers can bring a different sets of charges across the financial advisers and the arbitrators can separately assess damages across the financial advisers involved in the case. Consequently, we define an arbitration case at the customer/adviser complaint level.

III.B.1 Cases, Respondents, and Claimants

Observations are at the case by arbitrator level. These cases involve substantial monetary amounts: mean and median damages requested are \$785,000 and \$175,000 respectively. Figure 1 displays the percentage of awards granted relative to the damages requested. The median award granted is 32% of the requested amount, with large differences in arbitration outcomes: the standard deviation is 67%. The distribution is skewed to the right, with a mean award of 51% of damages, partially because awarded claims can exceed damages requested. For example, if punitive damages are awarded to the consumer the amount awarded may exceed the amount requested. Consumers initiate arbitration by filing a Statement of Claim with FINRA, in which consumers provide details of the dispute and the type of relief requested. Before the arbitration panel is appointed, consumers can modify these claims; however, once the arbitration panel has been appointed, consumers can only modify their

[17]FINRA has the power to expunge records from an adviser's record (Prior, 2015). If an adviser was involved in an arbitration proceeding that has been expunged, the arbitration proceeding will not be in our data set.

claim if they are granted a formal motion to amend the claim (FINRA 12309). While the specific case details differ, these univerarite comparisons suggest that, on average, the arbitration process is respondent friendly in that consumers typically only receive a fraction of their initial claim.

We observe detailed information on the nature of the dispute. Table 1 displays the nature of the allegations. We report the six most commonly recorded allegations and financial products in arbitration hearings. The allegation and product categories are not mutually exclusive–the average case includes two allegations. For example, a case can allege both fraud and a breach of fiduciary responsibility. Common allegations include the selling of unsuitable investments and misrepresentation. Fraud allegations comprise 24% of all claims. When alleged claims are directed at a specific financial product, we measure this as well. The most common allegations regard equity investments (9%), and insurance (5%). To measure how cases differ in complexity we measure the total number of allegations and length of the arbitration case in counts of words and sentences. For example, the accompanying case document contains roughly 1,430 words.

Our data set also contains detailed information on the respondent/defendant, i.e. the financial adviser named in the customer dispute. Since the securities industry is highly regulated, financial advisers must be licensed in order to engage in certain business activities, such as providing advice, selling mutual funds, insurance and other products. Advisers can hold up to 61 different types of licenses which help us control for potential differences across arbitration cases. For each adviser, we observe his/her complete employment, registration, and disclosure history. Table 1 reports the summary statistics for the advisers named in our arbitration cases. The average adviser holds 3.9 qualifications. Most advisers in our sample hold Series 63, allowing them to transact in securities in a given state, and Series 7 licenses, which allow for a broader range of securities transactions. Roughly half hold investment adviser qualification licenses (Series 65 or 66), allowing them to provide financial advice rather than transaction services. Using disclosure data, we can also investigate the past behavior of the defendants–roughly half (48%) of the respondents in the sample have past histories of misconduct and are repeat offenders. Past misconduct is predictive of future misconduct (Egan, Matvos, and Seru, 2016). Our data therefore allow us to measure a broad range of respondent/defendant characteristics.

From the perspective of claimants/plaintiffs, we observe details on whether or not the consumer used legal representation during arbitration. In roughly 6% of our observations, consumers do not use an attorney and report appearing pro-se. We also measure whether consumers are represented by an attorney who specialize in securities arbitration. The Public Investors Arbitration Bar Association (PIABA) is an international bar association whose members specialize in securities arbitration. These attorneys may be better informed about the arbitration proceedings, as well as about individual arbitrators. To determine PIABA membership, we manually match the lawyers representing consumers in our data set to the roster of attorneys posted on the PIABA website by first and last name.[18] Consumers use lawyers who are PIABA members in 7% of the cases in our

[18] In the Arbitration Awards Online database we observe the name of the customer's representation for roughly 1/3rd of the cases in our sample. Thus our measure of whether or not a consumer was represented by a PIABA attorney understates the true incidence in the population.

sample.

III.B.2 Arbitrators

We observe 7,891 unique arbitrators and, most importantly for our analysis, we observe repeated observations for 3,917 arbitrators. The arbitration panel size typically consists of one to five arbitrators, with three being the modal panel size. The average arbitrator participates in 2.4 different cases in our sample. Figure 2a displays the distribution of case experience at the case level. While not central to our argument, we also want to obtain better information on the background of arbitrators. Matching based on arbitrators' first and last names, we are able to match 40% of the arbitrators in our sample to financial advisers in the BrokerCheck database. In other words, these arbitrators have either been employed as financial advisers in the past, or currently work as financial advisers in the industry.

IV Differences between Arbitrators, and Arbitrator Selection

The awards stemming from arbitration hearings vary dramatically as displayed in Figure 1. The distribution of awards reflects the heterogeneity in terms of the severity of the offense, adviser culpability, and potentially the preferences/bias of an arbitrator. The arbitration selection process is based on the premise that arbitrators differ, and do so in terms of how favorable they will be to either party. As noted before, these differences across arbitrators are why both parties are allowed to eliminate arbitrators in the first place. Here we examine whether arbitrators display a systematic bias in awarding claims. Using data on repeated arbitrator interactions and case characteristics, we develop a measure of arbitrator slant/bias, i.e. how "industry friendly" (i.e., respondent friendly) an arbitrator is.

IV.A Arbitrator Bias

To construct our measure of industry friendliness, we first estimate a model of the awards granted as a function of observable case characteristics, and, critically, the identity of the arbitrator:

$$Pct\_Awarded_{ijklt} = \beta X_i + \mu_j + \mu_k + \mu_l + \mu_t + \epsilon_{ijklt} \tag{1}$$

The dependent variable $Pct\_Awarded_{ijkt}$ reflects the amount awarded relative to damages requested for a particular case. Observations are at arbitrator by case level. Here i indexes the arbitration case, j indexes the financial advisory firm involved in the case, k indexes the county the adviser operates in, l indexes the arbitrator, and t indexes time. The object of interest are arbitrator fixed effects, μ_l, which measure whether an arbitrator, conditional on case characteristics as well as county, firm and time fixed effects, awards higher claims to consumers than other arbitrators. An arbitrator is more industry friendly than other arbitrators, if this estimate is lower. This measure is relative: we do not measure whether arbitrators awarded too much or too little relative to some "correct" amount. We only measure if arbitrators awarded too much or too little relative to other arbitrators. In Section VI.B we use a model to estimate the underlying beliefs of arbitrators to obtain the "correct" benchmark.

To obtain a better estimate of arbitrator bias, we condition on case characteristics. The vector X_i reflects a set of case level characteristics, which we we described in more detail in the previous section. In addition, we control for adviser's experience, the six most popular qualifications, the adviser's total number of qualifications, and any past record of misconduct. We also control for the 11 different allegations and six different financial products covered in the case and the complexity of the case as measured by length of the case in sentences and words. These extensive covariates control for potential differences in cases on the type of claim that is arbitrated, which will be captured in allegations; moreover, adviser qualifications further narrow the potential set of claims which can be arbitrated in a given case. Financial adviser misconduct predicts future misconduct to a larger degree than other observable adviser (or firms) characteristics (Egan, Matvos, and Seru, 2017). We therefore condition on advisers' past misconduct and experience to account for the potential merit of the claim. We also include time, county, and firm employing the adviser fixed effects. County fixed effects control for possible geographic differences in claims. These can arise because of differing local regulations and/or local supply and demand conditions for financial services. Time fixed effects help account for aggregate differences in claims. Finally, we also include firm employing the adviser fixed effects. While controlling for firm fixed effects may be excessive, it accounts for possible heterogeneity in claims due to some firms specializing in activities which are more susceptible to arbitration.

Table 2 displays the corresponding estimates. Overall, the results suggest that our observable arbitrator, adviser, and case characteristics explain a fair amount of the variation in awards. Even without the knowledge of the arbitrator (i.e. no arbitrator fixed effects), our controls account for 37% percent of the variation in awards (column 3). For example, cases involving options have 9-13 percentage points (pp) lower awards on average. Conversely, cases involving fee and commission related allegations have 7-11pp higher awards. Arbitration involving advisers with prior misconduct generally have larger awards, consistent with the notion that past offenses are good predictors of future misconduct.

The estimates in Table 2 column (4) confirm that arbitrators differ in their degree in industry friendless. Including arbitrator fixed effects explains a substantial additional amount of variation in awards. The R^2 (Adjusted R^2) increases from 37% (31%) to 62% (41%) once we include arbitrator fixed effects. The differences among arbitrators are statistically significant: the F-test implies that they are jointly significant at 1%. In other words, who the arbitrator is plays a significant role in determining arbitration awards.

To evaluate the economic importance of arbitrator differences in determining arbitration awards, we have to consider the distribution of arbitrator bias. Because individual arbitrator fixed effects are estimated with noise, the estimated differences among arbitrators will be larger than the true underlying differences between them. As is common in the education and labor literature (e.g., Jacob and Lefgren, 2008; Kane and Staiger, 2008; and Chettty, Friedman, and Rockhoff, 2014) we shrink the estimated distribution of arbitrator bias to match the true distribution of arbitrator bias. We construct empirical Bayes estimates of arbitrator bias by simply re-scaling the estimated distribution of arbitrator fixed effects from column (4) of Table 2.[19] The estimated scaling factor suggests that actual differences across arbitrators accounts for about 33% of the variation in distribution of OLS estimated fixed effects. We plot the distribution of estimated fixed effects in Figure 2b. We normalize the mean of fixed effects to match the average percent granted in the data, 51%. Therefore, arbitrators with a fixed effect below 51% are on average more industry friendly than other arbitrators. Although the variation in the empirical Bayes estimated fixed effects is smaller than the variation in OLS estimated fixed effects, the results indicate substantial differences across arbitrators. The standard deviation of empirical Bayes estimated fixed effects is 12pp. In other words, the estimates suggest that if a one standard deviation more industry friendly arbitrator is chosen to arbitrate the case, the damages awarded to the consumer will be 12pp smaller, holding other attributes of the case fixed. Given that the median damages requested are roughly $175,000, the consumer would be awarded $21,000 less. Overall, our results are consistent with the idea that the choice of arbitrator can have a meaningful impact on case outcomes.

IV.B Arbitrator Selection

The choice of arbitrator plays a significant role in arbitration outcomes and does so in a systematic way: some arbitrators are relatively more friendly to the respondents, while others are more friendly to claimants. The idea behind the striking and ranking of arbitrators is that even though arbitrators are biased, the parties can reduce the bias by eliminating arbitrators most biased against their side. Here, we test whether firms or consumers are better at choosing arbitrators by eliminating those biased against them. Recall that the list from which arbitrators are selected is randomly generated. If both sides were equally good at eliminating arbitrators, then neither side would have an advantage, and an arbitrators' bias towards a specific side would not help them be selected. Alternatively, if firms are better at eliminating unfriendly arbitrators than consumers, then, on average, industry friendly arbitrators would be more likely to be chosen. Below we show that the latter is indeed the case, and that industry friendly arbitrators are more likely to be selected.

We begin with several simple cuts of the data. Figure 3 displays the relationship between an arbitrator's estimated bias (fixed effect obtained from column (4) of Table 2) and the number of times she is selected to arbitrate. We document a negative and significant relationship between an arbitrator's bias and the number of times an arbitrator was selected. In other words, arbitrators, who award larger damages to consumers, given case characteristics, are less likely to be selected–this is despite their chances of making it on the list being random. These results therefore suggest that consumer friendly arbitrators face higher chances of elimination than industry friendly arbitrators.

[19] We shrink the estimated distribution of fixed effects by the factor α, which is estimated from the data. Under the assumption that the variance of the estimation error is homoskedastic, the appropriate scaling factor is $\alpha = \frac{F-1-\frac{2}{k-1}}{F}$, where F is the F-test statistic corresponding to the a joint test of the statistical significance of the fixed effects and k is the number of fixed effects (Cassella, 1992).

We next examine an arbitrators *first ruling in her career*, and see her future prospects of being selected for arbitration. The first award is likely the most salient ruling from which the parties update most on the arbitrators type. Figure 4a displays the distribution of arbitration awards granted relative to what was requested for the first case an arbitrator oversees.[20] We compare the awards of arbitrators, who are subsequently never selected to arbitrate again (one career ruling) to those who are chosen to arbitrate again. The distribution of the former stochastically dominates the latter. In other words, the higher the award to the customer on the first ruling, the lower the chance of ever arbitrating again. These simple results suggest that firms are better at eliminating industry unfriendly arbitrators during the selection process, which results in more industry friendly arbitrators to be selected on average.

Building on the results from Section IV.A, we use the estimated arbitrator fixed effects as a measure of their consumer/industry friendliness. The fixed effects are estimated from awards, so a higher fixed effect implies a relatively more customer friendly arbitrator. To account for noise in the measurement of these fixed effects, we use the empirical Bayes estimates of arbitrator bias μ^{EB} as described in Section IV.A. Since the adjustment only re-scales the fixed effects, it aids in interpreting the magnitudes, but does not affect the regression estimates otherwise. Arbitrators who are more customer friendly are chosen to arbitrate less often than their industry friendly counterparts.

More formally, we examine how an arbitrator's estimated bias $\widehat{\mu_l^{EB}}$ impacts her probability of being selected in the a given year using the following linear probability model.

$$Selected_{lkt} = \beta X_{lt} + \gamma \widehat{\mu_l^{EB}} + \delta_t + \delta_k + \eta_{lkt} \tag{2}$$

Our observations are at the arbitrator by year level. *Selected* is a dummy variable that indicates whether or not arbitrator l was selected for a case in year t. The key independent variable of interest is the arbitrator's bias $\widehat{\mu_l^{EB}}$. The term X_{lt} is a vector of arbitrator controls that include the number of years he/she has been active in the industry, number of cases in the data set he/she has overseen, whether or not he/she worked as a financial adviser. In the most saturated specification we include year fixed effects δ_t and county fixed effects corresponding to the past case the arbitrator worked on δ_k. Our sample represents an unbalanced panel of arbitrators over the period 1988-2015.[21]

Table 3 displays the corresponding estimation results. In each specification, we estimate a negative and significant relationship between an arbitrator's bias $\widehat{\mu_l^{EB}}$and the probability an arbitrator is selected. Recall that a greater bias ($\widehat{\mu_l^{EB}}$) implies that the arbitrator was more consumer friendly and less industry friendly. The results suggest that arbitrators that are more consumer friendly are less likely to be selected to arbitrate a case from a panel of randomly generated arbitrators. The results are stable across specifications–if anything, adding controls increases the bias coefficient.

[20] We residualize the awards with respect to observable characteristics as in eq. 1, omitting arbitrator fixed effects. The residualized award is $\epsilon_{ijklt} = Pct\_Awarded_{ijklt} - \left(\hat{\beta} X_{it} + \widehat{\mu_j} + \widehat{\mu_k} + \widehat{\mu_t}\right)$

[21] An arbitrator enters the data set as soon as she oversees her first case and remains in the data set until 2015. We control for number of years he/she's been active in the industry, number of cases in the data set he/she has overseen to adjust different attrition rates among arbitrators. In Appendix C we replicate our main findings where we assume that an arbitrator remains in the arbitration pool for at most five years after her last arbitration case.

The average probability that an arbitrator is selected in a given year is 7%. Since the variables are normalized, the estimate in column (3) indicates that a one standard deviation increase in an arbitrator's industry friendliness is associated with a roughly 16% (1.12pp) increase in the probability of being selected in a given year.

These estimates suggest that industry friendly arbitrator selection has a meaningful impact on eventual awards. To see this, we first present Figure 4b that displays how the selection mechanism impacts the distribution of arbitrators appointed to cases. The black line plots the distribution of arbitrator bias if arbitrators were randomly assigned to cases. In other words, the black line plots the unconditional distribution of empirical Bayes arbitrator fixed effects (μ^{EB}) where each arbitrator is given equal weight. The gray dashed line plots the conditional distribution of arbitrator bias among arbitrators selected to arbitrate on cases. Specifically, the gray dashed line plots the conditional distribution of empirical Bayes arbitrator fixed effects, where we weight each arbitrator fixed effect by the probability that the arbitrator is selected in a given year based on her underlying bias. We calculate the probability that an arbitrator is selected in a given year according to the regression estimates reported in column (3) of Table 3. Because arbitrators that are more industry friendly (i.e. have a lower fixed effects) are more likely to be selected, the mass of the conditional/selected distribution shifts to the left relative to the unconditional distribution. The figure therefore displays how the arbitrator selection mechanism results in lower awards. The average arbitrator bias among the conditional distribution of selected arbitrators is 2.2pp lower than the average bias among the unconditional distribution of arbitrators. Put differently, the selection mechanisms results in awards that are roughly 2.2pp lower than if arbitrators were randomly assigned to cases. Given that the median (mean) award is 32% (51%), this represents an 7% (4%) decrease in in awards to consumers. In dollar terms, this represents a \$3,850 decrease in award for the median requested claim, or a \$17,270 decrease in award for the mean requested claim.

IV.C Mechanism

We find that consumer friendly arbitrators are less likely to be selected into arbitration. In this section we delve deeper into the mechanism that gives firms the advantage in arbitrator selection. Because arbitrators are selected through an elimination process, these results suggest that firms are better at eliminating arbitrators who are biased against the industry. If this is the case, then reducing the number of arbitrators that parties can eliminate should reduce firms' advantage. We exploit a 2007 rule changes in the arbitrator selection process, which reduced the number of arbitrators that could be eliminated by either party to test this conjecture. Second, we investigate why firms are better at selecting arbitrators. A popular explanation is that firms are more sophisticated and experienced in arbitration, providing them with an advantage in arbitration (see, Nichols, 1999; Gross, 2010; Barr, 2015; Silver-Greenberg and Gebeloff 2015). We show evidence consistent with the idea that sophisticated parties choose advisers who are more favorable to them.

IV.C.1 2007 Reform: Changing the Number of Strikes

As we describe in Section II.B.1 in 2007, the rules governing the selection of arbitrators were updated. Prior to 2007 the parties could eliminate an unlimited number of arbitrators from the list. Post 2007, the number of arbitrators each party could strike was limited to four. If firms' advantage comes from eliminating unfriendly advisers, the 2007 reform should have reduced this advantage. In other words, an industry friendly arbitrator's chance of being selected should decline post reform. We test this by re-estimating the arbitrator selection linear probability model (eq. 2), but allow the relationship between an arbitrator's bias and selection probability to vary around the time period of the rule change. Specifically, we estimate the following linear probability model

$$\begin{aligned} Selected_{ljkt} = &\gamma \widehat{\mu_l^{EB}} \\ &+ \gamma_{t\geq 2008}\widehat{\mu_l^{EB}} \times \mathcal{I}_{t\geq 2008} \\ &+ \beta X_{lt} + \delta_t + \delta_k + \eta_{ljkt} \end{aligned} \tag{3}$$

in which $\mathcal{I}$ is an indicator variable designating a time period. The coefficients of interest are γ and $\gamma_{t\geq 2008}$, which measure the relationship between an arbitrator's bias and her probability of being selected as an arbitrator. In particular, the coefficient on the interaction term, $\gamma_{t\geq 2008}$, measures how the relationship between an arbitrator's bias and her probability of being selected changed after the 2007 rule change. As before, X_{lt} is a vector of arbitrator controls that include the number of years she's been active in the industry, number of cases in the data set he/she has overseen, whether or not he/she worked as a financial adviser. In the most saturated specification we include year fixed effects (δ_t) and county fixed effects (δ_k) corresponding to the location of the past case the arbitrator worked on.

The estimates in Table 4 show that the rule change significantly decreased the probability that industry friendly arbitrators are selected. Prior to the rule change, an unlimited number of arbitrators could be eliminated from the list. During that period, a one standard deviation increase in arbitrator's consumer friendliness decreased their probability of being selected by approximately 1.80pp (column 3). This represents an 26% decrease in the probability of being selected. After the FINRA reform of 2007, the number of strikes decreased to 4. During the post reform period, the same increase in arbitrator's consumer friendliness represented a 0.45pp=(1.80-1.35) decrease in the probability of being selected (column 3). In other words, the benefit of pro-industry bias decreased dramatically, by almost 75%, following the reform.

IV.C.2 Firm and Client Sophistication

We find that, on average, firms are better at selecting arbitrators than consumers. We now provide more direct evidence that parties which are more experienced in arbitration are better informed about which arbitrators to eliminate. We do so by more directly measuring whether parties are well informed about arbitration. On the firm side, we proxy for the sophistication of firms based on the number of arbitration cases the firm has been involved in. Presumably being involved in an arbitration case is informative about arbitrators specifically, but also about which information to acquire in future arbitrations, the importance of selecting arbitrators, and which attorneys to hire to help with selecting arbitrators. While we argue that firms are generally the better informed party, consumers can also become informed by hiring attorneys who specialize in securities arbitration (PIABA attorneys). As noted earlier, consumers are represented by PIABA attorneys in roughly 7% of the observations in our database. We now exploit this variation in our analysis

We examine the bias of the arbitrator k selected to case i as function of firm and consumer sophistication

$$Arbitrator\_Bias_{il} = \phi_1 No\,Laywer_i + \phi_2 PIABA_i + \phi_3 Firm\_Experience_i + \varepsilon_{il} \tag{4}$$

where No_Lawyer_i indicates whether the customer in case i used a attorney, $PIABA$ indicates whether the customer used a PIABA attorney, and $Firm\_Experience$ indicates whether the firm has above median arbitration case experience in terms of number of arbitration cases a firm is involved in. The dependent variable $Aribtrator\_Bias_{il}$ measures the bias of the arbitrator l selected for case i. We measure arbitrator bias using the arbitrator fixed effects estimated in eq. (1). Because some cases involve more than one arbitrator, observations in eq. (4) are at the case by arbitrator level.

