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Kevin Croke
María Elena García Mora
Markus Goldstein
Edouard Mensah
Michael O'Sullivan

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Abstract

Small-scale cross-border trade provides opportunities for economic gains in many developing countries. Yet cross-border traders—many of whom are women—face harassment and corruption, which can undermine these potential gains. This paper presents evidence from a randomized controlled trial of a training intervention that provided access to information on procedures, tariffs, and rights to small-scale traders to facilitate border crossings, lower corruption, and reduce gender-based violence along the Democratic Republic of Congo (DRC)–Rwanda border. The training reduces bribe payment by 5 percentage points in the full sample and by 27.5 percentage points on average among compliers. The training also reduces the incidence of gender-based violence by 5.4 percentage points (30.5 percentage points among compliers). The paper assesses competing explanations for the impacts using a game-theoretic model based on Hirschman's Exit, Voice, and Loyalty framework. The effects are achieved through early border crossings at unofficial hours (exit) instead of traders' use of voice mechanisms or reduced rent-seeking from border officials. These results highlight the need to improve governance and establish clear cross-border trade regulations, particularly on the DRC side of the border.

This paper is a product of the Gender Innovation Lab, Africa Region, and the Gender Global Theme. It is part of a larger effort by the World Bank to provide open access to its research and make a contribution to development policy discussions around the world. Policy Research Working Papers are also posted on the Web at http://www.worldbank.org/prwp. The authors may be contacted at mosullivan@worldbank.org.

Up before Dawn: Experimental Evidence from a Cross-Border Trader Training at the Democratic Republic of Congo–Rwanda Border*

Kevin Croke[1], María Elena García Mora[2], Markus Goldstein[2], Edouard Mensah[3], and Michael O'Sullivan[2]

[1]Harvard T. H. Chan School of Public Health

[2]World Bank

[3]University of Georgia

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1 Introduction

Despite its potential to lift incomes and increase welfare, intra-regional trade in Sub-Saharan Africa remains low relative to other regions. Intra-African trade accounted for 17 percent of the region's total exports in 2017, compared to 10 percent in 1995. By contrast, in Asia and Europe, the corresponding shares are 59 and 69 percent, respectively (Songwe, 2019).

Yet the lack of regional integration likely masks a deeper level of informal trade which is not typically captured with official customs data (Brenton and Isik, 2012). While measurement issues around the volume of cross-border trade flows abound (Mitaritonna and Traoré, 2017), concerted efforts to measure them hint at the scale of these informal flows. For example, a recent national survey at 171 unofficial border crossings in Benin found that informal trade made up a very large share of flows with its neighboring countries, with the ratio of informal to formal trade flows at 5.1 to 1 with Nigeria and 2 to 1 with Togo (Bensassi et al., 2018). Similarly, a comprehensive 2006 survey of Uganda's informal cross-border trade flows into the Democratic Republic of Congo and four other neighboring countries found informal export levels that were 86 percent that of official export flows (Lesser and Moisé-Leeman, 2009).

Supporting informal cross-border trade is consequently an important element of the regional trade integration agenda. Cross-border trade can enhance welfare through increased income for producers and traders, reduced price dispersion, and cheaper food in areas where production is scarce (Brenton and Isik, 2012; Golub, 2015). Yet small-scale traders in the Great Lakes region of Africa, most of whom are women, face many obstacles to doing business, including harassment and requests for bribes at border crossings. The fragile institutional setting also constrains their ability to get their goods to market, as traders confront a maze of shifting formal and informal rules and procedures.

In this experimental study, we draw on the insights of Hirschman (1970)'s Exit, Voice, and Loyalty framework to shed light on the strategic behaviors of cross-border traders in a setting where border officials frequently extract rents and harass traders. By developing a randomized evaluation of an NGO program which sought to give traders new information about the legal framework governing cross-border trade, we examine whether reducing informational asymmetries between women traders and border officials could lower corruption and harassment at the border via the voice mechanism.

Our study was carried out along the border between the eastern Democratic Republic of Congo (DRC) and Rwanda. The randomized controlled trial tests the impact of a training intervention that aimed to provide small-scale traders with information on their rights, border procedures, and tariffs – with the broader goals of facilitating trade flows and helping traders navigate safe passage across the border. The intervention design rested on the assumption that the traders – who typically carry fruits, vegetables, and animal products that are exempt from any duties – were ill-informed about tariffs and border-crossing procedures, and were thus more susceptible to demands for bribes and acts of gender-based violence (GBV) by the border officials (Brenton et al., 2012; Titeca and Kimanuka, 2012). Our analysis finds that the training leads to an increase in the non-payment of bribes by 5 percentage points on average across the sample and by 27.5 percentage points on average among the compliers. The training also lowers the overall incidence of GBV by 5.4 percentage points on average across the sample and by 30.5 percentage points on average among the compliers. However, there is no improvement in self-reported knowledge following the training. We interpret that as occurring because the duty-free regulations were not fully clarified by the DRC government at the time of the workshops.

