



Regular Article

Contract enforcement in a stateless economy

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ABSTRACT

How are contracts enforced when the state cannot compel compliance? We study contract enforcement in a large illegal gambling market where legal recourse is unavailable and participation is largely anonymous. We observe more than 70 percent of gamblers repay their debts, indicating substantial baseline enforcement even in the absence of formal courts. We interpret this descriptive pattern as consistent with a broader set of informal enforcement forces, including repeated interaction, credit constraints, and reputational considerations. We then provide experimental evidence on one specific channel by experimentally varying reputational stakes and the time available to repay. Increasing reputational sanctions and extending the payment deadline raises repayment by a modest but significant amount, from roughly 70 percent to about 77 percent. These effects imply that reputational incentives can strengthen cooperation to a meaningful degree. Overall, our evidence suggests that impersonal markets can sustain substantial repayment without state enforcement, and that reputational sanctions further increase compliance.

1. Introduction

Extensive theoretical research has emphasized how informal reputation mechanisms can support contract enforcement in the absence of courts (Kandori, 1992; Greif, 1993; Ellison, 1994; Ghosh and Ray, 1996; Banerjee and Duflo, 2000; Baker et al., 2002; Bhaskar and Thomas, 2019; Sugaya and Wolitzky, 2021). Historical case studies document how exclusion and social sanctions may sustain exchange without state authority (Greif, 1993; Clay, 1997; Bernstein, 2001). Yet systematic empirical evidence remains limited, particularly in illicit or shadow markets where formal enforcement is unavailable and data are scarce.

We study contract enforcement without state authority in a market for illegal gambling, where court enforcement is unfeasible because the activity itself is illegal. This market, worth over USD 1.7 trillion globally, offers insights into underground economies shaped by distinct rules and enforcement schemes than legal markets (United Nations Office on

Drugs and Crime, 2021). Using transaction-level data from Pakistan's horse betting market, we document substantial baseline compliance: more than 70 percent of debts are repaid in full, and most remaining debts are partially repaid. These descriptive facts suggest that high repayment rates can emerge even when courts are absent and transactions are largely anonymous.

We then provide experimental evidence on one specific enforcement channel. We randomize reputational sanctions and repayment deadlines to test whether these features affect repayment behavior. Strengthening reputational sanctions increases repayment from roughly 70 to 77 percent. Extending repayment deadlines generates a smaller but statistically significant increase as well. These results show that reputational sanctions and liquidity constraints influence repayment decisions.

Studying Pakistan's gambling market is useful for several reasons. Gambling is illegal and punishable by imprisonment, precluding state enforcement (Brown, 2016). Transactions are unobserved due to

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deliberate destruction of records. Contracts are simple, with clear obligations and fulfillment, and high-stakes betting provides a unique experimental setting, as average bets equal monthly wages. We collected extensive data from gambling institutions, tracking contract enforcement and payback. Our findings suggest that this market, with annual transactions of around USD 11 million, thrives even with limited legal enforcement. This sum is comparable to the revenue of Pakistan's electronics industry or 10% of its healthcare spending in 2021 (Finance Division, Government of Pakistan 2021).

We oversaw randomization at one of Pakistan's largest horse racing markets. Bettors were randomly assigned to five different contracts. The control group received the status-quo contract, with a 7-day payback period. Failure to pay results in losing their informal credit rating ("awaz"), limiting future credit bets.¹ This rating allows larger credit wagers based on consistent repayment. The second and third groups received either a local or global blacklisting contract. The local blacklisting added a social image sanction, listing non-payers on the station's notice board, while the global blacklisting also excluded them from betting on credit at all stations. Both retained the same economic sanction as the control. The local and global blacklisting treatments test Greif (1989)'s concept of reputational enforcement without state authority. The local treatment affects social image (stigma or personal honor), while the global treatment adds further exclusion from credit betting. The fourth group received a contract with a 7-day payment extension, to examine the impact of credit constraints on fulfilling obligations.

Our first finding is descriptive: over 70 percent of obligations are repaid in full, and an additional 17 percent are repaid partially, repaying on average 46 percent of their debt. Thus, 87 percent of bettors remit at least something. These levels are consistent with informal enforcement mechanisms (reputation, honor, informal sanctions) sustaining repayment. In total, about 83 percent of the debt to the betting station is repaid. Our experiment further explores the margin effect of blacklisting alone or combined with economic sanctions influences repayment. Experimentally, global blacklisting (combining social image and economic sanctions) increases contract honoring by 10 percentage points (16% relative to the mean), equivalent to an additional USD 60 per bettor, half of the average monthly wage in Pakistan (Finance Division, Government of Pakistan 2021). Local blacklisting raises payback by 7 percentage points (10% relative to the mean), or USD 40 more than the status quo. Interestingly, under the threat of being blacklisted bettors place larger bets and lose more, suggesting that reputation is a key mechanism in contract enforcement, expanding transactions in this underground economy.

Our third main result is that extending the deadline to pay back the owed amount also increases payback. Theoretically, the effect of an increase in payment deadline in the absence of court enforcement can have ambiguous effects. On one hand, extending the payback time may relax the gambler's short-term financial pressure and allow the gambler more time to search for funds and pay back more. On the other hand, such an extension may damage the credibility of the betting association (race club) and reduce payback. We find evidence consistent with the first mechanism. The group assigned the payback extension is 5 percentage points *more* likely to pay back relative to the group assigned the status quo contract. These results indicate that when given additional time to honor the contracts, bettors respond by honoring, not renegeing, on their contractual obligations: paying back more often and in larger

¹ Mahar (2022) illustrates the concept of *awaz*: "As a new creditor, without any other reference or affiliation (someone else's *naam*), one may only start with around a maximum of PKR 5000. However, over time as one builds up rapport and creditworthiness by paying up diligently, one's *awaz* can go up, i.e. the monetary value attached to voice or call goes up. One's *awaz*, as a beginner, for example, can potentially double from PKR 5000 to PKR 10000 within the course of a couple of weeks of betting and consistently paying up on time."

amounts. Extending the deadline, therefore, can also increase contract enforcement and potentially the size of this informal economy. Notably, none of the treatments impact participants' perception of violence in the event of their non-payment. This is consistent with both qualitative and quantitative evidence that violence is rare in this market. Less than 1% of the control group reports fearing violence in case of renegeing on their contract.²

We next explore heterogeneous treatment effects and observe several significant heterogeneities. For example, the global blacklisting treatment is significantly mediated by risk-loving preferences: those who are more risk-seeking pay back more. This result is consistent with risk-loving individuals enjoying the risky gambling environment and being particularly likely to fulfill contractual obligations under the threat of exclusion. In addition, the punishment of losing your credit rating (*awaz*) at a betting station matters more for blacklisted gamblers. When gamblers with higher pretreatment credit ratings have debts owed, blacklisting has a larger impact on their likelihood to fulfill their contractual obligations as compared to the treatment impact on gamblers with lower pretreatment credit rating. That said, gamblers with zero credit rating still respond to the blacklisting treatments by honoring their debts relative to the status quo bettors, highlighting the effect of honor (social image) in this setting.

This paper speaks to several strands of literature. First, this research provides experimental evidence supporting Greif's (1989) hypothesis that contract enforcement is possible without a state authority. Greif, in his influential work of (1989) and later in (1993), employs historical documents from Old Cairo to argue that the eleventh-century Maghribi traders and their foreign agents managed to maintain a vibrant trading relationship, in the absence of any formal enforcing body for their contracts. He theorizes that a reputation-based system and the potential risk of exclusion facilitated exchange in such an economy.³ This line of inquiry closely relates to the extensive literature on the role of communication in promoting cooperation. It builds upon foundational contributions by Ostrom (1990), Kandori (1992) and Ellison (1994), as well as subsequent theoretical developments, such as those proposed by Sugaya and Wolitzky (2021), which pinpoint the conditions that foster cooperation, particularly in settings with limited information. Our paper is also closely related to Lang et al. (2022) on illegal money lending. Both studies highlight reputation as an enforcement device when formal courts are inaccessible. We complement their natural-experiment design by randomizing reputational sanctions and repayment terms at the individual level within a single market. The convergence of results across designs strengthens the interpretation that reputation supports contract enforcement. For economies to foster impersonal exchange during times of structural transformation and limited information (North, 1991), they necessitate communication institutions. These institutions are responsible for establishing and implementing the rules that allow for

² Fear of violence is also unaffected by any of the treatment conditions and has no statistical association with participation in the economy. During the experiment, we also observed several bettors renegeing on their bookbet contracts and exiting, and bettors who continued to participate in this economy by *bookbetting* at a different betting station or even placing bets at the same betting station they defaulted on, by making upfront payments of potential losses. In none of these cases, we could find evidence for the threat of violence upon non-payment. The low perceived fear of violence in case of non-payment is consistent with anecdotes that this market relies on attracting entrants to consume a potentially addictive good and that violence increases the probability of media coverage that can jeopardize the smooth functioning of this underground economy.