Table 5 displays the corresponding estimates. In each specification we measure a positive and significant relationship between whether the consumer used a PIABA attorney and the bias of the arbitrator selected for the case. The results suggest that in cases where consumers use a PIABA attorney, consumers select arbitrators that give out 4-5pp higher awards on average relative to the amount requested.[22] Conversely, we find evidence that self-represented consumers select arbitrators that give out 2-3pp lower awards on average. On the firm side, we find that firms that are more experienced in arbitration select arbitrators that are more industry friendly. The results in column (5) indicate that firms with above median experience select arbitrators that tend to give out 2.42pp lower awards relative to the amount requested. Consumers with attorneys who are more experienced in arbitration and firms with more experience in arbitration tend to select arbitrators who are more favorable to them. In other words, parties expertise in arbitration allows them to select more favorable arbitrators. More broadly, these results are consistent with the notion that the advantage that firms hold over consumers in selecting arbitrators is due to their superior information about arbitration.

[22] An interesting question that arises is why so many consumers choose non-PIABA attorneys. One could argue that knowing that there are attorneys who specialize in securities arbitration already requires a high level of information / sophistication from consumers. In other words, the reasons why these consumers do not choose a specialized attorney might be similar to ones due to which they need a specialized attorney in the first place.

IV.D Robustness

We find that arbitrators who are more industry friendly are more likely to be selected in the future. One potential concern with our analysis is that there may be some omitted case characteristic that is both correlated with the number of times an arbitrator is selected and with case outcomes. For example, suppose an arbitrator specializes in variable annuity cases and variable annuity cases are relatively common and tend to have lower associated awards. If we do not appropriately account for the type of case, omitted case characteristics, such as variable annuity case type in the example, could potentially drive our results. Recall that we control for a plethora of case and respondent characteristics when we construct our measure of arbitrator bias such as the product involved and allegations, as well as the responding adviser's qualifications/licenses, experience, and past misconduct. Moreover, the fact that the advantage of industry friendly arbitrators declines after the 2007 reform and that firms' and lawyers' experience in arbitration process play a role in arbitrator selection also cast doubt on the alternative that omitted characteristics are driving our results. Nevertheless, we examine this concern by exploring whether more experienced arbitrators are selected to different types of cases.

Here we regress the selected arbitrator's level of experience on observable case characteristics:

$$Experience_{ijklt} = \beta X_{jt} + \mu_l + \mu_t + \epsilon_{ijklt} \tag{5}$$

The dependent variable $Experience_{ijklmt}$ measures the total number of cases an arbitrator has previously overseen as of time t. Here i indexes the arbitration case, j indexes the financial advisory firm involved in the case, k indexes the county the adviser operates in, l indexes the arbitrator, and t indexes time. Observations are at the case by arbitrator level. We control for the observable case characteristics in X_{jt} as well as county fixed effects corresponding to the offending adviser's office location and time fixed effects. We also control for the arbitrators' tenure as an arbitrator as measured as the years since she oversaw her first case.

Column (1) of Table 6 displays the relationship between the experience of the arbitrator selected for a case and case observables (5). In general, we find little relationship between case observables and the experience of the arbitrator selected for the case. We find a statistically significant relationship between three of the observed case characteristics and the selected arbitrator's level of experience. Even if case characteristics were completely orthogonal to the selected arbitrator's level experience, there is roughly 60% chance ($= 1 - (0.9)^{19} - 19 \times (1 - 0.9)^{18} \times .1$) we would find two or more statistically significant coefficients. We find that cases involving unauthorized activity and omission of key facts tend to have less experienced arbitrators, but the effects are modest. The results in column (1) indicate that arbitrators appointed to cases involving "Unauthorized Activity" have -0.10 less case experience on average. In column (2), we report the relationship between awards granted and case observables corresponding to eq. (1). None of the observable characteristics that are significantly negatively associated with arbitrator experience are associated with significantly higher awards. Although we cannot rule out some sort of selection on unobservables, these results suggest that there is little such evidence.

In addition, one could argue that there is a look-ahead bias in how $\widehat{\mu_l^{EB}}$ is constructed, since we use the full sample arbitration outcomes rather than just the information available up to time t. In Appendix A, we replicate our analysis using a backwards looking measure of arbitrator bias that is constructed using only information available up to time t. As can be observed, our main inferences on arbitrator selection are unchanged.

V A Model of Arbitrator Selection

Our empirical analysis reveals that there are substantial differences between arbitrators in how industry or consumer friendly they are. Consumer friendly arbitrators are less likely to be selected for arbitration. Here, we develop a stylized model of consumer arbitration which is informed by our empirical findings and the institutional details laid out in Section II. The model has several related purposes.

First, the model highlights how arbitration outcomes change when one party holds an informational advantage in selecting arbitrators. In particular, the model illustrates that competition between arbitrators can in principle be a desirable property of the arbitrator selection system when both parties are equally informed, but can lead to biased outcomes when one party holds an informational advantage. Second, we use the model to evaluate several different proposed changes to the arbitrator selection system, and show that they may not achieve the desired outcome once one accounts for the informational advantage of firms. Third, while the model is designed to be as simple as possible to generate transparency, it is nevertheless rich enough to replicate the patterns in the data. We therefore estimate/calibrate the model, which allows us to assess the quantitative impact that the informational advantage of firms has on arbitration outcomes in equilibrium. Finally, while we apply the model to securities arbitration, its features are equally applicable to consumer arbitration proceedings more generally and other arbitrator selection mechanisms as discussed in Section VII.

V.A Set Up

The consumer (claimant) and firm (respondent) are arbitrating a claim that will be overseen by one of the available arbitrators who determines the award. The timing is as follows. First, arbitrators choose how industry or consumer friendly they are going to be: they commit to how they will award a case to the participants. Second, following the institutional design for arbitrator selection, a list of arbitrators is randomly chosen from the pool of all available arbitrators. The consumer and firm can strike a limited number of arbitrators from the list. Among the remaining arbitrators, one is selected randomly. Lastly, the selected arbitrator is paid a fee for arbitrating the case, and awards are paid to the parties. Below, we describe the incentives and information structure of the problem in more detail.

V.A.1 Consumer Claimants, Firm Respondents, and Arbitrators

Consumers and Firms: The award is the share of the requested damages $a_G \epsilon [0, 1]$ that is granted to the consumer. Since the award is just a transfer from the firm to the consumer, it is a zero sum game. We denote the payoff to the consumer claimant as $U_C = a_G$ and the payoff to the firm respondent as $U_R = -a_G$. For simplicity of exposition, we assume both parties are risk neutral. Risk aversion does not change the parties strategies for selecting arbitrators, but does change the trade-off between different arbitrator selection mechanisms as we discuss in Section VI.C.

Arbitrators: Arbitrators trade-off monetary incentives from being selected on a case with the psychological costs of departing from what they consider a "fair" award. This allows us to nest the extreme cases of arbitrators who are purely motivated by monetary incentives, as well as arbitrators being only motivated by fairness concerns. As we discuss below, both features are important in order to capture arbitrator behavior in the data.

Arbitrators earn a fee f if they are selected to arbitrate a case. The probability that a given arbitrator i will be selected depends on the party's expectation of the award a_i, the arbitrator's "slant." For simplicity, we assume that arbitrators can pre-commit to what they would award for a case a_i before being selected on the panel. The idea is that, just as in the data, arbitrators can choose their slant, i.e. how industry friendly they want to be. Instead of modeling the reputation building process, which is not the focus of this paper, we assume that arbitrators can choose their slant before even arbitrating a case. To keep the notation simple, we assume that the arbitrator's slant directly commits them to an award, rather than a type with some uncertainly surrounding the award, which would not alter the analysis.

Conditional on the observable case characteristics, each arbitrator has an inherent belief or type $b_i \epsilon [0, 1]$ regarding the fair award for the arbitration case that characterizes the arbitrator.[23] We can think of these beliefs as innate characteristics that arbitrators bring to the case. These could be formed based on their prior work experience, education, upbringing, or personal interaction with the industry. For example, based on her work experience as an insurance agent in the fraud department, an arbitrator may believe that investors frequently file baseless claims resulting in a low b_i. Alternatively, an arbitrator who had a bad experience with their home mortgage may believe that the financial industry is frequently in the business of taking advantage of consumers, having a high b_i. The distribution of beliefs among arbitrators in the population is $F(\cdot)$; the density $f(\cdot) = F'(\cdot)$ is continuous and strictly positive everywhere. For ease of exposition we assume that the fair ruling is in the middle of the unconditional arbitrator distribution, so that the average and median belief is 0.50, so $E[b] = 0.5$ and $F(0.5) = 0.5$. We can think of the the distribution of inherent beliefs as the distribution of awards that would arise if arbitrators were selected to the cases randomly, with no input from the parties in the case.

Arbitrators can have a sense of fairness. When their decisions depart from their beliefs of fair

[23] The idea that arbitrators have an inherent notion of a "fair" outcome goes back to early models of arbitration (Crawford, 1979; Farber 1979, 1980; Farber and Katz, 1979; Ashenfelter and Bloom 1984; De Clippel et al., 2014)

award, $a_i \neq b_i$, their suffer a disutility of $\theta\left|a_i - b_i\right|$. The parameter θ measures the weight that an arbitrator places on fairness relative to the monetary payoffs from arbitration. A lower θ implies that arbitrators care more about monetary payoffs. In the extreme case that arbitrators only care about monetary payoffs, $\theta = 0$. As $\theta \to \infty$ arbitrators are only motivated by their fairness beliefs, and do not respond to monetary incentives– i.e., $a_i = b_i$ so an arbitrators slant just represents their underlying beliefs.

Let $G(\cdot)$ be the equilibrium distribution of arbitrators' chosen slant, and denote the equilibrium probability that an arbitrator with slant a_i is chosen as $\Gamma\left(a_i, G(\cdot)\right)$. As we show later, an arbitrator's probability of being chosen depends on her slant, as well the slant of other arbitrators in the pool. An arbitrator's expected utility depends on her expected probability of being selected on the case, Γ, the fee she earns from arbitrating, f, and the award she grants relative to her beliefs:

$$U(b_i, a_i) = \Gamma\left(a_i, G(\cdot)\right)\left(f - \theta|a_i - b_i|\right) \tag{6}$$

Differences in Sophistication: When selecting arbitrators, a μ_C share of consumers and μ_R share of firms are well informed: they recognize arbitrators' slants and can therefore predict their awards when choosing among them. We think of these parties as experienced or more financially sophisticated, possibly having participated in other arbitrations in the past. The rest of consumers and firms are uninformed and do not observe/anticipate how a given arbitrator will award a case. For ease of exposition, we analyze two cases: the benchmark case in which both parties are fully informed, $\mu_C = \mu_R = 1$, and the case in which only firms are informed, $\mu_C = 0$, $\mu_R = 1$.

V.A.2 Arbitration Selection Process and Uninformed Consumers

N risk neutral arbitrators are randomly drawn from the population of arbitrators $A = \{a_1, a_2, ..., a_N\}$ and the "list" is presented to the parties. Both the consumer and firm simultaneously submit k arbitrators to be struck from the list of available arbitrators, where $k < \frac{N}{2}$. Among the remaining arbitrators, one is chosen randomly. The chosen arbitrator j grants the award according to their chosen slant $a_G = a_j$.

V.A.3 Equilibrium Definition

We study a pure monotone strategy symmetric Bayesian Nash equilibrium. The equilibrium is characterized by the optimal behavior of consumers, firms, and arbitrators. Firms and consumers optimally strike arbitrators from the arbitration pool to maximize their utility given the set of arbitrator A, and holding the strategy of the opposing party fixed. Arbitrators maximize their expected utility (eq. 6) by choosing their slant and taking the strategies of firms, consumers, and other arbitrators in the pool as given.

V.B Equilibrium: Arbitrator Selection, Bias, and Arbitration Outcomes

Here we illustrate two related advantages that informed parties hold over uninformed parities. First, given a population of arbitrators, consumers and firms influence the outcome by eliminating arbitrators from the pool. In other words, if firms are better informed than the consumers, they can choose more favorable arbitrators. Second, arbitrators compete to be selected to the arbitration panel. We show how this competition can be beneficial when both parties are equally informed, but when only one party is informed, arbitrators have incentives to slant the awards they grant in the favor of the informed party. We highlight how the competition among arbitrators leads to a biased distribution of arbitration outcomes.

V.B.1 Litigant Sophistication, and Arbitrator Selection from a Fixed Pool

We first analyze which arbitrators are selected by consumers and firms, taking arbitrator equilibrium slant, $G(\cdot)$, as given. Let $A = \{a_1, ..., a_N\}$ denote the list of arbitrators randomly drawn from the population. Without any loss in generality, arbitrators are indexed such that the most industry friendly arbitrator who grants the lowest awards is indexed by 1 and the least industry friendly arbitrator who grants the highest awards is indexed by n such that $a_1 < a_2 < ... < a_n$.

The incentives of firms and consumers are straightforward. An informed firm will find it optimal to always strike the arbitrators with the k highest (most consumer friendly) slant, and an informed consumer will find it optimal to strike the arbitrators with the k lowest (most industry friendly) slant. By contrast, uniformed firms and consumer both randomly strike k arbitrators. An arbitrator is randomly selected from the pool of eligible (non-striken) arbitrators. Then the equilibrium probability that an arbitrator with slant a_i will be selected on the panel, given the distribution of other arbitrator slant in the population is:

$$\begin{aligned}\Gamma(a, G(.)) = \quad & \underbrace{\frac{1}{N}(1-\mu_C)(1-\mu_R)}_{\text{Prob Selected: No informed parties}} \\ & + \underbrace{\mu_C(1-\mu_R)\frac{1}{N-k}P(a_i; k+1, n, n)}_{\text{Prob Selected: Informed Consumer}} \\ & + \underbrace{\mu_R(1-\mu_C)\frac{1}{N-k}P(a_i; 1, n-k, n)}_{\text{Prob Selected: Informed Firm}} \\ & + \underbrace{\mu_C\mu_R\frac{1}{N-2k}P(a_i; k+1, n-k, n)}_{\text{Prob Selected: Both Informed}}\end{aligned} \tag{7}$$

where the $P(a_i; l, m, n)$[24] denotes the probability that the arbitrator is between the $l'th$ and $m'th$ order statistics among a sample of n arbitrators.

[24] $P(a_i; l, m, n) = \sum_{j=l}^{m} \frac{(n-1)!}{(j-1)!(n-j)!} G(a_i)^{j-1}(1-G(a_i))^{n-j}$

This expression highlights the role that different information structures play in the selection of arbitrators for a given arbitrator pool. If both parties are informed, then the arbitrators in either tail of the distribution face elimination. Decreasing the number of strikes, k, does not affect the resulting bias of the outcome, but results in a median preserving spread of the distribution of awards.

Instead, suppose only firms are informed. Then the most consumer friendly arbitrators are eliminated. For a given arbitrator pool, a smaller informational advantage, i.e. a smaller share of informed firms, μ_P will lead to a more consumer friendly arbitrator being selected in expectation. These results are consistent with the idea that more experienced firms and consumers with expert advice choose more friendly arbitrators, as we illustrate in Section IV.C.2. It is straightforward to show the informational advantage of firms is diminished as the number of strikes increases, consistent with the results from the 2007 reform. On the other hand, an increase in the size of the arbitration list from which arbitrators are struck works in an opposite manner . Since the proposed reform of the arbitration system by FINRA proposes both increasing the size of the list, as well as the number of strikes, these two features work in opposite directions from the perspective of expected arbitration outcomes. This discussion illustrates that assuming that parties in arbitration are equally informed has important consequences on how we think about the design of the arbitration system and the corresponding arbitration outcomes.

V.B.2 Choice of Slant

Our discussion above holds the distribution of arbitrator slant fixed. In other words, it does not account for arbitrators' incentives to be selected on the panel. Arbitrators, however, can choose how they rule on cases and can therefore choose how consumer or industry friendly they want to be. Broadly, we want to understand whether competition among arbitrators reduces or increases the bias in arbitration awards. We show that competition among arbitrators can be desirable if both parties are equally informed, and exacerbate bias in the presence of an information gap.

When arbitrators choose slant, they trade off two forces. On the one hand, they want to be selected on the arbitration panel (increase $\Gamma(a_i, G(\cdot))$) to earn the arbitration fee f. To do so, they want to choose a slant which will minimize their chance of being struck from the arbitrator panel by an informed firm or a consumer. This probability is determined by their slant *relative* to other arbitrators. However, choosing awards that depart from their convictions, $a_i - b_i$, causes disutility. Arbitrator i with inherent belief b_i chooses slant a_i to maximize her expected utility given the choices of other arbitrators:

$$max_{a_i} \Gamma(a_i, G(\cdot)) \left(f - \theta \left|a_i - b_i\right|\right) \tag{8}$$

We look for an equilibrium in which arbitrators with more arbitrator friendly beliefs choose a more arbitrator friendly slant. For ease of intuition, assume that $\Gamma(a_i; G(\cdot))$ is differentiable. The corresponding first order condition can be written as:

$$|a_i - b_i| = \frac{f}{\theta} - sgn(a_i - b_i) \times \frac{\Gamma\left(a_i; G\left(\cdot\right)\right)}{\gamma\left(a_i; G\left(\cdot\right)\right)}\, \forall a_i \neq b_i \tag{9}$$

where $\gamma(a_i; G(\cdot) = \frac{\partial \Gamma(a_i;G(\cdot))}{\partial a}$. This is an arbitrator's choice of slant, given other arbitrators' choices in equilibrium–the best response function–and is at the core of our estimation. An arbitrator's choice of slant relative to their underlying beliefs b_i depends on the trade off between the costs and benefits of slant. The term $\frac{\Gamma(a_i;G(\cdot))}{\gamma(a_i;G(\cdot))}$ measures the inverse of the relative change in the probability of being selected for a marginal change in arbitrator's slant, holding other arbitrators' slant choices fixed, and the term $\frac{f}{\theta}$ is the fee that the arbitrator earns in utility terms.

In the empirical setting we study, the firms are frequently large institutions which engage in arbitration repeatedly, so we assume that they are the more informed party, while consumers are uninformed ($\mu_R = 1$, $\mu_C = 0$). Since firms are informed, they eliminate the most customer friendly arbitrators from the pool. This shifts the distribution of awards granted, $\tilde{G}(\cdot)$, to be more firm friendly than the pool of arbitrators, $G(\cdot)$. Because arbitrators most friendly to the consumer are eliminated from the pool, arbitrators have the incentive to be more firm friendly than other arbitrators to avoid elimination. If only the firm is informed, the probability an arbitrator is selected corresponds to the probability her slant is one of $n-k$ lowest order statistics. The probability an arbitrator is selected is therefore decreasing in her slant a, $\gamma(a, G(\cdot)) < 0$. This implies that $a_i \leq b_i$. In this case, the choice in slant is simply:

$$a_i = \min\left\{b_i - \frac{f}{\theta} - \frac{\Gamma\left(a_i; G\left(\cdot\right)\right)}{\gamma\left(a_i; G\left(\cdot\right)\right)}, b_i\right\}$$

Therefore, all arbitrators shade their slant to be more industry friendly than their underlying belief, $a_i < b_i$, as long as $\frac{f}{\theta} + \frac{\Gamma(a_i;G(\cdot))}{\gamma(a_i;G(\cdot))} > 0$ and will simply award $a_i = b_i$ if the marginal benefit of slanting their award is less than the marginal cost when $a_i = b_i$ such that $\frac{f}{\theta} + \frac{\Gamma(b_i;G(\cdot))}{\gamma(b_i;G(\cdot))} \leq 0$.

We can express the distribution of equilibrium probabilities as a function of the equilibrium distribution of slant:

$$a_i = \min\left\{b_i - \frac{f}{\theta} - \sum_{j=1}^{n-k} \binom{n-1}{j-1} \frac{(n-1)!}{(j-1)!(n-j)!} \frac{G(a_i)(1-G(a_i)}{g(a_i)\left(j-1-(n-1)G(a_i)\right)}, b_i\right\}$$

This equation is at the center of our estimation approach in Section VI. Furthermore, since the equilibrium is symmetric and strategies are monotonic, we can compute a closed form expression for the equilibrium distribution of arbitrator slant as a function of model primitives: the distribution of beliefs, the size of the list from which arbitrators are chosen, and the number of strikes from the list (see Appendix B for the complete derivation):

$$a_i = \min\left\{b_i - \frac{f}{\theta} + \frac{\int_{b_i}^{\bar{b}} \Gamma(\tilde{b}, F(\cdot)) d\tilde{b}}{\Gamma(b, F(\cdot))}, b_i\right\} \tag{10}$$

This expression clearly illustrates that the equilibrium distribution of arbitrator slant is more industry friendly than the underlying distribution of arbitrators' true beliefs when only firms are informed. We use the closed form expression (10) when computing counterfactual equilibria. Instead of analytically deriving the properties of equilibrium slant, we study the properties of changing incentives f, the number of strikes, k, and the size of the arbitrator slate size n in Sec VI.D quantitatively, after we estimate the model. This allows us to closely link the model with actual policy proposals that have been put forth in the past.

In the Appendix we also solve for the equilibrium distribution of arbitrator slant when both parties are fully informed ($\mu_C = \mu_R = 1$). When both parties are informed, arbitrators will find it optimal to slant their awards towards the median belief such that the distribution of slant is a median preserving contraction of the underlying distribution of beliefs. We discuss the model results when both parties are informed further below and in Section VI.D.

V.B.3 Extreme Competition, Unraveling, and the Information Gap

Before we proceed to the quantitative analysis of the model, we illustrate how competition between arbitrators shapes the arbitrator pool. The starkest effects of competition arise in the situation in which arbitrators only care about monetary incentives, $\theta = 0$. In other words, arbitrators' fairness concerns do not temper their desire to compete for the monetary fee. To maximize their monetary payoffs, the arbitrators maximize their chance of being selected to the arbitration panel. We contrast the case in which firms are the informed party, while consumers are uninformed ($\mu_R = 1$, $\mu_C = 0$), with the case in which both parties are informed ($\mu_R = 1$, $\mu_C = 1$).

