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ABSTRACT

This paper argues that firms have an informational advantage over consumers in selecting arbitrators in consumer arbitration. We document how the selection process impacts arbitration outcomes by studying roughly 9,000 consumer arbitration cases in the securities industry. Securities disputes present a good laboratory: arbitration is mandatory for all disputes, eliminating selection concerns; the parties choose arbitrators from a randomly generated list, and arbitrators are compensated only if chosen; and the selection mechanism is similar to other major arbitration forums. We document three facts. First, some arbitrators are systematically more industry friendly than others. Second, firms appear to exploit this information: despite a randomly generated list of potential arbitrators, industry-friendly arbitrators are forty percent more likely to be selected. Third, more experienced firms and less sophisticated consumers select more industry friendly arbitrators. We develop and calibrate a model of arbitrator selection with uninformed consumers. We find that competition between arbitrators exacerbates the informational advantage of firms resulting in all arbitrators slanting towards being industry friendly and resulting in roughly $16,000 lower awards. Counterfactuals suggest that several proposals aimed at improving customer outcomes in arbitration, such as increasing arbitrator incentives and increasing the number of strikes, lead to quantitatively more industry friendly arbitration due to firms' informational advantage.

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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. In addition, unlike judges, arbitrators are compensated only if they are selected. 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" (Stipanowich et al. 2010).[2] Despite the growing prevalence of arbitration in resolving consumer disputes, there is little empirical analysis of forces that might shape the arbitrator selection process and the impact of this process on consumer outcomes. This paper attempts to fill this gap.

This paper has two goals. The first is to establish several facts that suggest that some arbitrators are more favorable to the industry than others, and that firms hold an informational advantage over consumers in selecting such arbitrators. We then develop and calibrate a stylized model of arbitrator selection in which firms hold an informational advantage in selecting arbitrators. The model allows us to interpret these empirical facts in equilibrium. Using this model we quantify the advantage of firms, and show that accounting for this advantage is critical in understanding the effects of the proposed policy changes to the current arbitrator selection process and the impact of these changes on consumer outcomes.

We study arbitration in the securities industry using a new data set of roughly 9,000 disputes between consumers and their financial advisers. The securities industry lends itself to studying arbitration because of the data availability and the institutional setting. Our data on securities arbitration comes from the Financial Industry Regulatory Authority's (FINRA) Arbitration Awards Database, which we merge with FINRA's BrokerCheck data using unique case level identifiers. The merged data allow us to observe detailed

[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 arbitration 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" (Stipanowich et al. 2010)

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, implying that there is no selection of firms or consumers into arbitration clauses. 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. Most important for the research design, FINRA randomizes the list of potential arbitrators from which the parties select the arbitration tribunal, which we exploit in our research design.

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 regulator, 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 (Arbitration Agreements, 12 C.F.R. § 1040 2017). Beyond the policy relevance to the brokerage industry, the arbitrator selection system used by FINRA is similar to largest consumer arbitration forums such as the American Arbitration Association (AAA) and the Judicial Arbitration and Mediation Services, Inc. (JAMS).

We start by demonstrating that firms have an informational advantage in selecting arbitrators. We do this in two steps. First, we show that some arbitrators are systematically more industry friendly and others more consumer friendly. Evidence from practitioners and the design of arbitrator selection mechanisms suggest that there are inherent differences across arbitrators (Stipanowich et al. 2010). Our evidence supports this narrative. Accounting for the presiding arbitrator (i.e., incorporating arbitrator fixed effects), helps explain an additional 24% of the variation in arbitration awards over other case characteristics. Differences in awards across arbitrators are substantial. All else equal, a one standard deviation more industry friendly arbitrator awards 12 percentage points (pp) smaller damages relative to the damages requested. For a median case request ($175,000), this would translate to the consumer receiving $21,000 less.

Second, we find that firms have an informational advantage over consumers in choosing favorable arbitrators. The pool from which the parties select arbitrators is randomly generated by FINRA. Nevertheless, industry-friendly arbitrators are forty percent more likely to be selected than their consumer-friendly counterparts.[3] This selection can only arise if firms are better at eliminating consumer friendly arbitrators. The selection mechanism we document has a large impact on the pool of arbitrators who oversee cases and, ultimately, decreases award amounts by about 5pp or roughly $39,250, on average.

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' advantage is driven by their expertise in arbitration. In the securities arbitration data that we analyze, the average firm been involved in 81 different arbitration cases. Such experience may improve firms' ability to eliminate arbitrators who are more likely to deliver

[3]Similarly, Kondo (2006) finds that pro-industry arbitrators were more frequently selected in National Association of Securities Dealers (NASD) arbitrations.

unfavorable outcomes.[4] We confirm that firms, which are more experienced in arbitration, select arbitrators that are relatively more industry friendly than less experienced firms. We also investigate the role of expertise on the consumer side. Consumers might be less sophisticated than firms on average, but also differ in their sophistication (Barber and Odean, 2000; Barber and Odean 2001). We find that consumers who are part of trusts select more consumer friendly arbitrators. This result is consistent with the idea that fund trustees are frequently professionals with experience in legal and financial matters, and therefore more sophisticated. Consumers can potentially compensate for their lack of personal experience by hiring an experienced attorney. We find that consumers whose attorney specialized in arbitration (members of the Public Investors Arbitration Bar Association [PIABA]), select more consumer friendly arbitrators than consumers who do not use an attorney. 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 firms' information advantage in the current arbitrator selection process, we develop and calibrate a stylized model of arbitrator selection. Mirroring the institutional setting, firms and consumers strike arbitrators from a randomly generated list. Arbitrators differ in their underlying beliefs of fair awards. They can depart from these beliefs, and choose how consumer or industry friendly they are, i.e. their slant. Sophisticated firms observe arbitrators' slant; consumers, on the other hand, are uninformed. Because arbitrators are only compensated if they are selected to arbitrate a case, they compete to be selected on the arbitration panel. In doing so, their trade-off their preferences for a fair award with monetary compensation from arbitration.

A key result of the model is that even though the underlying beliefs of arbitrators may be unbiased, competition among arbitrators can drive all arbitrators to intentionally slant their case decisions in favor of firms.[5] In fact, under a benchmark in which arbitrators only want to maximize their monetary payoffs, no arbitrator wants to be the least industry friendly. This induces extreme competition between arbitrators, resulting in all arbitrators being maximally industry friendly. Intuitively, when consumers are uninformed, 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 exchangeability 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 exchangeability when both parties are informed lead to biased outcomes when one party, such as firms in our context, holds an informational advantage.

We calibrate the model and use the estimates to quantitatively evaluate arbitrator bias and the current

[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. 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] In the model slant (i.e. how industry/consumer friendly an arbitrator is) is an endogenous choice of arbitrators and impacted by competition among arbitrators. This concept of slant and competition is similar to the choice of political slant in the media industry (Mullainathan and Shleifer, 2005; Gentzkow and Shapiro, 2006; Gentzkow and Shapiro, 2010).

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 would increase investor awards by 5pp (relative to the amount requested), or $40,000 on average relative to the current system. The model also illustrates that the value of being informed for any individual consumer (summed across consumers) is smaller than the joint value of all consumers being 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 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 of firms. The counterfactuals from the model suggest that several proposals, which would be "consumer friendly" if consumers were informed, are instead industry friendly, once one accounts for firms' informational advantage. For example, increasing arbitrator compensation has been touted to improve arbitration outcomes for consumers. Our estimates suggest that doubling arbitrator compensation would lead to further biased outcomes and decrease awards by 4pp relative to the amount requested ($31,000), on average. Increasing arbitrator compensation 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. Similarly, increasing number of arbitrator strikes has been proposed to increase consumer choice. Instead, it allows the allows the informed party, firms, to have more influence over the selection process and lowers consumer awards.

Finally, we are also able to analyze more involved policy changes like the 2016 FINRA proposal to increase the size of the initial arbitrator selection list from 10 to 15 arbitrators while simultaneously giving the involved parties more control over the arbitrator selection process by giving each party two additional strikes. Our estimates suggest that the two changes work in opposite direction for the consumer: increasing the size of the arbitration pool would result in higher consumer awards while increasing strikes would result in lower awards. Overall, our estimates indicate that this rule change would have a small but negative effect on arbitration awards. These counterfactuals illustrate that accounting for the firms' information advantage is critical when changing arbitration selection schemes. Otherwise, changes meant to improve consumer outcomes hurt consumers instead.

Our empirical analysis and model focus on arbitration in the securities industry. We conclude the paper by discussing how the mechanism we illustrate in our model may extend to other settings and other arbitrator selection systems. We construct two additional data sets covering consumer arbitration cases administered by the other 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— there are systematic differences across arbitrators and industry friendly arbitrators are chosen more frequently. The caveat in these findings is 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, this analysis is consistent with the idea that our insights might apply to consumer arbitration beyond just financial services.

Related Literature

Most broadly, our paper relates to the literature on arbitration. One strand of the literature tests whether arbitrators are statistically exchangeable: that is, 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 arbitrations 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 in New Jersey. The arbitrator selection mechanism operated by the New Jersey Public Employment Relations Commission closely mirrors that of the FINRA's 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. Our works suggests that parties can only do so when informed. 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 (2006), 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 firms 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 between conventional arbitration and final offer arbitration proposed by Stevens (1966), where the arbitrator is required to impose one agent's final offer.[6] 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

[6] 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.

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 this 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 the existing mechanism, which has 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.[7] We document similar evidence for arbitrators. The distinction between arbitrators and judges is that while judge assignment can be random, in arbitration, only the list of arbitrators is random. In fact, 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.[8]

Previous work highlights the importance of trust and investor sophistication in consumer financial markets such as Campbell (2006), Guiso, Sapienza, and Zingales (2008), Gennaioli, Shleifer and Vishny (2015), Agarwal et al (2015), and Garleanu and Pederson (2018). We find evidence suggesting that consumers fail to select arbitrators friendly to their case, which results in a biased pool of arbitrators. This is consistent with the evidence, more generally, that suggests that individual investors underperform in financial markets due to a lack of consumer sophistication (Barber and Odean, 2000; Barber and Odean, 2001; Barber and Odean, 2013; Egan, 2019). These same forces that drive market under performance also potentially drive consumer under performance in arbitration.

Recent work suggests that fierce competition in financial markets can lead to undesirable outcomes, and how redesigning the market can lead to improvements. For example, Budish et al. (2015) shows that competition between traders leads to inefficient arms races in high-frequency trading. Moreover, moving from continuous limit order book market design trading to frequent batch auctions can reduce the arms race. We show that competition between arbitrators can exacerbate the informational advantage of firms in equilibrium, resulting in more biased outcomes. We study different changes to the market for arbitrators, and show that accounting for the lack of consumer sophistication is critical when considering such changes.

Lastly, 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, (2017), and Egan, Matvos, and Seru (2019); and the literature on corporate fraud more generally including Povel et al. (2007),

[7] 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.

[8] 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.

Dyck et al (2010; 2014), Wang et al (2010), Khanna et al. (2015), and Parsons et al. (2015). Using a data set containing the universe of financial advisers in the U.S., Egan, Matvos, and Seru (2019) document the extent of misconduct among financial advisers. More than 5% of advisers in the US have had a consumer dispute that was flagged by regulators, with the average award amount on the order of several hundred thousand dollars. Virtually all of these consumers would have signed a pre-dispute arbitration agreement with their advisers. Our paper relates to this work by assessing the efficiency and fairness of the dispute resolution system in financial services industry.

II Institutional Details: Consumer Arbitration

II.A Consumer Arbitration in the U.S.

Arbitration is a private dispute resolution alternative to civil courts. The United States has a relatively pro-arbitration history dating back to the enactment of the Federal Arbitration Act in 1925 (Southland Corp. v. Keating, 465 US 1, 1984). Through 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 exert significant control in selecting arbitrators, while courts select judges. Third, while judges are frequently paid a fixed salary, arbitrators are only compensated if they are selected for a case. Fourth, 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.[9]

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 consumers 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).[10]

[9] 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).

[10] For example, AAA is listed as potential forum in over 80% of credit card, checking account, prepaid card, and mobile

A unique feature of arbitration across these forums is that both the consumer (claimant) and firm (respondent) have control over the arbitrator selection process. 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. 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 consumer and firm. 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 rank (most preferred) is appointed as the arbitrator. 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).[11] 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 other *consumer* arbitration settings. Consumer arbitration mechanisms differ from those mechanisms used 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. Arbitrators are classified as either "Public" or "Non-public" arbitrators which impacts if and how the arbitrators are selected as described below. "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.[12] FINRA describes the pool of arbitrators as ranging from "from freelancers to retirees to stay-at-home parents" ("Become an Arbitrator Frequently Asked Questions," 2018). 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 only 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. Thus, arbitrators earn up to $600 per day or $725 for arbitrators serving as chairpersons. The typical arbitration case lasts four days, which means arbitrators could expect to earn $1,200-2,900 on the average case depending on whether the arbitrator serves as the chairperson and on the number of hearings per day.[13] In addition, arbitrators are entitled to reasonable local expenses. Therefore, the minimal compensation for an arbitrator is $75 per hour (= $300/4), and

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.

[11] 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.

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

[13] Source: https://www.finra.org/sites/default/files/Education/p117487_0_0.pdf

can be substantially larger for shorter hearings. This is almost twice the median hourly compensation of $39.8 for financial analysts and financial advisers, who comprise a substantial amount of the arbitration pool, and is comparable to the average compensation of federal district judges ($79 per hour).[14] Becoming an arbitrator also offers non-pecuniary benefits. FINRA advertises that arbitrators have the opportunity to "build networks," "gain professional experience," and "acquire knowledge of the securities industry" ("Become an Arbitrator Frequently Asked Questions," 2018). Given the sizable compensation, it is not surprising that FINRA has a large roster of potential arbitrators at its disposal. 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.[15] 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 randomly selects arbitrators. 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.

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 1998 and 2007 Reforms: Changing 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 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.[16]

[14] Adviser compensation data is reported from the BLS: https://www.bls.gov/oes/current/oes_nat.htm#13-0000 [Accessed 11/12/2018]. We calculate the average compensation of federal district judges as the annual salary as of 2006 divided by the number of work hours in a year ($52 \times 40 = 2,080$). Judicial compensation data is from https://www.uscourts.gov/judges-judgeships/judicial-compensation [Accessed 5/6/2019].

[15] See FINRA code 10308 for full details.

[16] 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."

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.

The concern with the arbitrator selection mechanism prior to 1998 and over the period 1998-2007 was that the industry had too much control over the arbitrator selection process. This is consistent with our idea that firms hold an informational advantage in arbitration. We explore the effect of 1998 and 2007 rule changes in Section VI.D.

In 2016, FINRA proposed further changes to the arbitration system. The proposed changes increase the number of arbitrators in the pool to 15 and increase the maximum number of strikes available to each party to 6.[17] 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 this change 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 involving consumer disputes with financial advisers. The claimant is always a consumer and the respondent is always a financial adviser. We observe the details of each arbitration case including the parties involved (claimant, respondent, and arbitrator), the nature of the allegations which are being arbitrated, detailed information on the respondent, 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. We collect some additional data, which we describe in the body of the paper.

FINRA's Arbitration Awards Online Data: FINRA's Arbitration Awards Online contains the details of FINRA and NASD arbitration hearings hearings dating back to 1988. For each of the 53,062 arbitration cases, we collect the case/award documents and systematically parse each document to determine the names and other information regarding the consumer (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 also provide detailed accounts of the nature of the disputes. The data cover consumer arbitration, as well as employment arbitration and arbitration between securities firms. We match the arbitration awards data with FINRA's BrokerCheck data, which provides additional granular details on each consumer arbitration case. The BrokerCheck data only provides details on consumer arbitration cases, which is the focus of our analysis, rather than all arbitration cases (i.e. the BrokerCheck data does not provide details on non-consumer arbitration cases such as employment disputes).

[17] 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]

FINRA's BrokerCheck Data: We use BrokerCheck data to obtain additional data on the respondent, as well as case details, such as specific allegations that triggered the arbitration, requested damages, and arbitration award, all of which we discuss in more detail below. FINRA's BrokerCheck data contains the employment, registration, and disclosure history for all individuals registered with FINRA. We collect the details of each financial adviser to construct a data set of the universe of financial advisers as described in Egan, Matvos, and Seru (2019). If a financial adviser is involved in an arbitration proceeding, the arbitration proceeding is reported on their disclosure record. 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. We match 8,828 consumer arbitration disputes which is the *universe* of arbitration disputes reported in BrokerCheck. The reason the matched data set (8,828 obs.) is smaller than the FINRA Arbitration Awards Online data set (53,062 obs.) is because we restrict our attention to consumer arbitration cases. These matched data represent our main data set. We describe the information we can observe in detail in the next section.

We observe the names of the arbitrators selected for 10,000 additional non-consumer arbitration cases, which are not reported BrokerCheck. Because non-consumer arbitration cases are not reported in BrokerCheck, we do not readily observe any information regarding these non-consumer arbitration cases beyond the name of the arbitrator. These additional non-consumer arbitration cases allow us to examine an arbitrator's total case load in addition to the arbitrators consumer arbitration case load.

III.B Summary Statistics: Cases and Arbitrators

Our baseline data set consists of 8,828 consumer arbitration cases and 20,231 arbitrator-by-case observations. Roughly 13% of consumer complaints in arbitration involve multiple financial advisers. In the same complaint and arbitration proceeding consumers can bring 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 consumer/adviser complaint level.

III.B.1 Cases, Firms, and Consumers

Our primary unit of observation is 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 distribution of awards granted as a percentage of 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 claim if they are granted a formal motion to amend the claim (FINRA 12309).

We observe detailed information on each dispute. In Table 1 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 average accompanying case document contains roughly 1,430 words.

Our data set also contains detailed information on the respondent, i.e. the financial adviser named in the consumer 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 a Series 63 license, allowing them to transact in securities in a given state, and a Series 7 license, which allows 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 responding adviser–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, 2019). Our data therefore allow us to measure a broad range of respondent characteristics.

From the perspective of consumers, we observe details on whether or not the consumer used legal representation during arbitration. Consumers use an attorney in roughly 88% of our observations. However, not all attorneys are necessarily the same. 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 attorneys representing consumers in our data set to the roster of attorneys posted on the PIABA website by first and last name. Consumers use attorneys who are PIABA members in 17% of our observations. We also observe details on the name of the consumer claimant. In roughly 17% of the observations, the consumer is a part of a trust. We use this variation in consumer type and representation as proxies for sophistication in our analysis.

III.B.2 Arbitrators

We observe 7,891 unique arbitrators and, most importantly for our analysis, we observe repeated observations for 3,917 arbitrators in our sample of 20,231 arbitrator-by-case observations. The arbitration panel size typically consists of one to five arbitrators, with three being the modal panel size. The average arbitrator in our sample oversees 8.3 total arbitration cases (including non-consumer dispute arbitration cases) and 4.5 consumer dispute arbitration cases. Figures 2a and 2b display the distribution of arbitrator case experience at the case level. Both Figures 2a and 2b illustrate that even though many arbitrators have little case experience, the arbitrator who oversees an average case tends to have a lot of experience. There are many arbitrators with extensive experience, who, almost tautologically, oversee a lot of cases in our sample. 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. Such

arbitrators average 3.9 certifications and have been employed in the industry for 14 years on average, which is in line with averages in the financial advisory industry (Egan, Matvos and Seru, 2019)

IV Differences between Arbitrators, and Arbitrator Selection

The arbitrator selection process is based on the premise that arbitrators differ in how favorable they will be to either party. These differences across arbitrators are why both parties are allowed to eliminate arbitrators in the first place. We measure systematic differences between arbitrators in their awards. The benchmark for this result is statistical exchangeability of arbitrators, i.e arbitrators should not differ in equilibrium. The argument is that even if arbitrators differ in their underlying preferences, the elimination of unfavorable arbitrators by both sides should provide arbitrators incentives not to differ in systematic ways *in equilibrium* (Ashenfelter 1987). Here we reject this null hypothesis, and use data on repeated arbitrator interactions and case characteristics, to measure how "industry friendly" an arbitrator is.

IV.A Arbitrator Industry Friendliness

To construct our measure of arbitrator 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:

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

Observations are at the arbitrator-by-case level. i indexes the arbitration case, j indexes the financial advisory firm involved in the case, k indexes the location, l indexes the arbitrator, and t indexes time. The dependent variable $Awarded_{ijkt}$ reflects the award granted through arbitration divided by the award requested for a particular case. In other words, if $Awarded = 1$ then the arbitrator granted the consumer 100% of the award the consumer requested. In the appendix we replicate our baseline analysis where we instead examine the log of awards granted through arbitration as function of case observervable characteristics and the log of awards requested. The object of interest are arbitrator fixed effects, μ_l, which measure whether an arbitrator, conditional on case characteristics, awards higher claims to consumers than other arbitrators at the same location at the same arbitration forum. An arbitrator l who is more industry friendly than arbitrator l' will have a lower associated fixed effect $\mu_l < \mu_{l'}$. This measure is relative: we do not measure whether arbitrators awarded too much or too little relative to some "correct" amount. We measure if arbitrators awarded more or less relative to other arbitrators. In Section VI.B we use a model to estimate the arbitrators' beliefs on what the fair or correct award would have been.

When estimating how industry friendly an arbitrator is, we condition on case characteristics, X_i. We describe the case characteristics in more detail in the data section. In addition, we control for the 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. Because the industry is heavily regulated, 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, and there are large differences in misconduct propensities across financial advisory firms (Egan, Matvos, and

Seru, 2019). We therefore condition on advisers' past misconduct and experience to account for the potential merit of the claim. We also include adviser firm 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.

We also include time and location fixed effects. In other words, we compare how industry friendly an arbitrator is relative to other arbitrators in the same location and at the same point in time. We include fixed effects for both the location of the arbitration hearing as well as county fixed effects corresponding the office location of the offending adviser. FINRA operates seventy different arbitration hearing locations for the arbitration proceedings, and we include a fixed effect the hearing location.[18] Including fixed effects for the location of the arbitration hearing as well as the office location of the offending adviser helps control for possible geographic differences in claims and arbitrators. These can arise because of differing local regulations, local supply and demand conditions, arbitrator pools, or competition between arbitrators. Time fixed effects help account for aggregate differences in claims.