³ An influential World Bank Development Report (2002), p. 7: also notes "Traders in Europe established community-based mechanisms to facilitate exchange of credit and trade across borders. ... reputation within the community was important, and agents could be trusted not to renege on their contracts."

impersonal exchange (Bates, 2010; North et al., 2009).⁴ We show that impersonal exchange (without reliance on personal relationships between parties) appears possible without legal enforcement of contracts by third parties. We bring descriptive, and field experimental evidence to this long-standing debate and provide evidence that contract enforcement is possible, and can indeed be fostered, without a legal enforcement authority. Reputational incentives, and individualized punishment facilitates contract enforcement even in impersonal markets.⁵

Second, we contribute to the literature on the working of informal and shadow economies. La Porta and Shleifer (2014) estimates that the informal economy constitutes at least half of all economic activity in the developing world and provides jobs to more than a billion people. Levitt and Venkatesh (2000) analyze a dataset of financial activities of street gang members in Chicago and provide descriptive evidence that many gang members earn close to minimum wage. Lang et al. (2022) analyze informal money lending in Singapore and show an association between enforcement and the size of loans. Blattman et al. (2021) and Blattman et al. (2022) study violent gang membership in Medellín, Colombia and show how gang membership and governance are linked. Cameron et al. (2021) study criminalization of the sex market in Indonesia and find that criminalization increases sexually transmitted diseases among sex workers and the wider population. Our study provides micro-data and experimental manipulations in the working of a large informal market and documents potential mechanisms—of reputation and credit constraints—that foster contract enforcement in a setting with very limited legal enforcement ability. Our study suggests participation in this informal economy can be increased or decreased, for example, by varying the ability to impose reputational sanctions or the length of time that participants need for fulfilling obligations.

Third, to the best of our knowledge, ours is the only study we are aware of that uses actual illicit gambling transactions data to provide a glimpse of the functioning of an illegal gambling market, providing both descriptive and experimental evidence on a market globally estimated to be worth 1.7 trillion dollars (according to the UN Office on Drugs and Crime, 2021). We are able to (1) observe betting decisions made in the field, (2) collect baseline characteristics of gamblers, (3) decisions in behavioral games, and use them to explore several sources of heterogeneous treatment effects. Leveraging these novel data allows us to provide insights into the functioning of this market and extend important work by Jullien and Salanié (2000) and Chiappori et al. (2019), who study the legal gambling market in Britain and the United States, respectively.⁶ We extend these fascinating works by providing insights into the decision-making of bettors using gamblers' individual-level data, measuring their preferences via behavioral games, observing payoff, and exploring heterogeneous treatment effects on bettors' decision-making. Finally, we speak to the literature on the behavioral economics of addiction. Recent studies document the role of time inconsistency in consumption of potentially addictive goods like alcohol, hard drugs, and smoking, all of which may have substantial economic consequences (Schilbach, 2019; Chaloupka IV et al., 2019; Kremer et al., 2019; McVicar et al., 2019). This line of scholarship

⁴ An example of an impersonal exchange relationship would be bank lending (see e.g. Greif (2002) or Ahmed (2019) for formal definitions and examples).

⁵ The paper also relates to the burgeoning empirical literature on relational exchange in agriculture markets (Macchiavello and Morjaria, 2015, 2021; Michler and Wu, 2020). We contribute to this literature by showing how reputational sanctions can facilitate exchange in informal markets with limited personal relationships and in the non-agricultural sector.

⁶ Eadington (1999) provides a review of some of the classical literature on legal gambling in the United States. Also related is recent work by Herskowitz (2021) who studies the role of savings in legal gambling in Uganda. Different from these prior works, we study illegal gambling, collect data on preferences of gamblers, document how reputational sanctions are important for its functioning.

evaluates the empirical predictions of rational addiction models that individuals respond little to temporary price changes in addictive goods, but do respond disproportionately more to expected price changes in the future. Interpreting the global blacklisting treatment as an increase in the future price to buy an addictive good implies that our evidence does not support the influential rational addiction models of Becker and Murphy (1988) or Gruber and Köszegi (2001). These models predict that individuals in the blacklisting treatment would participate less by betting lower amounts. Instead, the significant increase in amount bet for individuals in global blacklisting is more in line with a sudden increase in desire for consumption of an addictive good that overrides long-term preferences (as in Hoch and Loewenstein, 1991). This can be consistent with the global blacklisting treatment, inducing a mismatch between present and future consumption of the addictive good, explaining why blacklisted gamblers bet larger amounts but also pay back more.⁷

The rest of the paper is organized as follows. Section II provides the background, experimental setup and treatment details. Section III describes the data, logistics of the experiment and empirical specification. Section IV presents the main results. Section V presents the results of the heterogeneity analysis, while Section VI provides a series of robustness checks and a discussion of the findings. A final section concludes. Appendices report additional robustness checks and provide more details on the experiment, including a flow-chart summarizing the experimental design.

2. Background, ethics, and study details

Background.—Gambling is a criminal offense in Pakistan, punishable for up to 2 years of imprisonment under the Prevention of Gambling Act of 1977. Our interviews, fieldwork, and focus groups indicate that horse race betting in Pakistan takes place under the auspices of an informal network of gamblers, “the race club association,” every Sunday. The horse races take place every Sunday from noon to 6 p.m. with races scheduled every 30 min. Gambling takes place at betting stations inside the premises of the race club. There are 12 betting stations at the race club. The entry at the club requires a ticket of PKR 500 (USD 2.25), with anyone who has a ticket allowed entry in the club and by default the ability to bet at any of the 12 betting stations that issue identical odds. Every station charges a constant 5% participation fee on winnings. The betting can take place on credit or as a down payment bet, with each betting station offering a bet on credit, a “bookbet” contract up to PKR 5000 (USD 20) for first-time bettors. This allows the gamblers to pay back any liabilities the following week. The amount the bettors can “bookbet” increases over time if gamblers build their “awaz” (literally, voice) by paying back large amounts. The staff at each betting station consists of a “bookmaker” who is the manager of the station, with a “penciller” who records the bets and identity of the gambler, along with two assistants who help the penciller record the bets. Illustrations of the betting stations are provided in Fig. 1. Panel A of Fig. 1 provides an illustration of how punters gather around the betting stations before a race starts, while Panel B illustrates three betting stations in the center of the race club. The station, operating with the support of the betting association, enjoys control to offer different betting contracts, reject or accept bets, and demand information such as gamblers' names or

⁷ Alternatively, blacklisting may increase participation by improving beliefs about contract enforcement. Observing credible sanctions against other bettors raises perceived fairness of the platform, which can encourage entry and higher stakes among risk-averse participants. A second mechanism is horizon compression: a credible exclusion threat lowers the expected continuation value of the gambler–station relationship, shifting wagers toward the present. This front-loading does not require changes in time inconsistency or ‘addictiveness’.

Panel A: Betting Stations with gamblers**Panel B: Three betting Stations at the Race Club****Fig. 1.** The Gambling Stations

Note: The figure above illustrates the gamblers at the betting station. Each white booth represents a betting station at the race club. Panel A illustrates a typical betting rush before the horse race, while Panel B shows three betting stations, after the race.

identity documents.⁸ Illustrations of betting stations and the staff that manages them are provided in [Figure A1](#) and [Figure A2](#) in [Appendix A](#), while further details on the set-up are discussed in the logistics subsection below.

Research Ethics Approvals.— Our study protocols were reviewed and approved by the two independent Institutional Review Boards. The first ethical approval was received from the New Economic School with IRB number 09/26 and the second, a local IRB was obtained from the Center for Research on Economic Development in Pakistan with IRB Number RERC-162021-12. The Center for Research on Economic Development, specifically, made several spot visits to our experimental site and ensured that ethical protocols, for instance, prior consent to take part in the study was sought by all participants. The consent statements that participants filled out can be found in [Appendix B1](#). It is, nevertheless, worth noting that, *a priori*, welfare effects of the treatments are ambiguous, since we did not know whether blacklisting would increase or

decrease payback and whether gambling acts as a substitute or complement to other more harmful activities. We followed the recommendations of [Banerjee et al. \(2020\)](#) for moderation in pre-analysis plans, resulting in a concise pre-registration (AEARCTR-0009926). Our pre-registration outlines three primary outcomes (payback, amount bet, and net winnings) and four variables designated for heterogeneity analysis.

Study Design.— After several focus groups and discussions on the different contracts used by betting stations in the past, we oversee randomization of betting contracts at one betting station where we guide the randomization and observe outcomes. Specifically, using color coded cards, we moderate gamblers at the race club being randomly assigned into different betting contracts: (i) status quo contract that stipulates spot betting with the pay back the week after (910 bettors) (ii) the blacklisting contract that imposes a local or global blacklisting sanction in case of nonpayment, with globally blacklisted group assigned yellow cards (455 bettors) and locally blacklisting group allocated purple cards (455 bettors); (iii) payment deadline extension contract that provides a 7-day extension to pay back the lost money i.e. pay back deadline is set to 14 days instead of the status quo of 7 days (910 bettors). Another arm, notebook or decision aid group, is not offered any specific contract but we accept the status-quo 7 day pay back contract if the bettor explicitly requests it. Within this treatment arm, the gambler also receives a decision aid or notebook containing odds and historical data on horse racing bets (909 bettors). We, however, do not find the decision-aid group to impact any of the pre-specified outcome variables. Our study only focuses on the “bookbettors” who spot bet but receive potential wins or losses later.⁹ We have data on about 3500 of these gamblers who bet on credit. [Fig. 2](#) shows the “penciller” who registers the bets at the betting station we observe, as he randomly assigns the treatment according to the bettors’ color-coded card. All the randomly assigned contracts are read out aloud to the gamblers who approached the betting station where we oversaw the random assignment. The exact transcripts of treatments were read out in the Urdu language and are reported verbatim in Panel A of [Table A1](#) (an English translation of the transcript is also provided). [Figure A1](#) and [Figure A3](#) of [Appendix A](#) show illustrations of bettors at the race club and betting transactions data recorded in “betting registers”. The set-up of the experiment, including a flow chart describing the timeline is presented in Panel B of [Table A1](#).¹⁰

Compliance.— Because the experiment is run by one of the betting stations and has the backing of the race club association, we observe perfect compliance with the treatments. None of the 3639 gamblers refused the randomly assigned treatment offered to them giving us 100% compliance according to the randomly assigned treatment status. It may be due to limited outside options, since only one such horse racing association that operates at such a magnitude exists in the whole province. We observe betting transactions in one of the twelve betting stations and the contracts that are randomized at this station were those that were piloted by the betting station earlier with the penciller, his two assistants and the manager of the station, who remain identical to those before the experiment (see Panel A of [Fig. A1](#) for an illustration of the staff at the gambling station).