Informed Firms, Uninformed Consumers, and the Race to the Bottom In this setting the competition among arbitrators results in a race to the bottom: all arbitrators have the most industry friendly arbitrator slant possible $a_i = 0$. To see why, first, imagine that the equilibrum distribution of arbitrators, $G(\cdot)$, is non-degenerate, i.e. features different arbitrator slants. Then there is an arbitrator with the most pro-consumer slant, $\bar{a}$. This arbitrator will be eliminated for sure by the informed firm, so she will never be selected on an arbitration panel. If she instead chooses a slant, which is more industry friendly than that of other arbitrators, then she will be selected for sure if she is on the list, increasing her expected monetary payoff. Since she has no fairness concerns, there is no utility cost to changing her slant, so choosing the most industry friendly slant is clearly a profitable deviation. This suggests that in equilibrium all arbitrators have to be of the same slant $a_i = a$. Because all arbitrators are the same, the probability that an individual arbitrator is chosen is simply $\frac{1}{N}$. Imagine that all arbitrators choose a slant, which is not completely firm friendly $a_i = a > 0$. In this scenario, an arbitrator who deviates to a more firm friendly slant will never be eliminated, thereby increasing the probability of being selected. In equilibrium, all arbitrators want to be more firm friendly than the other arbitrators in order to decrease their chances of being eliminated. This results in a race to the bottom, in which all arbitrators are as firm friendly as possible.

Informed Firms, Informed Consumers, and the Race to the Median One can use the same reasoning to show that if both firms and consumers are informed, in equilibrium all arbitrators have to be of the same slant (Ashenfelter, 1987). In this situation, the arbitrator with the most firm or most industry slant faces certain elimination, so they move away from the extremes of the distribution, converging to the $a_i = 0.5$ median of the belief distribution.[25]This example illustrates the potential benefits of the arbitration selection system.

Discussion A couple of remarks are worth making. First, the information gap between the firm and the consumer does not have to be large in order for the equilibrium to devolve to one where there is a race to the bottom. The same result arises even if a vanishingly small share of firms is informed, $\mu_R > \mu_C$, as long as the number of arbitrators is large enough. An arbitrator always decreases their chances of elimination by being more firm friendly than other arbitrators. This results in extreme competition to be the most firm friendly arbitrator. In other words, without non-monetary motives, even a small information gap causes the competition among arbitrators to unravel .

Second, when arbitrators only want to maximize their monetary payoffs, they all select the same slant in equilibrium, and therefore grant the same awards. If the identity of the arbitrator does not affect arbitration outcomes then arbitrators are statistically exchangeable (Ashenfelter 1987). Interestingly, while arbitrator exchangeability is frequently seen as a sign of fairness (Ashenfelter 1987), this is not the case in our setting. When only the firm is informed, all arbitrators reach the same decision, i.e., are exchangeable. However, this decision is quite "unfair" in that all arbitrators are as industry friendly as possible, $a_i = 0$.

Third, our empirical results reject arbitrator exchangeability in securities arbitration – arbitrator identify does seem to be related to arbitration outcomes. These results show why modeling fundamental differences between arbitrators, i.e. beliefs b_i, is crucial when we take the model to the data; with pure monetary incentives and no differences among arbitrators' preferred outcomes, the model generates arbitrator exchageability.

VI Model Calibration and Policy Analysis

In this section we calibrate the model to better understand the quantitative implications of the arbitrator selection mechanism. Using the calibrated model, we are able to recover the underlying distribution of arbitrator beliefs and assess the degree of bias in arbitration outcomes. In Section VI.D we use this model to study the properties of changing incentives (f), the number of strikes (k), and the size of the initial arbitrator list (n) quantitatively. This allows us to closely link the model with actual policy proposals that have been put forth in the past.

[25]At $\theta = 0$, any slant choice represents an equilibrium $a_i = a$ for any a. Only the equilibrium of $a_i = 0.5$ is the limiting equilibrium as $\theta \to 0$.

VI.A Calibration

We calibrate our arbitrator selection model using the arbitration data set detailed in Section III. We use the observed distribution of arbitration awards to recover the underlying distribution of slant $G(\cdot)$ and the underlying distribution of arbitrator beliefs $F(\cdot)$. The calibration procedure most closely resembles the methodology developed in the auction literature by Guerre, Perrigne, and Vuong (2000). The idea is that an arbitrator's choice of slant in equilibrium is a best response to other arbitrators' choices of slant. From the data, we can measure other arbitrators' equilibrium choices of slant, as we describe below. Consistent with our empirical analysis, we assume that firms are fully informed and that all consumers are uninformed such that $\mu_R = 1$ and $\mu_C = 0$. Given the other arbitrators' equilibrium choice of slant, we can infer an arbitrator's true beliefs from her own choice of slant a_i as follows:

$$\begin{aligned} b_i &= \max\left\{a_i + \frac{f}{\theta} + \frac{\Gamma\left(a_i; G\left(\cdot\right)\right)}{\gamma\left(a_i; G\left(\cdot\right)\right)}, a_i\right\} \\ &= \max\left\{a_i + \frac{f}{\theta} + \sum_{j=1}^{n-k}\binom{n-1}{j-1}\frac{(n-1)!}{(j-1)!(n-j)!}\frac{G(a_i)(1-G(a_i)}{g(a_i)\left(j-1-(n-1)G(a_i)\right)}, a_i\right\} \end{aligned} \tag{11}$$

In order to recover the true beliefs for an arbitrator with award a_i, we need to observe the arbitrator fee, disutility from deviating from ones beliefs θ, which we have to estimate, and the unconditional density and distribution of arbitrator slant $G(\cdot)$ and $g(\cdot)$. We parameterize and estimate the model as follows. First, we set the fee for a case equal to $f = \$725$ which is the maximum fee an arbitrator can make in a single day (FINRA Rule 12214). Second, we estimate the distribution and density of awards nonparametrically in the data. Lastly, we calibrate the parameter θ to match the incentives of arbitrators in the data.

We use the empirical Bayes estimates of arbitrator fixed effects to estimate the equilibrium distribution of slant. The arbitrator fixed effects measure the differences in awards granted across arbitrators conditional on observable case characteristics. In the data, we observe the distribution of slant, conditional on arbitrators being chosen, $\tilde{G}(\cdot)$. The distribution $\tilde{G}(\cdot)$ represents a weighted average of the $n-k$ first order statistics of $G(\cdot)$.[26] To obtain the unconditional distribution of slant, $G(\cdot)$, we proceed in two steps. We first estimate $\tilde{G}(\cdot)$ from the data non-paramterically. Then we use the model to invert into the underlying distribution using the selection behavior of firms:

$$\tilde{G}(a_i) = \sum_{i=k}^{n-1}\left(\sum_{j=n-i}^{n}\frac{n!}{j!(n-j)!}G(a_i)^j(1-G(a_i))^{n-j}\right) \tag{12}$$

numerically solving for $G(\cdot)$. We also need to recover the density of the slant distribution $g(\cdot)$. We estimate $g(\cdot)$ non-parametrically using kernel density estimation where we weight each observation

[26] Recall that arbitrators with the k highest slant a_i are removed from the consideration set. Thus, in the data we observe the distribution of slant a_i conditional on a_i not being one of the k highest order statistics. This is analogous to only observing the winning bid in first price auctions.

by the our estimates of inverse probability of being selected$\frac{1}{\Gamma(\widehat{a, G(\cdot)})}$.

Lastly, we need to calibrate the parameter θ, which reflects the monetary cost of deviating from an arbitrator's true beliefs. Estimating the parameter θ is challenging because it involves understanding if and how much an arbitrator's award deviated from her true beliefs. We calibrate the parameter θ using two methods.

First, we simply regress the total number of cases an arbitrator oversees in her career on her bias ($\widehat{\mu_l^{EB}}$) for those arbitrators with at lease fifteen years experience (above median experience). We examine those arbitrators with at least fifteen years experience to measure the lifetime effects of arbitrator bias on the total number of cases an arbitrator oversees in her career. We find that a 10pp increase in slant is associated with an arbitrator overseeing an additional 1.3 cases or an additional $\$725 \times 1.3 = \$942.5$ in revenue. Consistent with these numbers, if we assume that the average benefit of deviating from one's beliefs is equal to the average cost we have that $\theta = \$942.5/.1 = 9,425$. This estimate implies that arbitrators are willing to deviate from their beliefs by 1pp for an extra \$94.25 increase in income. In other words, suppose the arbitrator believed that a fair award was to simply grant 100% of the amount requested. The arbitrator would be willing to grant an award of 0% in exchange for an extra \$9,425 increase in income.

Second, we use the 2007 rule change as described in Section IV.C.1. Starting in mid 2007, the number of strikes available to firms and consumers decreased from nine to four. We examine how arbitrators responded to the rule change by re-estimating eq. (1) around the rule change. We calibrate the model such that arbitrators increase the awards they grant by 2.5pp when the number of strikes shifts from nine to four. This calibration yields $\theta = 12,000$, which is comparable to our reduced form estimates. In our analysis below, we report the results where we set $\theta = 9,425$ but note that both parameterizations of θ ultimately yield comparable inferences.

VI.B Results: The Cost of Biased Arbitration for Consumers

Figure 5a displays the calibration results: the distribution of awards granted (of arbitrators who are ultimately selected) $\widehat{\tilde{g}(a)}$, the density of slant among the unconditional (entire) population of arbitrators $\widehat{g(a)}$, and the distribution of true beliefs among the unconditional (entire) population of arbitrators $\widehat{f(b)}$. The density of awards granted ($\widehat{\tilde{g}(a)}$) is observed directly in the data whereas the distribution of slant ($\widehat{g(a)}$) and true beliefs ($\widehat{f(b)}$) are recovered according to equations (11) and (12). Not surprisingly, the unconditional distribution of awards stochastically dominates the conditional distribution of awards granted.

The primary object of interest in estimation is the distribution of arbitrators' inherent beliefs of the appropriate arbitration awards, $f(b_i)$. We can think of the distribution of inherent beliefs as the hypothetical distribution of awards that would arise if arbitrators were selected to the cases randomly, with no input from the parties in the case. Figure 5b shows how the distribution of arbitration awards in equilibrium $\widetilde{G}(\cdot)$ compares to the the distribution of arbitrators' inherent beliefs $F(\cdot)$. Once firms have an informational advantage, the distribution of arbitration outcomes shifts to favor firms. The figure illustrates the mass of the distribution, which shifts to be more industry friendly. Under the current selection scheme, the average award in the data is 50% of the amount requested. If neither party had any input into the selection process, our estimates suggest that the mean award would be 55%. Given that the average award is on the order of $800,000, the model estimates suggest that the current arbitrator selection scheme costs consumers roughly $40,000 dollars. The shift in the distribution of awards affects the top half of of the distribution more: the 10^{th} percentile award declines from 41% to 40%, while the 90^{th} percentile declines from 74% to 63%. In other words, the arbitration system especially decreases the propensity of large awards to customers. The results show how the current arbitration scheme can result in a ex-ante biased distribution of arbitration awards even if the underlying distribution of beliefs among arbitrators is fair

We use the estimated distribution of beliefs to examine counterfactuals under different assumptions about consumer sophistication and different arbitrator selection mechanisms in Sections VI.C and VI.D. To estimate the counterfactuals, we numerically solve for the updated slant strategies given the change in the arbitration selection scheme and underlying arbitrator beliefs. In Appendix B, we formally solve for the optimal choice of arbitrators' slant for each counterfactual. Also for computational convenience, we assume that the underlying distribution of beliefs follows a gamma distribution. We estimate the parameterized distribution of beliefs via maximum likelihood to match the estimated distribution of beliefs from the previous section. Figure 6a displays the parameterized version of the model and is comparable to the non-parametric estimates in Figure 5a.

VI.C Informed Consumers

Another way to benchmark the effect of the informational advantage of firms on arbitration outcomes is to consider arbitration outcomes under the current system, if customers were as informed as firms. We conduct two counterfactual exercises. One in which all consumers are informed–this is the extreme example that best illustrates the potential benefits of the arbitration selection system. The second counterfactual we consider is one in which only a measure zero of consumers are informed–for example, because they purchase expertise. The differences between these two counterfactuals highlights the equilibrium consequences of competition between arbitrators and the negative spillovers that uninformed consumers provide to other uninformed consumers.

VI.C.1 All Customers are Informed

In this counterfactual, we study arbitration outcomes in the existing arbitration system if all customers were as informed as firms, $\mu_C = \mu_R = 1$ while keeping the distribution of arbitrator beliefs, $F(\cdot)$, constant. Figure 7a shows distribution of arbitration awards in equilibrium $\widetilde{G}(\cdot)$, the distribution of slant $G(\cdot)$, as well as the distribution of underlying beliefs $F(\cdot)$. The mass of the distribution of awards is contracted towards the median relative to the distribution of beliefs. The arbitration selection scheme in this setting results in an ex-ante fair distribution and lower variance distribution of awards. More formally, the distribution of arbitration awards $\tilde{G}(\cdot)$, is a median preserving contraction of the distribution of beliefs $F(\cdot)$. This median preserving contraction is the mechanism that proponents of arbitration intuitively appeal to. Figure 7a shows the two stages through which the contraction occurs. First, conditional on slant $G(\cdot)$, extreme arbitrators are eliminated, resulting in a tighter distribution of awards, $\tilde{G}(\cdot)$. The mean and median of $\tilde{G}(\cdot)$ is the same as $G(\cdot)$, but the standard deviation of $\tilde{G}(\cdot)$ is 65% smaller than $G(\cdot)$. This elimination provides incentives for extreme arbitrators to curb their slant towards the median, further shrinking the distribution. The mean and median of the distribution of beliefs $F(\cdot)$ is the same as the distribution of slant/type $G(\cdot)$, but the standard deviation of $G(\cdot)$ is 5% smaller than the standard deviation of $F(\cdot)$. In total, if both parties are informed the arbitration selection mechanism results in an unbiased outcome such that $E[a] = E[b]$, but the variance of outcomes is 67% smaller, $\sigma_a = (1 - 0.67) \times \sigma_b$. To the extent that the parties involved are risk averse and informed, the two parties may prefer the existing arbitration system since it reduces the variance of arbitration outcomes while preserving the median.

VI.C.2 Purchasing Expertise: Spillovers from Uninformed Consumers

As we show in Section IV.C.2, some customers hire PIABA attorneys, who specialize in arbitration. The presence of these attorneys diminishes the advantage that firms hold in selecting arbitrators. Here, we study the consequences if only a small subset of consumers is informed, either because they hired an expert or because they hired a PIABA attorney. Specifically, we show that consumer benefits from being informed as a group are larger than those of each individual consumer–being informed has externalities. To make the point most salient, imagine that this consumer was not anticipated by arbitrators. Formally, the mass of informed consumers is measure zero.

Given the list of arbitrators, the informed consumer will eliminate arbitrators who have the strongest pro-industry bias. On the other hand, because arbitrators assume almost all, except measure zero, consumers are uninformed, they will choose a pro-firm slant. Formally, the informed consumer's expected awards are drawn from the conditional distribution of arbitrator slant $G(\cdot)$ where the k^{th} lowest and $(n-k)^{th}$ highest order statistics are removed from the distribution. This is an improvement over the distribution of awards obtained by other uninformed consumers because the consumer is able to eliminate the arbitrators with k lowest order statistics. Our estimates suggest that a measure zero informed consumer's award is on average 6pp higher than that of an uninformed consumer.[27]

Second, this implies that the value of being informed for any individual consumer is smaller than the joint value of all consumers being informed. The estimates from our parametric model imply that the average gain for any individual consumer is 6pp, while the average gain, if all consumers are informed is 9pp.[28] The wedge arises, because each individual consumer cannot change the distribution of arbitrators' slant. However, if consumers are informed as a group, then this changes arbitrators' incentives. Since individual consumers do not internalize the benefits of every consumer

[27] In the parameterized version of the model, the mean of the unconditional distribution of arbitrator slant $G(\cdot)$ is 6pp higher than the mean of the distribution of awards granted $\tilde{G}(\cdot)$ as displayed in Figure 6a.

[28] In the parameterized version of the model, the mean of the distribution of arbitrator beliefs $F(\cdot)$ is 9pp higher than the distribution of awards granted $\tilde{G}(\cdot)$ as displayed in Figure 6a.

being informed, this externality opens the door for potential regulation. One example of such regulation that would need reconsideration is the prohibition on arbitration clauses, which rule out class action claims. For example,the Consumer Financial Protection Bureau proposed a rule preventing companies from using mandatory arbitration clauses, which was overturned by congress ("New protections against mandatory arbitration," 2017).

VI.D Changing the Arbitrator Selection System

We use our model to quantitatively investigate different arbitrator selection schemes. Rather than considering a complete re-design of the system, we examine changes to the features of the existing system of choosing and compensating arbitrators. We study how changing the number of strikes (k), the size of the list/pool from which arbitrators are struck (n), and changing the fee (f) would alter the award distribution and affect the bias in arbitration. One reason to study these counterfactuals is that FINRA has considered changing the arbitration system along these dimensions. More broadly, these policychanges were proposed with the idea that the arbitration process might lead to more "fair" outcomes for the consumer. We show that instead of achieving the intended objective, the outcomes are by and large more industry friendly once one considers the informational advantage that firms hold in the arbitration process.

VI.D.1 Changing the number of strikes

One dimension of arbitration selection that has been altered in the past and that is actively being considered again is altering the number of arbitrators that each party can remove. As discussed in Section II, FINRA proposed increasing the number of strikes from four to six in 2016. Figures 8a and 8b display the distribution of slant and awards as a function of the number arbitrators (strikes) that firms can remove from the arbitration pool. Figure 8a displays the distribution of arbitrator slant as a function of the number of strikes. Arbitrators are selected only if they are not one of the $(n-k)^{th}$ order statistics among arbitrators in the available pool where k is the number of strikes. As the number of strikes increases, arbitrators are incentivized to be more biased in favor of the firm relative to their beliefs. Figure 8a shows that as the number of strikes increases, the arbitration pool shifts in favor of the firm. The distribution of slant with k strikes stochastically dominates the distribution of slant with $k+1$ strikes.

Figure 8b displays the corresponding distribution of arbitration awards granted /outcomes as a function of the number of strikes. Not only does the underlying slant change with the number of strikes, but the set of arbitrators selected are drawn from a more extreme portion of the underlying belief distribution. Although the average belief in the distribution is 55%, the average award in the distribution with $k=6$ strikes is 43%. The estimates from the parametric model imply the average award with $k=4$ is 47%; thus increasing the number of strikes from $k=4$ to $k=6$ decreases the average award by 4pp.

VI.D.2 Increasing the Arbitration Pool Size

Another dimension that has been considered is allowing the parties to choose from a more "diverse" pool of arbitrators.[29] Figures 9a and 9b display the distribution of slant and awards if we were to increase the size of the arbitration pool. Rather than selecting arbitrators among a list of 10 arbitrators, firms and customers would be selecting among a list of 15 arbitrators. In 2016 FINRA proposed to increase the number of arbitrators in the pool from 10 to 15 arbitrators. Increasing the size of the arbitration pool changes the incentives of arbitrators. With the increased pool size, arbitrators are less likely to be selected in general and, all else equal, are less likely to be one of the $(n-k)^{th}$ order statistics in the distribution. Figure 9a indicates that arbitrators would be less biased relative to their beliefs if we were to increase the size of the arbitration pool. Furthermore, since the arbitrators selected for a case are drawn from a less extreme portion of the distribution, the associated awards granted would be closer to median beliefs (Figure 9b). Holding the number of strikes fixed, increasing the number of arbitrators from 10 to 15 increases the average award by 1pp from 47% to 48%.

VI.D.3 Changing the Fee

Another policy proposal that is frequently considered is increasing arbitration fees, in order to expand the pool of potential arbitrators. For example, in 2014 FINRA increased the fee paid to arbitrators by 50% (FINRA Notice 14-49, 2014). This counterfactual analyzes the consequence of changing arbitration fees on the existing pool of arbitrators. Increasing the fee paid to the arbitrator increases the incentives an arbitrator has to be selected. With higher powered incentives, arbitrators are more willing to be biased in order to increase the probability of being selected.

Figures 10a and 10b display the distribution of slant and awards if we were to double the fees paid to the arbitrator. Figure 10a shows that the distribution of slant in favor of the firms in response to a fee change. The distribution of arbitration awards granted also shifts accordingly in favor of the firms (Figure 10b). The estimates from the parametric model imply that the average award would be 43%, with average underlying beliefs of 55%. Relative to the current fee scheme, doubling the fee paid to the arbitrator will cause the average award to decrease by 4pp from 47% to 43%.

VI.D.4 Proposed Rule Change

Last, we examine recent arbitration rule change proposed by FINRA, which proposes changing several of features we discussed about simultaneously. FINRA proposed increasing the number of arbitrators in the pool to 15 and increasing the number of strikes available to 6 (Proposed Rule

[29] FINRA Executive Vice President and Director of Dispute Resolution Richard Berry has stated that "It's vitally important that our pool of arbitrators reflects the varied backgrounds of the parties who use the FINRA arbitration forum. We have bolstered our recruitment efforts, both in terms of increasing the numbers and diversity — in age, gender, race, and occupation — and continue working toward this goal." [https://www.finra.org/arbitration-and-mediation/diversity-and-finra-arbitrator-recruitment accessed on 10/2/2018]

Change Relating to the Panel Selection Process in Customer Cases with Three Arbitrators, 2016). The proposed policy change has potentially offsetting effects. As we have seen above, increasing the number of strikes encourages arbitrators to further slant their decisions toward firms relative to their beliefs, but increasing the arbitration pool size can result in less biased arbitration. Figure 11a displays the distribution of slant. The estimates indicate that the proposed policy change would cause arbitrators to be further biased but the effects are modest. The average slant decreases by 0.5pp in favor of firms among the pool of arbitrators. Similarly, Figure 11b displays the distribution of arbitration awards granted under the proposed policy change. The average award decreases by 0.5pp.