Table 2 displays the corresponding estimates. The observable arbitrator, adviser, and case characteristics explain 39% of the variation in awards without the knowledge of the arbitrator, i.e. without arbitrator fixed effects (column 3). For example, cases involving options have 9-13 percentage points (pp) lower awards on average, while cases involving fee and commission related allegations have 7-11pp higher awards. Arbitrations 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 column (4) confirm that arbitrators differ in their degree of industry friendless. Including arbitrator fixed effects increases the R^2 from 39% to 63%. 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 industry/consumer friendliness. Because individual arbitrator fixed effects are estimated with noise, the estimated differences in industry/consumer friendliness among arbitrators will be larger than the true underlying differences between them. We account for noise by constructing empirical Bayes estimates of arbitrator industry/consumer friendliness, $\widehat{\mu_l^{EB}}$ (e.g., Jacob and Lefgren, 2008; Kane and Staiger, 2008; and Chettty, Friedman, and Rockhoff, 2014). We do so by re-scaling the estimated distribution of arbitrator fixed effects from column (4) of Table 2 such that $\widehat{\mu_l^{EB}} = \alpha(\widehat{\mu}_l - \bar{\mu})$, where $\bar{\mu}$ is the average OLS estimated fixed effect and α is the appropriate scaling factor. 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). The estimated scaling factor suggests that actual differences across arbitrators accounts for about 31% of the variation in the distribution of OLS estimated fixed effects. In much of our proceeding analysis, the independent variable of interest is an arbitrator's bias, which we proxy for using our empirical Bayes estimated arbitrator fixed effects. The empirical Bayes estimator simply rescales the distribution of OLS fixed effects by a constant factor; therefore, using the empirical Bayes fixed effects, rather than OLS estimated fixed effects, as independent variables in our proceeding regressions will impact the estimated magnitude of our coefficient estimates but will not impact inference.[19]

[18] We observe the hearing location for roughly half of our observations. For the remaining observations we determine the arbitration hearing location based on the hearing location that is located closest to the office of the offending adviser.

[19] Under the assumption that thee variance of the estimation error is homoskedastic, the appropriate rescaling term α is

We plot the distribution of estimated fixed effects in Figure 2c. We normalize the mean of fixed effects to match the average percent of awards 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 that there are substantial differences across arbitrators. 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 relative to the amount requested, 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 and Industry Friendliness

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 firms, while others are more friendly to consumers. The idea behind the striking and ranking is that parties can reduce favoritism in awards by eliminating arbitrators most favorable to the other party. Here, we test whether firms or consumers are better at choosing arbitrators by eliminating those favoring the other side. 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' favoritism of a specific side would not help them to be selected. Alternatively, if firms are better at eliminating unfriendly arbitrators than consumers, then industry friendly arbitrators would be chosen with a higher probability on average. 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 a negative relationship between an arbitrator's estimated fixed effect (fixed effect obtained from column (4) of Table 2) and the number of times she is selected to arbitrate. In other words, arbitrators who grant larger awards to consumers, given case characteristics, are less likely to be selected. This is despite their having equal chances of making it on the list, which is randomly generated. These results therefore suggest that consumer friendly arbitrators face higher chances of elimination than industry friendly arbitrators.

We next examine an arbitrator's *first ruling in her career*, and see her future prospects of being selected for arbitration in Figure 4.[20] The first award is likely the most salient ruling from which the parties update most on the arbitrators type. 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 consumer 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 being selected on average.

Building on the results from Section IV.A, we use empirical Bayes estimates of arbitrator fixed effects $\widehat{\mu^{EB}}$ as a measure of their consumer/industry friendliness. Since the empirical Bayes adjustment only re-

constant for each arbitrator. If we were to relax the homoskedasticity assumption, the appropriate scaling factor would vary across each arbitrator based on the number of times the arbitrator is selected. Because we are in primarily interested in how often an arbitrator is selected as a function of his/her fixed effect, we prefer to maintain the assumption that the error terms are homoskedastic. Rescaling the fixed effects based on how often an arbitrator is selected could induce a mechanical correlation between the re-scaled fixed effects and how often an arbitrator is selected.

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

scales OLS fixed effects, it aids in interpreting the magnitudes, but does not affect the regression estimates otherwise. More formally, we examine how an arbitrator's estimated fixed effect $\widehat{\mu_l^{EB}}$ impacts her probability of being selected in 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. [21] l indexes the arbitrator, k indexes the location, and t indexes time. $Selected_{lkt}$ 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 fixed effect $\widehat{\mu_l^{EB}}$. The term X_{lt} is a vector of arbitrator controls that include the number of years she has been active in the industry. In the most saturated specification, we include year fixed effects and include fixed effects for both the location of the arbitration hearing as well as county fixed effects corresponding to the office location of the offending adviser. Including fixed effects for the location of the arbitration accounts for the fact that some hearing locations may have a smaller pool of arbitrators to choose from relative to the case load, or that types of cases may differ across locations. We compute the location fixed effects based on the previous case the arbitrator oversaw.

The estimates presented in Table 3 show that consumer friendly arbitrators are less likely to be selected from a randomly generated panel of arbitrators. We observe a negative and significant relationship between an arbitrator's fixed effect $\widehat{\mu_l^{EB}}$ and the probability an arbitrator is selected across specifications. Recall that a greater fixed effect ($\widehat{\mu_l^{EB}}$) implies that the arbitrator was more consumer friendly and less industry friendly. We standardize the arbitrator fixed effects in units of standard deviation to ease interpretation in the corresponding regression table. The average probability that an arbitrator is selected to any arbitration case in a given year is 11%. Therefore, the estimates in column (1) indicate that a one standard deviation increase in an arbitrator's industry friendliness is associated with a roughly 12% (1.27pp) increase in the probability of being selected in a given year.

For an alternative interpretation of the results, suppose random arbitrators would be selected to cases instead. The average arbitrator fixed effect ($\widehat{\mu_l^{EB}}$) weighted by the probability of being selected in a given year is 5pp lower than the average fixed effect among the unconditional distribution of arbitrators. Given that the median (mean) award is 32% (51%), this represents an 16% (10%) decrease in in awards to consumers. In dollar terms, this represents a $8,750 decrease for the median requested claim or a $39,250 decrease for the mean requested claim. These estimates suggest that industry friendly arbitrator selection has a meaningful impact on eventual awards.

IV.C Mechanism

We find that consumer friendly arbitrators are less likely to be selected into arbitration from a randomly generated panel. In this section, we delve deeper into the mechanism that gives firms the advantage in arbitrator selection. 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). In our data, the average firm is involved in 81 consumer dispute arbitrations. We show evidence consistent with the idea that firms' experience allows them to choose more favorable arbitrators, and that the relatively more sophisticated consumers are better at choosing arbitrators. Second, our results

[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 she's been active in the industry, number of cases in the data set she has overseen to adjust different attrition rates among arbitrators.

suggest that firms choose better arbitrators because they are better at eliminating those who are consumer friendly. If this is the case, then reducing the number of arbitrators that parties can eliminate should reduce firms' advantage. We exploit a 2007 rule change in the arbitrator selection process, which reduced the number of arbitrators that could be eliminated by either party, to test this conjecture.

IV.C.1 Firm and Consumer Sophistication

We now provide more direct evidence that parties which are more experienced in arbitration are better informed about which arbitrators to eliminate. On the firm side, we measure 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, allowing the firms to design a better "strike list," 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 differ in their sophistication. For example, when a consumer is a part of a trust, the trustee has a fiduciary duty to the beneficiary of the trust. Moreover, the trustee can be a professional, such as an attorney or accountant, who might be more sophisticated than the average consumer. Consumers can also become informed by hiring attorneys, especially those who specialize in securities arbitration (PIABA attorneys). As noted earlier, consumers are represented by PIABA attorneys in roughly 17% of the observations in our database. Also, some consumers may inherently be more sophisticated than others. We examine the fixed effect of the arbitrator l selected to case i as a function of firm and consumer sophistication:

$$\widehat{\mu_{il}} = \phi_0 + \phi_1 Attorney_i + \phi_2 PIABA_i + \phi_4 Trust_i + \phi_5 Firm\_Experience_i + \varepsilon_{il}. \tag{3}$$

Observations are at the arbitrator-by-case level. i indexes the arbitration case and l indexes the arbitrator. The dependent variable $\widehat{\mu_{il}}$ measures the fixed effect of the arbitrator l selected for case i. The estimated arbitrator fixed effects correspond to eq. (1) where a higher fixed effect implies that the arbitrator gives out higher awards on average. The independent variable $Attorney_i$ indicates whether the consumer used an attorney, $PIABA$ indicates whether the consumer used a PIABA attorney, and $Trust_i$ indicates whether the consumer is part of a trust. $Firm\_Experience_i$ indicates whether the firm has above median arbitration case experience in terms of number of consumer arbitration cases a firm is involved in. The omitted category is when the consumer is self-represented/does not use an attorney, is not part of trust, and faces a less experienced firm.

Table 4 displays the corresponding estimates. We find evidence that consumers who use attorneys tend to select more consumer friendly arbitrators. Arbitrators overseeing their cases grant 3.48pp higher awards on average (column 2). Hiring an attorney, especially one that specialized in arbitration, helps consumers compensate for their lack of sophistication. For example, consumers who use a PIABA attorney have their cases overseen by arbitrators whose awards are 10.23pp (=3.48+6.75) higher than in cases where consumers who are self represented (column 2).[22] Moreover, our results also suggest that more sophisticated consumers choose more consumer friendly arbitrators: the arbitrators chosen when consumers are a part of a trust grant 9.60pp higher awards on average (column 2).

[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.

We argue that firms partially derive an advantage in arbitrator selection through their extensive experience in arbitration: the average firm in our data is involved in 81 consumer dispute arbitrations. Consistent with this idea, we find that firms more experienced in arbitration also select arbitrators that are more industry friendly. The results in column (1) indicate that firms with above median experience select arbitrators that tend to give out 3pp lower awards relative to the amount requested. In other words, parties' expertise in arbitration allows them to select more favorable arbitrators.

IV.C.2 Changing the Number of Strikes: 1998 and 2007 Arbitration Rule Changes

As we describe in Section II.B.1, the rules governing the selection of arbitrators were updated in 1998 and 2007. Prior to November 1998, the industry sponsored regulator (NASD) was solely responsible for selecting arbitrators. Due to concerns that the arbitrator selection process was unfair to consumers, in 1998 NASD updated the rules and gave both consumers and firms control over the arbitrator selection process. Firms and consumers were given a list of ten arbitrators and both parties could strike/remove an unlimited number of arbitrators from the list. Again due to concerns that the arbitrator selection process was unfair to consumers, in 2007 the rules were updated such that the number of arbitrators each party could strike was limited to four. If firms' advantage in arbitration comes from the selection of industry friendly arbitrators, the 1998 and 2007 rule changes should have reduced this advantage. In other words, an industry friendly arbitrator's chance of being selected should decline post reforms. We test this by re-estimating the arbitrator selection linear probability model (eq. 2), but allow the relationship between an arbitrator's fixed effect and selection probability to vary around the time period of the rule changes. Specifically, we estimate the following linear probability model

$$\begin{aligned} Selected_{lkt} = {} & \gamma \widehat{\mu_l^{EB}} \\ & + \gamma_{1999 \leq t < 2008} \widehat{\mu_l^{EB}} \times \mathcal{I}_{1999 \leq t < 2008} \\ & + \gamma_{t \geq 2008} \widehat{\mu_l^{EB}} \times \mathcal{I}_{t \geq 2008} \\ & + \beta X_{lt} + \delta_t + \delta_k + \eta_{lkt} \end{aligned} \tag{4}$$

Our observations are at the arbitrator-by-year level. l indexes the arbitrator, k indexes the location, t indexes time, and $\mathcal{I}$ is an indicator variable designating a time period. The term $\gamma_{1999 \leq t < 2008}$ measures how the relationship between an arbitrator's fixed effect and her probability of being selected changed after the 1999 rule change, from 1999-2008. Similarly, the interaction term $\gamma_{t \geq 2008}$ measures how the relationship between an arbitrator's fixed effect 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. In the most saturated specification we include year fixed effects (δ_t) and location fixed effects (δ_k) corresponding to the location of the past case the arbitrator worked on.

The estimates in Table 5 show that both rule changes significantly decreased the probability that industry friendly arbitrators are selected. Prior to the 1998 rule change, a one standard deviation increase in an arbitrator's consumer friendliness decreased her probability of being selected by approximately 4.57pp (42%) (column 1). After the 1998 rule change, both firms and consumers were given control over the arbitrator selection process and could strike/remove an unlimited number of arbitrators from a randomly drawn list of potential arbitrators. During the period 1999-2007, the same increase in arbitrator friendliness represented a 1.72pp (=4.57-2.85) decrease in the probability of being selected (column 1). In other words, the benefit

of pro-industry friendliness decreased dramatically following the reform. Lastly, 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 0.2pp (=4.57-4.37) decrease in the probability of being selected. These results are consistent with the notion that firms posses substantial superior information about arbitrators relative to consumers, which lends them an advantage in the arbitration process. As the industry's control over the selection process diminished in 1998 and again in 2007, the relationship between an arbitrator's past industry friendliness and probability of being selected diminished as well. These results are in line with the predictions of the arbitration model we present in Section V; our quantitative model indicates that changing the number of strikes will have a dramatic impact on which arbitrators are selected to a case (Section VI.D.1; Figures 9ai and 9aii).

IV.D Robustness

IV.D.1 Selection on Observables

We find that more industry friendly arbitrators are more likely to be selected in the future. Our specifications control for a plethora of case and firm characteristics, such as the product involved and allegations, as well as the responding adviser's qualifications/licenses, experience, and past misconduct. A potential concern is that industry friendly arbitrators in fact arbitrate cases, which would on average have lower awards and that are more common. We believe this is unlikely. There is no a priori reason to believe that sorting would work that way; there would have to be an omitted case characteristic that is correlated with both lower awards and a higher frequency of cases. More importantly, the alternative has a difficult time explaining why the advantage of industry friendly arbitrators declines after the 1998 and 2007 reforms and why firms' and attorneys' experience in arbitration process play a role in arbitrator selection. Nevertheless, we examine which case characteristics are correlated with arbitrators being selected multiple times:

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

Observations are at the arbitrator-by-case level; i indexes the arbitration case, j indexes the financial advisory firm involved in the case, k indexes location, l indexes the arbitrator, and t indexes time. The dependent variable $Experience_{ijklt}$ measures the total number of consumer dispute cases an arbitrator has previously overseen as of time t. We control for the observable case characteristics in X_{jt} as well as location fixed effects corresponding to the offending adviser's office location and arbitration hearing location, and time fixed effects. We also control for the arbitrators' tenure as an arbitrator as measured by 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 our 19 observable characteristics that describe the nature of the case (5). We only find one statistically significant relationship: cases involving unauthorized activity have less experienced arbitrators, but the effects are modest. The results in column (1) indicate that arbitrators appointed to cases involving "Unauthorized Activity" have -0.08 less case experience on average. Even if case characteristics were completely orthogonal to the selected arbitrator's level experience, which they do not have to be since we control for them explicitly, there is roughly 86% chance ($= 1 - (0.9)^{19}$) we would find one or more statistically significant coefficients. 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 associated with arbitrator experience are associated with significantly higher awards. The lack of selection on observable characteristics, combined

with our other results, suggests that selection on unobservables, while possible, is not likely.

IV.D.2 Settling vs. Arbitrating Cases

Rather than going directly to arbitration, consumers and brokerage firms can try to negotiate a settlement. In BrokerCheck data we observe the resolution of all customer disputes, including settlements. Here, we examine the types of customer disputes that are arbitrated versus settled. Similar to our consumer arbitration data set, for each dispute we also observe the allegations, product involved, and the characteristics of the offending adviser as well as the settlement/award requested by the consumer and the agreed settlement/award. We examine which consumer disputes are arbitrated versus settled using the following linear probability model:

$$Arbitration_{ijkt} = \beta X_i + \mu_j + \mu_k + \mu_t + \epsilon_{ijkt} \tag{6}$$

Observations are at the consumer dispute level; i indexes the customer dispute, j indexes the firm involved in the dispute, k indexes the location of the dispute, and t indexes time. The dependent variable $Arbitration_{ijklt}$ is a dummy variable equal to one if case i was resolved through arbitration and is equal to zero if the case was settled. The vector X_i reflects a set of case level characteristics. As described previously, we control for the 11 different allegations and six different financial products covered in the case. We also control for the size of the case in terms of the award/settlement requested. In addition, we also control for the offending adviser's experience, the six most popular qualifications, the adviser's total number of qualifications, and any past record of misconduct. We include county fixed effects corresponding to the office location of the offending adviser to account for any geographic differences in arbitration. Similarly we include fixed effects for the firm employing the adviser because firms may have different propensities to settle versus arbitrate a case.

Table 7 presents the results corresponding to our linear probability model (eq. 6). One of the best predictors of whether a case gets arbitrated is size. Larger cases, in terms of the award/settlement requested, are more likely to be arbitrated rather than settled. The results in column (3) indicate that moving from the 10^{th} to the 90^{th} percentile in terms of the size of the case, increases the probability that the case is arbitrated by 4.9%. The result is intuitive. Given arbitration is costly for the parties, and involves fees paid to the arbitrators, the cost of legal representation, and opportunity cost of time, the parties involved may choose to settle smaller cases.

IV.D.3 Awards Granted or Requested and Other Robustness

In Appendix A we explore several robustness checks related to our measure of arbitrator industry/consumer friendliness $\widehat{\mu_l^{EB}}$. First, in our baseline analysis, we construct $\widehat{\mu_l^{EB}}$ using the full sample arbitration outcomes. In other words, we use information that was not available to parties when deciding on an arbitrator at a given time t. In Appendix A, we replicate our analysis using a backwards looking measure of arbitrator industry/consumer friendliness that is constructed using only information available up to time t. Our main inferences on arbitrator selection are unchanged.

Second, we construct alternative measures of arbitrator industry/consumer friendliness based on the log of the award granted. In our baseline analysis we construct our arbitrator fixed effects by regressing the variable $Awarded_{ijkt}$, which measures the award granted through arbitration divided by the award requested, on a vector arbitrator fixed effects and observable case characteristics. One might be concerned that normalizing awards granted by awards requested could introduce additional noise into our measure of arbitrator fixed

effects. For example, consumers may mis-target their awards requested which could potentially anchor case outcomes (Bordalo, Gennaioli and Shleifer 2015). As a robustness check, we construct our arbitrator fixed effects by regressing $\ln AwardGranted_{ijkt}$ on a vector of arbitrator fixed effects and observable case characteristics. In the Appendix we show that our main inferences on arbitrator section are unchanged with this alternative measure of arbitrator industry/consumer friendliness.

Finally, we also explicitly explore whether consumers factor in arbitrator industry/consumer friendliness when initially requesting awards for a case. This is highly unlikely: FINRA arbitration rules require that awards/claims must be formally requested before the arbitration panel has been appointed and can only be amended thereafter if the arbitration panel grants a formal motion to amend (FINRA Rule 12309). Nonetheless, we investigate the possibility that consumers factor in arbitrator industry/consumer friendliness when requesting awards in Appendix A. We find no relationship between *requested* awards and arbitrator industry/consumer friendliness in each specification.

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. Moreover, consumer friendly arbitrators are less likely to be selected for arbitration. 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. We illustrate that competition between arbitrators can be a desirable property of the arbitrator selection system when both parties are equally informed. The same competition can exacerbate biased outcomes when one party holds an informational advantage. Second, we use the model to evaluate 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 calibrate the model. The results presented above show that some arbitrators are relatively more industry friendly than others; the model allows us to recover arbitrators' underlying beliefs over what the correct or fair award should be. We use the estimates to assess the quantitative impact that the informational advantage of firms has on arbitration outcomes in equilibrium. While we apply the model to securities arbitration, its features are equally applicable to consumer arbitration proceedings more generally, and to other arbitrator selection mechanisms which we discuss 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 their slant, i.e. how industry or consumer friendly they are going to be. In choosing slant, arbitrators 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 Consumers, Firms, 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 as $U_C = a_G$ and the payoff to the firm 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, or the resulting equilibrium. It would affect parties' preferences over alternative arbitration mechanisms, which we discuss in Section VI.D.

Arbitrators: Arbitrators trade-off monetary incentives associated presiding over on a case against 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 who are only motivated by fairness concerns. As we discuss below, both features are important in order to capture arbitrator behavior in the data.

Conditional on the observable case characteristics, each arbitrator has an inherent belief $b_i \epsilon [0,1]$ regarding the fair award for the arbitration case.[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. 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 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 firm's and consumer's expectations of the award a_i that the arbitrator would grant if she is selected, 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 arbitrating a case. To keep the notation simple, we assume that the arbitrator's slant directly commits them to an award, rather than a noisy unbiased signal of the award, which would not alter the analysis.

Arbitrators can have a sense of fairness. When their decisions depart from their beliefs of fair awards, $a_i \neq b_i$, they suffer a disutility of $\theta |a_i - b_i|$. 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 arbitrator's 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 $\Gamma(a_i, G(\cdot))$. As we show later, an arbitrator's probability

[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)

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:

$$U(b_i, a_i) = \Gamma\left(a_i, G\left(\cdot\right)\right)\left(f - \theta|a_i - b_i|\right) \tag{7}$$

Consumer Sophistication: In the empirical setting we study, the firms are frequently large institutions that engage in arbitration repeatedly, while consumers typically only engage in arbitration once. Consistent with our empirical setting and analysis, we assume that firms are the informed party. They recognize arbitrators' slants and can therefore predict their awards when choosing among them. Consumers, on the other hand, are uninformed, and do not observe/anticipate how a given arbitrator will award a case. For ease of notation, we define $\mu_C = 0$ as the share of consumers who are informed. We compare the model of uninformed consumers to the case in which consumers are fully informed, $\mu_C = 1$.

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 $a_G = a_j$. Firms observe the slant $a_1, a_2, ..., a_n$ of each arbitrator appearing on the randomly generated list. Consumers, being uninformed, do not observe the slant. Given the equilibrium distribution of slant $G(\cdot)$, we denote $\widetilde{G}(\cdot)$ the distribution of awards granted through arbitration, $a_G \sim \widetilde{G}(\cdot)$.

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. 7) by choosing their slant and taking the strategies of firms, consumers, and other arbitrators in the pool as given.

V.B Equilibrium: Arbitrator Selection, Slant, 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 competition among arbitrators exacerbates the pro-industry bias in arbitration outcomes.