Control Condition.— The first group of bettors are offered the status-quo “bookbet” contract that allows spot betting but the payback takes place 7 days later. This bet-on-credit contract is the status-quo contract issued by all betting stations at the race club and serves as the placebo or control contract. It is the default contract that you are assumed to be in if you just request to place a “bookbet”. As is custom at the race club, the

⁹ Our key focus is on payback so the bettors who make down payment of potential losses are excluded from the experiment (about 50% of gamblers book bet i.e., bet on credit).

¹⁰ Further details on the data collected, e.g. the survey instrument, can be found in [Appendix B2](#).

⁸ The betting association is one of the two large horse racing betting clubs in Pakistan that operate independently in two major cities of Pakistan.

Panel A: Randomization at a Betting Station**Panel B: The Blacklisting Treatment**

Fig. 2. Randomization and the Blacklisting Treatment

Note: In Panel A, the randomization via color coded cards is shown. In Panel B, an illustration of the blacklisting treatment that includes displaying the full names of blacklisted gamblers at a betting station is shown. (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)

contract is by word of mouth and the first-time gamblers are offered to bet on credit up to PKR 5000 (USD 20), i.e. the first time bettors have *awaz* or credit rating of PKR 5000. Because names and IDs are recorded by the race club just before the bets, repeatedly appearing as a first-time gambler at a particular betting station is difficult. In this control contract, social image consequences are muted as one is not excluded from *bookbetting* at other betting stations. Not meeting obligations can result in loss of personal honor and failure to *bookbet* at the betting station you defaulted on, but the bettor's name is not listed for others to see as in

blacklisting treatments, we will discuss below, nor is the bettor prevented to *bookbet* at other essentially identical betting stations. The non-paying bettors, however, are punished by not being able to bet on credit at the betting station they defaulted on. These bettors lose their *awaz* (literally, voice). Consequently, this results in the economic sanction of losing the ability to bet large amounts on credit at the betting station.¹¹

Blacklisting Treatments.— The blacklisting treatment is divided into two sub-treatments, each of which randomly assigns the gamblers into two blacklisting contracts: (a) the local blacklisting contract involves listing the full names of the gamblers on the notice board of a gambling station, imposing a social image sanction for the non-paying gambler. The economic sanction, however, is identical to the economic sanction for the non-paying status quo contracted gambler. The local blacklisting treatment, therefore, imposes a reputational sanction, defined as *personal honor* or stigma an individual feels when the public knows about his non-payment (Bénabou and Tirole, 2006; Bénabou and Tirole, 2011). The gambler can, nevertheless, still make a bet with an upfront payment or *bookbet* at the remaining eleven betting stations as in the status quo *bookbet* contract group.¹² (b) the global blacklisting contract also stipulates that the gamblers' full names are to be put on the notice board of the betting station upon nonpayment, but it further includes an *additional* punishment of exclusion from betting on credit (*bookbetting*) at all twelve betting stations.¹³ Conceptually, the local blacklisting treatment impacts the social image component of reputational enforcement, while the global blacklisting treatment impacts both social image and prevents individuals from “*bookbetting*” at the race club. Full names were displayed on the notice board in line with the betting station's established enforcement rules. While this enhanced the external visibility of the sanction, the reputational response may also reflect an internal mechanism: bettors who saw their own names displayed may have experienced a moral or self-image cost independent of others' recognition. The study, therefore, may capture both social and psychological dimensions of reputational enforcement, while maintaining anonymity in the research data through the use of numeric identifiers only. All contracts are ‘issued’ by word of mouth. Panel A of Table A1 provides the complete transcript of the treatments that were read out. Figs. 1 and 2's Panel B, provide illustrations of the public listing of the blacklisted gamblers at the betting station.

Payment Extension Deadline Treatment.— In the last group, we assign gamblers a contract with an extension in payback time. That is, instead of the standard “*bookbet*” contract with a 7 days payback deadline, we assign the gamblers a 14-day payment deadline. The payment in this group does not take place the following Sunday but the one after that. In this treatment, we investigate whether extending the time to payback, on net, induces more payback by reducing gamblers' liquidity constraints or the extension in payback, instead, encourages gamblers to

¹¹ All bettors in treatment and control groups are still allowed to participate in the future with upfront payment of potential losses in the event of non-payment of a *bookbet*. In this status-quo contract, they can also “*bookbet*” at any other station, unless they have a debt obligation at that station, and are recognized, in which case they can only make a down payment bet.

¹² The local blacklisting treatment, by public listing of non-payer's names, imposes a reputational cost and excludes *bookbetting* at the one betting station, but betting on credit beyond the one betting station who defaulted on is still allowed, so the gambler can still freely at other, essentially similar, betting stations (that issue identical odds) as in status quo contract. The economic sanctions in both instances are similar.

¹³ In both local and global blacklisting treatments, the gamblers are blacklisted even if they pay back the debt partially.

renege on their contracts and reduce payback.¹⁴

Economic sanctions across treatments.—The economic sanction in case of non-payment is essentially identical between the local blacklisting and status quo contract: no bookbetting for 1 year at the station where the gambler defaulted. A key economic consequence of non-payment in status quo and local blacklisting treatment contracts is the risk of losing bookmaking privileges at one betting station. In both of the contracts, the penalty is losing the ability to bet large amounts on credit. This is because the gamblers gain the ability to bet higher amounts as they pay back larger amounts over time, building an *awaz* (literally, voice), an informal “credit rating”. We are able to use the pre-treatment *awaz* or credit rating to investigate whether those with more to lose economically respond more to the treatments.

Decision Aid Treatment.—In another treatment, we also provided a notebook to the gamblers on odds and historical data on the horse race, without offering any specific contract. We neither make reputational cost salient nor offer extension in payback time. To maintain a natural setting, this group is not explicitly offered any contract but is allowed the status quo 7-day payback bookbet contract if the bettor explicitly requests it. The treatment does not appear to impact any of the pre-specified outcome variables in this study and we report these null results in Table A4 of Appendix A. In brief, we attempted to improve decision-making quality of gamblers by giving them decision-aid on odds and history of the best times of the horses, but found null results across all the pre-specified outcomes. One possible reason for null effects may be that not being cold and calculating is intrinsic to the gambling activity itself, rendering a statistically zero effect of decision aid treatment. We, nevertheless, always control this treatment condition in all specifications.

Station Loyalty.—We acknowledge that bettors could, in principle, place additional bets at other stations after receiving their assigned contract. However, institutional features make this unlikely. The *awaz* (credit rating) of each bettor is specific to a single station and built through repeated interactions with the same penciller and manager. Moving to another station would require establishing a new credit record and forfeiting existing reputation and credit limits. Bettors also tend to maintain close relationships with the same staff, who monitor their transactions and repayments. While we cannot fully rule out some cross-station betting, available evidence suggests that most bettors continue to transact within the same station. Examining potential substitution across stations remains an interesting direction for future research.

3. Data and empirical strategy

Sample.—The experiment takes place at the “race club” in a major city of Pakistan.¹⁵ The gamblers bet at twelve kiosk-like betting stations whose staff are randomly rotated every week via a lottery. Our sample consists of all bets recorded at one such betting station, as the gamblers approach the station where we oversee randomization of the betting contracts. We also measure behavioral traits prior to the treatment being revealed to the bettors.

Betting takes place weekly on Sundays, when the races are held. On

¹⁴ The payment-extension treatment may operate through both financial and relational mechanisms. Allowing additional time to repay likely relaxes short-term liquidity constraints, but it may also foster goodwill or trust toward the betting station, reinforcing compliance through relational motives rather than purely financial ones.

¹⁵ We anonymize the name of the city to protect the identity of gamblers and bookmakers. Since the pool of bettors across all stations is large, individual identifiability remained limited. All names were replaced with numeric codes for analysis, ensuring that the research data contained no personally identifying information. The reputational mechanism may therefore reflect both social visibility and internal moral response triggered by public posting.

average, each bettor places about three wagers over the course of the Sunday races, typically diversifying across horses and race times. Betting is conducted on credit, known locally as “book-betting”, where bettors place wagers without pre-paying potential losses and promise to settle later. The total amount wagered over a Sunday typically equals about one month of average income,¹⁶ consistent with high-stakes but repeated participation within the same day. On average, bettors wager roughly PKR 30,000 per Sunday, and about 80 percent identify as Punjabi by ethnicity, 61 percent are employed, and around half report owning some form of property.