We also separately examine the proposed rule change if both parties were equally informed. Figures 12a and 12b display the distribution of slant and awards under the assumption that both the firm and customer are sophisticated. The results suggest that proposed rule change results in a slightly wider distribution of slant and award outcomes relative to the current arbitration selection scheme. While increasing the number of strikes encourages arbitrators to shift their slant towards the median belief, increasing the arbitration pool size disincentivizes arbitrators to shift their slant towards the median.

VII External Validity: Consumer Arbitration Beyond the Securities Industry

Our empirical analysis and model focus on arbitration in the securities industry. This is primarily due to the availability of detailed and high quality data. In this section we argue that the insights from our setting extend to consumer arbitration more generally. First, we discuss how the mechanism we illustrate in our model extends to other settings and other arbitrator selection systems. Second, with the limited data that is available, we provide suggestive evidence that the broad empirical facts we document in our analysis extend to two other large arbitration forums, the American Arbitration Association (AAA) or Judicial Arbitration and Mediation Services, Inc. (JAMS). These forums are used for consumer arbitration by over 8,000 firms ranging from banks (e.g., Wells Fargo, JPMorgan Chase, Citibank and Bank of America), credit card companies (e.g., American Express and Discovercard), as well as a wide variety of non-financial companies (e.g., AT&T, Blue Cross Blue Shield, Darden Restaurants, Macys Inc, United Health Group, Verizon Wireless, Apple, Uber and Spotify). As should be apparent, these forums moderate transactions totaling several billions of dollars.

VII.A Arbitrator Selection Mechanisms in Other Settings

The model in Section V highlights how arbitration outcomes change when one party holds an informational advantage in selecting arbitrators. In this section we discuss why this mechanism is not specific to the arbitrator selection system employed by FINRA, but extends to those of AAA and JAMS, and more generally to arbitrator selection systems in which one party holds an informational advantage. The intuition for this assertion is simple. One of the defining characteristics of arbitration is that parties participate in selecting arbitrators. If one party is better at selecting arbitrators, either because it is more sophisticated, or better informed, then arbitrators favored by this party will be selected with a higher probability. Moreover, because arbitrators are compensated if selected, this will give arbitrators incentives to choose their slants to favor the informed/sophisticated party.

Two arbitrator selection mechanisms, which are sometimes used in conjunction, are broadly used in consumer arbitration: striking and ranking. In striking, which we model in Section V, both parties remove arbitrators from the proposed list, making them ineligible. In ranking, both parties rank arbitrators, and the arbitrator with the lowest/most preferred combined rank is appointed. These systems can be combined: each party first strikes a given number of arbitrators, and ranks the rest. The ranking is then used to select arbitrators who were not struck by either party. The standard process used by JAMS is strike and rank. A list of five arbitrators is presented to both parties, from which each party is allowed to strike 2 or 3.[30] AAA's Arbitrator Select List and Appointment system uses a ranking system of 5-15 arbitrators.[31] In other words, while these systems are similar to FINRA's, they are not identical. Having said that, the insights from studying the mechanism in our model easily translates into the strike and rank (JAMS) or rank (AAA) systems.

Relative to the striking system, which we analyze, the ranking system (or strike and rank) allows the informed party more control over choosing arbitrators. In the striking system, the informed party can influence the selection by eliminating the least favorable arbitrators, for example, the 4 least favorable arbitrators from 10. In the ranking system, the party lists arbitrators from most to least desirable. The uninformed party either does not submit a ranking, or ranks randomly.[32] Then, the informed party can de facto eliminate 9 least favorable arbitrators from the list of 10, giving it an even larger advantage. In other words, the striking, ranking, and strike and rank arbitration selection systems provide an advantage to the informed party.

This advantage provides incentives for arbitrators to choose a slant that favors the informed arbitrator in these systems. Arbitrators' choice of slant in eq. (8) depends on the probability of being selected onto the panel, $\Gamma(a_i, G(\cdot))$, which increases when they tilt their slant in favor of the informed party. In the ranking system, this incentive is exacerbated, since only the most favored arbitrator of the informed party is chosen. More broadly, the forces we identify in the model arise due to the defining characteristics of arbitration. Parties participate in selecting arbitrators giving the informed party more power over arbitrator selection. Arbitrators are paid when selected, and therefore have incentives to slant in favor of the informed party.

[30][https://www.jamsadr.com/rules-comprehensive-arbitration/#Rule-15 accessed 6/5/2018]

[31][https://www.adr.org/sites/default/files/document_repository/AAA_Arbitrator_Select_2pg.pdf]

[32]When both parties are informed in the ranking system, they each rank the arbitrators honestly. Since all arbitrators have the same score, they are chosen randomly. Similarly, when both parties are informed in the strike and rank system, only the striking has an effect, and the ranking results in the remaining arbitrators to be chosen randomly.

VII.B Empirical Analysis

In this section we show that our empirical findings apply to arbitration more broadly. Specifically we examine whether arbitrators have persistent disparity in their decisions and whether more industry friendly arbitrators are more likely to be selected to arbitration cases in AAA and JAMS arbitrations. We construct two separate consumer arbitration data sets using limited data posted online by the AAA and JAMS.[33] The JAMS data set consists of 391 arbitration cases overseen by 104 different arbitrators over the period 2002-2018. The AAA data set consists of 965 arbitration cases overseen by 265 different arbitrators over the period 2013-2018. We report the summary statistics in Table 7a. Figure 13 panels (a) and (b) display the types of arbitration cases administered by AAA and JAMS in our data set. Common types of cases range from financial services (non-brokerage related, e.g., credit/debit cards, banking and insurance) to telecom, healthcare and car sales. One important caveat with our analysis of the AAA and JAMS data, is that the details on each case are sparse relative to what we observe in the data used in our main analysis (FINRA data). In particular, in the JAMS data we observe the arbitrator, industry and firm involved in the dispute, and the award granted, but not the amount requested. Similarly, in the AAA data set we observe the arbitrator, industry and firm involved in the dispute, the award amount requested, and the award granted. AAA and JAMS cases also span a broad range of industries and cases. Nevertheless, despite the sparse information, we use these additional data sources to provide some suggestive evidence that our main findings extend more broadly.

First, we show that arbitrators display a systematic bias in awarding claims. Some arbitrator slant more "industry friendly" than others. We employ eq. 1 and estimate differences in awards (either in dollars or percent awarded, depending on the data set) as a function of industry and arbitrator fixed effects (Table 7b.). In both data sets, we find significant differences across arbitrators, and reject the null hypothesis that our arbitrator fixed effects are equal to each other at the 1% level. Arbitrator fixed effects explain 36% and 38% of the variation in awards in JAMS and AAA cases, respectively. Consistent with our set of results for securities arbitration, some arbitrators are consistently more customer friendly while other arbitrators appear consistently more industry friendly.

Second, we provide suggestive evidence that industry friendly arbitrators are selected to more cases. Figure 14 panels (a) and (b) display binned scatter plots between our estimates of arbitrator fixed effects and the number of times an arbitrator is selected to a case. Figure 14a displays our results for JAMS consumer arbitration cases. We find a negative and statistically significant relationship between the estimates of arbitrator bias (consumer friendliness) and the number of cases the arbitrator oversees. In other words, arbitrators that give out lower awards are ultimately selected to more arbitration cases. Figure 14b displays our results for the AAA consumer arbitration cases. Here we find much weaker evidence of a relationship between the arbitrator fixed effects and the number of cases the arbitrator oversees. Overall, however, even with substantially lower quality data, we find some suggestive evidence that more industry friendly arbitrators are chosen more

[33] https://www.adr.org/consumer; https://www.jamsadr.com/consumercases/

often. These results are subject to the important caveat that the AAA and JAMS data sets are relatively sparse and span a wide range of industries and cases. As a result, we might be picking up less reliable estimates of arbitrator bias and selection. Together, the results in this section are broadly consistent with our mechanism applying to consumer arbitration more broadly.

VII.C Related Literature

Broadly, our paper relates to the literature on arbitration. One strand of the literature tests whether arbitrators are statistically exchangeable: that there are no systematic differences between arbitrators, at least for those who are selected to arbitrate. Farber and Bazerman (1986), Bloom (1986), Ashenfelter et al. (1992) provide empirical evidence to support the arbitrator exchangeability hypothesis. This result stands in contrast to our findings, where we find large differences among arbitrators. We argue that the difference arises because the previous studies mainly focus on arbitration in which both parties are equally informed, such as those between unions and employers, or arbitration in an experimental setting. We study consumer arbitration, where, instead, potential differences in parties information loom large.

The focus on consumer arbitration and the resulting information gap also distinguishes our work from existing work on arbitrator selection. Bloom and Cavanagh (1986a) examine the selection of arbitrators involved in arbitration pertaining to public safety employees New Jersey. The arbitrator selection mechanism operated by the New Jersey Public Employment Relations Commissions closely mirrors that of the FINRA Code of Arbitration Proceedings. Our findings are consistent with Bloom and Cavanagh's (1986a), who find that arbitration parties tend to select arbitrators based on their preferences. De Clippel et al. (2014) studies the selection of arbitrators in a laboratory setting, focusing on comparing different arbitrator selection mechanisms when both sides are informed. Kondo (2006) examines securities arbitration administered by the NASD over the period 1991-2004. Unlike the current common arbitrator selection process, NASD actively participated in selecting arbitrators. Kondo (2006) also finds evidence suggesting that industry friendly arbitrators were more likely to be selected through NASD's process and the effect is greater after a reform that reduced NASD's influence in arbitrator selection. Similar to Kondo, our work examines a longer panel of arbitration cases between financial advisers and consumers that were administered by NASD and its successor FINRA. We find that, regardless of changes in the arbitration process, industry friendly arbitrators continue to be selected. We also find that the sophistication of consumers and the degree of control respondents have on the arbitrator selection process is related to selection and arbitration outcomes. We build on these facts and focus on understanding how the information difference between consumers and firms and competition between arbitrators quantitatively impacts the equilibrium slant of arbitrators and arbitration outcomes. Our quantitative model allows us to decompose equilibrium slant by arbitrators in the data and illustrates that a significant portion of the slant is driven by the arbitrator pool responding to industry friendly selection. Our paper uses this model to quantitatively investigate arbitration outcomes in response to a variety of alternative arbitrator selection mechanisms and policy proposals.

Our paper is related to theoretical literature on designing arbitration mechanisms. A large part of this literature has focused on the difference conventional arbitration and final offer arbitration proposed by Stevens (1966), where the arbitrator is required to impose one agent's final offer.[34] De Clippel et al. (2014) studies the selection of arbitrators, where conflicting parties participate in the selection process, from the perspective of implementation theory. We also focus on arbitrator selection, but depart from the literature by studying the consequences of arbitration design when one party holds an informational advantage in selecting arbitrators. Second, rather than considering arbitrators slant as exogenous, we consider incentives of arbitrators to be chosen on the panel, and the resulting competition between arbitrators. We show that within the setting, changes in arbitration design that would reduce arbitrator slant when parties are symmetric, increase slant when there is an informational gap. We also illustrate why the conventional wisdom that arbitrator exchangeability of arbitrators is seen as a sign of fairness does not hold in the setting of consumer arbitration (Ashenfelter 1987). Moreover, our focus is on how to change features of existing mechanism, which have been subject of several policy changes and debates.

Our paper also relates to a literature documenting inherent biases among judges and other decision makers. A substantial literature has documented systematic biases among decision makers in other settings. Previous research such as Anderson, Kling, and Stith (2001), Kling (2006), Abrams, Bertrand and Mullathain (2012), and Gupta, Hansman and Frenchman (2016) have documented systematic biases among judges in the U.S. legal system in criminal cases. For example, Abrams, Bertrand and Mullainathan (2012) find that judges exhibit racial biases in incarceration. A previous literature has also documented judge specific heterogeneity in granting bankruptcy protection such as Sullivan, Warren, and Westbrook (1994), Bris, Welch, and Zhu (2006), Norberg and Compo (2007), Chang and Schoar (2013), and Dobbie and Song (2015). Cockburn, Kortum, and Stern (2003) and Lemley and Sampat (2012) document that there is substantial heterogeneity in patent examiners.[35] We document similar evidence for arbitrators. The distinction between arbitrators and judges is that unlike random assignment of judges, arbitration is designed such that parties in the dispute can actively participate in the selection of the arbitrator. Moreover, arbitrators, unlike judges, are only paid when they are selected, resulting in competition on slant, which may increase or reduce equilibrium differences in outcomes, depending on the information of the parties.[36]

Last, our paper also relates to the growing literature on fraud and misconduct among financial advisers including Dimmock et al. (2015), Qureshi and Sokobin (2015), Egan, Matvos, and Seru,

[34] Crawford (1979, 1982) study the effect of conventional and final-offer arbitration on negotiated settlements. Farber (1979, 1980) and Farber and Katz (1979) explore the case where the parties are uncertain about the arbitrator's preferences and find that the outcomes under conventional and final-offer arbitration generally differ. Brams and Merrill (1983, 1986) model arbitration as a zero-sum game of imperfect information. Gibbons (1988) analyzes strategic communication in equilibrium models of conventional and final-offer arbitration and emphasizes the role of learning by the arbitrator from the parties' offers about the state of the employment relationship. Rosenthal (1978), Samuelson (1991), Farmer and Pecorino (1998, 2003), Deck and Farmer (2007) and Olszewski (2011) compare different arbitration procedures under incomplete, asymmetric information.

[35] Researchers, such as Sampat and Williams (2015) and Farre-Mensa, Hedge, and Ljungqvist (2017), have exploited the heterogeneity in patent examiners as an instrument for patent approvals.

[36] Gennaioli and Ross (2010) develop a theoretical model suggesting that competitive pressures could drive bankruptcy courts (rather than judges themselves) to slant their rulings to attract more bankruptcy filings.

(2016), and Egan, Matvos, and Seru (2017). Using a data set containing the universe of financial advisers in the U.S., Egan, Matvos, and Seru (2016) document the extent of misconduct among financial advisers. More than 5% of advisers in the US have had a customer dispute that was flagged by regulators, with the average award amount in the order of several hundred thousand dollars. Virtually all of these customers would have signed a pre-dispute arbitration agreement with their advisers. Our work connects with this work by assessing the efficiency and fairness of the dispute resolution system in this industry.

VIII Conclusion

We examine whether firms have an informational advantage in selecting arbitrators in consumer arbitration, and the impact of the arbitrator selection process on outcomes. We use securities disputes as a laboratory for our study. The selection mechanism is similar to other major arbitration forums and both the consumer (claimant) and the firm (respondent) have substantial control over the arbitrator selection process. Moreover, arbitration is mandatory for all disputes, eliminating selection concerns; and the parties choose arbitrators from a randomly generated list. We document that some arbitrators are systematically industry friendly while others are consumer friendly. Despite a randomly generated list of potential arbitrators, industry-friendly arbitrators are forty percent more likely to be selected than their consumer friendly counterparts.

One potential explanation for our findings is that firms are more informed about the arbitration process than customers, which allows firms to strategically select arbitrators that have traditionally been industry friendly. Under such a scenario, we show that competition among arbitrators drives all arbitrators to behave more industry friendly in order to improve their chances of being selected to arbitrate a case. In equilibrium, the distribution of arbitration case outcomes is biased in favor of respondents, even though underlying distribution of beliefs among arbitrators is unbiased.

Our model allows us to quantify the effects of changes to the current arbitrator selection process on consumer outcomes. Our findings suggest that limiting the respondent's and claimant's inputs over the arbitrator selection process could significantly improve outcomes for consumers.

References

Abrams, David S., Marianne Bertrand, and Sendhil Mullainathan. "Do Judges Vary in Their Treatment of Race?." The Journal of Legal Studies 41, no. 2 (2012): 347-383.

Anderson, James M., Jeffrey R. Kling and Kate Stith. 2001. "Measuring Inter-Judge Sentencing Disparity Before and After the Federal Sentencing Guidellines," Journal of Law and Economics, Vol. 42, p. 271-307

Arbitration Agreements. 2017. 12 C.F.R. § 1040.

"Arbitrator Appointment FAQ." 2018. The Financial Industry Regulatory Authority. Accessed 9/12/2018 [https://www.finra.org/arbitration-and-mediation/faq-arbitrator-appointment-faq].

Ashenfelter, Orley. 1987. "Arbitrator behavior." *The American Economic Review Papers and Proceedings*, 77(2): 342-346.

Ashenfelter, Orley, and David E. Bloom. 1984. "Models of Arbitrator Behavior: Theory and Evidence." *The American Economic Review*, 74(1): 111-124.

Ashenfelter, Orley, Janet Currie, Henry S. Farber, and Matthew Spiegel. 1992. "An experimental comparison of dispute rates in alternative arbitration systems." *Econometrica*, 60(6): 1407-1433.

Barr, Michael S. 2014 "Mandatory arbitration in consumer finance and investor contracts." New York University Journal of Law and Business, 11(4):: 793-817.

Black, Barbara and Jill I. Gross. 2002. "Making it Up as They Go Along: The Role of Law in Securities Arbitration." Cardozo Law Review, 23(3): 991-1047.

Bloom, David E. 1986. "Empirical Models of Arbitrator Behavior under Conventional Arbitration." *Review of Economics and Statistics,* 68(4): 578-585.

Bloom, David E., and Christopher L. Cavanagh. 1986a. "An Analysis of the Selection of Arbitrators." American Economic Review 76 (3): 408-22.

Bloom, David E., and Christopher L. Cavanagh. 1986b. "An Analysis of Alternative Mechanisms for Selecting Arbitrators." Harvard Institute for Economic Research Discussion Paper 1224.

Block, Richard N., and Jack Stieber. "The impact of attorneys and arbitrators on arbitration awards." ILR Review 40, no. 4 (1987): 543-555.

Bris, Arturo, Ivo Welch, and Ning Zhu. 2006. "The costs of bankruptcy: Chapter 7 liquidation versus Chapter 11 reorganization." *The Journal of Finance,* 61(3): 1253-1303.

Cockburn, Iain, Samuel Kortum, and Scott Stern. 2003. "Are all patent examiners equal? Examiners, patent characteristics, and litigation outcomes." *Patents in the knowledge-based economy,* 19: 52-53.

Chang, Tom and Antoinette Schoar. 2013. "Judge Specific Differences in Chapter 11 and Firm Outcomes." Working Paper.

Colvin, Alexander J.S. 2018. "The growing use of mandatory abitration." Economic Policy Institute Report.

Consumer Arbitration Rules. 2016. American Arbitration Association. Accessed 9/11/2018 [https://www.adr.org/sites/default/files/Consumer%20Fee%20Schedule_0.pdf]

Consumer Financial Protection Buereau. 2015. *Arbitration Study: Report to Congress 2015.* Accessed 6/15/2018 [https://www.consumerfinance.gov/data-research/research-reports/arbitration-study-report-to-congress-2015/]

De Clippel, Geoffroy, Kfir Eliaz, and Brian Knight. 2014. On the selection of arbitrators. The American Economic Review, 104(11): 3434-3458.

Dimmock, Stephen G., William C. Gerken and Nathaniel P. Grahm. 2015. "Is Fraud Contagious? Career Networks and Fraud by Financial advisers." Working Paper

Dobbie, Will, and Jae Song. "Debt relief and debtor outcomes: Measuring the effects of consumer bankruptcy protection." The American Economic Review 105, no. 3 (2015): 1272-1311.

Egan, Mark, Gregor Matvos, and Amit Seru. 2016. "The Market for Financial Adviser Misconduct." *Journal of Political Economy, Forthcoming*

Egan, Mark, Gregor Matvos, and Amit Seru. 2017. "When Harry Fired Sally: The Double Standard in Punishing Misconduct." NBER Working Paper No. w23242.

Farber, Henry S., and Max H. Bazerman. 1986, "The General Basis of Arbitrator Behavior: An Empirical Analysis of Conventional and Final-Offer Arbitration." *Econometrica,* 54(6): 1503-1528.

Farre-Mensa, Joan, Deepak Hegde, and Alexander Ljungqvist. 2017. "What is a Patent Worth? Evidence from the US Patent "Lottery."" NBER Working Paper No. w23268.

Financial Industry Regulatory Authority. 2014. *Increases to Arbitrator Honoraria and Certain Arbitration Fees* (Notice 14-49). Accessed 9/6/2018 [http://finra.complinet.com/net_file_store/new_rulebooks/f/i/FINRANotice_14_49.pdf]

Gennaioli, Nicola, and Stefano Rossi. 2010. "Judicial Discretion in Corporate Bankruptcy." *The Review of Financial Studies*, 23(11): 4078-4114.

Griffin, John M., Samuel A. Krueger and Gonzalo Maturana. 2017. "Do Labor Markets Discipline? Evidence form RMBS Bankers. Working Paper.

Guerre, Emmanuel, Isabelle Perrigne, and Quang Vuong. 2000. "Optimal Nonparametric Estimation of First-Price Auctions." *Econometrica*, 68(3): 525-574.

Gupta, Arpit, Christopher Hansman, and Ethan Frenchman. 2016. "The heavy costs of high bail: Evidence from judge randomization." The Journal of Legal Studies 45(2): 471-505.

Kling, Jeffrey R., 2006, "Incarceration Length, Employment, and Earnings," American Economic Review, Vol. 96:3, p/863-876. 342-346

Kondo, Jiro. 2006. "Self-Regulation and Enforcement in Financial Markets: Eveidence from Investor-Broekr Disputes at the NASD." Working Paper.

Lemley, Mark A. and Bhaven N. Sampat. 2012. "Examiner Characteristics and Patent Office Outcomes," *Review of Economics and Statistics*, 94 (3): 817–827

Nichols, Cheryl. 1999. "Arbitrator Selection at the NASD: Investor Perception of a Pro-Securities Industry Bias." Ohio State Journal on Dispute Resolution. 15(1): 63-134.