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

We first analyze which arbitrators are selected by consumers and firms, taking arbitrator equilibrium slant, $G\left(\cdot\right)$, 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. The firm, being informed, will find it optimal to always strike the arbitrators with the k highest (most consumer friendly) slant. By contrast, uninformed consumers 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:

$$\Gamma(a, G(.)) = \frac{1}{n-k} P(a_i; 1, n-k, n) \tag{8}$$

where $P(a_i; l, m, n) = \sum_{j=l}^{m} \frac{(n-1)!}{(j-1)!(n-j)!} G(a_i)^{j-1}(1-G(a_i))^{n-j}$ denotes the probability that the arbitrator is between the $l'th$ and $m'th$ order statistics among a sample of n arbitrators.

This expression highlights the role that different information structures play in the selection of arbitrators for a given arbitrator pool. Suppose that consumers are uninformed ($\mu_C = 0$), then firms first strike k most consumer friendly arbitrators, with the highest slant. Formally, an arbitrator is only selected if she is one of the $n-k$ lowest order statistics of the distribution of slant among the set of n arbitrators. Thus, the probability an arbitrator is selected is decreasing in her slant a. Intuitively, arbitrators who are more industry friendly are more likely to be selected.

Conversely, if consumers are informed ($\mu_C = 1$), then the arbitrators in either tail of the distribution face elimination, and the probability that an arbitrator is selected becomes

$$\Gamma(a, G(.)) = \frac{1}{n-2k} P(a_i; k+1, n-k, n)$$

Informed consumers remove k arbitrators with the most pro-industry (lowest) slant, and firms remove the the k arbitrators with highest slant. Thus, an arbitrator is only selected if she is one of the $k+1 : n-k$ middle order statistics of the distribution of slant among the set of N arbitrators appearing on the list. The striking mechanism helps eliminate extreme outcomes, and the closer an arbitrator's slant (a) is to the median, the higher the probability she is selected. 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 pro-industry 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 that will minimize their chance of being struck from the arbitrator panel by an informed firm or

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:

$$max_{a_i}\Gamma(a_i, G(\cdot))\left(f - \theta\left|a_i - b_i\right|\right) \tag{9}$$

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

$$|a_i - b_i| = \frac{f}{\theta} - sgn(a_i - b_i) \times \frac{\Gamma(a_i; G(\cdot))}{\gamma(a_i; G(\cdot))} \forall a_i \neq b_i \tag{10}$$

where $\gamma(a_i; G(\cdot) = \frac{\partial\Gamma(a_i;G(\cdot))}{\partial a}$. 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. Firms eliminate the k most consumer friendly arbitrators from the pool. Therefore the probability an arbitrator is selected is decreasing in her slant a, $\gamma(a, G(\cdot)) < 0$. This implies that $a_i \leq b_i$. The choice in slant becomes:

$$a_i = \min\left\{b_i - \frac{f}{\theta} - \frac{\Gamma(a_i; G(\cdot))}{\gamma(a_i; G(\cdot))}, b_i\right\} \tag{11}$$

This expression shows the extent of an individual arbitrator's pro-industry bias. All arbitrators choose their slant to be more industry friendly than their underlying belief, $a_i < b_i$, as long as $\frac{f}{\theta} + \frac{\Gamma(a_i;G(\cdot))}{\gamma(a_i;G(\cdot))} > 0$. 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. The term $\frac{f}{\theta}$ is the fee that the arbitrator earns in utility terms if she is selected. Arbitrators will choose their slant equal to their beliefs $a_i = b_i$—will award what they think is fair—if the marginal benefit of slanting their award is less than the marginal cost when $a_i = b_i$ such that $\frac{f}{\theta} + \frac{\Gamma(b_i;G(\cdot))}{\gamma(b_i;G(\cdot))} \leq 0$. In other words, arbitrators will find it optimal to skew pro-industry and grant lower awards relative to their true beliefs.

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):

$$a_i = \min\left\{b_i - \frac{f}{\theta} + \frac{\int_{b_i}^{\bar{b}}\Gamma(\tilde{b}, F(\cdot))d\tilde{b}}{\Gamma(b, F(\cdot))}, b_i\right\} \tag{12}$$

This expression clearly illustrates that the equilibrium distribution of arbitrator slant is more industry friendly than the underlying distribution of arbitrators' true beliefs when consumers are uninformed. We use the closed form expression (12) when computing counterfactual equilibria. This allows us to closely link

the model with actual policy proposals that have been put forth in the past in Section VI.D.

V.B.3 Discussion: Arbitration Outcomes, Extreme Competition, and Statistical Exchangeability

A key result from the model is that when firms are the only informed party, the arbitrator selection mechanism results in a distribution of awards granted $\widetilde{G}(\cdot)$ that is biased downwards in favor of the industry relative to the the distribution of slant $G(\cdot)$, which is itself biased in favor of the industry relative to the underlying distribution of arbitrator beliefs $F(\cdot)$. To illustrate this result, Figure 5 displays the densities of awards granted $\widetilde{g}(\cdot)$, slant $g(\cdot)$, and beliefs $f(\cdot)$ that we estimate in the proceeding section. As we show in the model, the distribution of beliefs stochastically dominates the distribution of slant, and the distribution of slant stochastically dominates the distribution of awards granted. Thus, the awards granted by arbitrators are substantially lower than what arbitrators believe is fair. The intuition behind this result is straightforward. There are two mechanisms contributing to this result. First, there is a "striking effect" captured in eq. (8). The k most consumer friendly arbitrators are struck from the randomly generated list. The striking effect shifts the distribution of awards granted $\widetilde{G}(\cdot)$ downwards relative to the equilibrium distribution of arbitrator slant, $G(\cdot)$, as illustrated in Figure 5. The striking effect induces a "competition effect." Arbitrators compete to be selected to earn the fee f. They do so by deviating from their beliefs in choosing a more pro-industry slant, $a_i \leq b_i$ (eq. 11 and 12). The distribution of arbitrator slant $G(\cdot)$ is industry friendly relative to the distribution of arbitrator beliefs on what a "fair" awards should be, $F(\cdot)$.

In the extreme limiting example where arbitrators only care about monetary incentives ($\lim \theta \to 0$), the competition effect 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 equilibrium 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.

Intuitively, when arbitrators only maximize monetary payoffs, they all select the same slant in equilibrium, and therefore grant the same awards. In that case, the competition effect results in the "Statistical Exchangeability" of arbitrators such that the identity of the arbitrator does not affect arbitration outcomes (Ashenfelter, 1987). Interestingly, while arbitrator exchangeability is frequently seen as a sign of fairness (Ashenfelter 1987), this is not the case when consumers are uninformed. Even though all arbitrators reach the same decision, i.e., are exchangeable, but this decision is quite "unfair", since all arbitrators are as industry friendly as possible, $a_i = 0$.

Our empirical results reject arbitrator exchangeability in securities arbitration. 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 exchangeability.

In the Appendix we also solve for the equilibrium distribution of arbitrator slant when consumers are informed ($\mu_C = 1$). 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.

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 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, quantitatively linking the model with current and past policy proposals.

VI.A Calibration

We calibrate the model using the arbitration data set detailed in Section III. We use the observed distribution of arbitrator fixed effects to recover the underlying distribution of slant $G(\cdot)$ and the underlying distribution of arbitrator beliefs $F(\cdot)$. The intuition behind the estimation 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 a_i, as we describe below. Given the other arbitrators' equilibrium choice of slant, we can infer every arbitrator's true beliefs b_i from her own choice of slant a_i as follows:

$$\begin{aligned} b_i &= \max\left\{a_i + \frac{f}{\theta} + \frac{\Gamma\left(a_i; G\left(\cdot\right)\right)}{\gamma\left(a_i; G\left(\cdot\right)\right)}, a_i\right\} \\ &= \max\left\{a_i + \frac{f}{\theta} + \sum_{j=1}^{n-k}\binom{n-1}{j-1}\frac{(n-1)!}{(j-1)!(n-j)!}\frac{G(a_i)(1-G(a_i))}{g(a_i)\left(j-1-(n-1)G(a_i)\right)}, a_i\right\} \end{aligned} \tag{13}$$

In order to recover the true beliefs, b_i for an arbitrator with slant a_i, we need to observe the arbitrator fee, disutility from deviating from ones beliefs θ, which we have to calibrate, and the unconditional density and distribution of arbitrator slant $G(\cdot)$ and $g(\cdot)$. We parameterize and calibrate the model as follows.

We estimate the distribution $G(\cdot)$ and density $g(\cdot)$ of slant non-parametrically 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, $\tilde{G}(\cdot)$ rather than the distribution of arbitrators in the population $G(\cdot)$. Because k consumer friendliest arbitrators are removed from the randomly generated list of n arbitrators we observe the distribution of slant a_i conditional on a_i not being one of the k highest order statistics. The idea is analogous to only observing the winning bid in first price auctions. Formally, the distribution $\widetilde{G}(\cdot)$ represents a weighted average of the $n-k$ first order statistics of $G(\cdot)$. To obtain the unconditional distribution of slant, $G(\cdot)$, we proceed in two steps. We first estimate $\widetilde{G}(\cdot)$ from the data non-parameterically using the empirical distribution function. Then we use the model to invert into the underlying distribution given the striking behavior of firms:

$$\widetilde{G}(a_i) = \sum_{i=k}^{n-1} \left(\sum_{j=n-i}^{n} \frac{n!}{j!(n-j)!} G(a_i)^j (1 - G(a_i))^{n-j} \right) \tag{14}$$

numerically solving for $G(\cdot)$.

We also need to recover the density of the slant distribution $g(\cdot)$. The density of arbitrator slant among selected arbitrators $\tilde{g}(a)$ is equal to the unconditional density $g(a)$ multiplied by the probability of being selected $n \times \Gamma(a, G(\cdot))$, so $\tilde{g}(a) = g(a) \times n \times \Gamma(a, G(\cdot))$. We estimate $g(\cdot)$ non-parametrically using kernel density estimation where we weight each observation by our estimates of the inverse probability of being selected $\frac{1}{\Gamma(a, \widehat{G(\cdot)})}$.[24]

We next calibrate the parameters f and θ, which measure the trade off between monetary incentives and the cost of deviating from their beliefs. In fact, only their relative trade-off $\frac{f}{\theta}$ matters in equilibrium (eq. 13). Arbitrators earn \$300 per hearing and the typical case lasts four days (FINRA Rule 12214), so we set the fee for a case equal to $f = \$1,200$. We calibrate θ, which reflects the cost of deviating from an arbitrator's true beliefs using the 2007 rule change we describe in Section IV.C.2. 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. All else equal, with fewer strikes, there is a smaller chance that any given arbitrator is one of the k most consumer friendly arbitrators who will be struck. Reducing the number of strikes curtails an arbitrator's incentive to slant their decisions in favor of the industry. Consistent with this intuition, our regression estimates indicate that after the 2007 rule change, arbitrators increased awards by 3pp, on average. We calibrate the model to match this average change in awards when the number of strikes shifts from nine to four in the model. This calibration yields $\theta = 17,000$. This estimate implies that arbitrators are willing to deviate from their beliefs by 1pp for an extra \$170 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 90% in exchange for an extra \$1,700 increase in income. Since potential non-pecuniary benefits of being an arbitrator are difficult to measure (see Section II.B) we experiment with alternative calibrations, in which we scale $\frac{f}{\theta}$ by 50% and 150% in the Appendix. The alternative parameterizations yield similar policy counterfactuals.

Once we have obtained the magnitudes of disutility from deviating from ones beliefs θ, arbitrator compensation f, and the unconditional density and distribution of arbitrator slant $\widehat{G(a)}$ and $\widehat{g(a)}$, we use eq. (13) to compute the density of arbitrators' beliefs of what a fair award would be, $(\widehat{f(b)})$.

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

Figure 6a displays the calibration results. The primary object of interest is the distribution of arbitrators' inherent beliefs of the appropriate arbitration awards, $f(b_i)$. We can think of this distribution as the hypothetical distribution of awards that would arise if arbitrators were selected to the cases randomly, like judges in some courts; i.e. if parties in the case would have no input in the selection. Because firms have an informational advantage, the distribution of arbitration outcomes shifts to favor firms. Figure 6b shows how the density of arbitration awards in equilibrium $\widetilde{g}(\cdot)$ shifts to be more industry friendly relative to the distribution of arbitrators' inherent beliefs $f(\cdot)$. 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

[24] Specifically, we use a Gaussian kernel and a smoothing parameter of 3% which is in line with Silverman's Rule of Thumb (1986).

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 consumers. The results show the extent to which the current arbitration scheme results in a biased distribution of arbitration awards relative to the underlying distribution of beliefs of fair awards.

We can decompose the advantage of the industry that leads to $5pp$ higher awards into two components: the striking effect and the competition effect. This selection effect illustrated in Figure 6a is the advantage firms derive in selecting arbitrators from a given arbitrator pool. Since firms strike the most consumer friendly arbitrators, the mean of the density of awards granted $\widetilde{g}(\cdot)$ is roughly 3pp lower than the equilibrium density of slant $g(\cdot)$. This striking effect induces a competition effect: arbitrators compete to be selected by choosing a pro-industry slant a that is biased relative to their beliefs b. The competition effect is illustrated by comparing the distribution of slant $g(a)$ (dotted line) with the distribution of beliefs $f(b)$ (dashed line). The average arbitrator slant is roughly 2pp lower than their beliefs. In other words, the average arbitrator gives out an award that is 2pp lower than what she believes is fair because doing so increases her probability of being selected for arbitration.

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 arbitrator selection scheme and underlying arbitrator beliefs. In Appendix B, we formally solve for the optimal choice of arbitrators' slant for each counterfactual. 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 non-parametrically estimated distribution of beliefs. Figure 5a displays the parameterized version of the model and is comparable to the non-parametric estimates in Figure 6a. The parametric also produces quantitatively similar implications in terms of the degree of arbitrator bias. The parametric estimates imply the average belief of a fair award is 55%, the average slant is 53%, while the average award granted is 47%. In other words, the parametric model implies that, on average, the awards granted through arbitration are 8pp lower than what arbitrators actually believe is fair.

VI.C Informed Consumers

A common assumption in arbitration is that both parties are equally well informed about how to choose arbitrators. We benchmark the effect of firms' informational advantage on arbitration outcomes by considering outcomes under the current system if consumers were as informed as firms. We conduct two counterfactual exercises. One in which all consumers are informed–this is the standard assumption, which also best illustrates the potential benefits of the existing 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 by hiring PIABA attorneys. The differences between these two counterfactuals highlights the equilibrium consequences of competition between arbitrators and the negative spillovers that uninformed consumers provide to other consumers.

VI.C.1 All Consumers are Informed

In this counterfactual, we study arbitration outcomes in the existing arbitration system if all consumers were as informed as firms, $\mu_C = 1$ while keeping the distribution of arbitrator beliefs of fair outcomes, $F(\cdot)$, constant. In Appendix B, we show that when both parties are informed, the arbitrator selection mechanism results in a distribution of arbitration awards that is a median preserving contraction of arbitrators' underlying beliefs. The intuition for this result is straightforward, and is broadly the intuition used to rationalize the use of the arbitrator selection mechanism. Firms strike most pro-consumer arbitrators, and informed consumers strike the most pro-industry arbitrators, increasing the selection probability of arbitrators in the middle of the distribution. Consequently, the distribution of arbitration awards granted $\widetilde{G}(\cdot)$ is a median preserving contraction of the distribution of arbitrator slant $G(\cdot)$. This is illustrated in the Figure 7a by comparing the density of arbitration awards $\widetilde{g}(\cdot)$ (black line) with the density of arbitrator slant $g(\cdot)$ (dotted line). The mean and median of $\widetilde{g}(\cdot)$ is the same as $g(\cdot)$, but the standard deviation of $\widetilde{g}(\cdot)$ is 65% smaller than the standard deviation of $g(\cdot)$.

Because of striking, arbitrators are incentivized to choose a slant near the median of the distribution. Due to competition among arbitrators, arbitrators with below median (pro-industry) beliefs choose a pro-consumer slant that is more consumer friendly than their beliefs, $a_i \geq b_i$. Conversely, arbitrators with above median (pro-consumer) beliefs choose a pro-industry slant that is weakly more industry friendly than their beliefs. As a result of this competition effect, the distribution of chosen slant reflects a median preserving contraction of the distribution of arbitrator beliefs. This is illustrated in Figure 7a by comparing the density of arbitrator slant $g(\cdot)$ (dotted line) with the density of arbitrator beliefs $f(\cdot)$ (dashed line). The mean and median of the distribution of beliefs $f(\cdot)$ is the same as the distribution of slant $g(\cdot)$, but the standard deviation of $f(\cdot)$ is 5% smaller than the standard deviation of $g(\cdot)$. In total, if both parties are informed, the arbitration selection mechanism results in an median preserving outcome such that the median and mean award equals the median belief, $\widetilde{G}^{-1}(0.5) = F^{-1}(0.5)$, but the variance of awards is 67% smaller than the variance of beliefs, $\sigma_{\tilde{G}} = (1 - 0.67) \times \sigma_F$. This result is a frequently touted benefit of the existing arbitrator selection mechanism. A reduction of variance in decision has no benefits in our benchmark model since the parties are risk neutral. On the other hand, as we discuss in Section VI.E, the lower variance becomes an appealing feature of the arbitration system if litigants are risk averse, despite risk aversion having no effect on equilibrium outcomes.

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

As we show in Section IV.C.1, some consumers 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 the aggregate consumer benefits from being informed as a group are larger than the sum of informed individuals. In other words, being informed has externalities. To make the point most salient, imagine that this informed 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 slant. On the other hand, because arbitrators assume almost all, except measure zero, consumers are uninformed, they will choose the same pro-industry slant. The informed consumer's choose arbitrators from the same pool $G(\cdot)$, but eliminate the k most pro-industry arbitrators. Our estimates suggest that

a measure zero informed consumer's award is on average 6pp higher than that of an uninformed consumer (Figure 8.).

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 8pp.[25] 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 being informed, this externality opens the door for potential regulation. One example of such regulation 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 policy changes 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 which is actively being considered again is altering the number of arbitrators that each party can strike from the list. As discussed in Section II, FINRA proposed increasing the number of strikes from four to six in 2016, allowing the parties "more control" over the process. We present the changes in slant and awards as the number of strikes increases from one to seven in Figures 9a(i) and 9a(ii). As the number of strikes increases, the awards distribution becomes more favorable to the industry. Consider the concrete example of the FINRA proposed changes of increasing strikes from four to six. The average belief of a fair award among arbitrators is 55%. The average award when both parties are allowed four strikes, $k = 4$, is 47%. As the number of strikes increases to six, $k = 6$, the average award declines to 43%. This change partially occurs because firms are able to select more favorable arbitrators from the list. Moreover, as illustrated in Figure 9a(i), 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. This counterfactual illustrates that increasing the control that the parties have over the process increases the bias in arbitration outcomes when consumers are uninformed. This result stands in stark contrast to consequences of this policy if consumers were informed. Then, increasing the number of strikes would indeed shrink the distribution of awards towards the more "fair" median outcome.

[25] In the parameterized version of the model, the mean of the distribution of arbitrator beliefs $F(\cdot)$ is 8pp higher than the distribution of awards granted $\tilde{G}(\cdot)$ as displayed in Figure 5a.

These results are consistent with our earlier findings from Section IV.C.2 where we examine past changes to the arbitrator selection process. Starting in 2008, FINRA reduced the number of strikes available to firms and consumers from an unlimited number of strikes to four. Our reduced form empirical results indicate that following the rule change, consumer friendly arbitrators were more likely to be selected than previously. The results displayed in Figures 9a(i) and 9a(ii) mirror this finding as the award distribution shifts from the left to the right, becoming more consumer friendly, as the number of strikes available to firms and consumers decreases.

VI.D.2 Increasing the Arbitration List Size

Another dimension that has been considered is allowing the parties to choose from a wider pool of arbitrators.[26] In 2016 FINRA proposed that rather than striking arbitrators among a list of 10 arbitrators, firms and consumers would choose from among a list of 15 arbitrators. Figures 9b(i) and 9b(ii) illustrate that this change would benefit consumers. With the increased list size, arbitrators are less likely to be selected in general. All else equal, a given pro-consumer arbitrator is less likely to be one of the k most consumer friendly arbitrators on the list, and thus is less likely eliminated. Figure 9b(i) indicates that arbitrators would also be slightly less biased relative to their beliefs if they were chosen from a larger list. 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 Arbitrator Compensation

Another policy proposal that is frequently considered is to increase the fees paid to arbitrators. For example, in 2014 FINRA increased the fee paid to arbitrators by 50% (FINRA Notice 14-49, 2014). The idea is that higher fees will provide arbitrators with higher powered incentives to set aside their biases, and instead work in the interest of reaching a fair outcome; i.e. that awards will be closer to the median. If consumers are as informed as firms, this is indeed the case.

This counterfactual analyzes the consequence of doubling the fees paid to arbitrators when consumers are uninformed. We report the corresponding results in Figures 9c(i) and 9c(ii). Recall that under the current scheme, our estimates imply an average award of 47%, while the average arbitrator belief of fair awards is 55%. Figure 9c(ii) shows that doubling the fee paid to the arbitrator will cause the average award to decrease by 4pp from 47% to 43%. The intuition is simple: 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 pro-industry biased in order to increase the probability of being selected, (Figure 9c(i)). This counterfactual again illustrates that policies, which would potentially improve arbitration outcomes if consumers were informed, worsen the pro-industry bias in arbitration outcomes, when consumers are uninformed. These results also suggest that lower powered incentives for arbitrators could decrease the pro-industry bias in arbitration. To maintain the expected compensation of arbitrators unchanged, the lower fees could be coupled with a flat wage.

[26] 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]

VI.D.4 2016 Proposed Rule Change

Last, we examine a recent arbitration rule change proposed by FINRA, which proposes changing several of features we discussed above simultaneously. FINRA proposed increasing the number of arbitrators on the list to 15, and simultaneously increasing the number of strikes to 6 (Proposed Rule Change Relating to the Panel Selection Process in Customer Cases with Three Arbitrators, 2016). Effectively, the policy allowed the parties to strike the same share of arbitrators from a larger list. The proposed policy change has offsetting effects. Increasing the number of strikes increases pro-industry bias, but increasing the list size decreases it. The estimates indicate that the proposed policy change would cause arbitrators to be further biased but the effects are modest. The average award decreases by 0.5pp (Figure 9d(ii)) because arbitrators' average slant becomes 0.5pp more industry friendly (Figures 9d(i)). The results also suggest that the proposed rule change results in a slightly wider distribution of slant and award outcomes relative to the current arbitration selection scheme.