Since we are mainly interested in debt repayment, our sample consists of those gamblers who “bookbet,” i.e. do not pre-pay their potential losses.¹⁷ Gamblers who have outstanding debt obligations at a betting station are not allowed to bookbet at that betting station, and must make upfront payments of potential losses if they choose to bet at that station. We obtained data for all 8598 bets made by 3639 bettors that were randomly assigned the treatments at the betting station on a Sunday. These 3639 illicit gamblers engaged in a bookbet and promised to pay back later, so they had the potential to pay back if they lost non-zero amounts. We study the impact of the treatments on payback, amount wagered, won and lost. To investigate how many bettors honor their pledge to pay back absent Court enforcement, we have to investigate the segment of bettors who lost non-zero amounts. These 2505 bettors placed “bookbets” and were due to pay back their owed amount in 7 or 14 days, depending on their treatment status. Repayments are observed for 2–3 weeks. Using a common 14-day window for both arms, full repayment is 66.7% in the 7-day control and 71.0% in the 14-day contract (+4.3 pp; ≈6%); the mean repayment ratio (repaid/principal over 14 days) increases from 67% to 71%. Many bettors classified as “late” at day 7 are repaid by day 14. Our primary analysis still codes timeliness against the stated contract deadline.

Logistics and Data Collection.—The gambler walks to the betting station, the “penciller” at the station draws the randomly assigned color-coded betting card shown in Fig. 2’s Panel A, and according to the treatment condition determined by the color-coded card, reads out aloud the treatment contract to the bettor.¹⁸ The *penciller* notes down the bettor’s full name and allocates a unique ID to the gambler before proceeding to register the bet. The betting contract is sealed once the penciller copies the details on the bet on the betting station’s card (shown in Panel A of Fig. 2) along with the bettor’s uniquely identifying ID.¹⁹ The betting card is then handed to the bettor and acts as redeemable security for cash in case of winnings and a liability in case of loss. Each bettor’s treatment status was fixed upon first entry to the station and remained constant for all bets placed during that day. If a bettor returned to place additional bets, the same contract terms applied. This ensured consistency in treatment exposure and avoided cross-contamination across contracts. The design therefore operates at the bettor level rather than the bet level. Amount bet and net winnings

¹⁶ this comparison is about gross wagering volume rather than net losses or sustained weekly outlays, and that repeated weekly participation can exceed monthly income in wagered amounts because participants can finance bets through borrowing and can default.

¹⁷ The setting allows us to zoom in specifically on the collection of gambling debts because paying out wins by the gambling station is not an issue. The race club itself operates as a lender of last resort in case of liquidity constraints of a particular betting station.

¹⁸ For the exact transcripts that are read out by treatment status, see Panel A of Table A1 in Appendix A.

¹⁹ Before placing a bet, bettors provided their name and national ID number, recorded by the penciller from the front of the ID card. Since address information is located on the back of the card and was not collected, and because addresses are often outdated, enforcement relies on social rather than formal mechanisms. Bettors who fail to repay lose their *awaz*, a locally recognized credit reputation, and can be blacklisted from future betting both within the station and, under global blacklisting, across affiliated stations.

are recorded for each gambler at the end of the day in the station's betting register (Week 1). Debts were not settled immediately after the races. Bettors returned to the station within the next two weeks to repay their dues in cash, as remote or mobile payment options were not in use during the study period. Payback amount is recorded on the following Sunday and the one after that (Week 2 and 3). For further details, see the flow chart summarizing the design and data in Panel B of [Table A1](#). These data on amount bet, payback, winnings are collected from the "betting register" or betting transactions notebook of the betting station. A snapshot of the notebook is provided in [Fig. A3](#) of [Appendix A](#). In addition, behavioral games on risk, confidence, theory of mind and baseline characteristics are collected, before the treatment roll-out, as bettors queue up to bet.²⁰ Further details on the data and variables are provided in [Appendix B](#).

Outcome Variables.— The first set of outcome variables concern payback that we measure at the extensive and intensive margin. At the extensive margin, we construct a payback dummy variable that takes the value of one when the bettors return the owed amount in full and zero otherwise. This captures the full honoring of the contract since partial payback is also coded as zero. At the intensive margin, we use the actual amount paid back by the bettor, denominated in Pakistani Rupees (PKR). We also construct a partial payback variable i.e. when the bettor only returns a fraction of the amount stipulated in the contract.²¹ The second set of outcome variables concerns total amount bet by the gambler, and wins or losses also denominated in Pakistani Rupees (PKR). We report these variables in the original scale denominated in Pakistani Rupees and standardized to mean zero and standard deviation one in [Appendix Table A14](#). The betting station records provide us payback, amount bet and net winnings, averaged over the 3639 gamblers, so the individual gambler is our unit of observation.

Interaction Variables.— We collected outcomes on behavioral games, pretreatment credit rating, and whether the bettor is a regular gambler. Specifically, we specify to collect bettors' preferences over risk, confidence, cooperation and coordination *before* they place bets. The bettors were incentivised by converting points into canteen coupons that could be utilized at the race club's cafeteria (details on the incentivization can be found in [Appendix B3](#)). The cooperation and coordination games were played in pairs as the gamblers waited in line to bet. Due to logistical constraints, the behavioral games were administered on paper with the games managed by trained enumerators with cooperation and coordination games involving 2 gamblers standing adjacent to each other (G, G+1) in the queue. The enumerators recorded responses for both participants and were also responsible for the timekeeping. In the case a partner was not available, the enumerator played with the participant. The points players received were the actual coupon points they had won in the games. The points were converted into coupons' cash equivalent that the gamblers could use in the cafeteria at the race club. For more details and exact text that the gamblers saw in these behavioral games, please refer to [Appendix B3](#). We also explore whether the treatment impacts are larger for those who have more to lose in the event of non-payment since the gambling stations keep information on *awaz* (credit rating), i.e., the maximum amount a bettor is allowed to bet on credit.²²

Main Explanatory Variables.— The key explanatory variables are the dummy variables for treatments. *Global* and *Local* denote indicator variables that switch on if the bettor was assigned the global or local

blacklisting contract, respectively. *Extension* is a dummy variable that switches on if the bettor was assigned to the payment deadline extension treatment. The control group is offered the status-quo bookbet contract. We add all individual level characteristics of gamblers that we collected as controls which are reported in a balance check over bettors' characteristics in [Table 1](#).

Empirical Specification.— The impact of the treatments can be evaluated by comparing outcomes across groups in a simple regression framework. For each outcome, the estimation equation is:

$$Y_i = \alpha + \beta Global_i + \gamma Local_i + \delta Extension_i + X_i \mu + \epsilon_i \quad (1)$$

where Y_i is the respective outcome for bettor i , $Global_i$ is a dummy variable equal to one if the bettor is assigned to the global blacklisting treatment; $Local_i$ is a dummy variable equal to one if the bettor is assigned to local blacklisting treatment; $Extension_i$ is a dummy variable equal to one if the bettor is assigned to payment deadline extension treatment. X_i is a vector of individual-level controls and also includes the notebook or decision aid treatment, which we later show has no impact on any of the outcome variables. Standard errors are clustered at the individual gambler level because that is our level of randomization.

Attrition.— The contracts were designed and implemented in close collaboration with experienced staff at the race club to ensure that the intervention appeared natural to bettors. Preference was given to contract types previously used at the same station, thereby reducing the likelihood of behavioral disruptions. A survey of the twelve betting stations operating during the experiment reveals that the seven-day payback contract was used at all stations, while global blacklisting, local blacklisting, and payment extension contracts were also employed at four, one, and three stations, respectively. Given that these contracts were already familiar to bettors and that no individual refused the randomly assigned contract despite the option to bet elsewhere, differential attrition is unlikely to be a concern. As shown in [Table A2](#) and [Table A14](#), treatments have negligible effects on participation or total amount wagered, suggesting that differences in exposure are unlikely to drive the main repayment effects. Nevertheless, to address concerns about selective attrition, we apply [Lee's \(2009\)](#) bounds. The method adjusts for differences in dropout rates across treatment groups by trimming the sample so that both groups have the same share of continuing participants. We then re-estimate the treatment effect using this restricted sample to obtain the highest and lowest possible values consistent with the data. As shown in [Tables 2](#) and [3](#), the bounded estimates remain close in size and direction to the baseline results, suggesting that selective exit is unlikely to be key in explaining our results.

Selection into the Repayment Sample.— Our repayment outcome is observed only for gamblers who lost their bet and therefore entered the payback stage. This creates a distinct selection concern: treatment assignment could, in principle, affect gambling behavior and thereby alter who appears in the repayment sample. We estimate the effect on repayment using a restricted sample of gamblers who lost their bet. Although the null effect on attrition and the Lee bounds are consistent with our baseline estimates, suggesting this is unlikely to be a major concern, we nonetheless estimate treatment effects at every measurable stage of the gambling process to discipline the potential for endogenous sample selection. [Table 5](#) reports these results. With the exception of the previously discussed outcomes, effects at each stage, including the number of bets and the probability of ending up in a repayment sample, are statistically indistinguishable from zero, providing further evidence that compositional endogeneity does not meaningfully confound our estimates.

Balance.— Before we proceed with presenting the results, we provide evidence that our randomization was successful in creating balance between the control and treatment groups of bettors. In [Table 1](#), we show the balance of treatment and control over individual characteristics of gamblers. We find that the treatment and control group gamblers are statistically similar in their gender, religion, ethnicity, employment

²⁰ *Awaz* or credit rating of an individual gambler is retrieved from the list of gamblers in the betting station's register. The most recent *Awaz* from last Sunday used as the previous records are purposely destroyed.

²¹ An illustration of payback occurring at the betting station is shown in Panel B of [Fig. A3](#).

²² This variable was not available at the time of preregistration, and was discovered on the betting register of the betting station, so we could not preregister it at our pre-analysis plan available at the AEA registry.

Table 1
Balance over individual characteristics.