Norberg, Scott, and Nadia Compo. 2007. "Report on an Empirical Study of District Variations, and the Roles of Judges, Trustees and Debtor's Attorneys in Chapter 13 Bankruptcy Cases." The American Bankruptcy Law Journal, 81(4): 431-493.

Prior, Anna. 2015. "Too Many Black Marks Removed From Brokers' Records, Group Says." *The Wall Street Journal.* Accessed 9/7/2018 [https://www.wsj.com/articles/too-many-black-marks-removed-from-brokers-records-group-says-1445370909].

Proposed Rule Change Relating to the Panel Selection Process in Customer Cases with Three Arbitrators. 2016. 81 Fed. Reg. 136: 46139-46140.

Qureshi, Hammad and Jonathan Sokobin. 2015. "Do Investors Have Valuable Information About Brokers?" FINRA Office of the Chief Economist Working Paper.

Sampat, Bhaven, and Heidi L. Williams. 2015. "How do patents affect follow-on innovation? Evidence from the human genome." NBER Working Paper No. w21666.

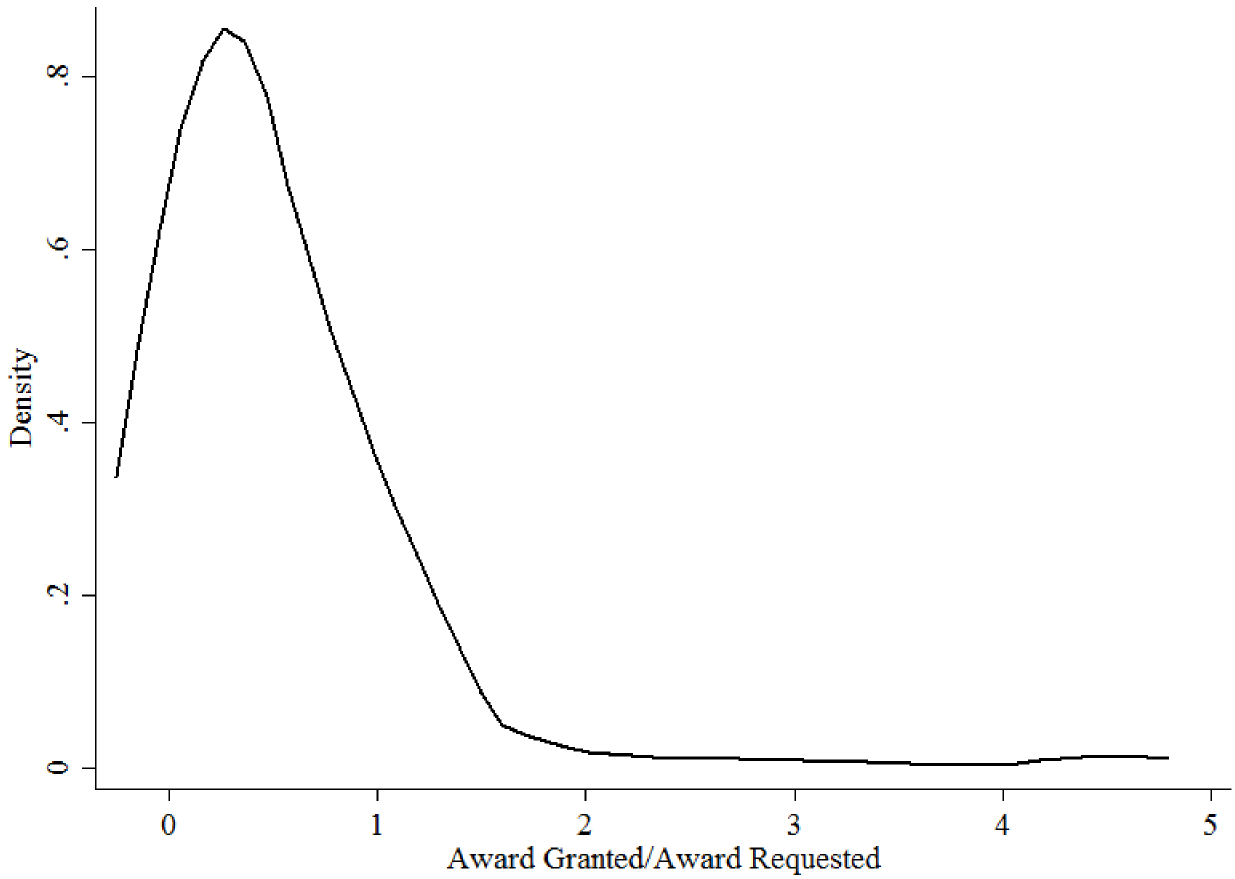
Silver-Greenberg, Jessica and Robert Gebeloff. 2015. "Arbitration Everywhere, Stacking the Deck of Justice." *The New York Times.* Accessed 6/15/2018 [https://www.nytimes.com/2015/11/01/business/dealbook/arbitration-everywhere-stacking-the-deck-of-justice.html]

State of Minnesota Office of the Attorney General. 2009. *National Arbitration Forum Barred from Credit Card and Consumer Arbitrations Under Agreement with Attorney General Swanson.*

Sullivan, Teresa, Elizabeth Warren, and Jay Westbrook. 1994. "The Persistence of Local Legal Culture: Twenty Years of Evidence from the Federal Bankruptcy Courts." Harvard Journal of Law and Public Policy, 17(3): 801-865

US Chamber of Commerce Institute for Legal Reform. 2005. *U.S. Chamber Releases Poll Showing Arbitration Faster, Simpler and Less Costly than Litigation.* Accessed 9/6/2018 [https://www.instituteforlegalreform.com/resource/us-chamber-releases-poll-showing-arbitration-faster-simpler-and-less-costly-than-litigation]

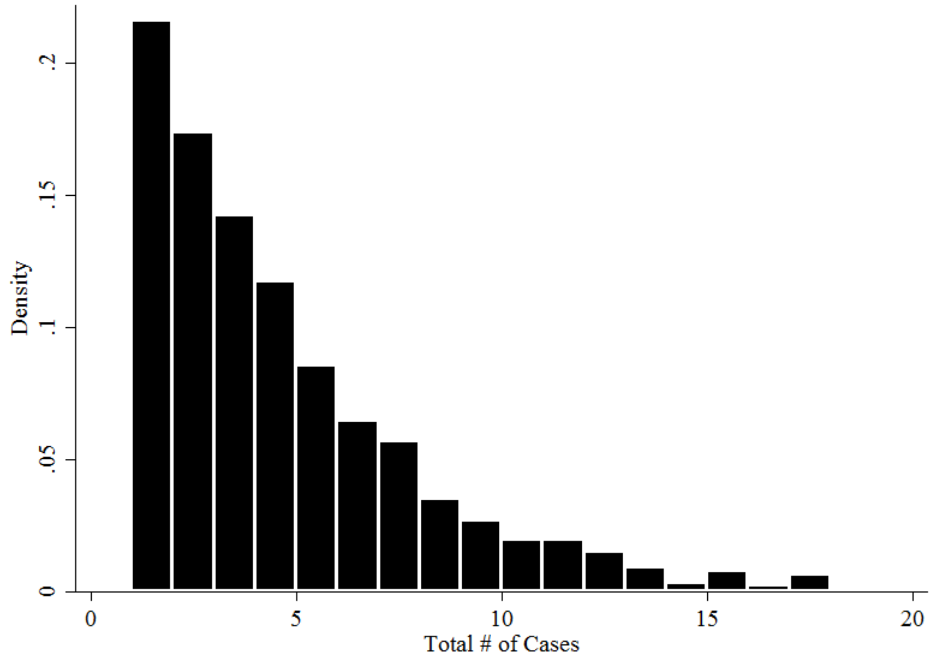
Figure 1: Award Requested vs Award Granted



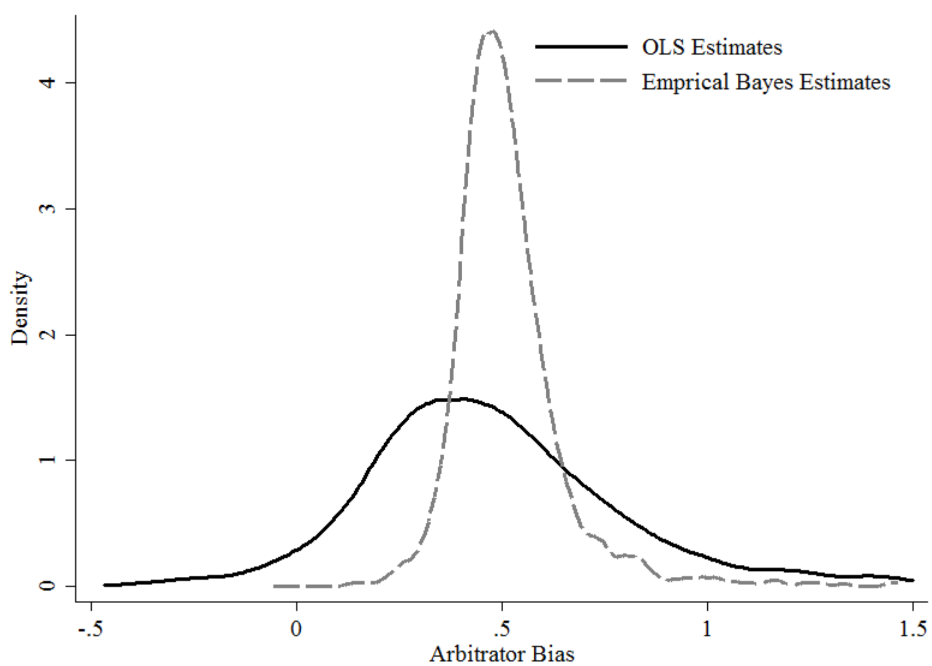
Note: Figure 1 displays the distribution of the awards requested relative to awards granted. The distribution is winsorized at the 1% level. The sample consists of 8,828 different arbitration cases over the period 1982-2015.

Figure 2: Arbitrator Heterogeneity

(a) Experience of Arbitrator Selected to Each Case

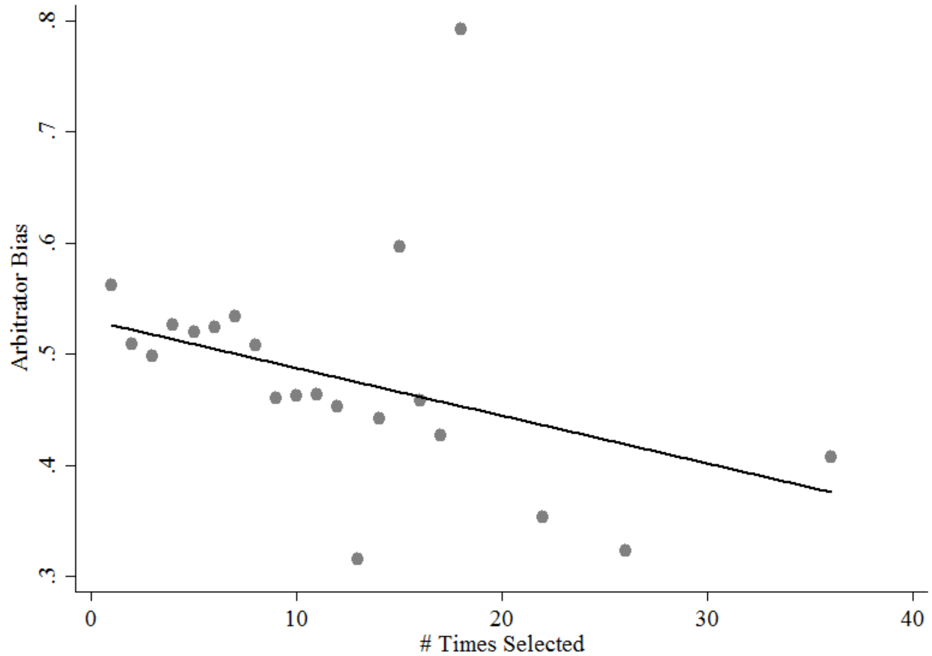


(b) Arbitrator Fixed Effects



Note: Figure 2a displays the lifetime experience of an arbitrator in terms of the number of cases she oversaw during her career. Observations are at the arbitrator by case level. Figure 2b displays the estimated distribution of arbitrator fixed effects corresponding to eq. (1). The gray dashed empirical density reflects the distribution of fixed effects as estimated via OLS. The black empirical density reflects the corresponding empirical Bayes estimates where we shrink the estimated distribution of fixed effects to account for estimation error.

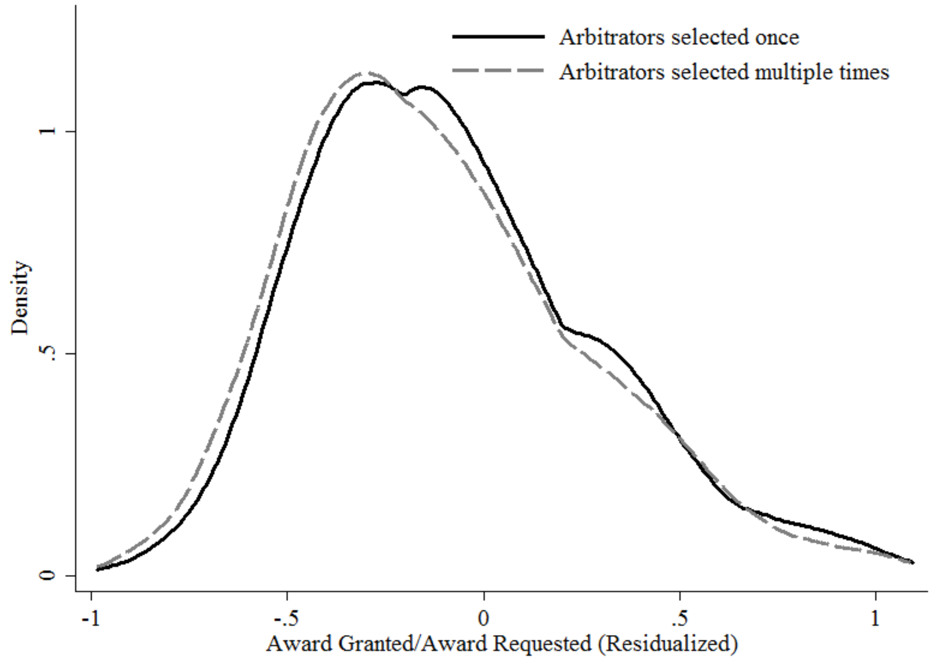
Figure 3: Arbitrator Bias and Selection



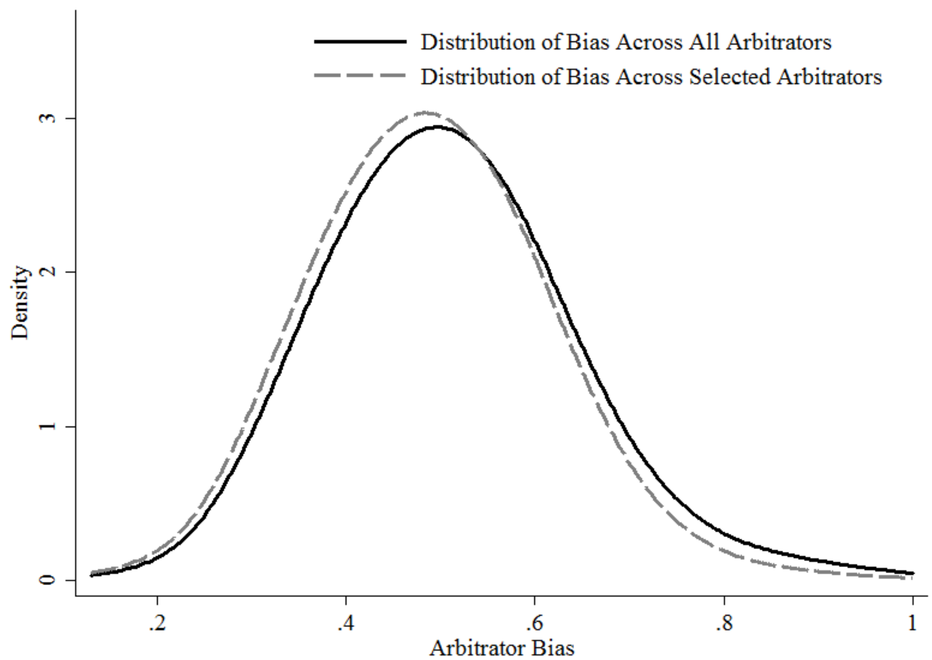
Note: Figure 3 displays a binned scatter plot of the arbitrator fixed effects versus the total number of cases the arbitrator oversaw in the data. The arbitrator fixed effects correspond to the estimates reported in column (4) of Table 2. Observations are at the arbitrator level.

Figure 4: Distribution of Arbitration Outcomes

(a) Initial Case Outcomes vs. Future Experience



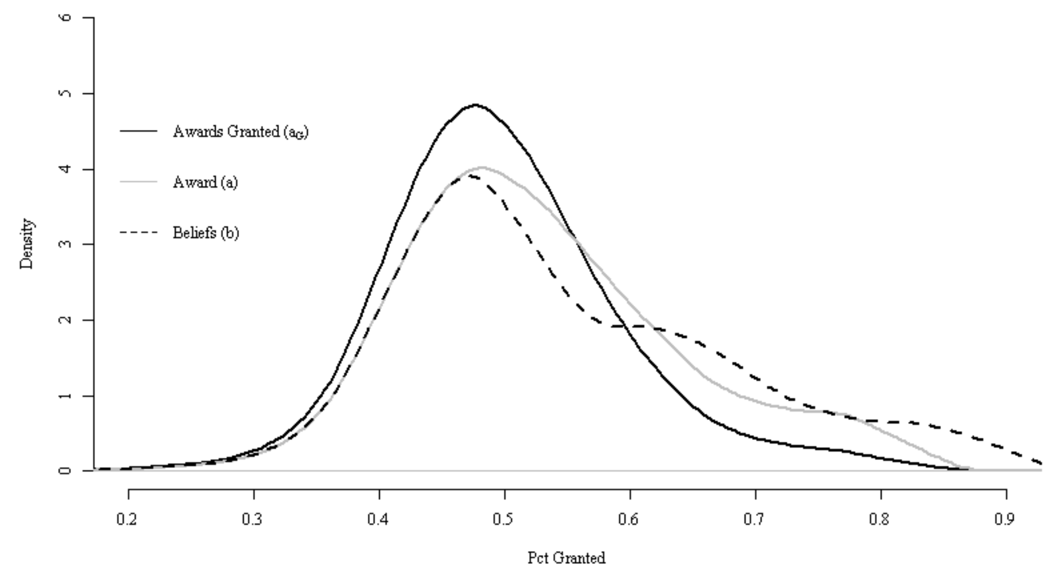
(b) Arbitrator Bias: Selected vs Randomly Draw



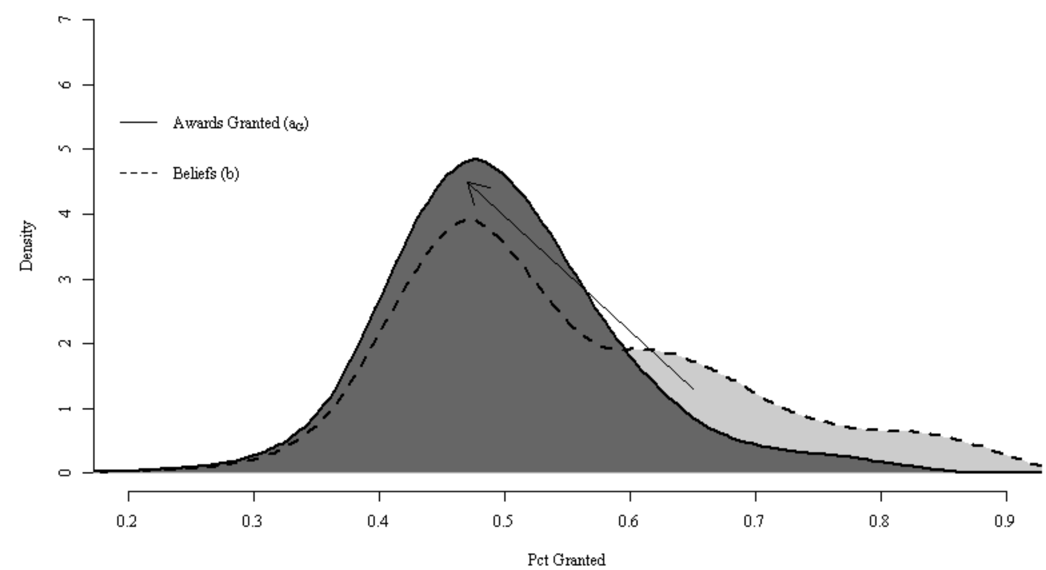
Note: Figure 4a displays the residualized distribution of initial arbitration outcomes in terms of the percentage of damages granted for those arbitrators who only selected once versus those arbitrators who were selected five or more times. Figure 4b displays the distribution of arbitrator bias, conditional on the arbitor being selected and the unconditional distribution. We calculate the conditional distribution using the estimates implied in column (4) of Table 3 Observations are at the arbitrator by case by adviser level.