VI.E Risk Aversion: Comparing Arbitrator Selection Mechanisms

For convenience, our model assumes that consumers and/or firms are risk neutral. In practice, consumers and even firms are likely risk averse over arbitration outcomes. The arbitrator selection process is inherently stochastic, as the initial list/set of n arbitrators is randomly drawn from the pool of arbitrators. Here, we discuss two points related to risk aversion. First, risk aversion has no effect on outcomes *within* a given arbitrator selection mechanism. Second, risk aversion can alter parties preferences *across* arbitration mechanisms.

First, risk aversion does not alter the analysis in our model holding the arbitrator selection mechanism fixed. We do not need to specify the utility/risk preferences of consumers and firms. Regardless of their risk aversion, firms always remove the most consumer friendly arbitrators from the list; similarly, if consumers are informed, they always remove the least consumer friendly arbitrators from the list. In other words, risk aversion does not alter striking behavior, which is the source of arbitrator incentives.

Second, litigant risk aversion can alter preferences of the parties *across* different arbitration mechanisms. For example, risk averse consumers may prefer the current arbitrator selection mechanism to one in which arbitrators are selected randomly, in a similar manner to judges. As we discuss in Section VI.B, the current arbitration system has, on average, lower, more pro-industry awards relative to the random system. On the other hand, the distribution of awards in the current arbitration system has lower variance than under randomly assigned arbitrators. If consumers and firms are sufficiently risk averse, they may prefer the current system over the random assignment.

An advantage of our methodology is that we are able to recover the complete distribution of arbitration outcomes $\widetilde{G}(\cdot)$ given essentially any arbitrator selection mechanism $\Gamma(a, G(\cdot))$ as illustrated in Sections VI.C and VI.D. Thus, for any set of consumer and firm preferences, such as levels of risk aversion, one can compare outcomes across mechanisms, and choose the mechanism which has the preferred distribution of arbitration outcomes $\widetilde{G}(\cdot)$. This is the case if the criterion is overall welfare, consumer or firm welfare, or the welfare of a subset of certain consumers, such as those who are most vulnerable.

VII 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 suggest 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) and 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 slant their decisions in favor of 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.[27] AAA's Arbitrator Select List and Appointment system uses a ranking system of 5-15 arbitrators.[28] While these systems are similar to FINRA's, they are not identical.

Relative to the striking system, that 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.[29] Then, the informed party can de

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

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

[29] 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.

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 arbitrator selection systems provide an advantage to the informed party.

This advantage provides incentives for arbitrators to choose a slant that favors the informed party in these systems. Arbitrators' choice of slant in eq. (9) 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. Therefore insights from studying the mechanism in our model easily translates into the strike and rank (JAMS) or rank (AAA) systems.

VII.B Suggestive Evidence

In this section we present suggestive evidence that our empirical findings apply to arbitration more broadly. We examine whether arbitrators systematically differ, and whether more industry friendly arbitrators are more likely to be selected to arbitration cases in two main consumer arbitration forums outside of the securities industry, AAA and JAMS. The benefit of using these data is coverage across a wide range of industries and cases. The downside is that the cases are much less comparable, the data on each individual case is significantly more sparse, and firms can choose which arbitration forum they want to use. We construct two separate consumer arbitration data sets using the data posted online by the AAA and JAMS.[30] 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 A5a. Figure A3 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.

The AAA and JAMS data contain less information relative to the FINRA data used in our main analysis. In the AAA data set we observe the arbitrator, industry and firm involved in the dispute, the award amount requested, and the award granted. In the JAMS data we observe the arbitrator, industry and firm involved in the dispute, and the award granted, but not the amount requested. In other words, from JAMS data we cannot compute our preferred outcome variable, award granted/award requested. 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 industry/consumer friendliness 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 A5b). In both data sets, we find significant differences across arbitrators and reject the null hypothesis that 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 consumer friendly while other arbitrators are consistently more industry friendly.

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

Second, we provide suggestive evidence that industry friendly arbitrators are selected to more cases. Figure A4 panels (a) and (b) display binned scatter plots between the estimated arbitrator fixed effects and the number of times an arbitrator is selected to a case. We find a negative and statistically significant relationship between the estimates of arbitrator fixed effects (consumer friendliness) and the number of cases the arbitrator oversees in JAMS data. In other words, arbitrators that give out lower awards are ultimately selected to more arbitration cases. We find similar evidence of a relationship between the arbitrator fixed effects and the number of cases the arbitrator oversees in AAA data. Even with substantially lower quality data, we find some suggestive evidence that more industry friendly arbitrators are chosen more 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, resulting in larger measurement error. Nevertheless, the results in this section suggests that the mechanisms we identify in the securities industry apply to consumer arbitration more generally.

VIII Conclusion

We argue that firms have an informational advantage over consumers in selecting arbitrators in consumer arbitration and document how the selection process impacts arbitration outcomes. We use securities disputes as a laboratory for our study. Securities disputes present a good laboratory for arbitration: arbitration is mandatory for all disputes, eliminating selection concerns; the parties choose arbitrators from a randomly generated list and arbitrators are compensated only if chosen; and this selection mechanism is similar to other major arbitration forums. We document that some arbitrators are systematically industry friendly while others are consumer friendly. Importantly, firms appear to exploit this information: despite a randomly generated list of potential arbitrators, industry friendly arbitrators are forty percent more likely to be selected than their consumer friendly counterparts. Our preferred explanation for these findings is that firms are more informed about the arbitration process than consumers, which allows firms to strategically select arbitrators that have traditionally been industry friendly.

We develop and calibrate a model of arbitrator selection that allows us to interpret our empirical facts in equilibrium and to quantify the effects of policy changes to the current selection process. In the model, 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 consumers and firms. 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 the industry, even though underlying distribution of beliefs among arbitrators is unbiased.

The counterfactuals from the model suggest that several proposals aimed at improving customer outcomes in arbitration, such as increasing arbitrator incentives and increasing the number of strikes, lead to quantitatively more industry friendly arbitration due to firms' informational advantage. The model also illustrates that the value of being informed for any individual consumer (summed across consumers) is smaller than the joint value of all consumers being 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. More broadly, our findings suggest that limiting the firm's and consumer's inputs over the arbitrator selection process could significantly improve outcomes for consumers.

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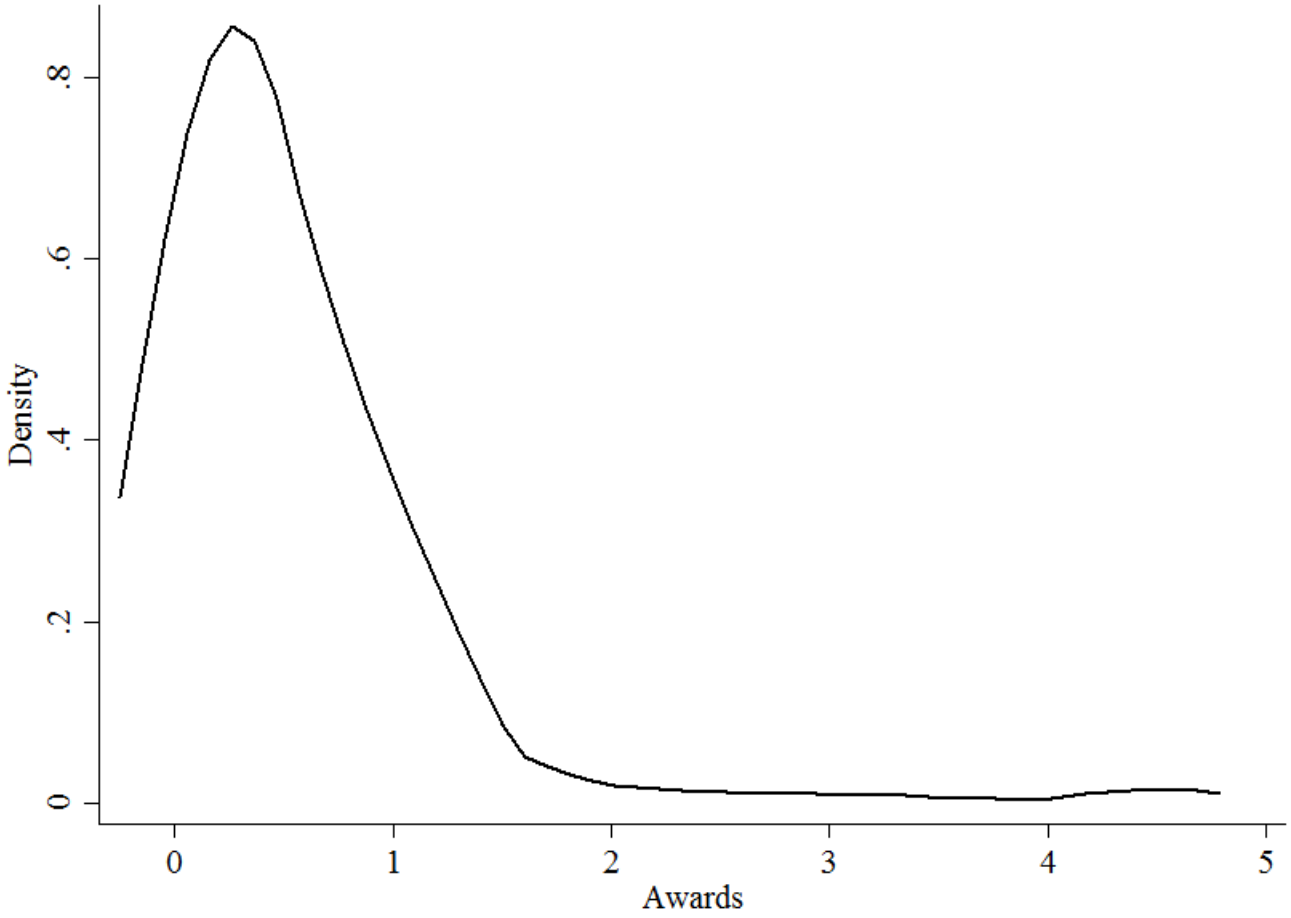
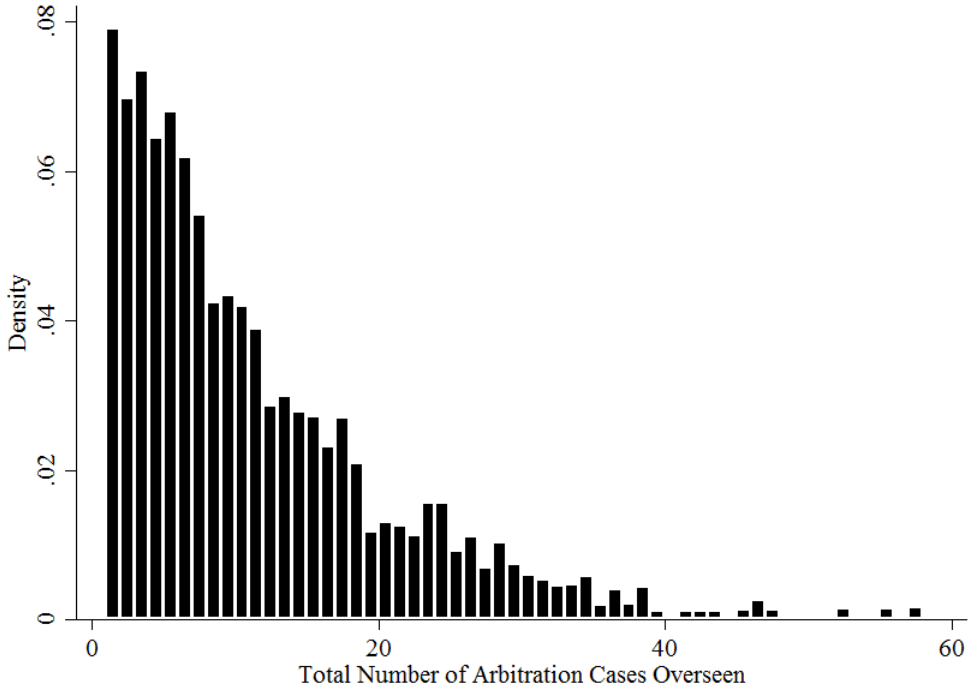
Figure 1: Award Distribution



Note: Figure 1 displays the distribution of arbitration Awards. We calculate Awards as the percentage of awards granted through arbitration divided by the awards initially requested by the consumer. The arbitration panel can grant an award that is greater than the amount requested which is why Awards can be greater than 1. For example, the arbitration panel could award punitive damages. The distribution of Awards is winsorized at the 1% level. The sample consists of 8,828 different arbitration cases over the period 1988-2015.

Figure 2: Arbitrator Experience and Differences

(a) Experience of Arbitrator Selected to Each Case



(b) Experience of Arbitrator Selected to Each Case (Consumer Disputes Only)

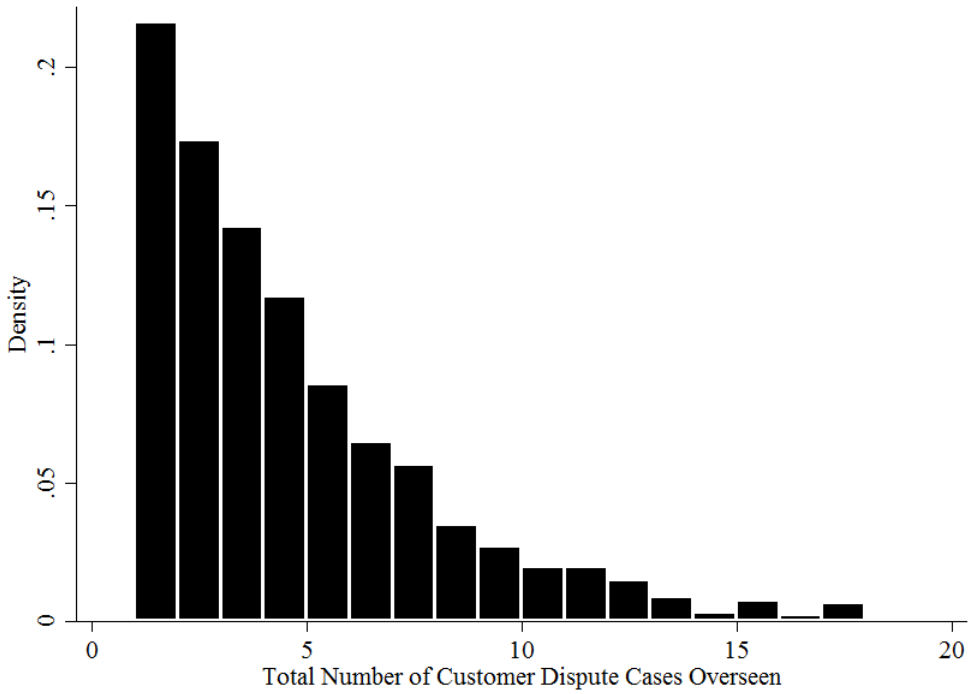
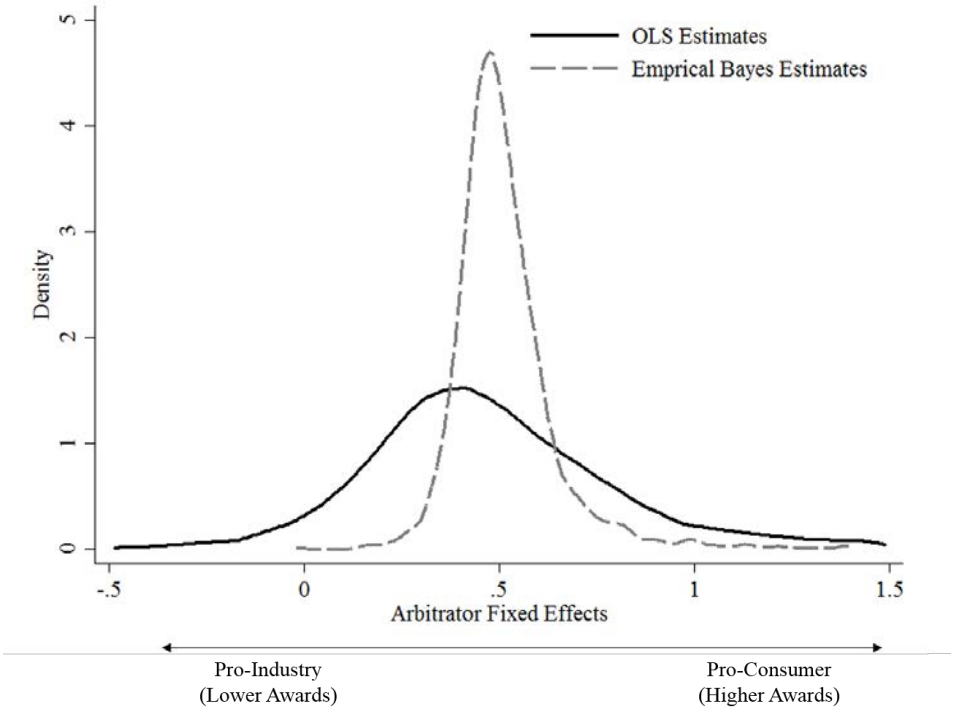


Figure 2: Arbitrator Differences

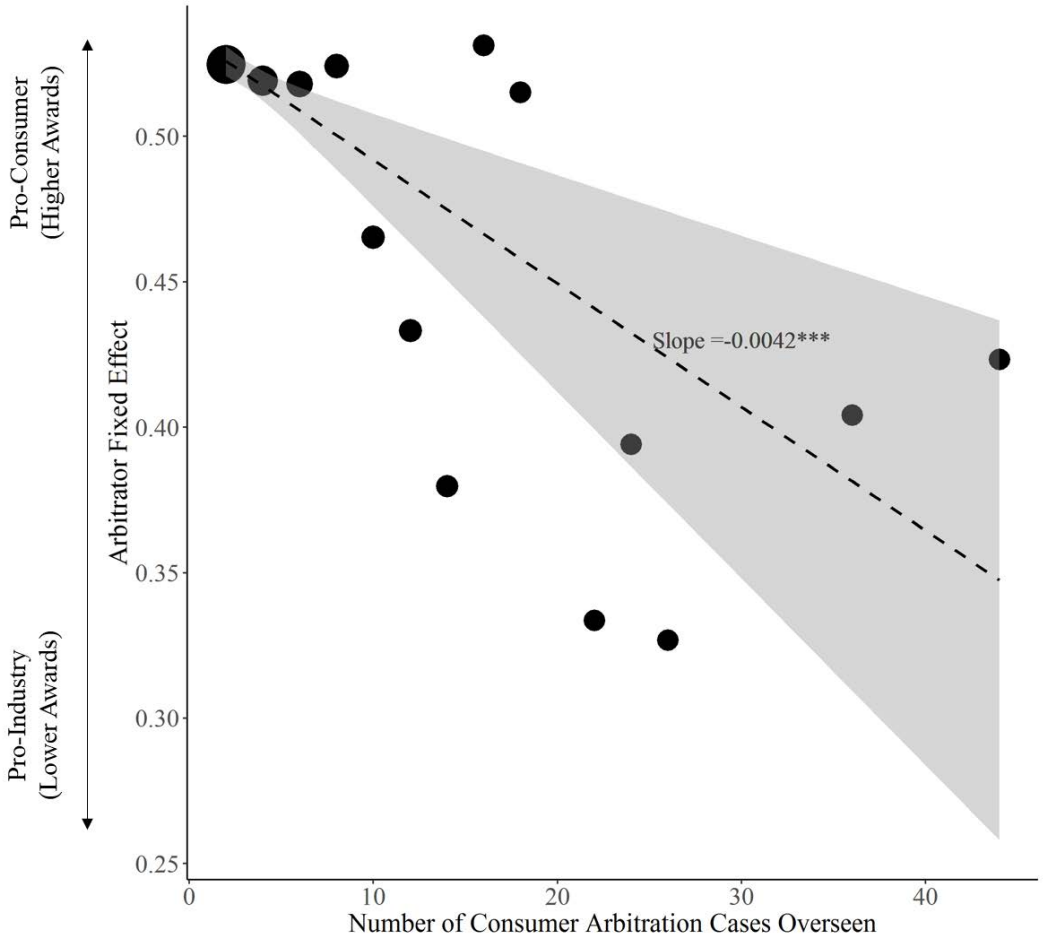
(c) Arbitrator Fixed Effects



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 over the period 1988-2015 (35,353 observations). Figure 2b displays the lifetime experience of an arbitrator in terms of the number of consumer dispute cases she oversaw during her career. Observations are at the arbitrator by consumer-dispute case level over the period 1988-2015 (20,231 observations).