Panel A: Full Sample										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	<i>Gender</i>	<i>Age</i>	<i>Muslim</i>	<i>Family Members</i>	<i>Ethnicity Punjabi</i>	<i>Years of Education</i>	<i>Employed</i>	<i>Own Property</i>	<i>Pre-treatment Payback</i>	<i>Pre-treatment Amount bet</i>
<i>Global Blacklisting (GB)</i>	−0.00546 [0.0116]	0.0153 [0.285]	0.0170 [0.0118]	0.287 [0.202]	0.00365 [0.0239]	0.213 [0.182]	0.0117 [0.0286]	−0.000106 [0.0296]	−0.0242 [0.0269]	639.1 [2,234]
<i>Local Blacklisting (LB)</i>	0.00695 [0.0101]	0.411 [0.283]	−0.00108 [0.0130]	0.0503 [0.194]	−0.000206 [0.0239]	−0.171 [0.163]	0.0271 [0.0283]	−0.00819 [0.0290]	−0.0407 [0.0269]	4,219* [2,260]
<i>Payment Deadline Extension (PDE)</i>	0.00288 [0.00867]	−0.00494 [0.223]	−0.00651 [0.0107]	0.260* [0.157]	−0.00593 [0.0192]	−0.170 [0.143]	−0.00175 [0.0230]	−0.0257 [0.0235]	−0.00374 [0.0212]	1,386 [1,735]
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,639	3,639	3,639	3,639	3,639	3,639	3,639	3,639	3,639	3,639
R-squared	0.013	0.019	0.014	0.020	0.020	0.022	0.013	0.015	0.017	0.019
F Statistics (Joint Significance)	0.48	2.27	2.23	0.99	1.26	1.32	0.38	0.55	0.75	0.94
Mean of dependent var	0.967	35.377	0.952	7.449	0.794	11.243	0.614	0.510	0.705	29793
Panel B: Payback Sample										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<i>Global Blacklisting (GB)</i>	0.00348 [0.0133]	0.193 [0.347]	0.00788 [0.0131]	0.210 [0.245]	0.0335 [0.0285]	0.303 [0.224]	0.0136 [0.0342]	−0.0226 [0.0358]	−0.00973 [0.0327]	1,265 [2,788]
<i>Local Blacklisting (LB)</i>	0.00582 [0.0128]	0.351 [0.352]	−0.00790 [0.0146]	−0.0238 [0.232]	0.0230 [0.0290]	−0.0303 [0.204]	0.00574 [0.0345]	−0.0371 [0.0354]	−0.0543* [0.0330]	4,370 [2,791]
<i>Payment Deadline Extension (PDE)</i>	0.00725 [0.0106]	0.00501 [0.270]	−0.0175 [0.0121]	0.201 [0.194]	−0.00338 [0.0242]	−0.0566 [0.176]	−0.0213 [0.0283]	−0.0387 [0.0289]	0.00564 [0.0260]	593.6 [2,099]
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,505	2,505	2,505	2,505	2,505	2,505	2,505	2,505	2,505	2,505
R-squared	0.025	0.021	0.025	0.026	0.030	0.023	0.019	0.018	0.025	0.028
F Statistics (Joint Significance)	0.38	1.34	1.03	0.45	1.15	0.72	0.40	0.58	1.72	0.66
Mean of dependent var	0.9685	35.373	0.956	7.484	0.787	11.206	0.621	0.521	0.689	29363

Robust standard errors appear in brackets (clustered at the individual level). The dependent variables are dummies for gender, age, religion, employment, property ownership, years of education, family members, Punjabi ethnicity and past recollection of payback and amount bet. The local blacklisting involves listing the full names of gamblers who did not fully pay back their gambling debt. This leads to the exclusion of betting on credit at one betting station. The global blacklisting also similarly lists the gamblers at the notice board of a betting station but also excludes the bettors from betting on credit at the race club. The placebo group is assigned the status quo contract with payback amount due a week after the bet. The payment deadline extension contract stipulates pay back deadline of 14 days as opposed to 7 days in the status quo contract. *** $p < 0.01$, ** $p < 0.05$, * $p < 0$.

status and income. Differences across treatment groups is small in magnitude, and almost all estimated p-values are larger than 0.10, suggesting that the randomization was effective in creating balance. Our dataframe also allows us to assess pre-treatment balance on past recollections of payback and amount bet. Columns 9 and 10 of Table 1 report that past recollections of pretreatment payback and amount bet are also similar for treated and control bettors. Similar results are obtained when we instead conduct a joint orthogonality balance test, as suggested by Bruhn and McKenzie (2009) (see Table A3 of Appendix A). These results indicate our random assignment via color-coded cards was successful in creating balance across the treated and control groups of bettors.

4. Main results

Affect on 100% Payback.— We begin by examining how the treatments affected the likelihood that bettors repaid their debts in full. Fig. 3 reports average payback rates across experimental groups, where full payback denotes repayment of the entire owed amount. Across all groups, roughly 70 percent of bettors fully repaid their debts. Repayment is highest among bettors in the global blacklisting treatment, where about 77 percent paid in full, compared with 70 percent in the status-quo contract. Table 2 presents the regression results with and without the full set of individual controls. Global blacklisting increases the probability of full repayment by about 11 percentage points, or roughly 15 percent relative to the sample mean of 70 percent, corresponding to an additional repayment of about PKR 12,000 (USD 60). Local blacklisting increases repayment by about 7 percentage points, or 10 percent relative to the mean, corresponding to an additional PKR

9,000 (USD 40). Extending the payment deadline also raises complete repayment by around 5 percentage points, or about PKR 3,500 (USD 20). Although the global blacklisting treatment produces the largest point estimates, followed by local blacklisting and deadline extension, formal tests do not indicate that these differences are statistically significant.

Affect on Less than 100% Payback.— We next examine the effects of the treatments on bettors who repaid only part of the amount they owed. Table 3 reproduces the specification in Table 2 but replaces the dependent variable with an indicator for any positive repayment and the total amount repaid. Across all groups, roughly 87 percent of bettors paid back at least some portion of their debt, with an average repayment of PKR 43,000. Global blacklisting increases the probability of partial repayment by about 15 percentage points ($p < 0.01$), or roughly 17 percent relative to the sample mean of 87 percent, corresponding to an additional repayment of about PKR 5,900 (USD 30). Local blacklisting raises repayment by about 11 percentage points ($p < 0.01$), or 13 percent relative to the mean, corresponding to an additional PKR 3,300 (USD 15). Once again, the point estimates are larger for the global blacklisting treatment; this time, however, formal tests indicate that the difference is statistically significant at a conventional significance level. Extending the payment deadline increases repayment by around 8 percentage points ($p < 0.01$), or 9 percent relative to the mean, corresponding to an additional PKR 2,800 (USD 12). The pattern mirrors that for full repayment: bettors under the global blacklisting contract repay the most, followed by those under local blacklisting and deadline-extension contracts. Fig. A4 in Appendix A illustrates this ordering visually, while Fig. A5 shows that, across all treatment arms, most gamblers still repay the majority of their debts, typically at least 60

Table 2
Impact on complete payback.

	(1)	(2)	(3)	(4)
	Complete Payback Y/N		Complete Payback Amount (PKR)	
Global Blacklisting (GB)	0.108*** [0.0311]	0.113*** [0.0312]	12,394*** [3,397]	5,484** [2,678]
Local Blacklisting (LB)	0.0715** [0.0318]	0.0729** [0.0317]	9,013*** [3,305]	4,867* [2,537]
Payment Deadline Extension (PDE)	0.0491* [0.0267]	0.0499* [0.0267]	6,730** [2,656]	3,488* [2,077]
Controls	No	Yes	No	Yes
Observations	2,505	2,505	2,505	2,505
R-squared	0.029	0.031	0.030	0.435
Mean of the dependent variable	0.701	0.701	44894	44894
Lower Lee Bound, GB	0.069	0.072	5377	6138
Upper Lee Bound, GB	0.101	0.099	10100	10686
Lower Lee Bound, LB	0.038	0.038	4346	4348
Upper Lee Bound, LB	0.041	0.041	4854	4759
Lower Lee Bound, PDE	-0.033	-0.032	-888.4	-815.3
Upper Lee Bound, PDE	0.03	0.029	8362	8043
p-value (GB = LB)	0.303	0.265	0.397	0.842
p-value (GB=PDE)	0.0591	0.0456	0.104	0.460
p-value (LB=PDE)	0.486	0.472	0.501	0.592

Robust standard errors appear in brackets (clustered at the individual level). In Panel A, the dependent variables are a dummy variable that switches on when the participant pays back (Columns 1 and 2) and the full amount the bettor owes, and zero and the amount paid back by the bettor, denominated in Pakistani Rupees (Columns 3 and 4). The Global Blacklisting is a dummy variable that switches on when the contract stipulates her name will be listed on the notice board of the betting station and the race club will exclude the gambler from bookbetting at all betting stations. The Local Blacklisting is a dummy variable that switches on when the non-paying gambler has her name listed on the notice board of the betting station but without the sanction of ban on bookbetting at all betting stations. The placebo group is assigned the status quo contract with payback amount due a week after the bet. The Decision Aid group is the treatment arm randomly assigned the decision aid treatment i.e. odds and historical data relevant to bet and the status quo contract that stipulates spot betting and pay back the week after. This is always included in the regressions. Finally, the payment deadline extension switches on if the gambler is randomly assigned the contract of a week's extension to pay back. The individual controls include dummies for gender, religion, employment, property ownership, age, years of education, family members, Punjabi ethnicity, and debt size. Lee bounds are added, in each case Lee bounds are calculated for one specific treatment against the remaining sample, so they do not necessarily contain the estimated effect. In columns 2 and 4 lee bounds are tightened using the religion variable. ***p < 0.01, **p < 0.05, *p < 0.1.

percent of what they owe.