Figure 5: Estimated Distribution of Arbitrator Beliefs

(a) Arbitrator Slant, Only Firm is Informed



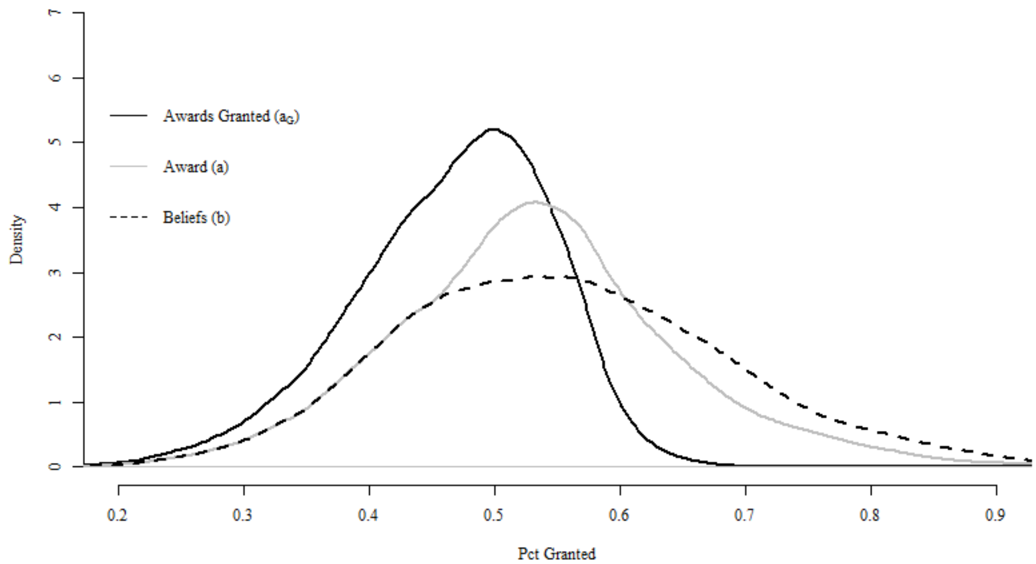
(b) Awards Granted, Only Firm is Informed



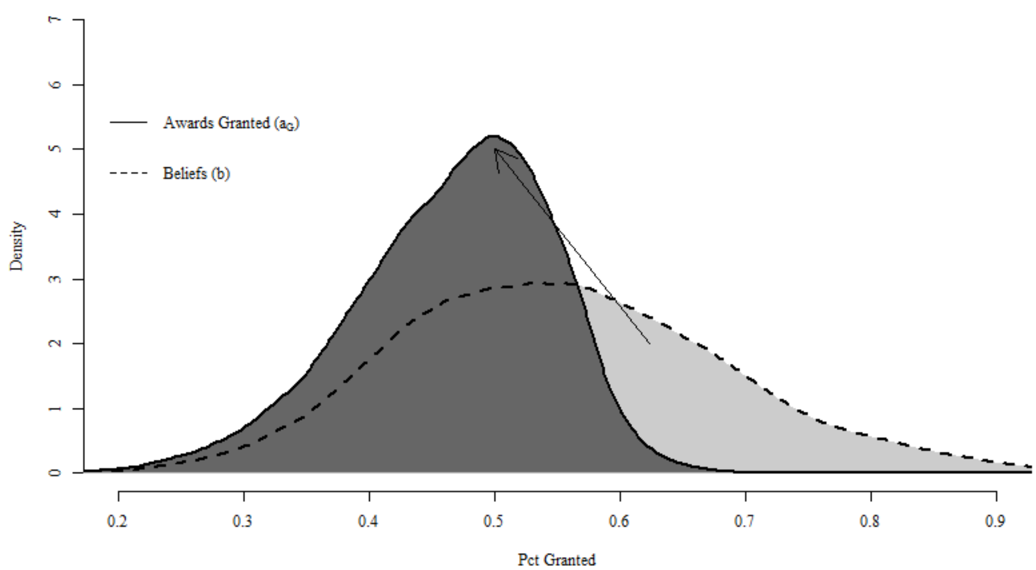
Note: Figures 5a and 5b display the estimated density of slant/awards among conditional distribution of selected arbitrators $\widehat{\tilde{g}(a)}$, the estimated density of slant/awards among the unconditional (entire) population of arbitrators $\widehat{g(a)}$, and the estimated density of true beliefs among the unconditional (entire) population of arbitrators $\widehat{f(b)}$. The black line plots the distribution of realized awards/outcomes observed in the data. The unconditional distributions of slant/awards and beliefs are estimated non-parametrically as described in Section VI. The model is estimated under the assumption that only firms are informed.

Figure 6: Distribution of Arbitration Outcomes

(a) Arbitrator Slant, Only Firm is Informed



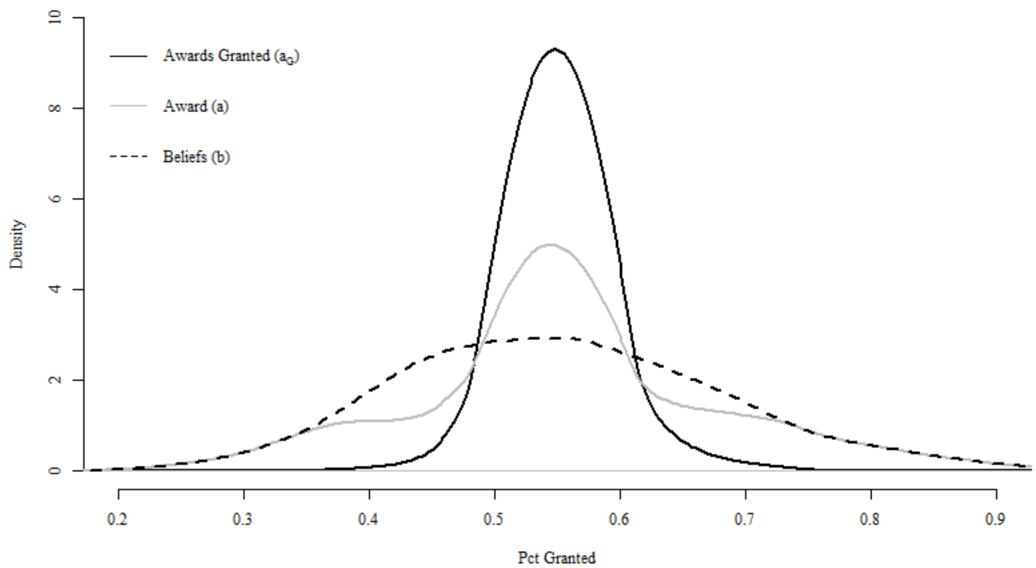
(b) Awards Granted, Only Firm is Informed



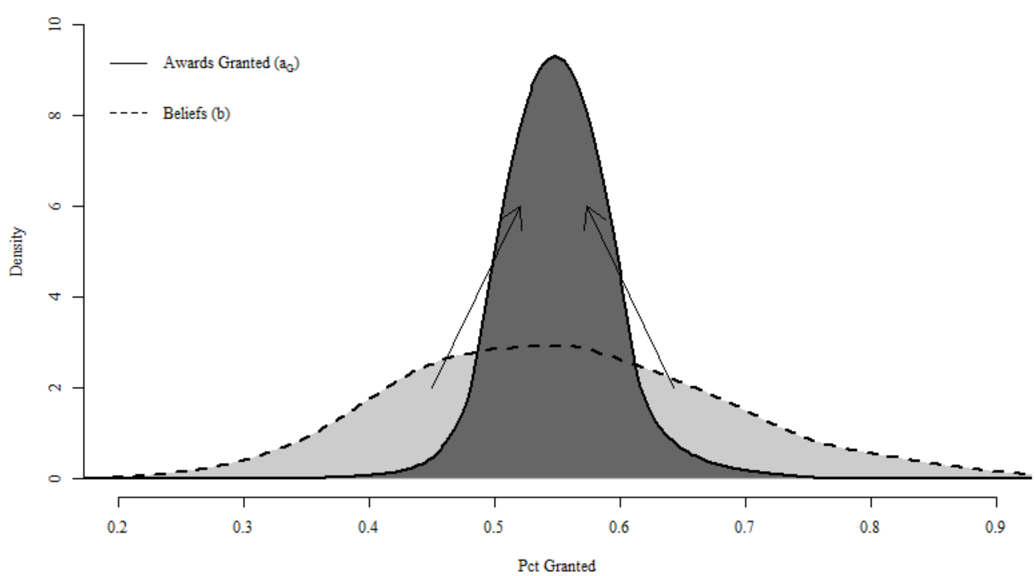
Note: Figure 6 panels (a) and (b) displays the estimated density of slant/awards among conditional distribution of selected arbitrators $\tilde{g}(a)$, the density of types among the unconditional (entire) population of arbitrators $g(a)$, and the distribution of true beliefs among the unconditional (entire) population of arbitrators $f(b)$. Panels (a) and (b) display the distribution of outcomes and bias under the assumption that only the firm is informed. The underlying distribution of arbitrator beliefs is estimated via MLE to match fit the estimated distribution of arbitration beliefs from Section VI.

Figure 7: Distribution of Arbitration Outcomes

(a) Arbitrator Slant, Both Parties Informed



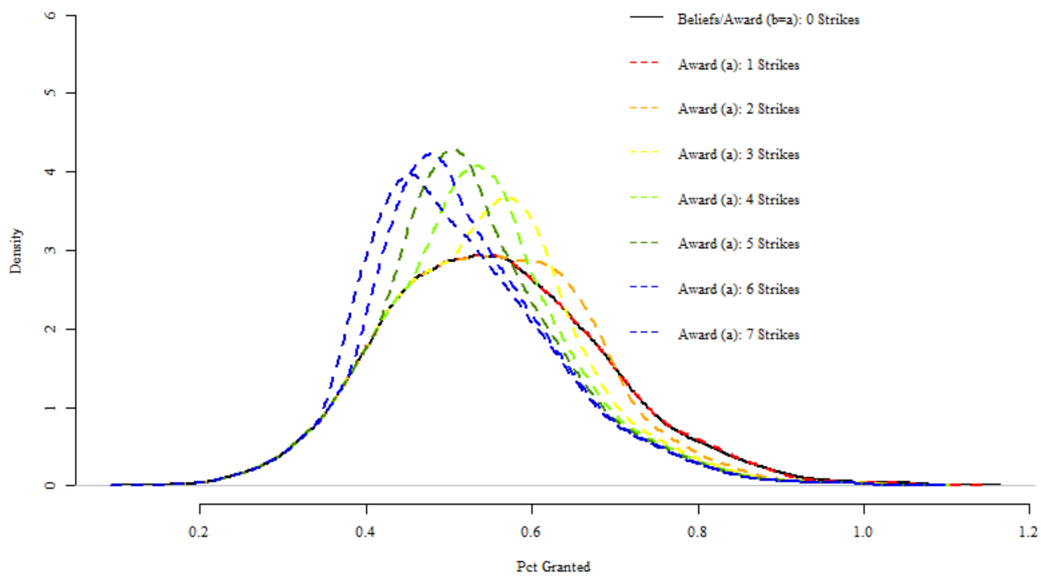
(b) Awards Granted, Both Parties Informed



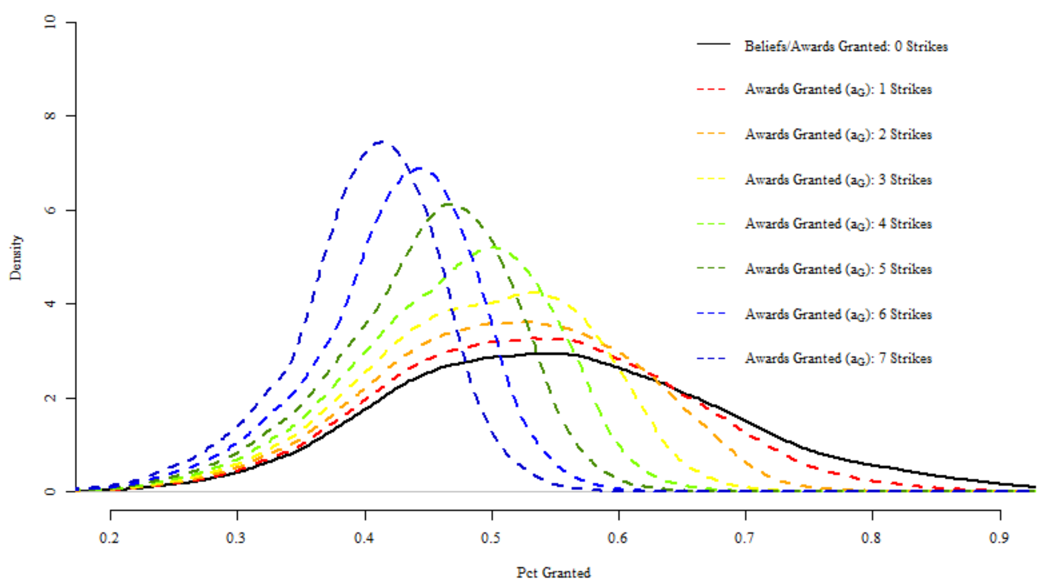
Note: Figure 7 panels (a) and (b) displays the model implied density of slant/awards among conditional distribution of selected arbitrators $\tilde{g}(a)$, the density of slant/awards among the unconditional (entire) population of arbitrators $g(a)$, and the distribution of true beliefs among the unconditional (entire) population of arbitrators $f(b)$. Panels (a) and (b) display the distribution of outcomes and biases under the assumption that both the firm and customer are informed. The underlying distribution of arbitrator beliefs is estimated via MLE to match fit the estimated distribution of arbitration beliefs from Section VI.

Figure 8: Counterfactual: Changing the Number of Strikes

(a) Arbitrator Slant



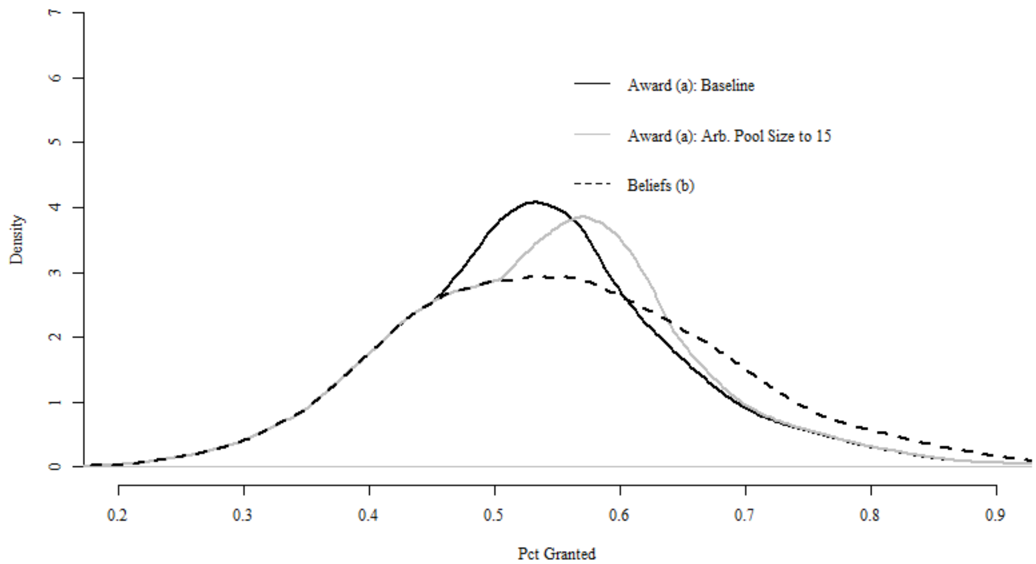
(b) Awards Granted



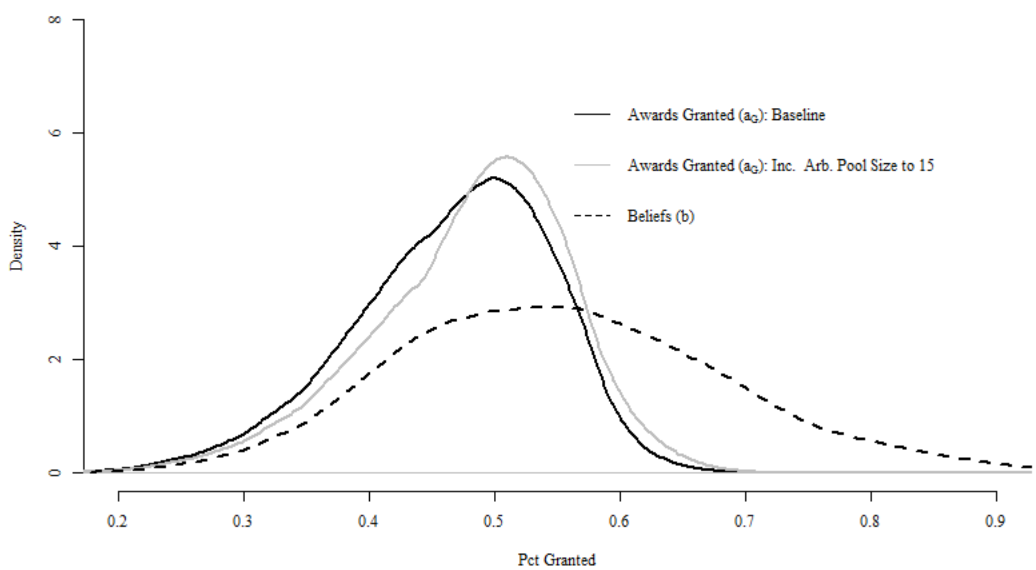
Note: Figure 8a and 8b displays the counterfactual distribution of arbitrator slant and awards as a function of the number arbitrators firms are able to remove/strike from the arbitration pool. The estimates are constructed under the assumption that only firms are informed.

Figure 9: Counterfactual: Increasing the Aribtration Pool/List Size

(a) Arbitrator Slant



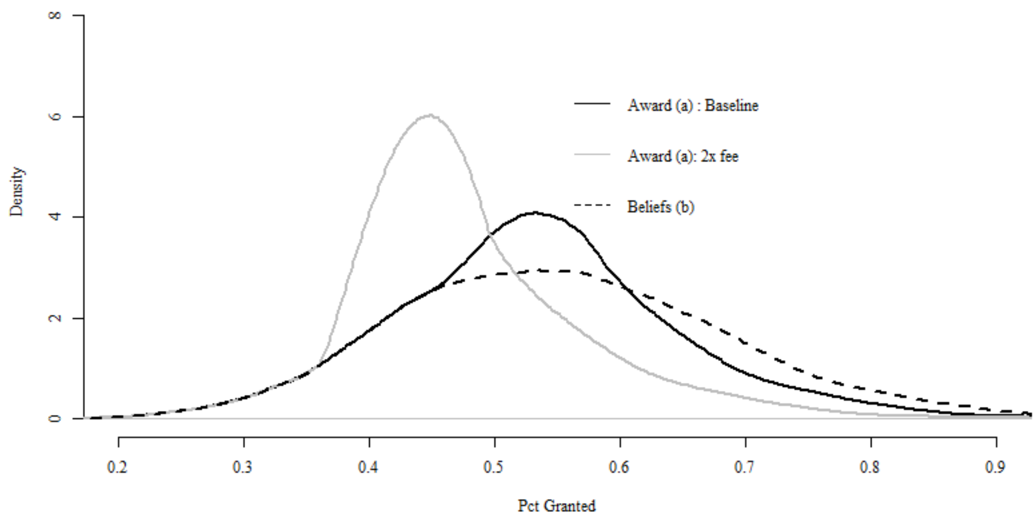
(b) Awards Granted



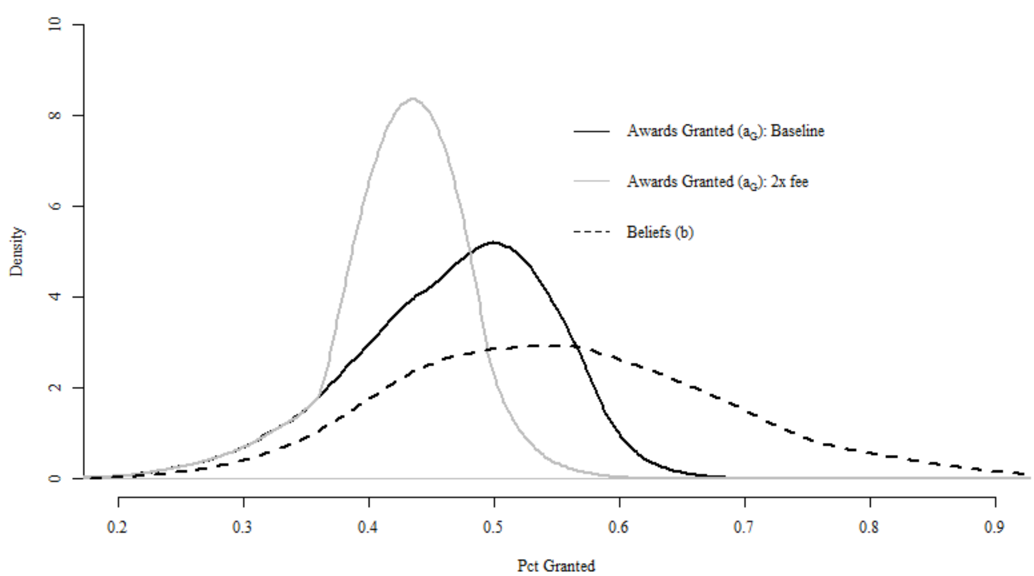
Note: Figures 9a and 9b display the counterfactual distribution of arbitrator slant and awards if regulators were to increase the arbitration pool size to fifteen. The estimates are constructed under the assumption that only firms are informed.