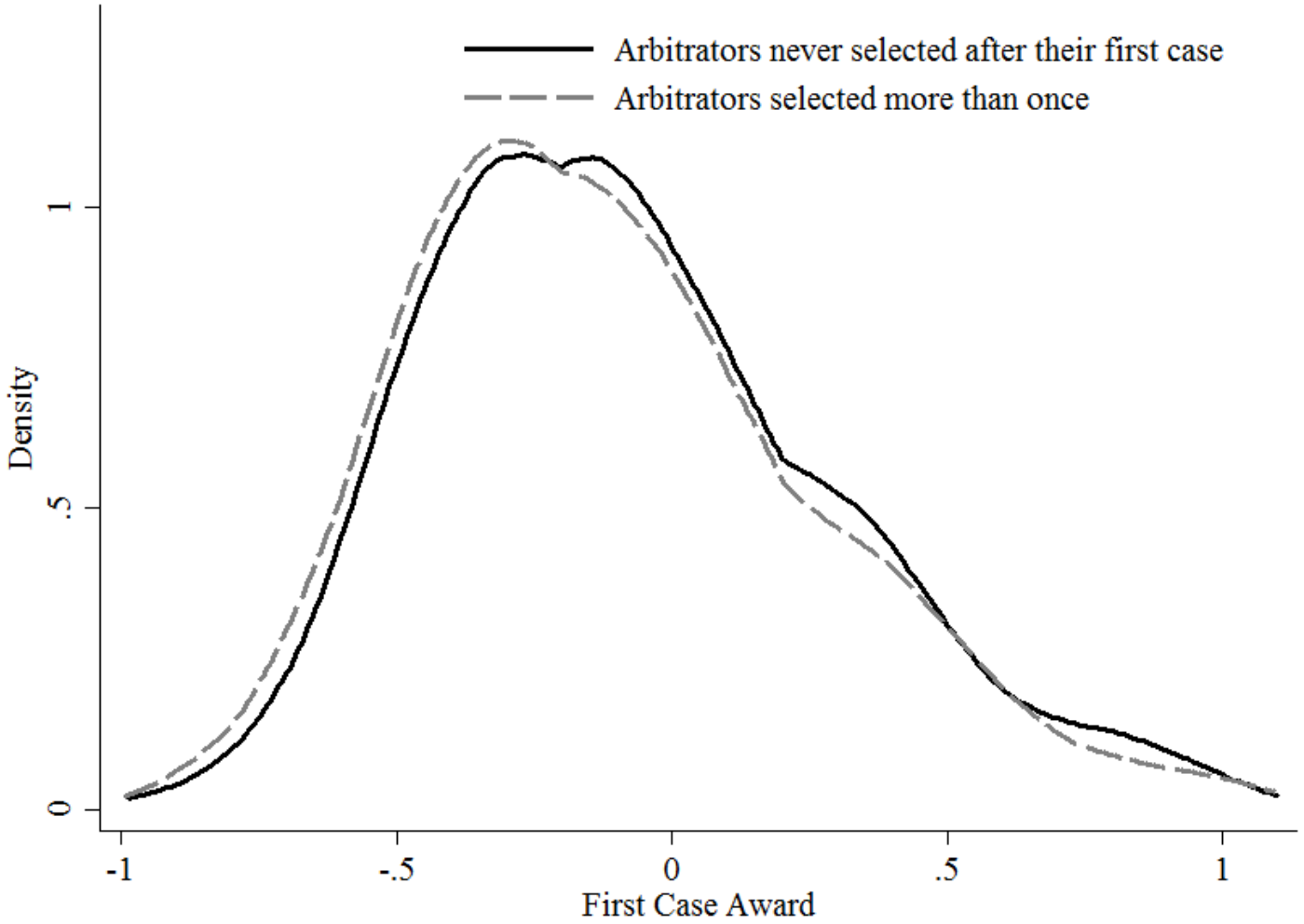
Figure 2c displays the estimated distribution of arbitrator fixed effects corresponding to eq. (1). The black empirical density reflects the distribution of arbitrator fixed effects estimated via OLS. We compute the OLS estimated arbitrator fixed effects by regressing case Awards, defined as the value of awards granted through arbitration divided by the awards initially requested by the consumer, on a vector of case observable characteristics and arbitrator fixed effects as reported in from column (4) of Table 2. We estimate the fixed effects using our sample of 8,828 consumer dispute arbitration cases where our unit of observation is at the arbitrator-by-case level. We normalize the mean of the distribution of fixed effects to 51% which is the average Award in our sample. To construct the empirical Bayes estimates we shrink the estimated distribution of fixed effects by a constant factor α such that $\widehat{\mu_l^{EB}} = \alpha(\widehat{\mu}_l - \bar{\widehat{\mu}})$ where α is estimated from the data and $\bar{\mu}$ is the average OLS estimated fixed effect. Rhe scaling factor is $\alpha = \frac{F-1-\frac{2}{k-1}}{F}$, where F is the F-test statistic corresponding to the joint test of the statistical significance of the fixed effects and k is the number of fixed effects (Cassella, 1992).

Figure 3: Are Industry Friendly Arbitrators Selected More Frequently?



Note: Figure 3 displays a binned scatter plot of the arbitrator fixed effects versus the total number of cases the arbitrator oversaw in her career. Observations are at the arbitrator level over the period 1988-2015. The size of the bubble corresponds to the number of arbitrators in the bin. The gray shaded area reflects the 90% confidence interval for the corresponding weighted least squares regression of an arbitrator's fixed effect vs. the total number of cases the arbitrator oversaw in her career. We compute the arbitrator fixed effects by regressing case Awards, defined as the value of awards granted through arbitration divided by the awards initially requested by the consumer, on a vector of case observable characteristics and arbitrator fixed effects (see column (4) of Table 2). We estimate the fixed effects using our sample of 8,828 consumer dispute arbitration cases where our unit of observation is at the arbitrator-by-case level. We normalize the mean of the distribution of fixed effects to 51% which is the average Award in our sample.

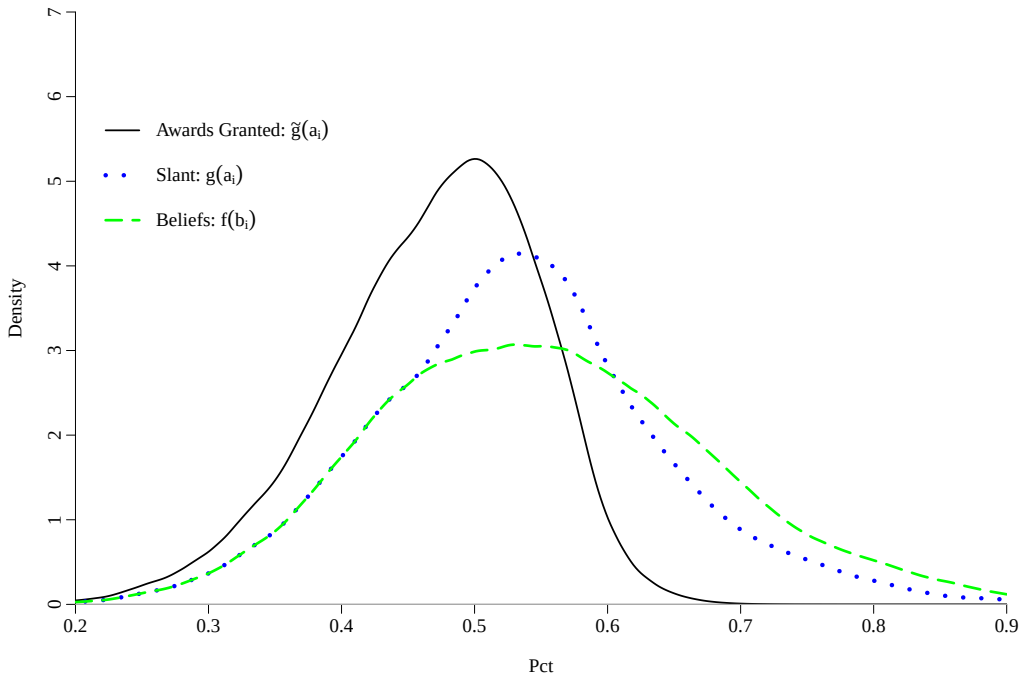
Figure 4: Initial Case Awards and Future Arbitrator Selection



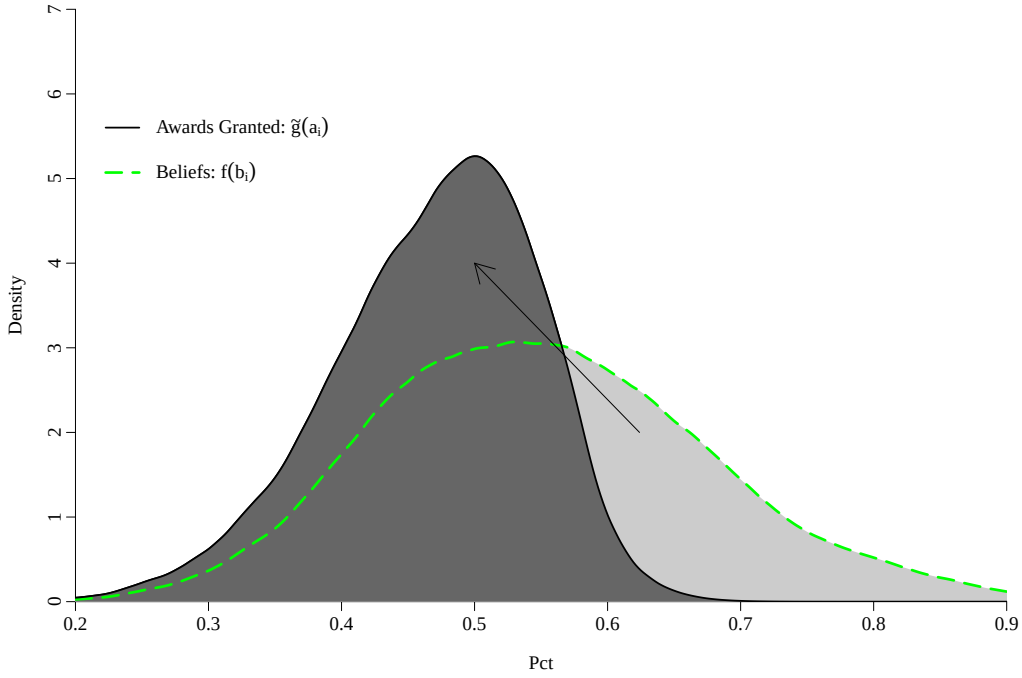
Note: Figure 4 displays the residualized distribution of initial arbitration Awards for arbitrators who were never selected to another consumer dispute case after their first case versus those arbitrators who were selected to multiple consumer dispute cases. We calculate Awards as the value of awards granted through arbitration divided by the awards initially requested by the consumer (we calculate residualized Awards as the residuals from the regression of case Awards on a vector of case characteristics, including time and location fixed effects, as reported in column (2) of Table 2). Using the Kolmogorov-Smirnov test, we reject the null hypothesis that the distributions of Awards are drawn from the same distribution at the 1% level.

Figure 5: Distribution of Arbitrator Beliefs, Slant, and Awards (Parametric Model)

(a) Arbitrator Beliefs, Slant, and Awards



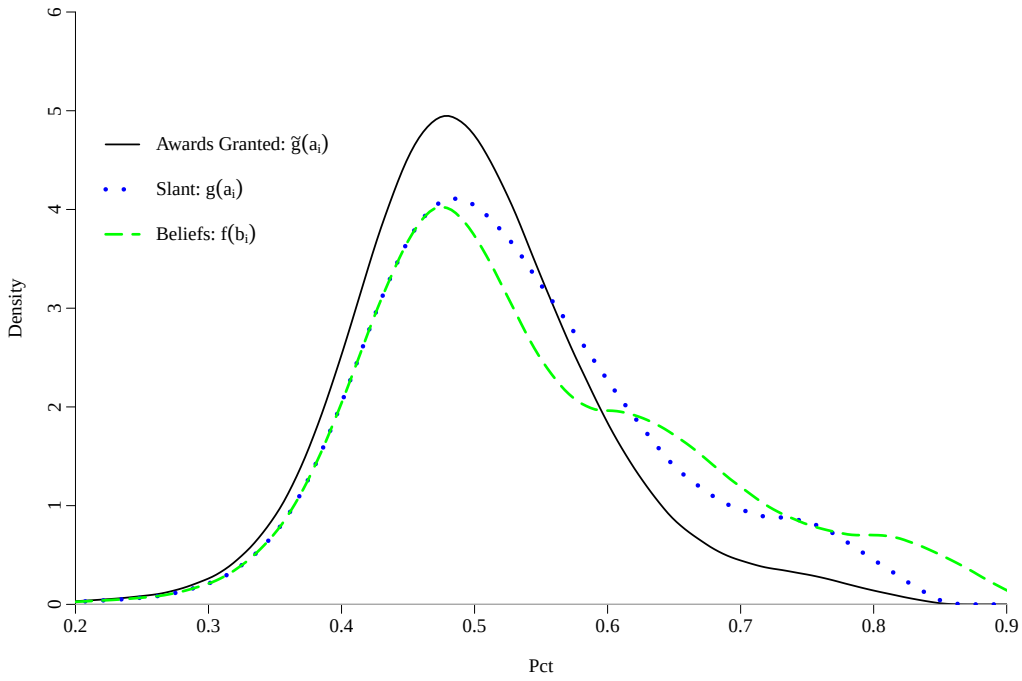
(b) Arbitrator Beliefs and Awards



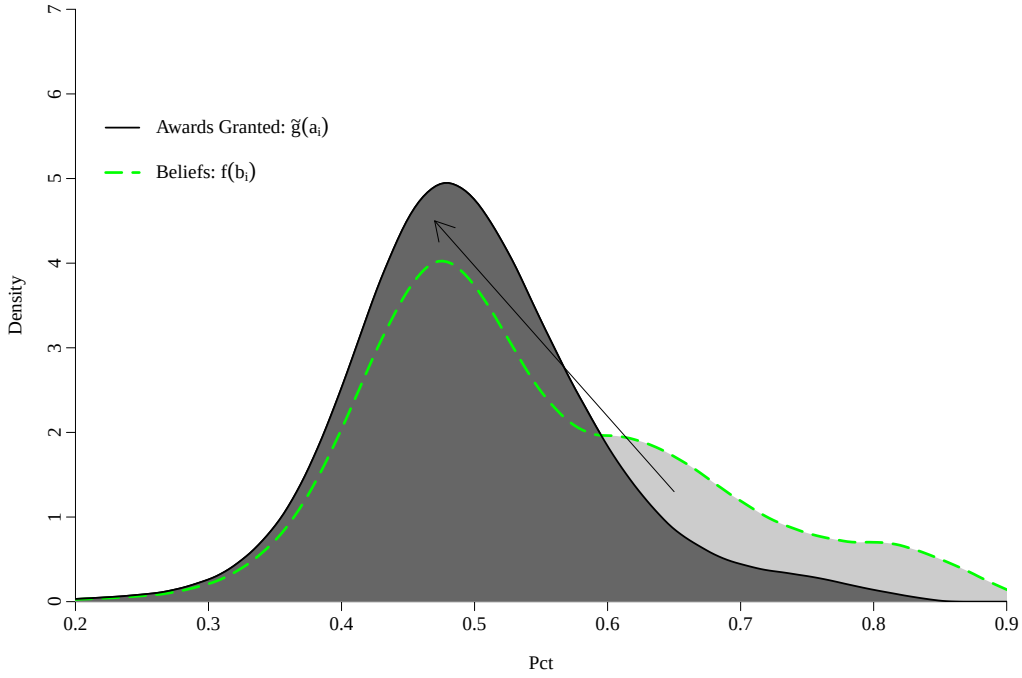
Note: Figure 5 panels (a) and (b) display the estimated density of awards among the conditional distribution of selected arbitrators $\tilde{g}(a)$, the density of slant among the unconditional (entire) population of arbitrators $g(a)$, and the distribution of true beliefs among the unconditional (entire) population of arbitrators $f(b)$. Panel (a) displays the distribution of awards, slant, and beliefs, and panel (b) displays the distribution of awards and beliefs. The mean belief is 55%, slant is 53%, and award granted is 47%. The underlying distribution of arbitrator beliefs is as constructed described using MLE as described in Section VI.

Figure 6: Distribution of Arbitrator Beliefs, Slant, and Awards (Non-Parametric Model

(a) Arbitrator Beliefs, Slant, and Awards



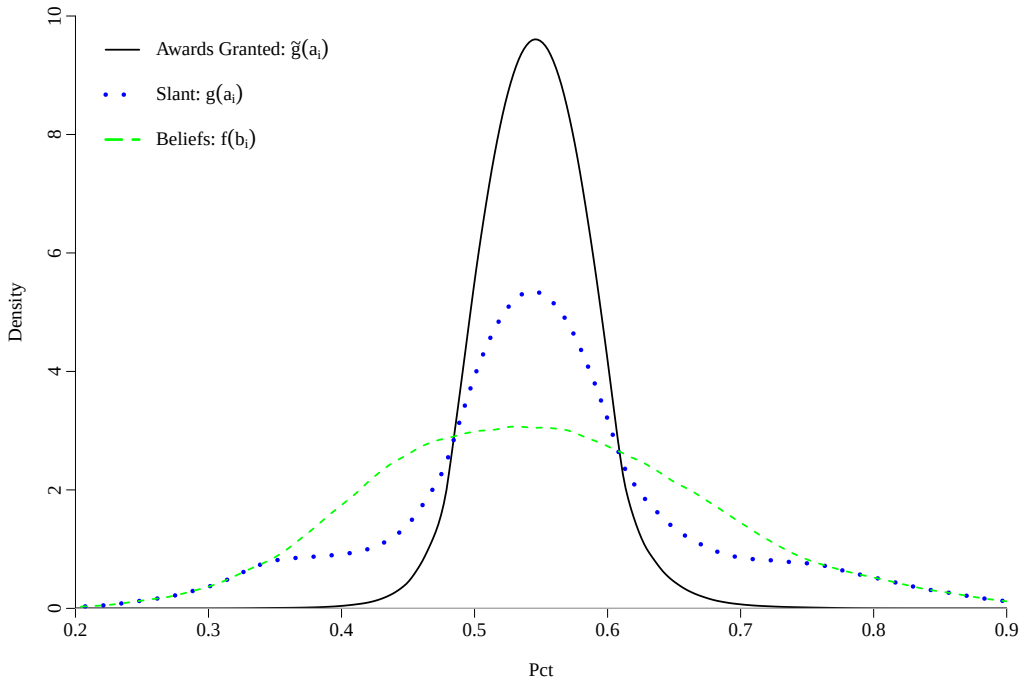
(b) Arbitrator Beliefs and Awards



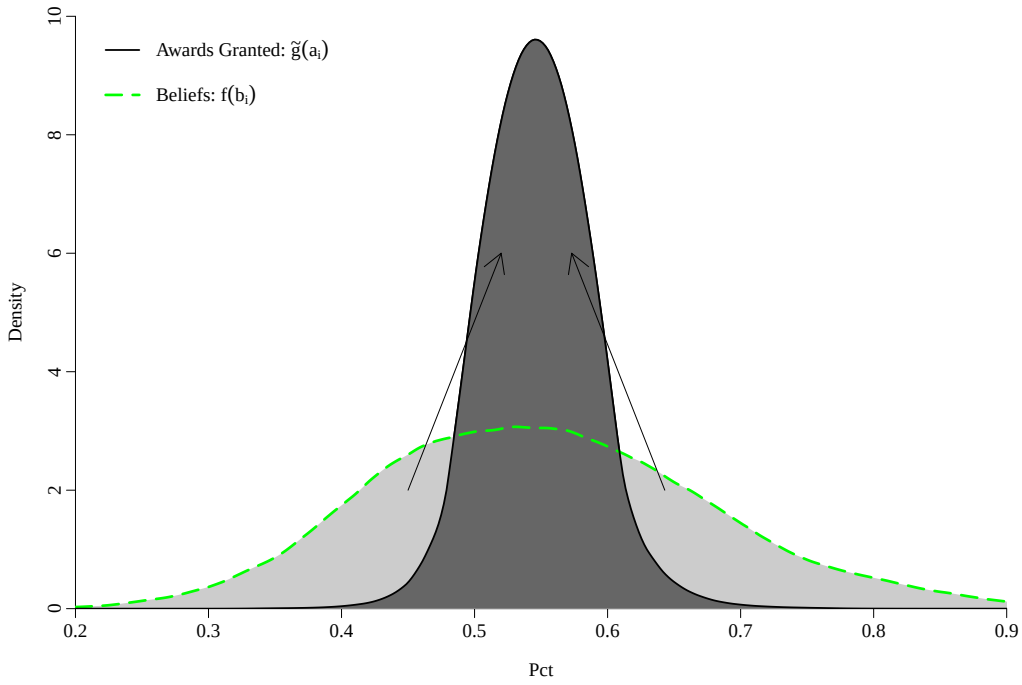
Note: Figures 6a and 6b display the estimated density of awards among the conditional distribution of selected arbitrators $\widehat{\tilde{g}(a)}$, the estimated density of slant among the unconditional (entire) population of arbitrators $\widehat{g(a)}$, and the estimated density of true beliefs among the unconditional (entire) population of arbitrators $\widehat{f(b)}$. The black line plots the distribution of realized awards/outcomes observed in the data. The mean belief is 55%, slant is 53%, and award granted is 50%. The unconditional distributions of slant/awards and beliefs are estimated non-parametrically as described in Section VI.

Figure 7: Distribution of Arbitrator Beliefs, Slant, and Awards—Informed Consumers

(a) Arbitrator Beliefs, Slant, and Awards

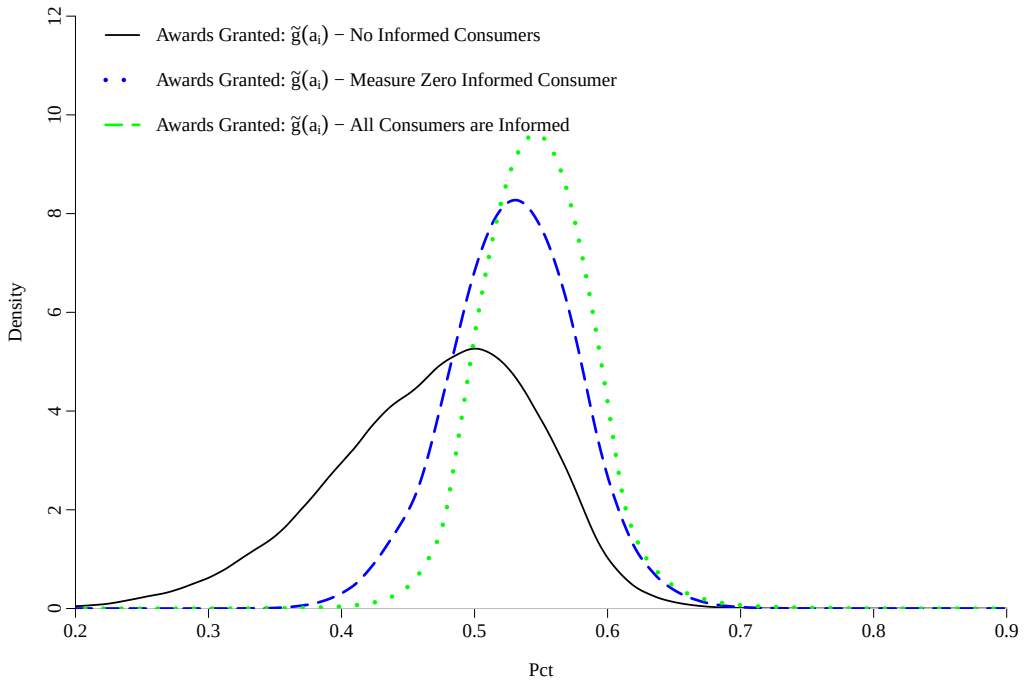


(b) Arbitrator Beliefs and Awards



Note: Figure 7 panels (a) and (b) displays the model implied density of awards among the conditional distribution of selected arbitrators $\tilde{g}(a)$, the density of slant 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 awards, slant, and beliefs under the assumption that consumers are informed. The mean belief, slant, and award granted is 55%. The underlying distribution of arbitrator beliefs is estimated via MLE to match fit the estimated distribution of arbitration beliefs from Section VI.