Affect on Amount Bet.—We next examine how the treatments affected the amount wagered by bettors. Table 4 (Columns 1 and 2) reports these results. On average, bettors in the global blacklisting treatment placed larger bets, increasing the amount wagered by about PKR 8,000 (USD 35) relative to the status quo contract, equivalent to roughly an 18 percent increase over the sample mean. Local blacklisting also raises the amount bet, though by roughly half as much and with greater imprecision. The differences are statistically significant. This pattern is consistent with the interpretation that enhanced reputational enforcement alters short-term behavior. One possibility is that gamblers exhibit time-inconsistent preferences—betting more in the present despite potential long-term losses. The core intuition rests on a psychological tension between restraint and reward-seeking. When bettors face reputational consequences (blacklisting), they exert self-control in an attempt to manage their behavior and reputation. However, this mental effort creates an unexpected psychological rebound: the deliberate restraint itself is aversive and cognitively costly. To restore emotional equilibrium after exercising self-control, individuals temporarily amplify their sensitivity to immediate rewards, a phenomenon known as reward responsiveness. This pattern is analogous to models of spontaneous demand for addictive goods where individuals with present-biased

Table 3
Impact on partially paid back.

	(1)	(2)	(3)	(4)
	Any Paid Back Amount Y/N		Any Paid Back Amount (PKR)	
Global Blacklisting (GB)	0.156*** [0.0184]	0.155*** [0.0185]	12,791*** [2,784]	5,896*** [1,758]
Local Blacklisting (LB)	0.115*** [0.0210]	0.115*** [0.0210]	7,394*** [2,662]	3,367** [1,688]
Payment Deadline Extension (PDE)	0.0647*** [0.0207]	0.0642*** [0.0207]	6,019*** [2,237]	2,899** [1,468]
Observations	2,505	2,505	2,505	2,505
R-squared	0.041	0.043	0.030	0.601
Controls	No	Yes	No	Yes
Mean of the dependent variable	0.873	0.873	43272	43272
Lower Lee Bound, GB	0.108	0.109	7190	7665
Upper Lee Bound, GB	0.140	0.136	11618	11892
Lower Lee Bound, LB	0.069	0.07	3472	3503
Upper Lee Bound, LB	0.072	0.072	3956	3903
Lower Lee Bound, PDE	-0.048	-0.046	-726.7	-549
Upper Lee Bound, PDE	0.015	0.015	7473	7279
p-value (GB = LB)	0.0245	0.0260	0.0875	0.188
p-value (GB=PDE)	<0.01	<0.01	0.0160	0.0828
p-value (LB=PDE)	0.0108	0.0103	0.610	0.777

Note: Robust standard errors appear in brackets (clustered at the individual level). In Panel A, the dependent variables are a dummy variable that switches on when the participant pays back a partial amount the bettor owes and zero otherwise (Columns 1 and 2) and the partial amount paid back by the bettor, denominated in Pakistani Rupees (Columns 3 and 4). The Global Blacklisting is a dummy variable that switches on when the contract stipulates her name will be listed on the notice board of the betting station and the race club will exclude the gambler from betting on credit at all betting stations. The Local Blacklisting is a dummy variable that switches on when the non-paying gambler has her name listed on the notice board of the betting station but without the sanction of ban on bookbetting at all betting stations. The placebo group is assigned the status quo contract with payback amount due a week after the bet. The decision aid group is the treatment arm randomly assigned the decision aid treatment i.e. odds and historical data relevant to bet and the status quo contract that stipulates spot betting and pay back the week after. This is always included in the regressions. Finally, the payment deadline extension switches on if the gambler is randomly assigned the contract of a week's extension to pay back. The individual controls include dummies for gender, religion, employment, property ownership, age, years of education, family members and Punjabi ethnicity, and the debt size. Lee bounds are added, in each case Lee bounds are calculated for one specific treatment against the remaining sample, so they do not necessarily contain the estimated effect. In columns 2 and 4 lee bounds are tightened using the religion variable. ***p < 0.01, **p < 0.05, *p < 0.1.

preferences opt for immediate gratification despite awareness of long-term harm. Hoch and Loewenstein (1991). Alternatively, higher stakes may reflect increased trust in the betting institution: stronger reputational sanctions could reassure participants that others will honor their debts, encouraging greater participation in the current period.

Affect on Net Winnings.—We then turn to the effects of the treatments on bettors' net winnings. Table 4 (Columns 3 and 4) presents the results. Although extensive-margin estimates are imprecise, the point estimates indicate that globally blacklisted bettors lose more relative to those in the status quo contract. At the intensive margin, globally blacklisted gamblers record net losses of about PKR 10,000 (USD 45) compared with the control group. These results suggest that while bettors in the global blacklisting condition lose more overall, they also bet larger amounts and repay a greater proportion of their gambling debts, consistent with increased engagement in the informal betting economy. The evidence points to the role of reputation in sustaining exchange:

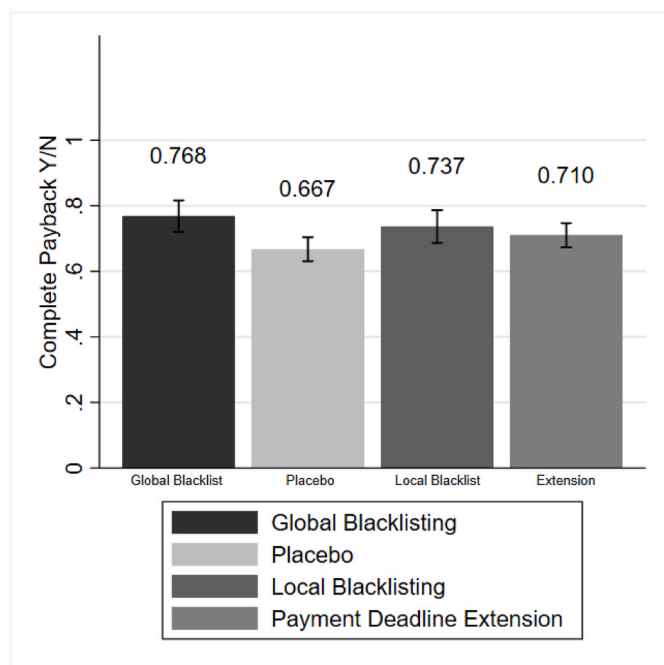


Fig. 3. Impact on Complete Paid Back Y/N
 Note: The bars represent average complete payback rates for the gamblers in each treatment arm. The local blacklisting involves the social image sanction of listing the full names of gamblers who did not fully pay back their gambling debt. This leads to the exclusion of betting on credit (bookbetting) at one betting station. The global blacklisting similarly lists the gamblers at the notice board of a betting station but also excludes the bettors from betting on credit at the whole race club. The placebo group is assigned the status quo contract with payback amount due a week after the bet. The payment deadline extension contract stipulates pay back deadline of 14 days as opposed to 7 days in the status quo contract. 95% Confidence Intervals are also reported.

stronger enforcement appears to increase participation even when expected returns decline.²³ Reputation appears to facilitate transactions in this informal economy.

5. Heterogeneity in treatment effects

Regular vs. Irregular Gamblers.— Fig. 4 shows that regular gamblers appear more responsive to the payment-extension contract. Those assigned the extension are about 0.3 standard deviations more likely to repay than irregular gamblers. This pattern is suggestive that extending repayment periods may relax short-term liquidity constraints for regular, possibly more habitual, gamblers. It is also consistent with addictive behavior: regular bettors may mobilize funds to maintain access to betting credit. We find little evidence of comparable heterogeneity for the blacklisting treatments or for betting amounts and winnings. An alternative interpretation is that high-intensity bettors, who are often regular gamblers, may already have weaker reputational standing. If so, they may respond less to reputational sanctions because they have relatively less to lose from further social disapproval. We find little evidence of comparable heterogeneity for the blacklisting treatments or for betting amounts and winnings.

²³ These results are also unlikely to be vulnerable to ecological inference concerns since individuals who pay back more are also those who bet more along different bins of payback amounts. A point we will further discuss in the robustness section. We also show there that the randomization effectively created balance between the treated and status quo group of gamblers and that accounting for multiple hypotheses and permutation inference also does not have much bearing on the main conclusions.

Table 4
 Impact on betting and outcomes.