Figure 10: Counterfactual: Increasing the Fee

(a) Arbitrator Slant



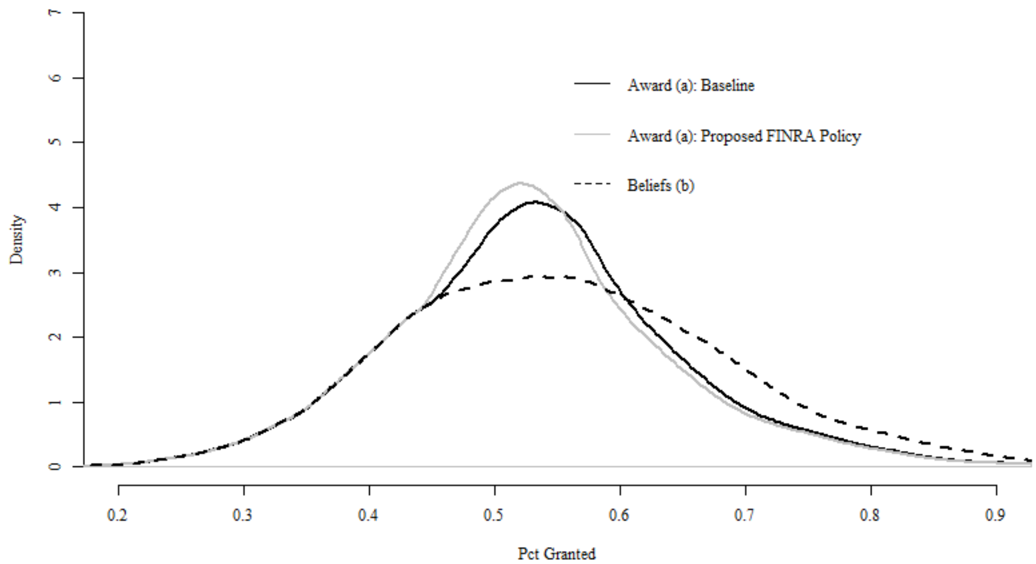
(b) Awards Granted



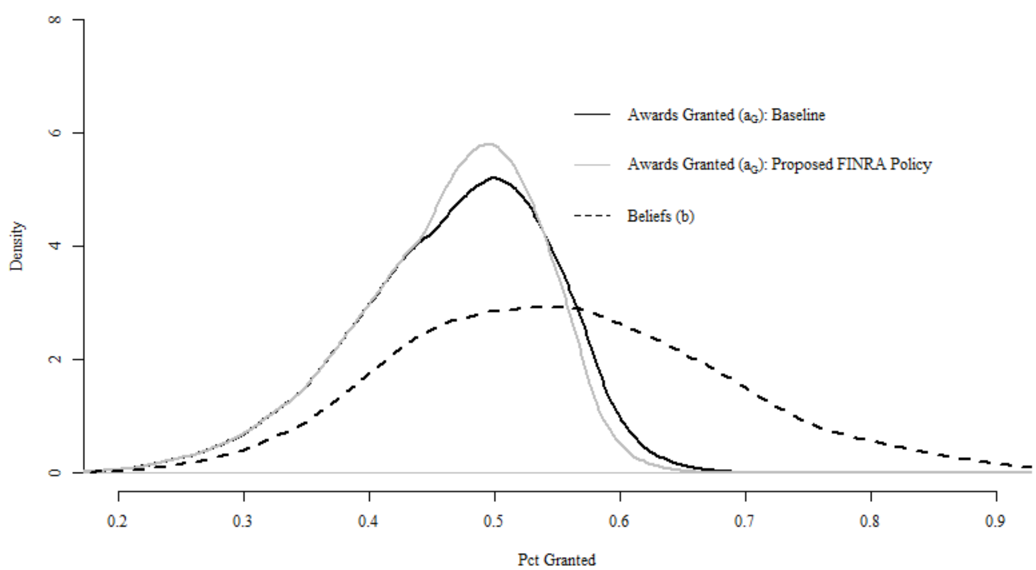
Note: Figures 10a and 10b display the counterfactual distribution of arbitrator slant and awards if regulators were to double the fee paid to arbitrators. The estimates are constructed under the assumption that only firms are informed.

Figure 11: Counterfactual: Proposed FINRA Change, Only Firm is Informed

(a) Arbitrator Slant



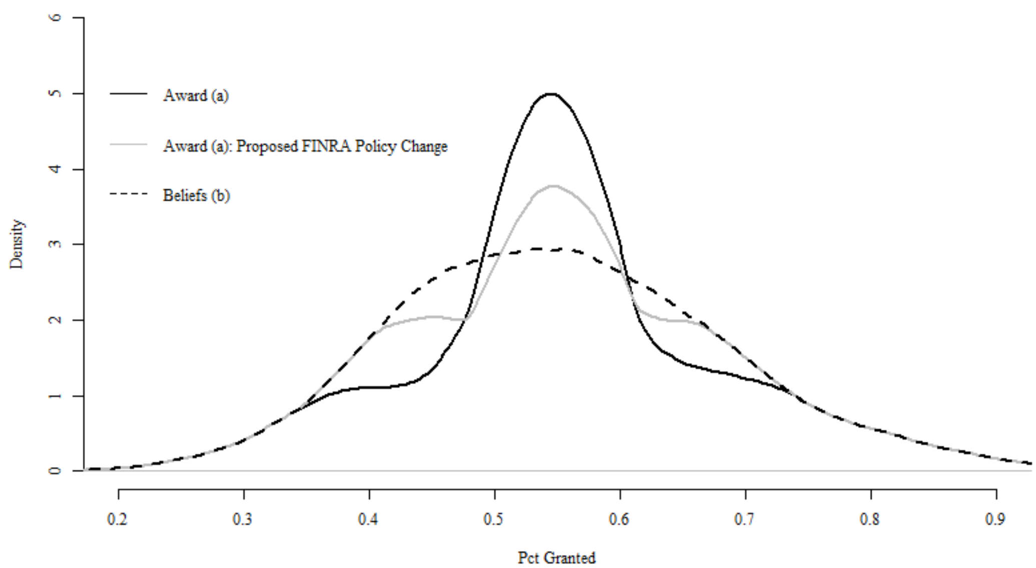
(b) Awards Granted



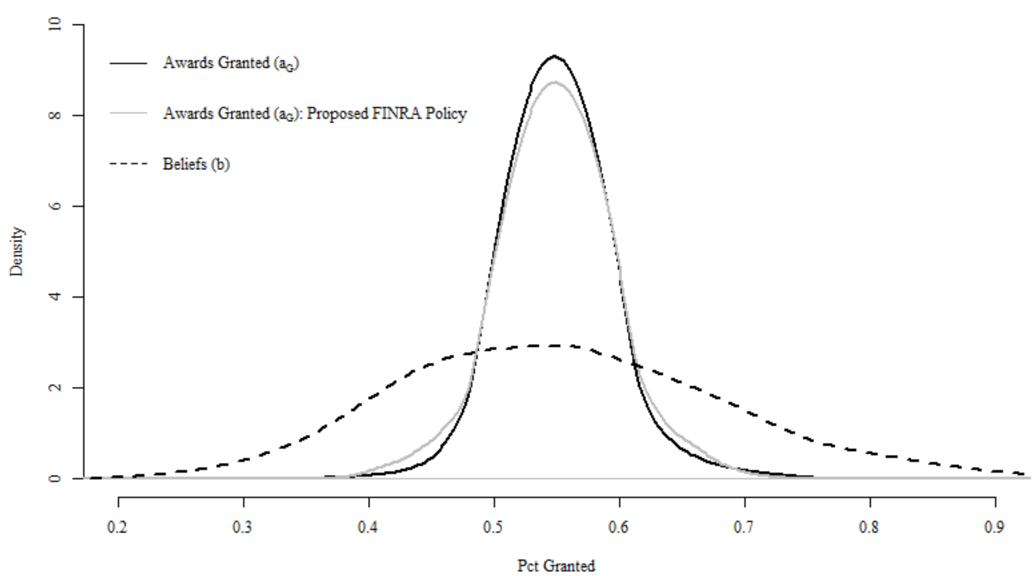
Note: Figures 11a and 11b display the counterfactual distribution of arbitrator slant and awards if regulators were to increase the arbitration pool size to fifteen and increase the number of strikes to six as recently proposed by FINRA. The estimates are constructed under the assumption that only firms are informed.

Figure 12: Counterfactual: Proposed FINRA Change, Both Parties Informed

(a) Arbitrator Slant



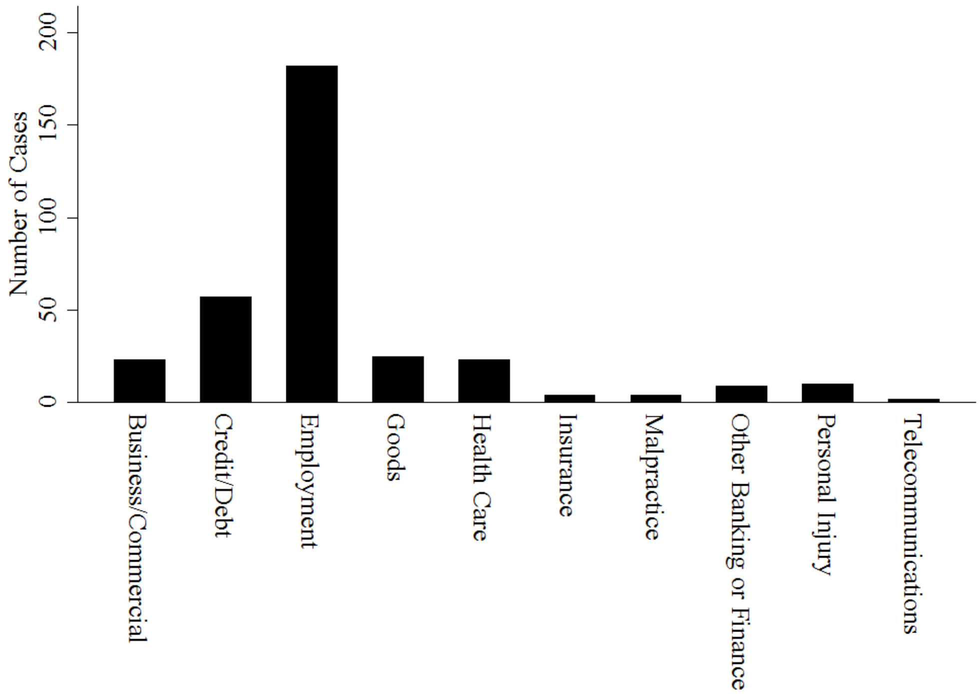
(b) Awards Granted



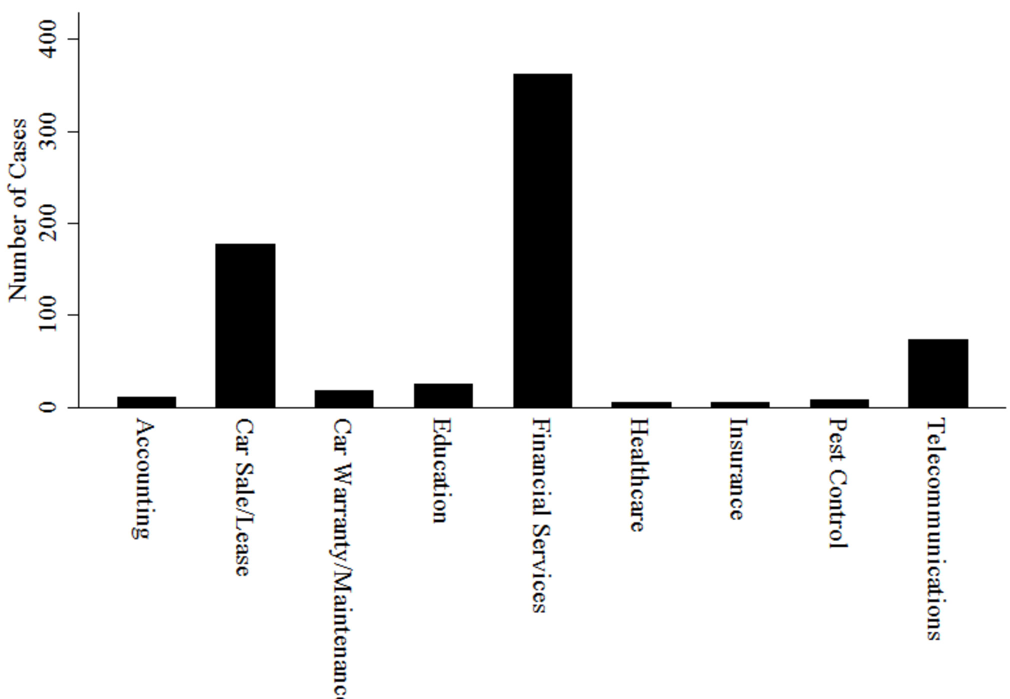
Note: Figures 12a and 12b display the counterfactual distribution of arbitrator slant and awards if regulators were to increase the arbitration pool size to fifteen and increase the number of strikes to six as recently proposed by FINRA. The estimates are constructed under the assumption that both firms and customers are fully informed.

Figure 13: American Arbitration Association (AAA) and JAMS Arbitration

(a) Types of Disputes: JAMS



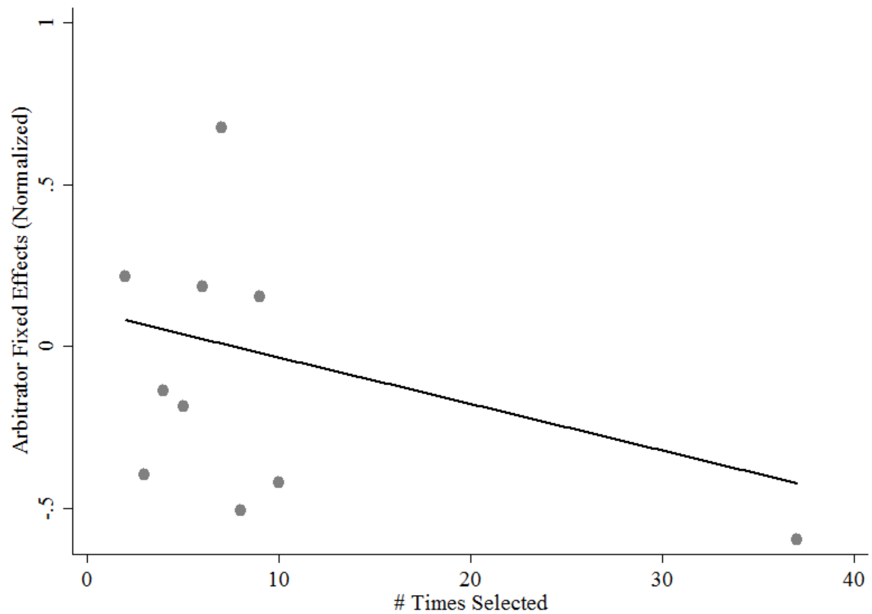
(b) Types of Disputes: AAA



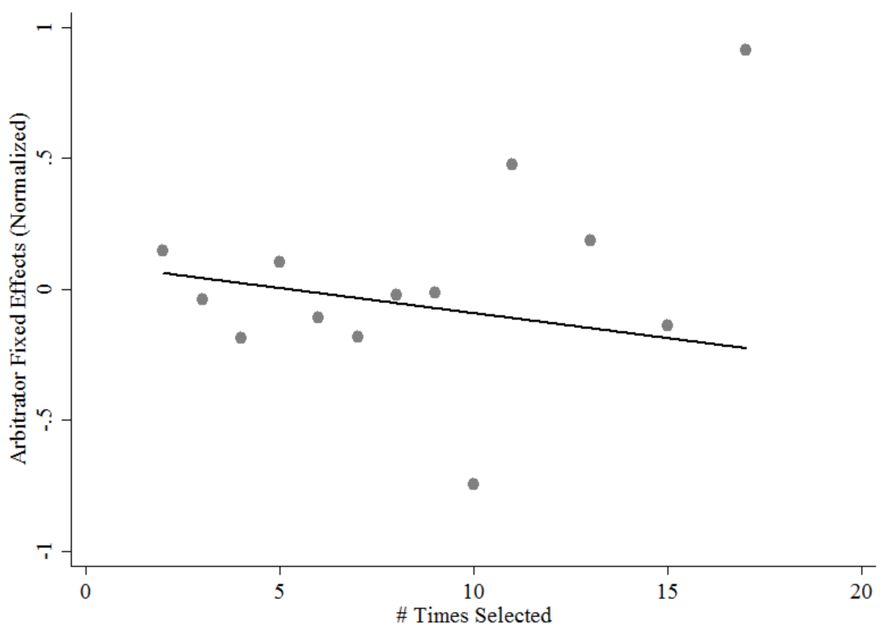
Note: Figure 13 panels (a) and (b) display the types of arbitration/mediation overseen by the American Arbitration Association and JAMS. Data are reported by the AAA and JAMS over the period 2013-2018. Panel (a) displays all types of disputes in the JAMS data set. Panel (b) displays the ten most common types of disputes in the AAA data set. The case types reported by JAMS do not directly correspond to the case types reported by AAA.

Figure 14: External Validity: Bias and Arbitrator Selection

(a) Arbitrator Fixed Effects/Bias vs Selection - JAMS



(b) Arbitrator Fixed Effects/Bias vs Selection - AAA



Note: Figure 14 panels (a) and (b) display the distribution between arbitrator case outcomes and the total number of times an arbitrator is selected. Figure 14a displays a binned scatter plot of the normalized arbitrator fixed effects versus the total number of cases the arbitrator oversaw in the JAMS data. Figure 14b displays a binned scatter plot of the normalized arbitrator fixed effects versus the total number of cases the arbitrator oversaw in the JAMS data. A higher fixed effect indicates that the arbitrator gave out higher awards than expected given case observables. Observations in Figure 14 panels (a) and (b) are at the arbitrator level. The arbitrator fixed effects correspond to the estimates reported in columns (2) and (4) of Table 7b

Table 1: Arbitration Summary Statistics

Variable	Obs	Mean	Std. Dev.	Median
Requested Damages	20,196	785,025	4,867,927	175,000
Percent of Requested Damages Awarded	20,231	51%	67%	32%
Allegations:				
Unsuitible	20,231	51%		
Fiduciairy	20,231	34%		
Misrepresentation	20,231	33%		
Negligence	20,231	27%		
Fraud	20,231	24%		
Unauthorized Activity	20,231	20%		
Products:				
Stocks	20,231	9%		
Insurance	20,231	5%		
Mutual Fund	20,231	3%		
Annuity	20,231	3%		
Bonds	20,231	2%		
Options	20,231	2%		
Complexity:				
Number of Allegations	20,231	2.3	1.7	2
Length of the Case Document: Words	19,451	1430	649	1399
Length of the Case Document: Sentences	19,451	145	65	140
Offending Adviser Characteristics:				
Experience	20,033	14.5	9.2	13.0
No. Qualifications	20,231	3.9	1.6	4.0
Prior Record of Misconduct	20,231	48%		
Series 6	20,231	11%		
Series 7	20,231	85%		
Series 24	20,231	38%		
Series 65 or 66	20,231	49%		
Consumer Claimant Representation:				
Self-represented	20,231	5.7%		
PIABA attorney	20,231	6.6%		
Arbitrator Characteristics:				
Former/Current Financial Adviser	7,891	40%		
Prior Record of Misconduct	7,891	15%		

Note: Table 1 displays the summary statistics corresponding to our arbitration data set. Observations for the Arbitrator Characteristics are at the arbitrator level. All other observations are at the arbitrator by case level and correspond to 8,828 distinct cases. We report the standard deviation and median for non-dummy variables. The categories Allegations and Products are dummy variables indicating whether the specific product or allegation were mentioned in the arbitration case summary in BrokerCheck. Prior Record of Misconduct indicates whether or not the adviser or arbitrator has a past record of misconduct in the financial advisory industry as defined in Egan, Matvos and Seru (2017). The variable PIABA attorney indicates whether the consumer used a attorney who is a member of the Public Investors Arbitration Bar Association. The Percent of Requested Damages Awarded is winsorized at the 1% level.

Table 2: Percent of Requested Awards Granted

	(1)	(2)	(3)	(4)
Allegations:				
Unsuitable	-3.16*	-2.83	-1.88	-1.58
	(1.64)	(1.76)	(1.91)	(1.93)
Misrepresentation	-0.98	-1.37	-0.75	-0.91
	(1.78)	(1.93)	(2.16)	(2.13)
Unauthorized Activity	-0.86	-0.20	0.69	0.61
	(2.17)	(2.30)	(2.39)	(2.49)
Omission of Key Facts	-1.18	-0.49	-0.47	0.24
	(2.62)	(2.88)	(2.97)	(2.99)
Fee/Commission Related	11.2***	7.43*	9.24**	10.1**
	(4.31)	(4.19)	(4.19)	(4.50)
Fraud	4.81*	4.42	6.07**	5.24*
	(2.53)	(2.72)	(3.00)	(2.80)
Fiduciary Duty	1.37	3.36	-0.030	1.42
	(2.22)	(2.40)	(2.54)	(2.59)
Negligence	-4.43*	-5.51**	-5.71**	-6.70**
	(2.36)	(2.53)	(2.77)	(2.75)
Risky Investments	-0.82	-0.42	0.89	0.0016
	(3.24)	(3.57)	(3.72)	(4.15)
Churning/ Excessive Trading	1.64	1.74	-0.58	-3.10
	(2.63)	(2.76)	(2.92)	(2.89)
Unregistered Securities	17.8**	18.0*	5.82	2.05
	(8.43)	(9.90)	(12.5)	(11.2)
Products:				
Insurance	4.69	4.26	6.82	0.79
	(4.16)	(3.89)	(4.60)	(4.02)
Annuity	7.59	6.61	11.9	6.44
	(6.16)	(6.03)	(7.38)	(7.47)
Stocks	1.22	-0.22	-0.49	2.44
	(2.51)	(2.69)	(2.99)	(3.03)
Mutual Funds	-9.59***	-8.29***	-10.1***	-6.35
	(2.67)	(2.78)	(3.44)	(4.02)
Bonds	-0.71	-0.44	-7.49**	-5.61
	(3.96)	(4.28)	(3.45)	(4.30)
Options	-8.83**	-9.17**	-11.4***	-12.8***
	(3.64)	(3.93)	(4.08)	(4.97)
Adviser Characteristics:				
Prior Misconduct	6.54***	6.98***	6.91***	6.84***
	(1.70)	(1.80)	(1.95)	(1.99)
Experience	-0.42***	-0.45***	-0.15	-0.14
	(0.13)	(0.14)	(0.14)	(0.13)
Other Controls	X	X	X	X
Year F.E.	X	X	X	X
County F.E.		X	X	X
Firm F.E.			X	X
Arbitrator F.E.				X
Observations	19,451	18,632	18,507	15,168
R-squared	0.043	0.115	0.373	0.619
Adj. R-squared	0.040	0.092	0.310	0.403

Note: Table 2 displays the regression results for a linear regression model (eq. 1). The dependent variable is awards granted expressed as a percentage of awards requested. The independent variable Prior Misconduct indicates whether or not the adviser has been previously reprimanded for misconduct. We also control for the case size, the arbitration panel size, the case length in terms of the number of sentences and words, and other adviser characteristics. Other adviser controls include the adviser's experience and qualifications: Series 6, Series 7, Series 24, Series 63, Series 65/66, and number of other qualifications. Observations are at the arbitrator by customer complaint/case by adviser level. Standard errors are clustered at the case level. *** p<0.01, ** p<0.05, * p<0.10.