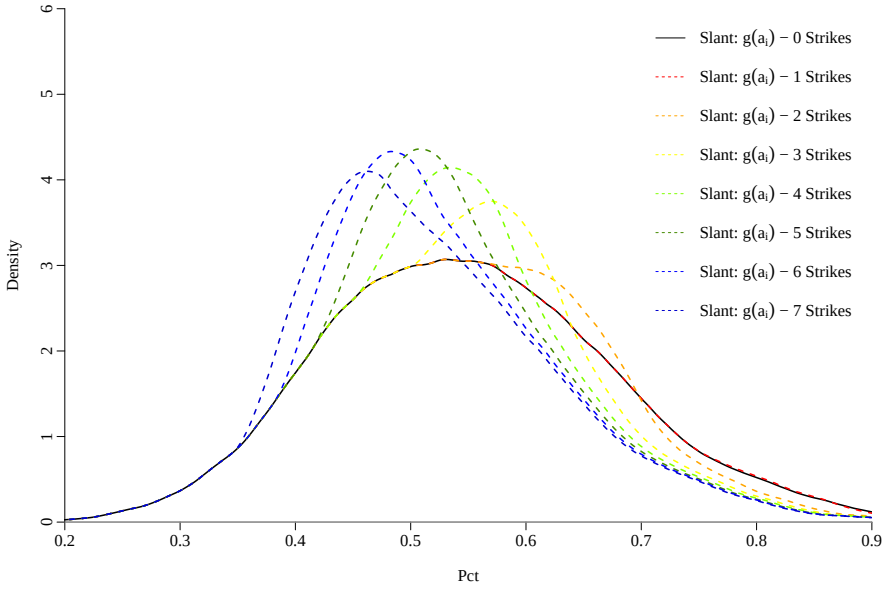
Figure 8: Distribution of Arbitrator Beliefs, Slant, and Awards—Measure Zero Informed Consumer



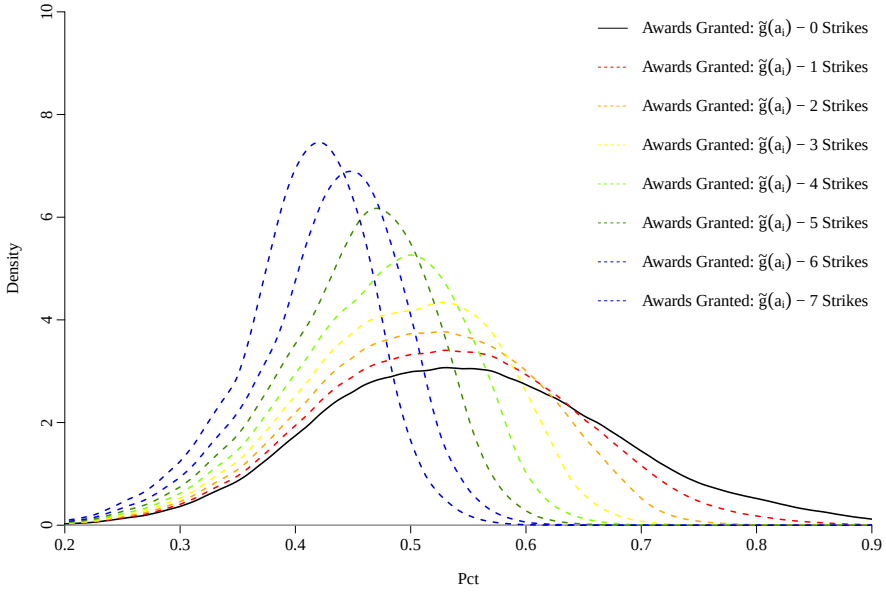
Note: Figure 8 displays the model implied density of awards if (i) all consumers are uninformed, (ii) a measure zero of consumers are informed, and (iii) all consumers are informed.

Figure 9a: Counterfactual: Changing the Number of Strikes (k)

(i) Arbitrator Slant



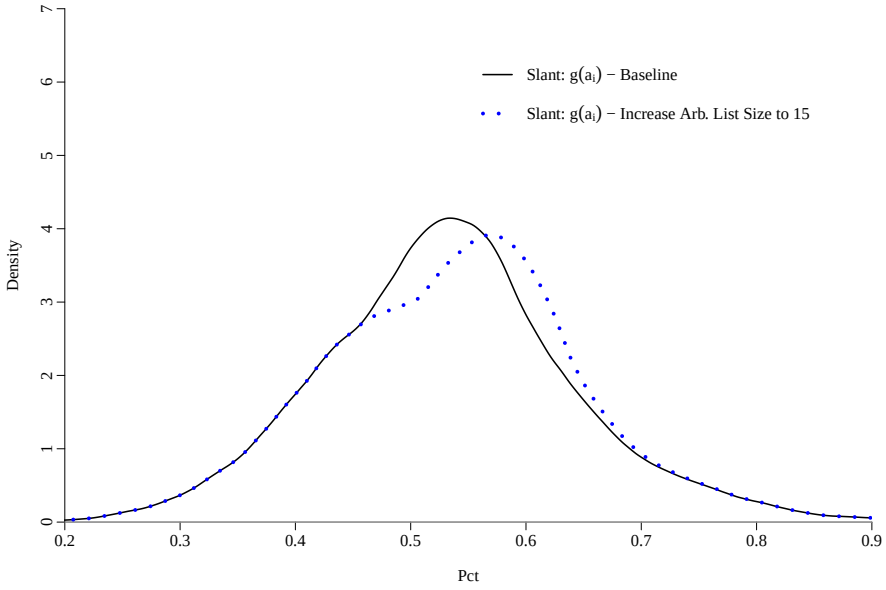
(ii) Arbitration Awards



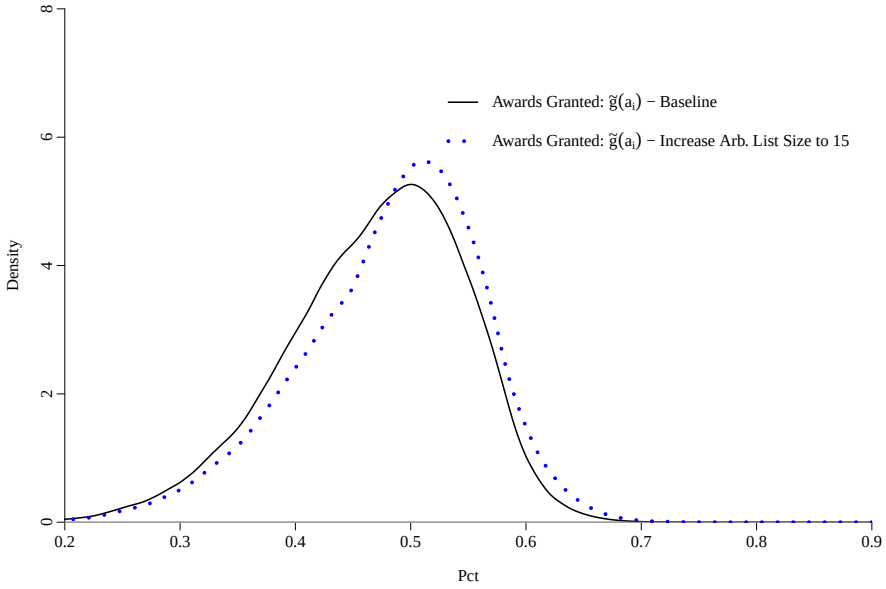
Note: Figure 9a(i) and 9a(ii) displays the counterfactual distribution of arbitrator slant and awards as a function of the number arbitrators firms are able to remove/strike from the arbitration pool. We compute the counterfactual distributions of arbitrator slant and awards where we fix the distribution of beliefs and solve for the optimal choice for arbitrators' slant as we change the number strikes (k) in the model for $k = 0, 1, ...7$. We derive and characterize each arbitrator's optimal choice of slant in Appendix B. We obtain the distribution of beliefs from Figure 5. Panel (i) displays the counterfactual distribution of arbitrator slant, and panel (ii) displays the counterfactual distribution of arbitration awards. In panels (i) and (ii), each dashed line corresponds to a different number of strikes, and the dashed lines get darker as the number of strikes increases. As displayed in panels (i) and (ii), arbitrator slant and arbitration awards are both decreasing in the number of strikes.

Figure 9b: Counterfactual: Increasing the Aribtration List (n)

(i) Arbitrator Slant



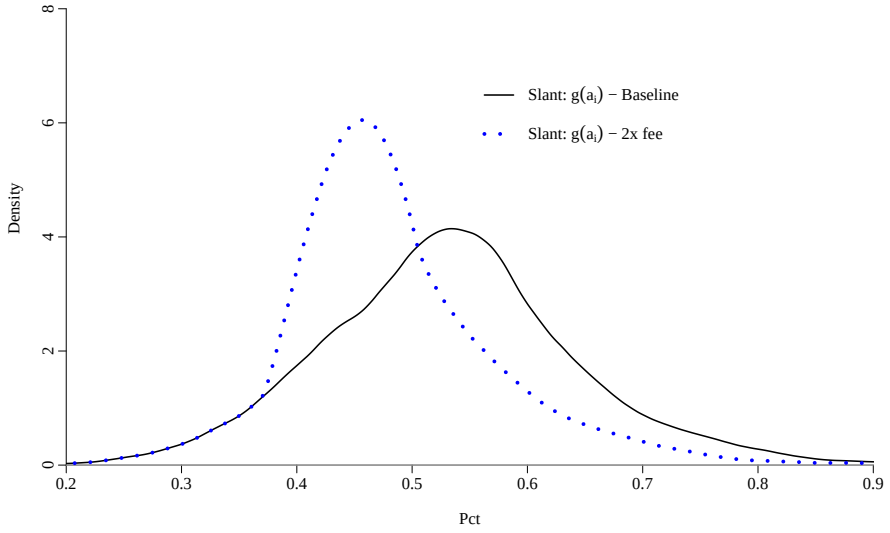
(ii) Arbitration Awards



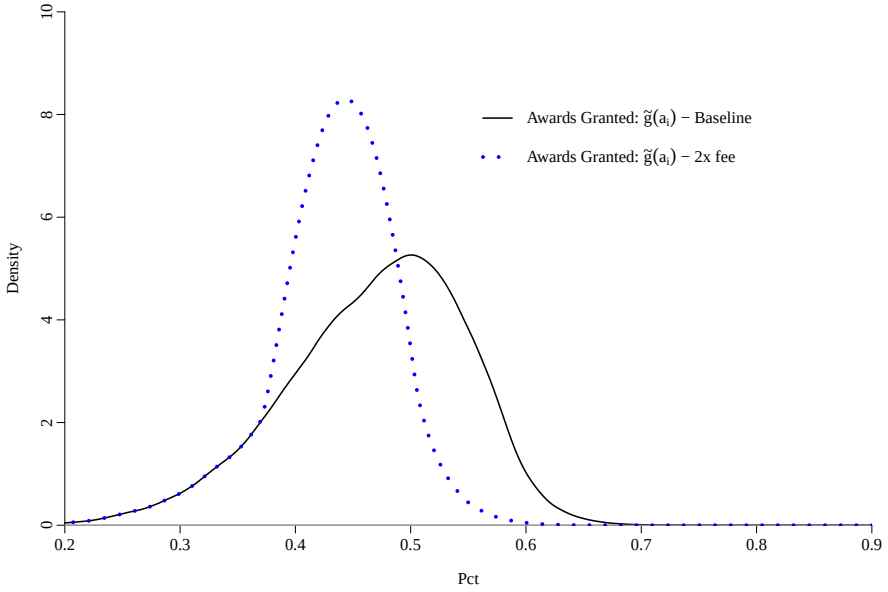
Note: Figures 9b(i) and 9b(ii) display the counterfactual distribution of arbitrator slant and awards if regulators were to increase the arbitration list size from ten to fifteen. We compute the counterfactual distributions of arbitrator slant and awards where we fix the distribution of beliefs and solve for the optimal choice for arbitrators' slant as we increase the number of arbitrators on the list (n) from ten to fifteen. We derive and characterize each arbitrator's optimal choice of slant in Appendix B. We obtain the distribution of beliefs from Figure 5. The dotted (solid) line in panel (i) displays the counterfactual (baseline) distribution of arbitrator slant if we were to increase the arbitration list from ten to fifteen. Similarly, the dotted (solid) line in panel (ii) displays the counterfactual (baseline) distribution of arbitration awards if we were to increase the arbitration list from ten to fifteen. As displayed in panels (i) and (ii), arbitrator slant and arbitration awards are both increasing in the number of arbitrators on the list.

Figure 9c: Counterfactual: High Powered Incentives

(i) Arbitrator Slant



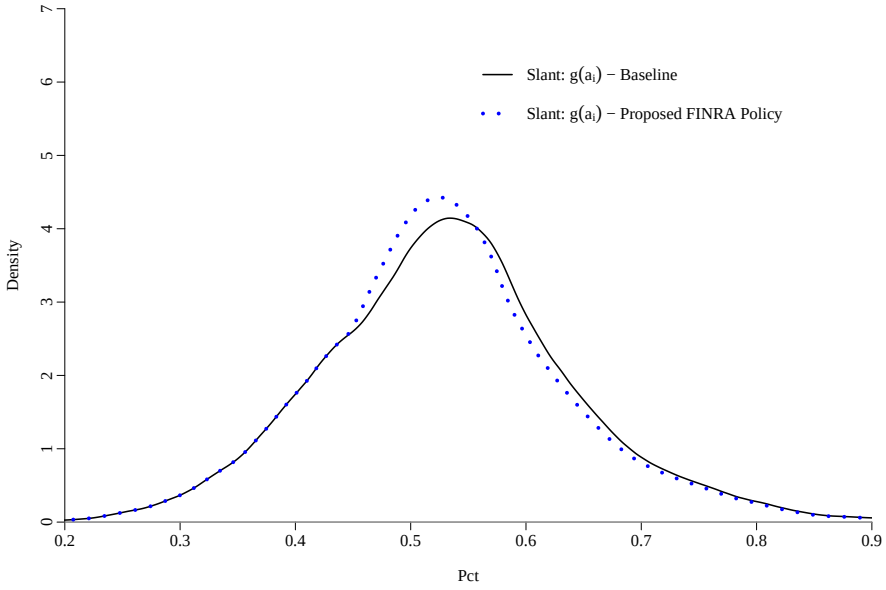
(ii) Arbitration Awards



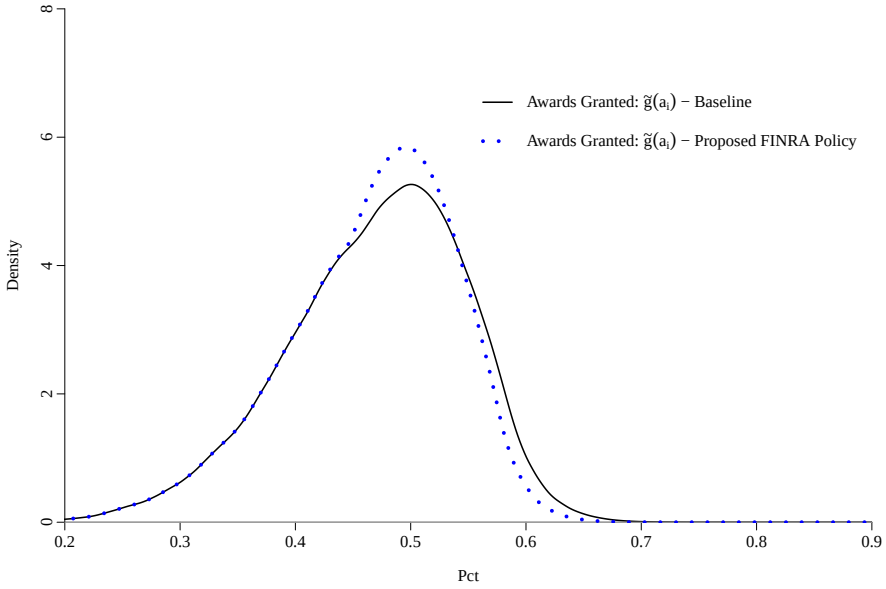
Note: Figures 9c(i) and 9c(ii) display the counterfactual distributions of arbitrator slant and awards if regulators were to double the fee paid to arbitrators from \$1,200 to \$2,400. We compute the counterfactual distributions of arbitrator slant and awards where we fix the distribution of beliefs and solve for the optimal choice for arbitrators' slant as we increase the fee (f) paid to arbitrators. We derive and characterize each arbitrator's optimal choice of slant in Appendix B. We obtain the distribution of beliefs from Figure 5. The dotted (solid) line in panel (i) displays the counterfactual (baseline) distribution of arbitrator slant if we were to increase the fee paid to arbitrators. Similarly, the dotted (solid) line in panel (ii) displays the counterfactual (baseline) distribution of arbitration awards if we were to increase the fee paid to arbitrators. As displayed in panels (i) and (ii), arbitrator slant and arbitration awards are both decreasing in the fee paid to the arbitrator.

Figure 9d: Counterfactual: 2016 FINRA Proposal

(i) Arbitrator Slant



(ii) Arbitration Awards



Note: Figures 9d(i) and 9d(ii) display the counterfactual distribution of arbitrator slant and awards if regulators were to increase the arbitration list size (n) from ten to fifteen and increase the number of strikes (k) from four to six as recently proposed by FINRA. We compute the counterfactual distributions of arbitrator slant and awards where we fix the distribution of beliefs and solve for the optimal choice for arbitrators' slant as we increase the number of arbitrators on the list (n) and increase the number of strikes (k). We derive and characterize each arbitrator's optimal choice of slant in Appendix B. We obtain the distribution of beliefs from Figure 5. The dotted (solid) line in panel (i) displays the counterfactual (baseline) distribution of arbitrator slant if we were to implement the recent FINRA proposal. Similarly, the dotted (solid) line in panel (ii) displays the counterfactual (baseline) distribution of arbitration awards if we were to implement the recent FINRA proposal. As displayed in panels (i) and (ii), the FINRA proposal would result more industry friendly arbitrator slant and lower arbitration awards.

Table 1: Arbitration Summary Statistics

(a) Consumer Dispute Case Characteristics

Variable	Obs	Mean	Std. Dev.	Median
Requested Awards	20,196	785,025	4,867,927	175,000
Percent of Requested Awards Granted	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	1,430	649	1399
Length of the Case Document: Sentences	19,451	145	65	140
Offending Adviser Characteristics:				
Experience	20,231	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/No Attorney	20,231	11.7%		
Represented by an Attorney	20,231	88.3%		
Represented by a PIABA Attorney	20,231	17.0%		
Consumer is a Trust	20,231	7.3%		

Table 1: Arbitration Summary Statistics

(b) Arbitrator Characteristics

Variable	Obs	Mean	Std. Dev.	Median
Number of Arbitration Cases Overseen				
Total Number of Arbitration Cases	20,231	8.3	8.8	5.0
Total Number of Consumer Dispute Cases	20,231	4.5	4.3	3.0
Arbitrator Experience in the Financial Advisory Industry:				
Former/Current Financial Adviser	20,231	40%		
Years Experience as an Adviser	8,147	14.4	9.2	13.0
Number of Regulatory Qualifications	8,147	3.9	1.61	4.0

Note: Table 1 displays the summary statistics corresponding to our arbitration data set. Observations are at the arbitrator-by-case level, and correspond to 8,828 distinct consumer arbitration cases. The data set consists of the universe of consumer dispute arbitration cases reported in both FINRA's Arbitration Awards data and FINRA's BrokerCheck data over the period 1988-2015. Panel (a) corresponds to the consumer dispute arbitration case characteristics. The Percent of Requested Awards Granted is winsorized at the 1% level. The categories Allegations and Products are dummy variables indicating whether the specific product or allegation were mentioned in the arbitration case summary in BrokerCheck. The categories are not mutually exclusive and may sum up to more than 100%. We measure the complexity of each case based on the number of allegations in the case and based on the length of the associated FINRA arbitration award case document in terms of the number of words and sentences. We do not observe the case award document for 1,684 of our 8,828 cases. Prior Record of Misconduct indicates whether or not the adviser has a past record of misconduct in the financial advisory industry as defined in Egan, Matvos and Seru (2019). The variable PIABA attorney indicates whether the consumer used a attorney who specializes in arbitration and is a member of the Public Investors Arbitration Bar Association. Trust indicates that the consumer is part of a trust. Panel (b) describes arbitrator characteristics for arbitrators involved in consumer dispute arbitration cases. The total number of arbitration cases includes all arbitration cases the arbitrator was involved in including non-consumer related arbitration. Former/Current Financial Adviser is a dummy variable indicating whetehr the arbitrator is a financial adviser. Years Experience as an Adviser measures the years an arbitrator was employed as a financial adviser. Number of Regulatory Qualifications measures the number of regulatory qualifications arbitrators had when they were registered as financial advisers.

Table 2: Percent of Requested Awards Granted

	(1)	(2)	(3)	(4)
Allegations:				
Unsuitable	-3.16*	-2.67	-1.77	-1.43
	(1.64)	(1.78)	(1.91)	(1.94)
Misrepresentation	-0.98	-1.84	-0.66	-0.92
	(1.78)	(1.95)	(2.17)	(2.12)
Unauthorized Activity	-0.86	-0.21	0.88	0.92
	(2.17)	(2.32)	(2.41)	(2.50)
Omission of Key Facts	-1.18	0.10	-0.35	-0.13
	(2.62)	(2.87)	(2.95)	(2.97)
Fee/Commission Related	11.2***	7.42*	9.76**	10.2**
	(4.31)	(4.18)	(4.22)	(4.52)
Fraud	4.81*	4.56*	6.61**	5.67**
	(2.53)	(2.74)	(3.02)	(2.83)
Fiduciary Duty	1.37	3.16	-0.37	0.95
	(2.22)	(2.42)	(2.55)	(2.59)
Negligence	-4.43*	-5.62**	-6.23**	-6.96**
	(2.36)	(2.53)	(2.78)	(2.77)
Risky Investments	-0.82	0.55	1.79	-0.43
	(3.24)	(3.58)	(3.66)	(4.12)
Churning/ Excessive Trading	1.64	1.83	-1.05	-3.39
	(2.63)	(2.80)	(2.93)	(2.93)
Unregistered Securities	17.8**	15.6	1.45	1.83
	(8.43)	(9.62)	(11.9)	(11.2)
Products:				
Insurance	4.69	4.08	7.08	1.00
	(4.16)	(3.86)	(4.57)	(4.04)
Annuity	7.59	6.70	12.8*	7.51
	(6.16)	(6.08)	(7.40)	(7.52)
Stocks	1.22	0.45	0.41	2.96
	(2.51)	(2.72)	(3.02)	(3.04)
Mutual Funds	-9.59***	-7.45***	-10.1***	-5.72
	(2.67)	(2.80)	(3.45)	(4.11)
Bonds	-0.71	0.49	-7.33**	-5.51
	(3.96)	(4.33)	(3.49)	(4.29)
Options	-8.83**	-9.98**	-12.8***	-13.5***
	(3.64)	(3.96)	(4.32)	(5.09)
Adviser Characteristics:				
Prior Misconduct	6.54***	7.04***	6.94***	6.51***
	(1.70)	(1.80)	(1.96)	(1.98)
Year F.E.	X	X	X	X
Adviser County F.E.		X	X	X
Arbitration Location F.E.		X	X	X
Firm F.E.			X	X
Arbitrator F.E.				X
Observations	19,451	18,630	18,505	15,168
R-squared	**0.043**	**0.115**	**0.3853**	**0.626**

Note: Table 2 displays the regression results for a linear regression model (eq. 1). Observations are at the arbitrator-by-case level over the period 1988-2015 and come from our consumer dispute arbitration data set. Awards and is measured as awards granted through arbitration divided by awards requested. 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 controls. Other adviser controls include the corresponding adviser's experience and qualifications: Series 6, Series 7, Series 24, Series 63, Series 65/66, and number of other qualifications. In columns (2)-(4) we include fixed effects for the location of the arbitration proceedings and a fixed effect for the adviser's office location. In the full specification (column 4) we include arbitrator fixed effects. The F-test for whether arbitrator fixed effects are jointly significantly different from each other is significant at 1%. Standard errors are clustered at the case level. *** p<0.01, ** p<0.05, * p<0.10.