	(1)	(2)	(3)	(4)
	Amount Bet (PKR)		Net Winnings (PKR)	
Global Blacklisting (GB)	8,138***	8,016***	-10,611***	-10,481***
	[2,613]	[2,617]	[3,526]	[3,533]
Local Blacklisting (LB)	4,120	4,003	-5,170	-5,022
	[2,504]	[2,502]	[3,386]	[3,384]
Payment Deadline Extension (PDE)	2,674	2,559	-839.5	-727.4
	[1,987]	[1,984]	[2,718]	[2,713]
Observations	3,639	3,639	3,639	3,639
R-squared	0.013	0.016	0.014	0.016
Controls	No	Yes	No	Yes
Mean of the dependent variable	55163	55163	-35101	-35101
p-value (GB = LB)	0.187	0.188	0.187	0.186
p-value (GB=PDE)	0.0383	0.0392	0.00661	0.00687
p-value (LB=PDE)	0.566	0.566	0.211	0.214

Note: Robust standard errors appear in brackets (clustered at the individual level). The dependent variables are the total amount bet by the gambler, denominated in Pakistani Rupees (Columns 1 and 2) and the amount paid back by the punter, denominated in Pakistani Rupees (Columns 3 and 4). The Global Blacklisting is a dummy variable that switches on when the contract stipulates her name will be listed on the notice board of the betting station and the race club will exclude the gambler from bookbetting at all betting stations. The Local Blacklisting is a dummy variable that switches on when the non-paying gambler has her name listed on the notice board of the betting station but without the sanction of ban on bookbetting at all betting stations. The placebo group is assigned the status quo contract with payback amount due a week after the bet. The decision aid group is the treatment arm randomly assigned the decision aid treatment i.e. odds and historical data relevant to bet and the status quo contract that stipulates spot betting and pay back the week after. This is always included in the regressions. Finally, the payment deadline extension switches on if the gambler is randomly assigned the contract of a week's extension to pay back. The individual controls include dummies for gender, religion, employment, property ownership, age, years of education, family members and Punjabi ethnicity. ***p < 0.01, **p < 0.05, *p < 0.1.

Cognitive-Social Traits.— Fig. 5 suggests that risk-loving individuals respond more strongly to the blacklisting treatment, especially under global blacklisting. These bettors repay and wager more when reputation sanctions are imposed, indicating that such reputational sanctions may reshape participation incentives for risk-seeking individuals. The pattern appears at both extensive and intensive margins (Appendix Figures A6–A7). Fig. A8–A12 explore heterogeneity along confidence, cooperation, coordination, and theory-of-mind scores specified in the pre-analysis plan. We do not find statistically strong evidence that these traits mediate treatment effects.

Credit Rating (Awaz).— Fig. A14 examines how existing credit limits shape responses. High-awaz bettors, who have more to lose from blacklisting, are more affected by sanction treatments. Even bettors with zero credit rating adjust their behavior when locally blacklisted, consistent with social-image or honor motives. Overall, the results align with the view that social reputation, rather than credit value alone, underpins repayment behavior. Consistent with this interpretation, awaz itself is not significantly associated with repayment, betting amounts, or net winnings (Appendix Figures A15–A16). These patterns suggest two distinct channels through which the interventions operate. The payment-extension treatment appears to relax liquidity constraints among regular gamblers, while the blacklisting treatments seem to activate reputational or honor-based mechanisms, particularly among risk-seeking individuals. While these results are suggestive, they contribute to a better understanding of how credit and social incentives jointly influence behavior in informal gambling markets.

6. Robustness and discussion

Multiple Hypothesis Testing. — Given that we are testing multiple

Table 5
Treatment effects on each betting stage.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Number of Bookbets	Amount Bet (PKR)	Positive Winnings Y/N	Size of Winnings (PKR)	Net Loss (Dummy)	Loss Amount (PKR)	Net Winnings (PKR)	In Repayment Sample	Net Winnings (Conditional sample)
<i>Global</i>	0.0962	8,016***	-0.0370	-886.3	0.0369	9,594***	-10,481***	0.0370	12,467***
<i>Blacklisting</i>	[0.0707]	[2,617]	[0.0273]	[1,090]	[0.0273]	[2,883]	[3,533]	[0.0273]	[3,398]
<i>Local Blacklisting</i>	0.0832	4,003	-0.0125	-286.6	0.0126	4,735*	-5,022	0.0125	8,892***
	[0.0711]	[2,502]	[0.0271]	[1,056]	[0.0271]	[2,751]	[3,384]	[0.0271]	[3,318]
<i>Payment Deadline Extension</i>	0.0696	2,559	0.0179	1,192	-0.0177	1,919	-727.4	-0.0179	6,569**
	[0.0559]	[1,984]	[0.0221]	[900.0]	[0.0221]	[2,172]	[2,713]	[0.0221]	[2,654]
<i>Decision Aid</i>	-0.0149	2,233	-0.0512**	-1,260	0.0502**	4,306*	-5,565**	0.0512**	3,055
	[0.0544]	[2,044]	[0.0212]	[854.6]	[0.0212]	[2,205]	[2,686]	[0.0212]	[2,628]
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,639	3,639	3,639	3,639	3,639	3,639	3,639	3,639	2,505
R-squared	0.018	0.016	0.020	0.017	0.020	0.016	0.016	0.020	0.033
Control mean	2.323	52526	0.326	9319	0.674	41069	-31750	0.674	40274
Observations	3639	3639	3639	3639	3639	3639	3639	3639	2505

Note: Robust standard errors appear in brackets and are clustered at the individual level. The dependent variables are defined as follows: *Number of Bookbets* is the number of races bet on during the day; *Amount Bet (PKR)* is the total amount wagered; *Positive Winnings Y/N* indicates positive net winnings; *Size of Winnings (PKR)* equals net winnings when positive and zero otherwise; *Net Loss (Dummy)* indicates negative net winnings; *Loss Amount (PKR)* equals the absolute value of losses when net winnings are negative and zero otherwise; *Net Winnings (PKR)* is the signed net outcome of betting; *In Repayment Sample* indicates that the bettor incurred a net loss on credit and is observed in the repayment data; *Payback Amount (PKR)* is estimated in the repayment sample only. All specifications include baseline controls and city fixed effects. The decision-aid treatment is always included. ***p < 0.01, **p < 0.05, *p < 0.

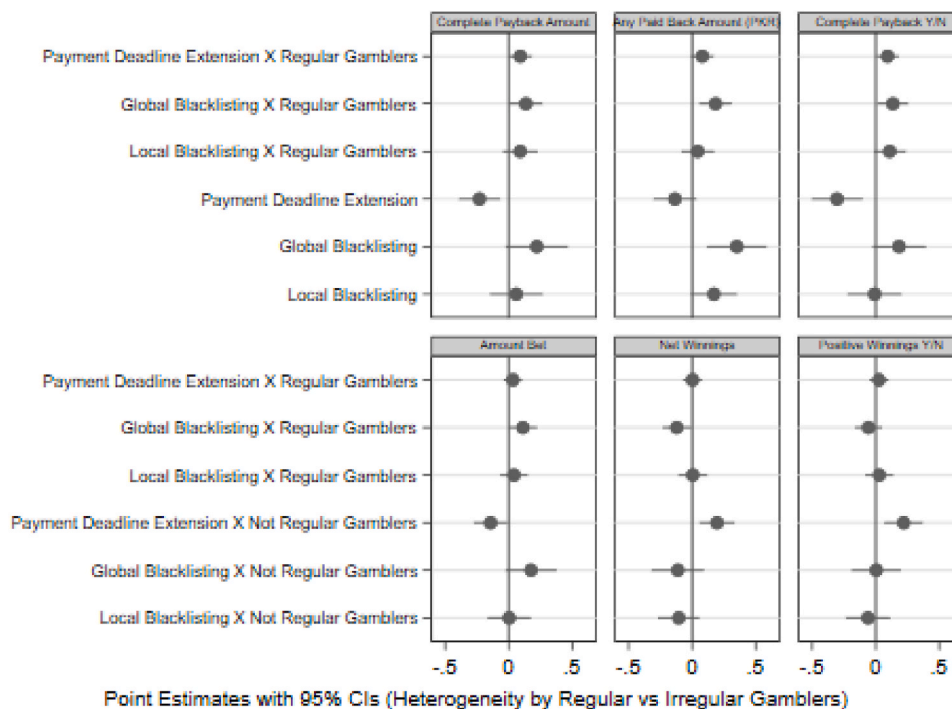


Fig. 4. Heterogeneity by Regular Gambler

Note: The figure reports the heterogeneous impact by pre-treatment gambling regularity for outcomes collected at extensive and intensive margins. The fully saturated specification is estimated with an indicator for each treatment group included, so the statistical difference between coefficients indicate the significant heterogeneity of the treatment. The dependent variables are standardized to mean zero and standard deviation one. 95% Confidence Intervals are also reported.

hypotheses, we also examine whether our results are explained by false positives. Under the assumption that the treatments have no effect on any of the outcomes (i.e. all our null hypotheses are true), then the probability of at least one false rejection when using a critical value of 0.05 is about 60%. Consequently, we adjust for the fact that we are testing for multiple hypotheses by using two complementary approaches. First, we report sharpened q-values based on the adaptive step-up procedure of Benjamini et al. (2006), which adjusts significance levels to keep the expected share of false positives low when testing many related outcomes. Second, we report familywise error rate

(FWER)-adjusted p-values using the Romano-Wolf stepwise method implemented by List et al. (2023), which controls the probability of making even a single false rejection within a family while accounting for correlation across tests. Results in Table A5 show that the main findings remain robust under both corrections.