Table 3: Probability an Arbitrator is Selected

	(1)	(2)	(3)	(4)	(5)
Bias (Empirical Bayes Estimates)	-1.08**	-1.00***	-1.12***	-1.02***	-1.14***
	(0.43)	(0.33)	(0.34)	(0.33)	(0.34)
Former/Current Financial Adviser				-0.10	-0.025
				(0.30)	(0.31)
Past Record of Adviser Misconduct				0.57	0.66
				(0.40)	(0.42)
Other Arbitrator Controls		X	X	X	X
Year F.E.		X	X	X	X
County F.E.			X		X
Observations	65,295	60,013	59,362	60,013	59,362
R-squared	0.000	0.032	0.042	0.032	0.042

Note: Table 3 display the regression results corresponding to a linear probability model (eq. 2). Observations are at the arbitrator by year level. The dependent variable is a dummy variable indicating whether or not an arbitrator was selected in a given year. . The independent variable interest is Bias. We measure Bias using our empirical Bayes estimated arbitrator fixed effects as described in Section IV.A. Former/Current Financial Adviser indicates whether or not the arbitrator currently or previously worked in the financial advisory industry. Past Record of Adviser Misconduct indicates whether or not the arbitrator has a past record of misconduct in the financial advisory industry as defined in Egan, Matvos and Seru (2016). We also control for the number of cases the arbitrator previously oversaw as well as the number of years the arbitrator has been active in the industry. We include year fixed effects as well as county fixed effects that correspond to the last case the arbitrator oversaw. Standard errors are in parentheses and are clustered by firm. *** p<0.01, ** p<0.05, * p<0.10.

Table 4: Probability an Arbitrator is Selected: Rule Change

	(1)	(2)	(3)
Bias (γ)	-2.45***	-1.91***	-1.80***
	(0.67)	(0.55)	(0.56)
Bias×(Year≥2008)($\gamma_{t \geq 2008}$)	2.31***	1.81***	1.35**
	(0.80)	(0.67)	(0.67)
Arbitrator Controls		X	X
Year F.E.		X	X
County F.E.			X
Observations	65,282	60,001	59,350
R-squared	0.108	0.032	0.042

Note: Table 4 displays the regression results corresponding to a linear probability model (3). Observations are at the arbitrator by year level. The dependent variable is a dummy variable indicating whether or not an arbitrator was selected in a given year. The independent variables of interest are Bias and Bias interact interacted with the period dummy variable Bias×(Year≥2008). Starting in 2008, FINRA limited the number of arbitrators either party could eliminate from the list to four. We also control for the number of cases the arbitrator previously oversaw as well as the number of years the arbitrator has been active in the industry. We include year fixed effects as well as county fixed effects that correspond to the last case the arbitrator oversaw. Standard errors are in parentheses and are clustered by firm. *** p<0.01, ** p<0.05, * p<0.10.

Table 5: Selected Arbitrator Bias and Consumer/Firm Sophisitication

	(1)	(2)	(3)	(4)	(5)
PIABA attorney	4.95***			4.54***	4.09***
	(1.33)			(1.34)	(1.58)
No attorney		-2.92*		-2.90*	-2.59
		(1.60)		(1.60)	(1.68)
Firm Experience			-2.96***	-2.86***	-2.42***
			(0.68)	(0.68)	(0.76)
Other Controls		X	X	X	X
Observations	14,449	14,449	14,449	14,449	14,449
R-squared	0.018	0.017	0.018	0.019	0.085

Note: Table 5 displays the regression results for a linear regression model (eq. 4). The dependent variable in columns is the selected arbitrator's bias as calculated in column (4) of Table 2. The independent variable Firm Experience is a dummy variable indicating whether the firm has above median experience in terms of the number of arbitration cases it has been involved in. The variable No attorney is a dummy variable indicating whether the consumer was self represented. The variable PIABA attorney indicates whether the consumer used a attorney who is a member of the of the Public Investors Arbitration Bar Association. Coefficients are in percentage points such that the estimates in column (1) indicate that in cases where the customer uses a PIABA attorney, the bias of the arbitrator selected is 4.95pp higher (i.e. the arbitrator gives out awards that are 4.95pp higher). Other Controls include case size, the arbitration panel size, the case length in terms of the number of words, and other adviser characteristics. Other adviser controls include the advisers qualifications: Series 6, Series 7, Series 24, Series 63, Series 65/66, and number of other qualifications. Observations are at the arbitrator by customer complaint/case by adviser level. Standard errors are clustered at the case level. *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

Table 6: Selected Arbitrator Experience and Case Observables

Dep. Var.	Arbitrator Experience	Pct Granted
Allegations:		
Unsuitable	0.0029	-2.83
	(0.042)	(1.76)
Misrepresentation	-0.033	-1.37
	(0.046)	(1.93)
Unauthorized Activity	-0.10**	-0.20
	(0.048)	(2.30)
Omission of Key Facts	-0.12*	-0.49
	(0.064)	(2.88)
Fee/Commission Related	0.18*	7.43*
	(0.098)	(4.19)
Fraud	-0.026	4.42
	(0.054)	(2.72)
Fiduciary Duty	-0.038	3.36
	(0.056)	(2.40)
Negligence	0.011	-5.51**
	(0.055)	(2.53)
Risky Investments	0.039	-0.42
	(0.11)	(3.57)
Churning/ Excessive Trading	0.054	1.74
	(0.055)	(2.76)
Unregistered Securities	-0.0029	18.0*
	(0.22)	(9.90)
Products:		
Insurance	-1.2e-05	4.26
	(0.11)	(3.89)
Annuity	-0.017	6.61
	(0.15)	(6.03)
Stocks	0.10	-0.22
	(0.071)	(2.69)
Mutual Funds	0.067	-8.29***
	(0.13)	(2.78)
Bonds	-0.11	-0.44
	(0.12)	(4.28)
Options	0.074	-9.17**
	(0.16)	(3.93)
Adviser Characteristics:		
Prior Misconduct	-0.020	6.98***
	(0.042)	(1.80)
Experience	0.0024	-0.45***
	(0.0030)	(0.14)
Year F.E.	X	X
County F.E.	X	X
Other Controls	X	X
Observations	18,618	18,632
R-squared	0.111	0.115

Note: Table 6 displays the regression results corresponding to two linear regression models (eq. 5 and 1). The dependent variable in Column (1) is reflects the experience of the arbitrator selected for a case in terms of the number of cases the arbitrator previously oversaw. The dependent variable in Column (2) is damages granted expressed as a percentage of damages requested. The independent variable Prior Misconduct indicates whether or not the adviser has been previously reprimanded for misconduct. We also control for the arbitration panel size, the case length in terms of the number of words, and adviser qualifications (Series 6, 7, 24, 63, 65/66, total licenses). In column (1) we also control for the years since the arbitrator first entered the industry. Observations are at the arbitrator by case level. Standard errors are clustered at the case level. *** p<0.01, ** p<0.05, * p<0.10.

Table 7: External Validity - AAA and JAMS Arbitration

(a) Summary Statistics

Data Set	JAMS			AAA		
Variable	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
Amount Awarded	408	109,619	352,311	965	6,656	78,676
Percent of Requested Damages Awarded				965	20%	115%

(b) Awards Granted vs Case Characteristics

Dep. Var	$ Award Granted		Pct Awarded	
	(1)	(2)	(3)	(4)
JAMS Data Set	X	X		
AAA Data Set			X	X
Dispute Type/Industry Fixed Effects	X	X	X	X
Year Fixed Effects	X	X	X	X
Arbitrator Fixed Effects		X		X
Observations	408	408	965	965
R-squared	0.038	0.386	0.206	0.427

Note: Tables 7a displays the summary statistics corresponding to our JAMS and AAA data sets. Observations are at the case by arbitrator level. For the JAMS data set we do not observe the damages that were requested by the claimant. Table 7b corresponds to a linear regression model (eq 1). The dependent variable in columns (1)-(2) is the amount awarded to the claimant through JAMS arbitration. The dependent variable in columns (3)-(4) is the percentage of damages award expressed as a percentage of damages requested. Observations are at the case by arbitrator level. We estimate columns (1)-(2) using our JAMS arbitration data set and we estimate columns (3)-(4) using our AAA arbitration data set. We include dispute type/industry fixed effects in each specification. The most popular dispute types in the JAMS data set are employment (n=184), debt collection (n=35), and credit (n=31). The most popular dispute types in the AAA data set are financial services related (n=435), car sale/lease (n=172), and telecommunications/wireless/cable/satelite (n=85).

Appendices

Appendix A: Backward Looking Model of Arbitration

Our previous results suggest that there are persistent and statistically differences in how individual arbitrators grant awards. In other words, our estimates suggest that the particular arbitrator who oversees a hearing has a substantial impact on the case outcome. Here we build on those findings to examine whether past judgments by an arbitrator are predictive of future judgments.

We construct a backwards looking measure of industry friendliness that firms could use to forecast the behavior of arbitrators. Using the residuals from the estimation results reported in column (2) of Table 2, we construct a measure of how friendly arbitrator m's decision regarding case i as:

$$\delta_{ijklmt} = Pct\_Awarded_{ijklmt} - \hat{\beta}X_{jt} - \hat{\mu}_l - \hat{\mu}_t \tag{13}$$

We construct our measure of past slant/bias $\bar{\delta}_{mt}$, as the average of the residuals (δ_{ijklmt}) from the cases arbitrator m previously oversaw. A higher $\bar{\delta}_{mt}$ implies that the arbitrator is less industry friendly and more investor friendly.

We examine how an arbitrator's past decisions impact the probability he/she is selected as an arbitrator again in the future more formally in the following linear probability model.

$$Selected_{lt} = \beta X_{lt} + \gamma\bar{\delta}_{lt} + \eta_{lt} \tag{14}$$

Our observations are at the arbitrator by year level. Selected is a dummy variable that indicates whether or not arbitrator l was selected for a case in year t. The key independent variable of interest is the arbitrator's past bias $\bar{\delta}_{lt}$ which is computed as the average of the residuals δ_{ijklt}) from the cases arbitrator l previously oversaw. The term X_{lt} is a vector of arbitrator controls that include the number of years he/she's been active in the industry,number of cases in the data set he/she has overseen, whether or not he/she worked as a financial adviser, and whether or not he/she has a record of misconduct as a financial adviser. We also include year fixed effects and fixed effects for the firm and location (county-level) of the past case the arbitrator worked on. Our sample represents an unbalanced panel of arbitrators over the period 1988-2015. An arbitrator enters the data set as soon as she oversees her first case and remains in the data set until 2015.

We report the corresponding estimates in Table A1. We estimate a positive and significant relationship between past bias and future awards in each specification. The positive estimates indicate that an arbitrator's past biases are correlated with his/her future decisions. Arbitrators that are more industry friendly in the past are more industry friendly in the future. The past slant/bias variable ($\bar{\delta}_{mt}$) is standardized such that the results in column (2) of Table A1 indicate that a one standard deviation in slant is correlated with a 3.12 percentage point increase in the percentage of damages granted. To put this number in perspective, given the average award requested, a one standard deviation increase in past slant is associated with a $26,000 increase in awards. To the extent our estimates of an arbitrator's past bias $\bar{\delta}_{mt}$ suffers from classical measurement error, the associated coefficient may understate the true correlation.

Table A1 displays the corresponding estimation results. In each specification, we estimate a negative and significant relationship between an arbitrators past bias $\bar{\delta}_{lt}$ and the probability an arbitrator is selected. Recall that a greater past bias implies that the arbitrator was more investor friendly and less industry friendly. The results suggest that those arbitrators that are industry friendly are more likely to be selected in the future. The results in column (1) of Table A1 indicate that a one standard deviation decrease in past bias (i.e. more industry friendly) is correlated with 0.38pp increase in the probability of being selected in a given year. To put this number in perspective, the average probability an arbitrator is selected in a given year is 6%. Hence, this amounts to a roughly five percent increase in the probability of being selected. To the extent that our measure of past bias suffers from classical measurement error, our estimates understate the true effect. The results in columns (5)-(7) also indicate that those arbitrators with financial advisory industry experience are more likely to be selected for cases.

Appendix B: Model Solution

Competition between Arbitrators

Arbitrators compete for cases by choosing their slant: how customer or firm friendly they want to be. They trade off two forces. On the one hand, they want to be selected on the arbitration panel (increase $\Gamma(a_i, G(.))$) to earn the arbitration fee f. They want to slant an award which has a small chance of being rejected from an arbitration panel by an informed firm or customer. This probability is determined by their type *relative* to other arbitrators. We solve for the optimal choice of slant as a function of the model primitives for two separate case: first, when firm and customers are equally informed ($\mu_D = \mu_P = 1$); and second, when only firms are informed ($\mu_D > 0, \mu_P = 0$),

Equally Informed Firms and Customers

We first present the benchmark model in which both firms and customers are fully informed such that ($\mu_D = \mu_P = 1$). This benchmark illustrates the potential benefits of the existing arbitrator selection mechanism. When both firms and customers are equally informed, the outcome reached in expectation is fair, so the median arbitrator will be chosen. Moreover, the arbitrator selection process will result in awards closer to the fair outcome. More formally, the distribution of arbitration outcomes $\tilde{G}(\cdot)$,will be a median preserving contraction of the distribution of beliefs $F(\cdot)$.

We study a symmetric equilibrium in strictly increasing piece-wise differentiable strategies. If both parties are informed, then an arbitrator is selected if her type is the $k+1th$, $k+2th$,... $n-kth$ order statistic among the arbitrators in the pool. Given the selection mechanism, the probability an arbitrator is selected is increasing in a for a below the median ($\gamma(a, G(\cdot)) > 0, \forall a < G^{-1}(0.5)$) and is decreasing in a for a above the median ($\gamma(a, G(\cdot)) < 0, \forall a > G^{-1}(0.5)$). The first order condition (eq. 9) implies that arbitrators with below the median beliefs will slant their awards type upwards relative to their beliefs $a_i > b_i$, $\forall b_i < F^{-1}(0.5)$, arbitrators with above median beliefs will slant their awards downwards relative to their beliefs $a_i < b_i$, $\forall b_i > F^{-1}(0.5)$, and arbitrators with median beliefs will be unbiased $a_i = b_i$ $\forall b_i = F^{-1}(0.5)$.

We begin by studying those arbitrators with beliefs above the median. These arbitrators will find it optimal to slant their awards downward relative to their beliefs such that $a_i < b_i$. We can write arbitrator's expected utility as a function of her beliefs b_i as

$$U(b_i) = max_{a_i}\Gamma(a^{-1}(a_i), F(\cdot))\,(f - \theta(b_i - a_i)) \tag{15}$$

From the envelope condition (Milgrom and Segal, 2002; Levin 2004), we have

$$\frac{\partial}{\partial b}U(b_i) = -\Gamma(b_i, F(\cdot))\theta\,\forall b_i > F^{-1}(0.5)\,and\,b_i \neq a_i \tag{16}$$

An arbitrator with median beliefs has no incentive to deviate and has the highest expected utility in equilibrium $\bar{U} = f\Gamma(F^{-1}(0.5), F(\cdot))$. Combining this initial condition and the differential equation from the envelope condition (eq. 16), we can write the utility of arbitrator with belief b_i as

$$U(b_i) = \bar{U} - \int_{F^{-1}(0.5)}^{b_i} \Gamma(\tilde{b}, F(\cdot))\theta d\tilde{b},\, \forall b_i > F^{-1}(0.5)\, and\, b_i \neq a_i \tag{17}$$

Last, we can use equations (15) and (17) to solve for the optimal strategy.

$$a(b_i) = \min\left\{ b_i - \frac{f}{\theta} + \frac{\left(\frac{\bar{U}}{\theta} - \int_{0.5}^{b_i} \Gamma(\tilde{b}, F(\cdot))d\tilde{b}\right)}{\Gamma(b_i, F(\cdot))}, b_i \right\},\, \forall b_i > F^{-1}(0.5)$$

By symmetry we can write solve for the optimal strategy for arbitrators with below median beliefs as

$$a(b_i) = \max\left\{ b_i + \frac{f}{\theta} - \frac{\left(\frac{\bar{U}}{\theta} - \int_{F^{-1}(0.5)}^{b_i} \Gamma(\tilde{b}, F(\cdot))d\tilde{b}\right)}{\Gamma(b_i, F(\cdot))}, b_i \right\},\, \forall b_i < F^{-1}(0.5)$$

Informed Firms

Here we analyze arbitration outcomes when one party holds an informational advantage. In the empirical setting we study, the firms are frequently large institutions which engage in arbitration repeatedly, so we assume that they are the more informed party, while customers are uninformed ($\mu_D > 0$, $\mu_p = 0$).

Since firms are informed, they eliminate the most customer friendly arbitrators from the pool. This shifts the distribution of awards granted $\tilde{G}(\cdot)$ to be more firm friendly than the pool of arbitrators $G(\cdot)$. Because arbitrators most friendly to the customer are eliminated from the pool, arbitrators have the incentive to be more firm friendly than other arbitrators to avoid elimination.

If only the firm is informed, the probability an arbitrator is selected is equal to the probability she is one of $n - kth$ lowest order statistics. The probability an arbitrator is selected is therefore decreasing in her award a, $\gamma(a, G\cdot) < 0$. From the first order condition (9), we can see that $a \leq b$ such that an arbitrator's award is always slanted downwards relative to her beliefs. We can rewrite the arbitrator's problem as

$$U(b_i) = max_{a_i}\Gamma(a^{-1}(a_i), F(\cdot))\,(f - \theta(b_i - a_i)) \tag{18}$$

From the envelope condition, we have

$$\frac{\partial}{\partial b}U(b_i) = -\Gamma(b_i, F(\cdot))\theta\,\forall b_i \neq a_i \tag{19}$$

Note that an arbitrator with bias $\bar{b}$ will never be selected for arbitration; thus, $U(\bar{b}) = 0$. Combining

(18) and (19) we solve for the equilibrium strategy

$$a(b_i) = \min\left\{ b_i - \frac{f}{\theta} + \frac{\int_{b_i}^{\bar{b}} \Gamma(\tilde{b}, F(\cdot)) d\tilde{b}}{\Gamma(b, F(\cdot))}, b_i \right\}$$

Appendix C: Additional Tables and Figures

Table A1: Probability an Arbitrator is Selected - Past Bias

	(1)	(2)	(3)	(4)	(5)
Past Bias	-0.33***	-0.22***	-0.22***	-0.21***	-0.22***
	(0.073)	(0.066)	(0.066)	(0.066)	(0.066)
Former/Current Financial Adviser				0.35*	0.32*
				(0.18)	(0.19)
Past Record of Adviser Misconduct				0.56**	0.62**
				(0.25)	(0.26)
Other Arbitrator Controls		X	X	X	X
Year F.E.		X	X	X	X
County F.E.			X		X
Observations	105,997	104,532	104,341	104,532	104,341
R-squared	0.000	0.029	0.036	0.029	0.036

Note: Tables A1 displays the regression results corresponding to a linear probability model (eq. 14). The dependent variable is a dummy variable indicating whether or not an arbitrator was selected in a given year. The independent variable interest is Past Bias. We measure Past Bias using a backward measure of bias as described in Appendix A (eq. 13). Former/Current Financial Adviser indicates whether or not the arbitrator currently or previously worked in the financial advisory industry. Past Record of Adviser Misconduct indicates whether or not the arbitrator has a past record of misconduct in the financial advisory industry as defined in Egan, Matvos and Seru (2016). We also control for the number of cases the arbitrator previously oversaw as well as the number of years the arbitrator has been active in the industry. We include year fixed effects as well as county fixed effects that correspond to the last case the arbitrator oversaw. Standard errors are in parentheses and are clustered by firm. *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

Table A2: Probability an Arbitrator is Selected - Accounting for Sample Attrition

	(1)	(2)	(3)	(4)	(5)
Bias (Empirical Bayes Estimates	-0.60	-1.14**	-1.17**	-1.15**	-1.19**
	(0.63)	(0.54)	(0.56)	(0.54)	(0.56)
Former/Current Financial Adviser				-0.80*	-0.65
				(0.43)	(0.45)
Past Record of Adviser Misconduct				0.89	0.96
				(0.56)	(0.59)
Other Arbitrator Controls		X	X	X	X
Year F.E.		X	X	X	X
County F.E.			X		X
Observations	45,932	40,651	40,000	40,651	40,000
R-squared	0.000	0.026	0.038	0.026	0.038

Note: Table A2 display the regression results corresponding to a linear probability model (eq. 2). Observations are at the arbitrator by year level. Here we account for sample attrition by constructing our panel data set such that an arbitrator enters the data set as soon as she oversees her first case and remains in the data set for up to five years after her last arbitration case.The dependent variable is a dummy variable indicating whether or not an arbitrator was selected in a given year. The independent variable interest is Bias. We measure Bias using our empirical Bayes estimated arbitrator fixed effects as described in Section IV.A. Former/Current Financial Adviser indicates whether or not the arbitrator currently or previously worked in the financial advisory industry. Past Record of Adviser Misconduct indicates whether or not the arbitrator has a past record of misconduct in the financial advisory industry as defined in Egan, Matvos and Seru (2016). We also control for the number of cases the arbitrator previously oversaw as well as the number of years the arbitrator has been active in the industry. We include year fixed effects as well as county fixed effects that correspond to the last case the arbitrator oversaw.W Standard errors are in parentheses and are clustered by firm. *** p<0.01, ** p<0.05, * p<0.10.