Table 3: Are Industry Friendly Arbitrators Selected More Frequently?

	(1)	(2)	(3)
Arbitrator Fixed Effects	-1.27***	-1.06***	-1.15***
	(0.37)	(0.37)	(0.39)
Arbitrator Controls		X	X
Year F.E.		X	X
Location F.E.			X
Adviser County F.E.			X
Observations	61,559	61,559	60,981
R-squared	0.047	0.055	0.069

Note: Table 3 display the regression results corresponding to a linear probability model (eq. 2). Observations are at the arbitrator-by-year level over the period 1988-2015. The dependent variable is a dummy variable indicating whether an arbitrator was selected in a given year. Arbitrator Fixed Effects are empirical Bayes estimated arbitrator fixed effects as described in Section IV.A. A higher Arbitrator Fixed Effect indicates that, all else equal, the arbitrator gives out higher awards and is therefore more consumer friendly. To ease interpretation of the regression results, we standardized the Arbitrator Fixed Effects such that they are in units of standard deviation. We control for the number of years the arbitrator has been active in the industry. We include year fixed effects, fixed effects for the location of the arbitration proceedings, and fixed effects for the county of the adviser's office location. The hearing location fixed effects and adviser office location county fixed effects correspond to the last consumer dispute case the arbitrator oversaw. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

Table 4: Industry Friendly Arbitrator Selection and Consumer Sophisitication

	(1)	(2)
Attorney	3.08***	3.48***
	(1.17)	(1.31)
PIABA Attorney	6.00***	6.75***
	(0.89)	(0.96)
Trust	10.2***	9.60***
	(1.29)	(1.39)
Firm Experience	-2.87***	-2.11***
	(0.67)	(0.76)
Other Controls	X	X
Year F.E.		X
Adviser County F.E.		X
Observations	15,155	15,155
R-squared	0.026	0.093

Note: Table 4 displays the regression results for a linear regression model (eq. 3). Observations are at the arbitrator-by-case level over the period 1988-2015 and come from our consumer dispute arbitration data set. The dependent variable is the selected Arbitrator's Fixed Effect as calculated in column (4) of Table 2. A higher Arbitrator Fixed Effect indicates that, all else equal, the arbitrator gives out higher awards and is therefore more consumer friendly. Attorney is a dummy variable indicating whether the consumer used an Attorney. PIABA Attorney indicates whether the consumer used a attorney who specializes in arbitration and is a member of the of the Public Investors Arbitration Bar Association. Trust indicates whether the consumer claimant is a trust. 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 ommited category is consumers who are self-represented, not part of a trust, and are facing firms with below average experience. Coefficients are in percentage points. Other Controls include case size, the arbitration panel size, the case length in terms of the number of words, and other adviser characteristics. Other controls also include the corresponding adviser's qualifications: Series 6, Series 7, Series 24, Series 63, Series 65/66, and number of other qualifications. . Standard errors are clustered at the case level. *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

Table 5: Industry Friendly Arbitrator Selection and the 2008 Rule Change

	(1)	(2)	(3)
Arbitrator F.E.	-4.57***	-4.53***	-4.11***
	(1.41)	(1.41)	(1.53)
Arbitrator F.E.×(1999≤Year<2008)	2.85*	3.07**	2.47
	(1.56)	(1.56)	(1.67)
Arbitrator F.E. ×(Year≥2008)	4.37***	4.54***	3.96**
	(1.47)	(1.46)	(1.58)
Arbitrator Controls		X	X
Year F.E.		X	X
Location F.E.			X
Adviser County F.E.			X
Observations	61,559	61,559	60,981
R-squared	0.047	0.055	0.069

Note: Table 5 displays the regression results corresponding to a linear probability model (4). Observations are at the arbitrator-by-case level over the period 1988-2015. The dependent variable is a dummy variable indicating whether an arbitrator was selected in a given year. A higher Arbitrator Fixed Effect indicates that, all else equal, the arbitrator gives out higher awards and is therefore more consumer friendly. To ease interpretation of the regression results, we standardized the Arbitrator Fixed Effects such that they are in units of standard deviation. We also control for the number of years the arbitrator has been active in the industry. We include year fixed effects, fixed effects for the location of the arbitration proceedings, and fixed effects for the county of the adviser's office location. The hearing location fixed effects and adviser office location county fixed effects correspond to the last consumer dispute case the arbitrator oversaw. Robust standard errors are in parentheses. *** 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	-0.014	-2.67
	(0.041)	(1.78)
Misrepresentation	-0.048	-1.84
	(0.045)	(1.95)
Unauthorized Activity	-0.088*	-0.21
	(0.048)	(2.32)
Omission of Key Facts	-0.10	0.10
	(0.064)	(2.87)
Fee/Commission Related	0.13	7.42*
	(0.096)	(4.18)
Fraud	-0.040	4.56*
	(0.054)	(2.74)
Fiduciary Duty	-0.028	3.16
	(0.055)	(2.42)
Negligence	-0.0049	-5.62**
	(0.055)	(2.53)
Risky Investments	0.033	0.55
	(0.11)	(3.58)
Churning/ Excessive Trading	0.037	1.83
	(0.055)	(2.80)
Unregistered Securities	0.100	15.6
	(0.23)	(9.62)
Products:		
Insurance	0.036	4.08
	(0.11)	(3.86)
Annuity	-0.0083	6.70
	(0.15)	(6.08)
Stocks	0.096	0.45
	(0.071)	(2.72)
Mutual Funds	0.057	-7.45***
	(0.13)	(2.80)
Bonds	-0.043	0.49
	(0.12)	(4.33)
Options	0.054	-9.98**
	(0.16)	(3.96)
Adviser Characteristics:		
Prior Misconduct	-0.012	7.04***
	(0.041)	(1.80)
Experience	0.0012	-0.47***
	(0.0030)	(0.14)
Year , Adviser County, and Arb. Loc. F.E.	X	X
Other Controls	X	X
Observations	18,616	18,630
R-squared	0.455	0.131

Note: Table 6 displays the regression results corresponding to two linear regression models (eq. 5 and 1). Observations are at the arbitrator-by-case level over the period 1988-2015 and come from our consumer dispute arbitration data set. The dependent variable in column (1) reflects the experience of the arbitrator selected for a case in terms of the number of consumer dispute arbitration cases the arbitrator previously oversaw. The dependent variable in column (2) is Awards and is measured as awards granted divided by awards requested. 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. We find a statistically significant relationship between one 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 of experience, there is a roughly 86% chance ($= (1 - 0.9^{19})$ we would find one or more statistically significant coefficients. Standard errors are clustered at the case level. *** p<0.01, ** p<0.05, * p<0.10.

Table 7: Cases Arbitrated vs Settled

	(1)	(2)	(3)
ln(Award Requested)	1.11***	1.10***	1.11***
	(0.26)	(0.25)	(0.25)
Allegations:			
Unsuitable	0.92**	1.03***	0.98**
	(0.39)	(0.36)	(0.37)
Misrepresentation	0.83*	0.52	0.48
	(0.47)	(0.42)	(0.40)
Unauthorized Activity	1.81***	0.54*	0.45
	(0.45)	(0.31)	(0.31)
Omission of Key Facts	3.88***	3.24***	3.05***
	(0.69)	(0.55)	(0.52)
Fee/Commission Related	-0.14	0.15	0.11
	(0.52)	(0.49)	(0.49)
Fraud	4.32**	3.86***	4.11***
	(1.75)	(1.32)	(1.30)
Fiduciary Duty	10.9***	9.43***	9.57***
	(1.16)	(0.93)	(0.95)
Negligence	5.33***	5.15***	5.33***
	(0.92)	(0.83)	(0.81)
Risky Investments	-1.40***	-0.75*	-0.76*
	(0.49)	(0.39)	(0.42)
Churning/ Excessive Trading	3.23***	1.50***	1.52***
	(0.70)	(0.55)	(0.54)
Unregistered Securities	-0.051	-0.75	-0.77
	(2.66)	(2.74)	(2.47)
Products:			
Insurance	-2.12***	-1.03**	-1.01**
	(0.56)	(0.39)	(0.41)
Annuity	-1.70***	-0.73***	-0.77***
	(0.39)	(0.25)	(0.26)
Stocks	-0.029	0.080	0.19
	(0.58)	(0.44)	(0.45)
Mutual Funds	-1.38***	-0.55	-0.49
	(0.34)	(0.37)	(0.39)
Bonds	-1.95***	-1.19**	-1.21**
	(0.51)	(0.46)	(0.49)
Options	-0.92	-0.100	-0.39
	(0.81)	(0.71)	(0.75)
Adviser Characteristics:			
Prior Misconduct	0.45	-0.58	-0.57
	(0.67)	(0.56)	(0.58)
Experience	-0.096***	-0.012	-0.013
	(0.032)	(0.024)	(0.023)
Year F.E.	X	X	X
Firm F.E.		X	X
County F.E.			X
Other Controls	X	X	X
Observations	100,279	99,045	96,075
R-squared	0.124	0.232	0.235

Note: The table displays the regression results corresponding to a linear probability model (6). Our data set consists of 100,279 customer disputes that are reported in BrokerCheck. Observations are at the customer dispute level. The dependent variable is an indicator variable that is equal to one if the customer dispute was decided in arbitration or zero if the case was settled outside of arbitration. ln(Award Requested) requested measures the award requested by the customer. Prior Misconduct indicates whether or not the adviser has been previously reprimanded for misconduct. Other controls include the corresponding offending adviser's qualifications (Series 6, 7, 24, 63, 65/66, total licenses). Standard errors are clustered at the year level and at the firm level. *** p<0.01, ** p<0.05, * p<0.10.

Appendices

Appendix A:

A.1 Backward Looking Measure of Arbitrator Consumer Friendliness

Our previous results suggest that there are persistent and statistically significant 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:

$$\delta_{ijklt} = Pct\_Awarded_{ijklt} - \hat{\beta}X_i - \hat{\mu}_k - \hat{\mu}_t \tag{15}$$

We construct our measure of arbitrator past consumer/industry friendliness $\bar{\delta}_{lt}$, as the average of the residuals (δ_{ijklt}) from the cases arbitrator l previously oversaw. A higher $\bar{\delta}_{lt}$ implies that the arbitrator is less industry friendly and more consumer friendly.

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

$$Selected_{lt} = \beta X_{lt} + \gamma\bar{\delta}_{lt} + \eta_{lt} \tag{16}$$

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 she's been active in the industry, number of cases in the data set she has overseen, whether or not she worked as a financial adviser, and whether or not she has a record of misconduct as a financial adviser. We also include year fixed effects and fixed effects for the location 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. In columns (1)-(3) we examine the probability that an arbitrator is selected to a consumer arbitration case in a given year. In columns (4)-(6) we examine the probability that an arbitrator is selected to any arbitration case, including non-consumer arbitration cases. 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 consumer 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 0.23pp increase in the probability of being selected in a given year. To put this number in perspective, the average probability that an arbitrator is selected in a given year is 6%. Hence, this amounts to a roughly four 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.

A.2 Do Consumers Account for Arbitrator Bias when Requesting Awards?

The results from Section IV.B suggests that firms hold an informational advantage over consumers when selecting arbitrators. Why aren't investors using the same information to select arbitrators? One potential explanation is that consumers account for the potential bias of the arbitrator but do so when initially requesting/claiming awards though the timing of the proceedings suggests that this is highly unlikely. FINRA arbitration rules (Rule 12309) require that claims must be formally requested/stated before the arbitration panel has been appointed, and can only be amended thereafter if the arbitration panel grants a formal motion to amend. Here, we separately examine whether either the damages requested or the damages granted is correlated with the types of arbitrators that are selected for a case.

We first examine the damages requested by a client on the arbitrator's past bias and set of additional control variables.

$$\ln(Awards\_Requested)_{ijklt} = \alpha\bar{\delta}_{lt} + \beta X_i + \mu_j + \mu_k + \mu_t + \varepsilon_{ijklt} \tag{17}$$

The regression specification mirrors that of eq. (1), except that our dependent variable is now the awards requested, and we also control for the arbitrators past bias $\bar{\delta}_{lt}$ which is computed as defined above (eq. 15). Observations are at the arbitrator-by-case level. The key independent variable is the arbitrator's past bias. We again control for case level characteristics and include time, county, and firm fixed effects.

Table A2a displays the corresponding estimation results. We find essentially no relationship between the requested awards and the arbitrator bias in each specification. The corresponding estimates are relatively precise which suggests that this finding (or lack thereof) is not due to a lack of statistical power.

We also examine the relationship between awards granted and the past bias of an arbitrator.

$$\ln(Award\_Granted)_{ijklt} = \alpha\bar{\delta}_{lt} + \beta X_i + \mu_j + \mu_k + \mu_t + \varepsilon_{ijklt} \tag{18}$$

The regression specification corresponds to that of eq. (17) other than the dependent variable. We use the same set of controls as in eq. (17) and observations are at the arbitrator-by-case level.

Table A2b displays the corresponding estimation results. In each specification, we estimate a positive relationship between the awards granted and the arbitrator's past bias, and the estimates are statistically significant in each specification. The results in column (1) suggest that a one standard deviation increase in an arbitrator's past bias is associated with an 8% increase in the award amount.

Appendix B: Model Solution

Competition between Arbitrators

Arbitrators compete for cases by choosing their slant: how consumer 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 consumer. 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 cases: first, when consumers are informed ($\mu_P = 1$); and second, when only consumers are uninformed ($\mu_P = 0$),

Informed consumers

We first present the benchmark model in which firms and consumers are fully informed ($\mu_P = 1$). This benchmark illustrates the potential benefits of the existing arbitrator selection mechanism. When both firms and consumers 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. 10) 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

$$U(b_i) = max_{a_i} \Gamma(a^{-1}(a_i), F(\cdot)) (f - \theta(b_i - a_i)) \tag{19}$$

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

$$\frac{\partial}{\partial b} U(b_i) = -\Gamma(b_i, F(\cdot))\theta \, \forall b_i > F^{-1}(0.5) \, and \, b_i \neq a_i \tag{20}$$

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. 20), we can write the utility of arbitrator with belief b_i as

$$U(b_i) = \bar{U} - \int_{F^{-1}(0.5)}^{b_i} \Gamma(\tilde{b}, F(\cdot))\theta d\tilde{b}, \, \forall b_i > F^{-1}(0.5) \, and \, b_i \neq a_i \tag{21}$$

Last, we can use equations (19) and (21) 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

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

Uninformed Consumers

Here we analyze arbitration outcomes when the firm holds an informational advantage. Since firms are informed, they eliminate the most consumer 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 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 (10), 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

$$U(b_i) = max_{a_i} \Gamma(a^{-1}(a_i), F(\cdot)) \left(f - \theta(b_i - a_i)\right) \tag{22}$$

From the envelope condition, we have

$$\frac{\partial}{\partial b} U(b_i) = -\Gamma(b_i, F(\cdot))\theta \, \forall b_i \neq a_i \tag{23}$$

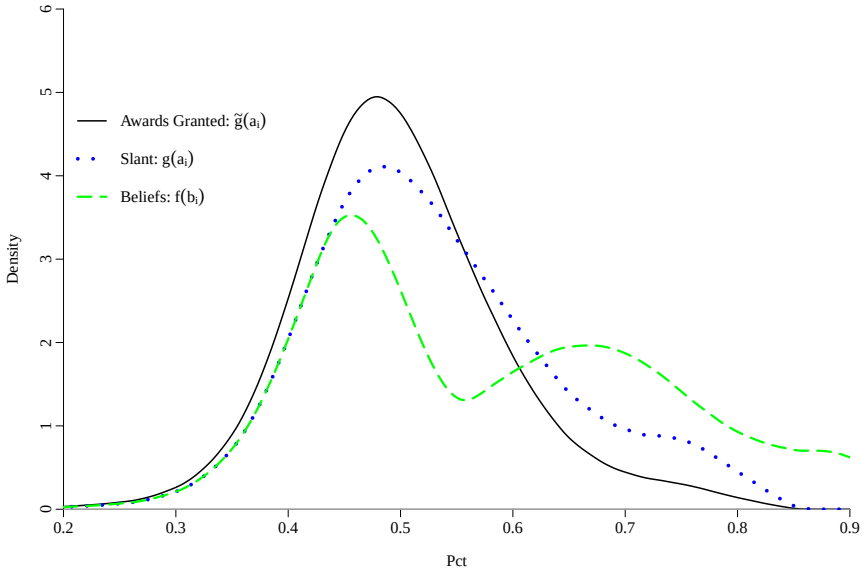
Note that an arbitrator with bias $\bar{b}$ will never be selected for arbitration; thus, $U(\bar{b}) = 0$. Combining (22) and (23) we solve for the equilibrium strategy

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

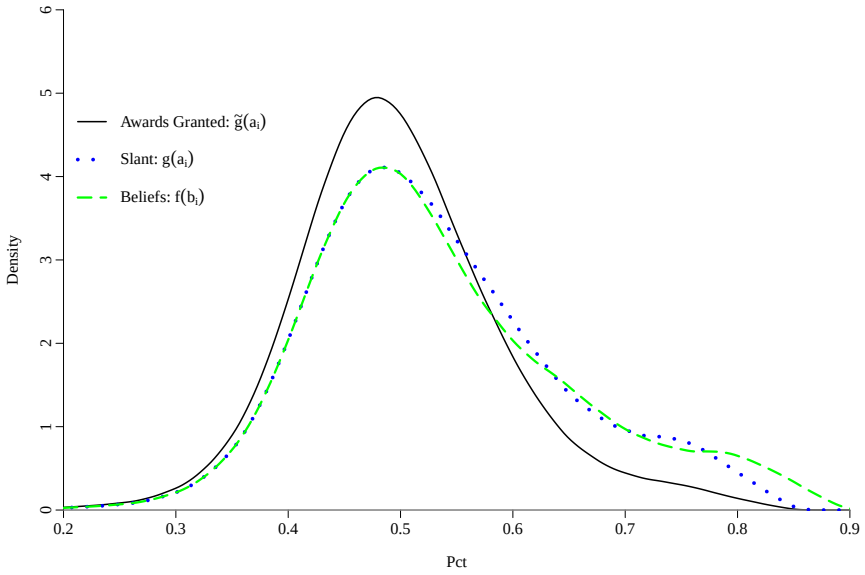
Appendix C: Additional Tables and Figures

Figure A1: Distribution of Arbitrator Beliefs, Slant, and Awards Under Alternative Parameterizations

(a) $\frac{f}{\theta}$ scaled by 50%



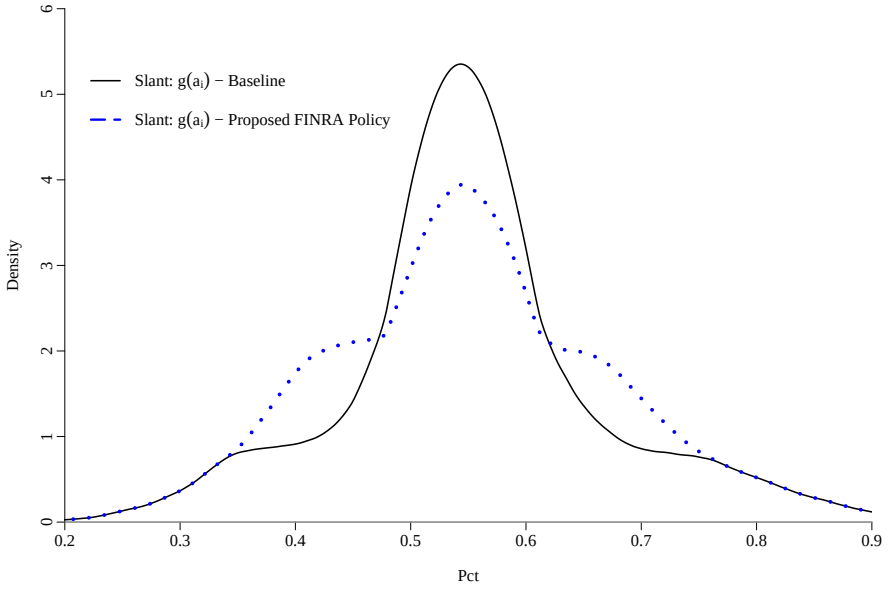
(b) $\frac{f}{\theta}$ scaled by 150%



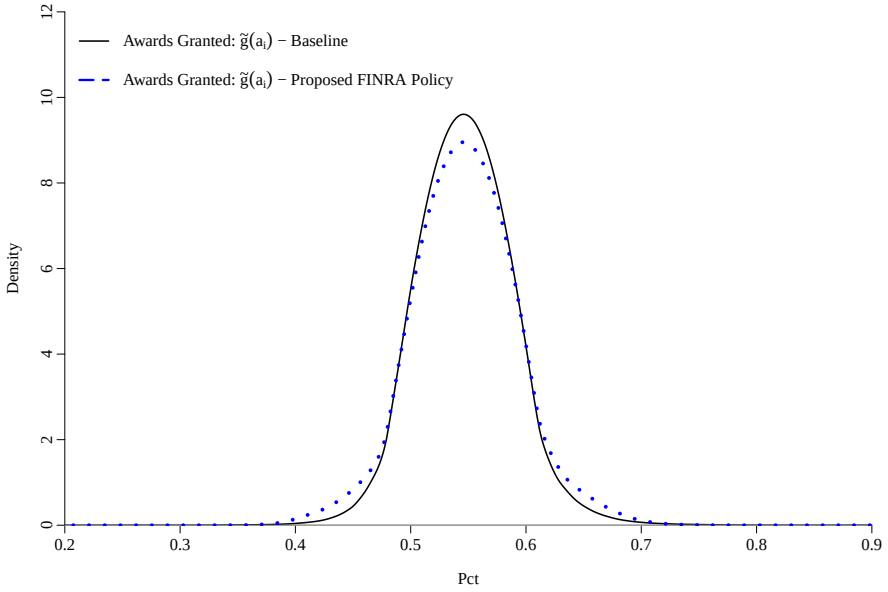
Note: Figures A1a and A1b display the estimated density of awards among the conditional distribution of selected arbitrators $\widehat{\tilde{g}(a)}$, the estimated density of slant among the unconditional (entire) population of arbitrators $\widehat{g(a)}$, and the estimated density of true beliefs among the unconditional (entire) population of arbitrators $\widehat{f(b)}$. The black line plots the distribution of realized awards/outcomes observed in the data. In panel (a) we calibrate the unconditional distributions of slant and beliefs by scaling the parameter $\frac{f}{\theta}$ by 50% relative to our baseline calibration. In panel (b) we calibrate the unconditional distributions of slant and beliefs by scaling the parameter $\frac{f}{\theta}$ by 150% relative to our baseline calibration. Both panels are estimated under the assumption that only firms are informed.