Experimenter Demand.— Almost all experiments are vulnerable to experimenter demand effects. However, several arguments mitigate experimenter demand concerns explaining our results. First, is the natural setting. The experiment is organized and conducted by the owner of one of the betting stations at the race club, using essentially the same

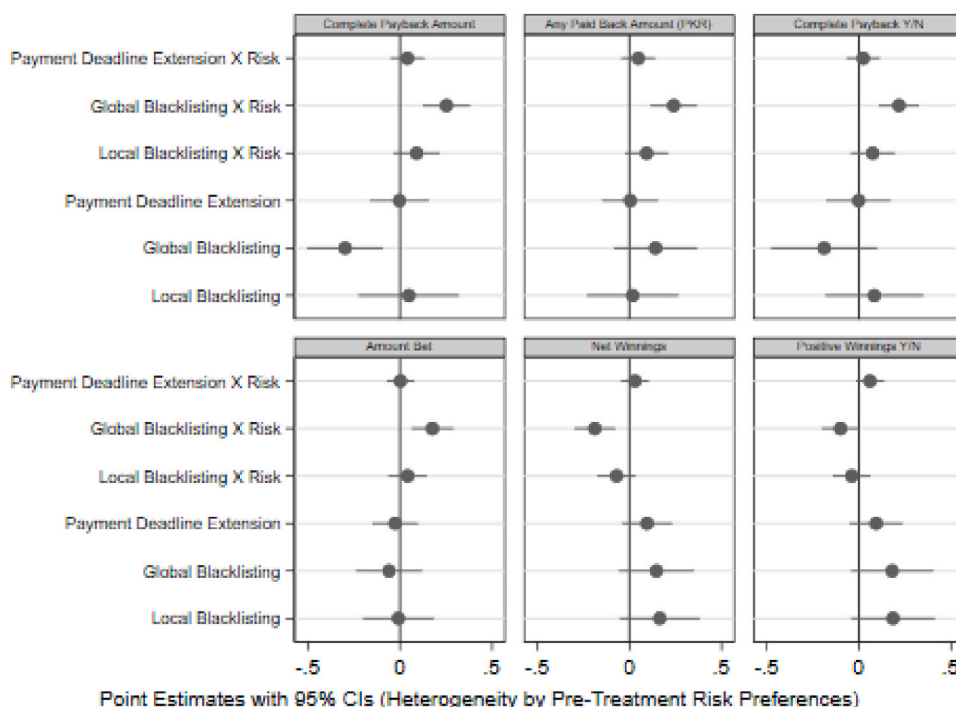


Fig. 5. Heterogeneity by Risk Taking

Note: The figure reports the heterogeneous treatment impact by pre-treatment risk (higher values indicate risk-loving preferences). The fully saturated specification is estimated with an indicator for each treatment group included, so the statistical difference between coefficients indicate the significant heterogeneity of the treatment. The dependent variables are standardized to mean zero and standard deviation one. 95% Confidence Intervals are also reported. For more details on the risk game administered can be found in Appendix B3.

staff that operated before the experiment. Second, we minimize our own footprint in the experiment as much as we can: the field assistants were explicitly instructed to just collect baseline data and outcomes on behavioral games as bettors stand in line to bet, they do not read out the betting contracts. Last, the three prespecified outcome variables: payback, winnings and amount bet are all high-stakes decisions, with gamblers on average betting as much as their monthly wages. The bettors incur real risk and lose real money which is unlikely to be completely swayed by experimenters alone.

Sample Size and Randomization Inference. — To examine whether the results are driven by a particular draw of bettors, we follow Imbens and Rubin (2015) suggestion to use randomization inference. That is, we scramble the data, reassign treatments, and compare the distribution of control estimates with the estimates from the experiment. The resulting p-values for 1000 iterations of this process are reported in Table A6 of Appendix A. The treatment effects are still statistically significant at conventional levels, suggesting that an idiosyncratic draw explaining our results is statistically unlikely. Consistent with randomization, our results are also unlikely to be driven by the choice of controls. We find that varying controls or adding *no controls* changes none of our main conclusions. This is true for all field outcomes on complete payback (Table A7), partial payback (Table A8), Amount Bet (Table A9) or Net Winnings (Table A10).

Spillovers.—Our experiment allowed us to randomly allocate contracts for about 3500 gamblers in Pakistan. It may be thought that since the treated and control group interact at the race club, this could lead to potential spillovers with the individuals in the control group also ending up being partially treated. This is highly unlikely given our setting. First, the bets take place almost simultaneously as the random assignment of contract is revealed to the individual, making the impact on spot decisions of amount bet and net winnings completely impervious to spillovers. Second, the setting makes spillovers close to impossible because “trading” contracts is strictly prohibited at the race club and the betting card allocated to you is individual-specific. All bets are placed by

noting the amount bet and potential winnings or losses placed on a “betting card” which is linked to a ID of a person making it possible for the betting station to uniquely link the gambler. Finally, even if there are spillovers within the club, and some bettors do somehow also get treated, our estimate can then be considered as a lower bound on the impact of the treatments (though the setting of the race club suggests such spillovers would be extremely rare).

Discussion.— The global blacklisting treatment bundles two mechanisms: social image and prevention of *bookbetting* at all betting stations. The local blacklisting treatment only contains the additional social image sanction (over the status quo) because participation is available at other similar betting stations. The impact of the local blacklisting treatment isolates the impact of increasing the social image mechanism underlying reputation as other betting stations are essentially identical. We also observe the status quo group of bettors have 66% payback rate. This can be due to many factors, including to honor or social image considerations that already drive behavior in this control group. We can also assess the potential mechanism of fear of violence explaining our treatment effects. Consistent with qualitative accounts, and focus groups, we find no evidence for fear of violence explaining contract enforcement in this economy. None of our treatments impact bettors’ fear of violence (Table A11 reports these results). In fact, it is worth noting from the table that less than 1% of bettors state they would fear

violence if they do not pay back with only 0.5% bettors reporting fearing violence in the status quo condition.²⁴ This echoes ethnographic analysis that also reports a “surprising lack of violence in this setting.” (Mahar, 2022). The low perceived fear of violence may be due to the fact that the market relies on attracting newcomers to consume a potentially addictive good and that violence or even threat of violence may increase the probability of media coverage that can endanger the smooth functioning of this illicit economy. Finally, an alternative interpretation of the regression results is that blacklisted bettors place larger bets because they do not intend to pay back. That is, the results on the amount bet are driven by gamblers attempting to game the system by betting more and then renegeing on their contracts in case of losses. Although, we observe that the blacklisted gamblers also pay back more in Tables 2 and 3, these are average effects and our results may be driven by “compositional” or ecological aggregation effects. Results presented in Fig. A17, however, suggest this is unlikely. Regardless of the treatment group, payback amount and bet amount are positively associated across deciles. Moreover, the results also do not appear to be driven by particular level of payback or amount bet, nor by a handful of bettors who bet and payback large amounts (see Table A13 for the quantile regression results and Figs. A18–A20 for distributions of outcome variables by treatment group; the conclusions drawn based on average effects are essentially unchanged).

7. Concluding remarks

Much of the world relies on informal markets. In developing countries, informal firms account for a large share of economic activity and provide livelihoods for billions of people (La Porta and Shleifer, 2014). In many such settings, transactions take place without access to formal court enforcement. This raises a basic question: how are contracts sustained when the state cannot readily compel compliance?

This paper studies that question in a large illegal sports betting market. We first document substantial baseline compliance even in the absence of formal legal enforcement. Around 70% of participants in our sample fully repay their gambling debts, and even partial defaulters repay a sizable share of what they owe. We interpret this descriptive pattern as consistent with the presence of informal enforcement forces, which may include repeated interaction, liquidity constraints, and reputational concerns.

We then use experimental variation to isolate the role of two specific channels. Increasing reputational sanctions in the contract reduces the share of non-paying participants from 30% to 23%, implying a meaningful increase in repayment on top of an already high baseline. Extending the repayment deadline from 7 to 14 days also increases debt fulfillment, with somewhat larger effects among habitual gamblers. Finally, risk-loving individuals appear more responsive to blacklisting

²⁴ For all the four questions we asked, less than 100 bettors out of the 3639 answered yes to even one of these questions. The specific survey questions we fielded were as follows: 1. *Have you now or ever in the past, felt threatened with violence from the race club, for instance, in the event of non-payment of your dues?* 2. *Have you now or ever in the past, felt your life was in danger from the race club, for instance, in the event of non-payment of your dues?* 3. *Have you now or ever in the past, heard anyone threatened with violence from the race club, for instance, in the event of non-payment of his dues?* 4. *Have you ever heard anyone, now or ever in the past, that his life was in danger from the race club, for instance, in the event of non-payment of his dues?* Furthermore, fear of violence appears to play little role in participation in the market as we also find no significant association between amount bet, payback amount and award with any of the variables related to violence (see Table A12 in Appendix A). Consistent with this and several anecdotal accounts, during the experiment, we observed several bettors who *did not* pay back their *bookbets*. They appeared not to be threatened, upon their non-payment of *bookbet* dues. They could continue to bet at the very same station they renegeed on, albeit, with upfront payment of potential losses or *bookbet* at other betting stations.

treatments, a pattern that is consistent with stronger behavioral responses to reputational penalties in this subgroup.

Our results provide experimental evidence that reputational incentives can strengthen cooperation in an impersonal setting. Introducing reputational sanctions increases participation in this informal market. More broadly, our data and experiment point to the continuing importance of informal enforcement forces, including individual punishment and reputation, in supporting economic exchange where formal legal enforcement is limited.

CRedit authorship contribution statement

Sultan Mehmood: Conceptualization, Formal analysis, Investigation, Methodology, Project administration, Resources, Software, Supervision, Visualization, Writing – original draft, Writing – review & editing. **Georgii Marinichev:** Data curation, Formal analysis, Investigation, Methodology, Validation, Visualization, Writing – review & editing. **Sajwaar Khalid:** Data curation, Formal analysis, Investigation, Methodology, Project administration, Resources, Validation, Visualization, Writing – review & editing. **Daniel Chen:** Funding acquisition. **Margarita Kudaeva:** Formal analysis, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – review & editing.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jdeveco.2026.103802>.

Data availability

Data will be made available on request.

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