Figure A2: Counterfactual: Proposed FINRA Change, Informed Consumers

(a) Arbitrator Slant



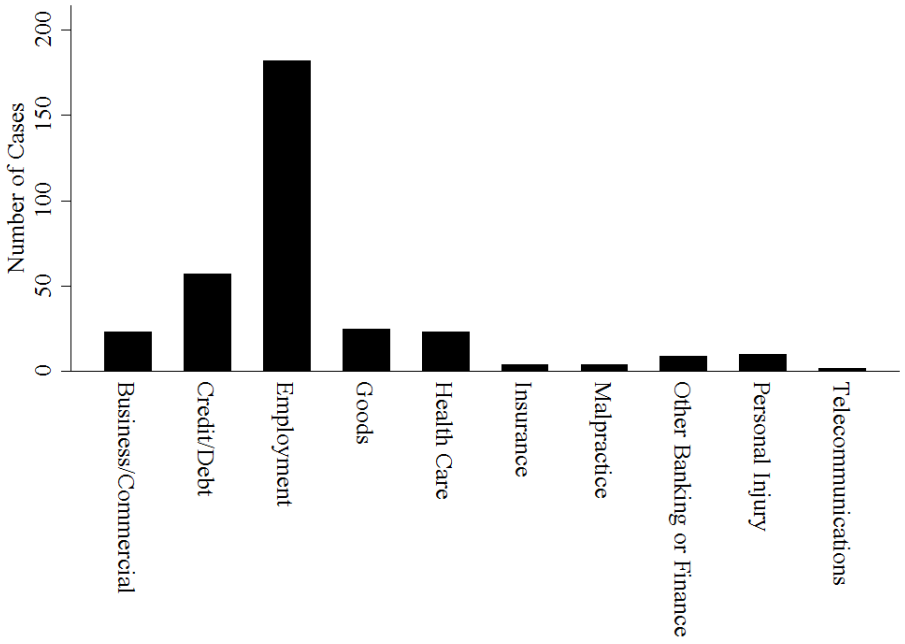
(b) Arbitration Awards



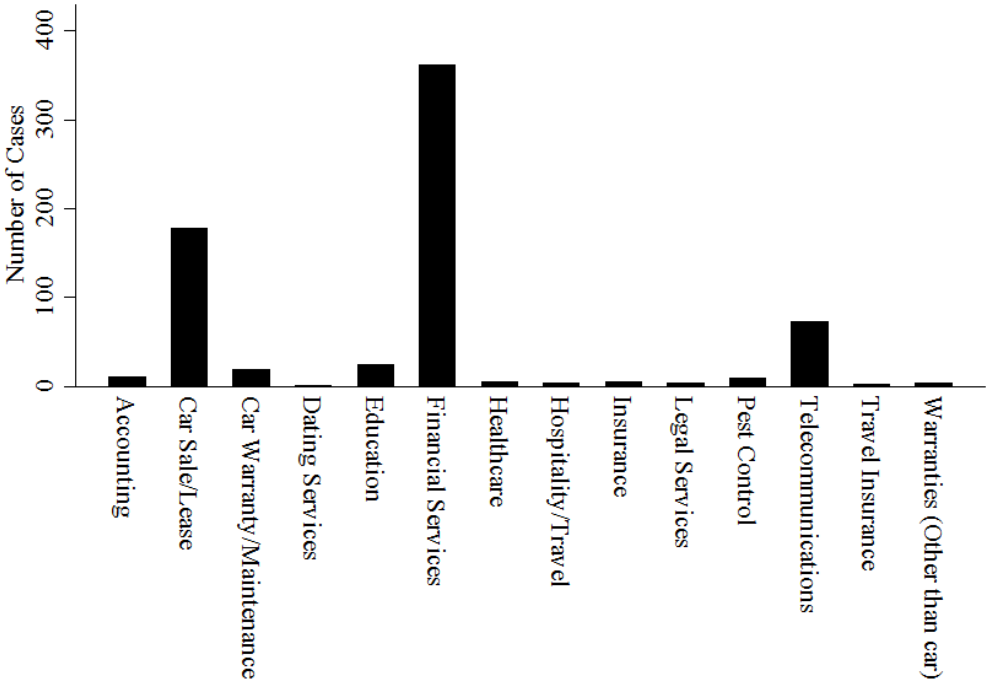
Note: Figures A2(a) and A2(b) display the counterfactual distribution of arbitrator slant and awards if regulators were to increase the arbitration list size (n) from ten to fifteen and increase the number of strikes (k) from four to six as recently proposed by FINRA. We compute the counterfactual distributions of arbitrator slant and awards where we fix the distribution of beliefs and solve for the optimal choice for arbitrators' slant as we increase the number of arbitrators on the list (n) and increase the number of strikes (k). We resolve the model under the assumption that both firms and consumers are informed. We derive and characterize each arbitrator's optimal choice of slant in Appendix B. In the counterfactuals we fix the distribution of beliefs to match the estimated parameterized distribution of beliefs in the data as reported in Figure 5. The dotted (solid) line in panel (a) displays the counterfactual (baseline) distribution of arbitrator slant if we were to implement the recent FINRA proposal. Similarly, the dotted (solid) line in panel (b) displays the counterfactual (baseline) distribution of arbitration awards if we were to implement the recent FINRA proposal.

Figure A3: Types of Disputes at the American Arbitration Association (AAA) and JAMS

(a) JAMS



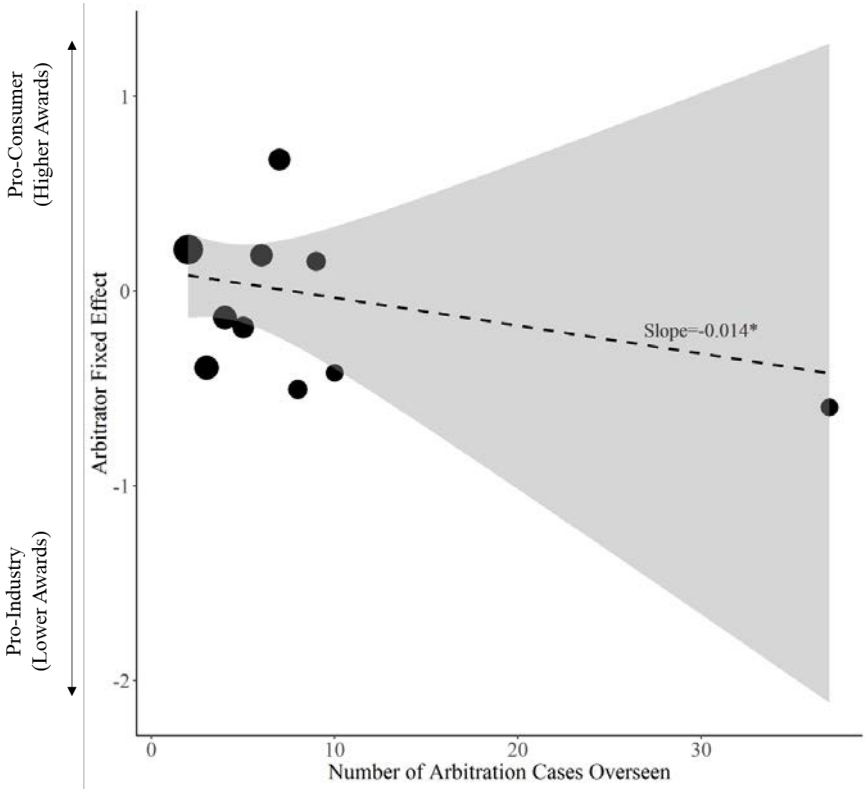
(b) AAA



Note: Figure A3 panels (a) and (b) display the types of arbitration/mediation overseen by the AAA and JAMS. Data are reported by the AAA and JAMS over the period 2013-2018. Panel (a) displays the frequency of all types of disputes in the JAMS data set. Panel (b) displays the frequency of all 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 A4: External Validity: Arbitrator Selection in AAA and JAMS

(a) Arbitrator Fixed Effects vs. Selection - JAMS



(b) Arbitrator Fixed Effects vs. Selection - AAA

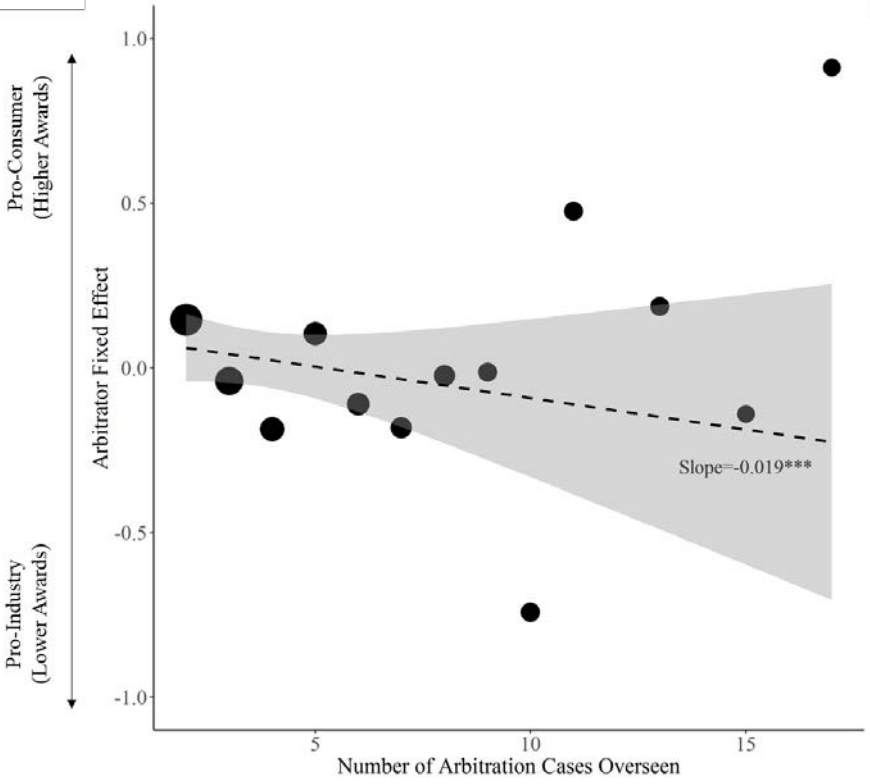


Figure A4: External Validity: Arbitrator Selection in AAA and JAMS

Note: Figure A4 panels (a) and (b) display the distribution between arbitrator case outcomes and the total number of times an arbitrator is selected. Figure A4a 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 A4b displays a binned scatter plot of the standardized arbitrator fixed effects versus the total number of cases the arbitrator oversaw in the JAMS data. Observations in Figure A4 panels (a) and (b) are at the arbitrator level. A higher fixed effect indicates that the arbitrator gave out higher awards than expected given case observables. The size of the bubble corresponds to the number of arbitrators in the bin. The gray shaded area reflects the 90% confidence interval for the corresponding weighted least squares regression. The arbitrator fixed effects in panel (a) correspond to column (2) of Table A5b. The arbitrator fixed effects are computed from a regression of total awards granted in dollar terms on a vector of case controls and arbitrator fixed effects. The arbitrator fixed effects in panel (b) correspond to column (4) of Table A5b. The arbitrator fixed effects are computed from a regression of Awards, defined as awards granted divided by awards requested, on a vector of case controls and arbitrator fixed effects. We compute the arbitrator fixed effects for the JAMS cases based on the total awards granted in dollar terms rather than in percentage terms because we do not observe the awards requested in the JAMS cases.

Table A1: Probability an Arbitrator is Selected - Past Consumer Friendliness

	(1)	(2)	(3)
Past Arbitrator Consumer Friendliness	-0.30***	-0.29***	-0.30***
	(0.072)	(0.072)	(0.073)
Arbitrator Controls		X	X
Year F.E.		X	X
Location F.E.			X
Adviser County F.E.			X
Observations	105,854	105,854	105,838
R-squared	0.028	0.031	0.045

Note: Table display the regression results corresponding to a linear probability model (eq. 16). Observations are at the arbitrator-by-year level over the period 1988-2015. The dependent variable is a dummy variable indicating whether an arbitrator was selected in a given year. The independent variable of interest is our measure of Past Arbitrator Consumer Friendliness. We measure Past Arbitrator Consumer Friendliness using a backward measure of friendliness as described in Appendix A (eq. 15). A higher Past Arbitrator Consumer Friendliness indicates that, all else equal, the arbitrator gave out higher awards in the past. Relative to Table 3, we have roughly 40k more observations because we are able to calculate our backawards looking measure of Arbitrator Consumer Friendliness for those arbitrators who only oversee one case in their career. Those arbitrators are dropped from our previous sample because we cannot compute Arbitrator Fixed Effects for those arbitrators. Arbitrator controls include the number of years the arbitrator has been active in the industry. We include year fixed effects, fixed effects for the location of the arbitration proceedings, and fixed effects for the county of the adviser's office location. The hearing location fixed effects and adviser office location county fixed effects correspond to the last consumer dispute case the arbitrator oversaw. Robust standard errors are in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

Table A2: Arbitrator Bias and Awards Requested

(a) Award Requested

	(1)	(2)	(3)	(4)
Past Arbitrator Consumer Friendliness	0.0176	0.0136	0.0130	0.032
	(0.0157)	(0.0119)	(0.0122)	(0.0114)
Arbitration Case Controls		X	X	X
Year F.E.		X	X	X
Adviser County F.E.			X	X
Location F.E.			X	X
Firm F.E.				X
Observations	11,768	11,092	10,758	10,530
R-squared	0.000	0.394	0.440	0.606

(b) Award Granted

	(1)	(2)	(3)	(4)
Past Arbitrator Consumer Friendliness	0.080***	0.077***	0.068***	0.055***
	(0.020)	(0.017)	(0.016)	(0.016)
Arbitration Case Controls		X	X	X
Year F.E.		X	X	X
Adviser County F.E.			X	X
Location F.E.			X	X
Firm F.E.				X
Observations	9,617	9,076	8,745	8,548
R-squared	0.002	0.282	0.347	0.529

Note: Table A2a and A2b displays the regression results for linear regression models (eq. 17 and 18). Observations are at the arbitrator-by-case level over the period 1988-2015 and come from our consumer dispute arbitration data set. The dependent variable in panel (a) is the log value of awards requested. The dependent variable in panel (b) is the log value of awards granted. The independent variable interest is Past Arbitrator Consumer Friendliness. We measure Past Arbitrator Consumer Friendliness using a backward measure of friendliness as described in Appendix A (eq. 15). A higher Past Arbitrator Consumer Friendliness indicates that, all else equal, the arbitrator gave out higher awards in the past. We also control for 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. Standard errors are clustered at the case level. *** p<0.01, ** p<0.05, * p<0.10.

Table A3: ln(Award Granted)

	(1)	(2)	(3)	(4)
ln(Award Requested)	0.62***	0.62***	0.63***	0.64***
	(0.016)	(0.016)	(0.018)	(0.019)
Allegations:				
Unsuitable	0.029	0.044	0.049	0.056
	(0.034)	(0.037)	(0.041)	(0.042)
Misrepresentation	-0.026	-0.039	-0.019	-0.035
	(0.038)	(0.040)	(0.045)	(0.047)
Unauthorized Activity	-0.063	-0.0082	0.035	0.085
	(0.043)	(0.045)	(0.050)	(0.052)
Omission of Key Facts	-0.083	-0.087	-0.073	-0.061
	(0.059)	(0.063)	(0.072)	(0.072)
Fee/Commission Related	0.12**	0.11*	0.19***	0.17**
	(0.058)	(0.064)	(0.071)	(0.077)
Fraud	0.16***	0.13**	0.13**	0.058
	(0.055)	(0.059)	(0.066)	(0.067)
Fiduciary Duty	0.014	0.062	0.074	0.12**
	(0.052)	(0.054)	(0.060)	(0.061)
Negligence	0.022	-0.016	-0.025	-0.069
	(0.053)	(0.057)	(0.067)	(0.066)
Risky Investments	0.028	0.063	0.094	0.036
	(0.071)	(0.076)	(0.084)	(0.089)
Churning/ Excessive Trading	-0.020	0.0013	0.025	-0.030
	(0.053)	(0.055)	(0.060)	(0.064)
Unregistered Securities	0.88***	0.89***	0.73***	0.69***
	(0.15)	(0.16)	(0.19)	(0.19)
Products:				
Insurance	-0.012	0.0069	0.0056	-0.10
	(0.078)	(0.078)	(0.093)	(0.098)
Annuity	-0.068	-0.041	0.054	0.0054
	(0.096)	(0.11)	(0.12)	(0.12)
Stocks	0.047	0.028	0.049	0.12*
	(0.049)	(0.054)	(0.062)	(0.063)
Mutual Funds	-0.15**	-0.10	-0.14	-0.11
	(0.073)	(0.077)	(0.089)	(0.099)
Bonds	0.096	0.078	-0.013	0.015
	(0.077)	(0.084)	(0.10)	(0.11)
Options	0.0072	-0.019	-0.058	-0.20*
	(0.098)	(0.11)	(0.12)	(0.11)
Adviser Characteristics:				
Prior Misconduct	0.085**	0.097***	0.087**	0.089**
	(0.034)	(0.036)	(0.041)	(0.042)
Year F.E.	X	X	X	X
Adviser County F.E.		X	X	X
Arbitration Location F.E.		X	X	X
Firm F.E.			X	X
Arbitrator F.E.				X
Observations	15,220	14,460	14,347	11,044
R-squared	**0.487**	**0.540**	**0.658**	**0.802**

Note: Table A3 displays the regression results for a linear regression model (eq. 1). Observations are at the arbitrator-by-case level over the period 1988-2015 and come from our consumer dispute arbitration data set. The dependent variable is the log value of the award granted through arbitration. 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 sentences and words, and other adviser controls. Other adviser controls include the corresponding adviser's experience and qualifications: Series 6, Series 7, Series 24, Series 63, Series 65/66, and number of other qualifications. In columns (2)-(4) we include fixed effects for the location of the arbitration proceedings and a fixed effect for the adviser's office location. In the full specification (column 4) we include arbitrator fixed effects. The F-test for whether arbitrator fixed effects are jointly significantly different from each other is significant at 1%. Standard errors are clustered at the case level. *** p<0.01, ** p<0.05, * p<0.10.

Table A4: Are Industry Friendly Arbitrators Selected More Frequently - Alternative Fixed Effects Estimates

	(1)	(2)	(3)
Arbitrator Fixed Effects	-1.20**	-0.87*	-0.97*
	(0.47)	(0.47)	(0.50)
Arbitrator Controls		X	X
Year F.E.		X	X
Location F.E.			X
Adviser County F.E.			X
Observations	51,688	51,688	51,229
R-squared	0.052	0.061	0.077

Note: Table A4 display the regression results corresponding to a linear probability model (eq. 2). Observations are at the arbitrator-by-year level over the period 1988-2015. The dependent variable is a dummy variable indicating whether an arbitrator was selected in a given year. Arbitrator Fixed Effects are empirical Bayes estimated arbitrator fixed effects as described in Section IV.A. The empirical Bayes estimated fixed effects correspond to our alternative estimates that are reported in Column (4) of Table A3, where we examine arbitration outcomes in terms of the $\ln(AwardGranted)$ rather than $\frac{AwardGranted}{AwardRequested}$. A higher Arbitrator Fixed Effect indicates that, all else equal, the arbitrator gives out higher awards and is therefore more consumer friendly. To ease interpretation of the regression results, we standardized the Arbitrator Fixed Effects such that they are in units of standard deviation. We control for the number of years the arbitrator has been active in the industry. We include year fixed effects, fixed effects for the location of the arbitration proceedings, and fixed effects for the county of the adviser's office location. The hearing location fixed effects and adviser office location county fixed effects correspond to the last consumer dispute case the arbitrator oversaw. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

Table A5: 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 Awards Granted				965	20%	115%

(b) Awards

Dep. Var	$ Award Granted		$\frac{Award\_Granted}{Award\_Requested}$	
	JAMS		AAA	
	(1)	(2)	(3)	(4)
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 A5a displays the summary statistics corresponding to our JAMS and AAA data sets. Observations are at the case-by-arbitrator level over the period 2013-2018. We estimate columns (1)-(2) using our JAMS arbitration data set and we estimate columns (3)-(4) using our AAA arbitration data set. Table A5b corresponds to a linear regression model (eq. 1). The dependent variable in columns (1)-(2) is the amount awarded to the consumer through JAMS arbitration. For the JAMS data set we only observe the award granted and do not observe the awards that were requested by the consumer. The dependent variable in columns (3)-(4) is the percentage of award granted relative to award requested. 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/satellite (n=85).