Building on the Hirschman framework, we model three response strategies of traders when presented with ambiguous information on cross-border trade regulations during the training: (1) avoid crossing the border at official working hours and face a lower threat of corruption and GBV from officials (exit strategy); (2) cross the border at official working hours but use the existing claim/complaint channels to report any bribe requests or harassment (voice strategy); or (3) cross the border at official working hours and face an uncertain bribe payment and GBV (loyalty strategy).

Our investigation isolates the exit strategy as the unique impact pathway. The training leads to an increase in crossing the border before 7:30 a.m. (when border officials report for duty) by 8.4 percentage points on average across the sample and by 47.5 percentage points on average among those who attend the training. The training does not provoke a voice response, as demonstrated by the 2.4 percentage point decline in requests for receipts for unofficial payments among those assigned to treatment, and the null impact on association membership (another potential vehicle for voicing grievances). In addition, we find no change in reported bribe requests from officials or in the value of bribes requested, suggesting that the results are not driven by a change in the behavior

of border officials. It is important to rule this channel out because, in a secondary component of the intervention, some border officials also attended joint training sessions with traders.

This work contributes to four streams of literature. First, the study provides the first set of causal evidence to the expanding literature on cross-border trade in developing countries (Aker et al., 2014; Bensassi and Jarreau, 2019; Brenton and Isik, 2012; Golub, 2015). Identifying ways to reduce trade frictions and enhance well-being is important for regional integration and poverty. Second, the work enhances our understanding of corruption and informality (Fisman and Svensson, 2007; Sequeira and Djankov, 2014), particularly in fragile settings (Reid and Weigel, 2019). Specifically, the study examines the extent to which exogenously varying traders' access to information through training can reduce the incidence of corruption at the border. Third, we build on the extensive literature on exit, voice, and loyalty (Dowding and John, 2008; Hirschman, 1970; Wiens, 2014) by adapting the theoretical framework to a novel setting: the fragile, conflict-affected borderlands between DRC and Rwanda. The model affords us a deeper understanding of citizen-state interactions along the border and yields insights on the channel through which the training affects trader outcomes. Finally, the study speaks to the literature on gender and entrepreneurship (Campos et al., 2017; Fafchamps et al., 2014), and particularly the impact of training interventions for self-employed women. As Mckenzie and Woodruff (2014) note, analyses of the impact of training on business outcomes require a thorough understanding of the likely mechanisms, as different mechanisms can yield divergent policy implications.

Despite these contributions, our study has two key limitations. First, a sub-set of individuals in the sample did not adhere to the treatment/control group assignments. In light of this two-sided non-compliance, the intent-to-treat estimates presented in this paper represent a lower-bound estimate of the true program impact. Second, some respondents provided false names at baseline, likely due to the low levels of trust in the conflict-affected setting. In response, the follow-up survey included a robust tracking exercise to retrieve and match approximately 84% of the baseline sample. While attrition is not correlated with treatment assignment, our analysis nevertheless controls for the observed correlates of attrition in our impact estimates.

The remainder of the paper is organized as follows. Section 2 introduces cross-border trade and gender issues in the study zone, followed by an overview of the training. In Section 3 we present

and adapt the Exit/Voice/Loyalty theoretical framework as a game between cross-border traders and border officials to better understand the theory of change and generate testable hypotheses. Section 4 details the experimental design, describes the data, lays out the econometric approach, and presents the limitations of the study. Section 5 assesses the impact of the training on traders' knowledge, border-crossing time and intensity, corruption, and GBV. Section 6 analyzes the degree to which the training effects are driven by the traders' use of voice or by lower bribe demand from border officials. We conclude with a set of policy implications from these results in Section 7.

2 Context and intervention

2.1 Context

Small-scale, informal cross-border trade – sometimes misperceived as illegal smuggling in parts of Africa (Golub, 2015) – provides opportunities for gains from trade and reduced price dispersion across neighboring countries in the Great Lakes Region of Africa.[1] Yet, cross-border traders face demands for bribes which pose a threat to their small-scale trading businesses in the Democratic Republic of Congo, which is ranked 161st out of 180 countries in the Corruption Perceptions Index of 2018 according to Transparency International and well-known as a fragile and war-affected zone, particularly in its eastern provinces.[2] Similarly, the World Bank's Doing Business rankings place DRC 188th out of 190 countries in terms of the time and cost to trade across borders, while Rwanda's more favorable institutional environment is ranked 88th (World Bank, 2018).

Demands for bribes also coincide with gender-based violence (GBV) during border crossings given the gender dimensions of cross-border trade. This is particularly important in DRC, where sexual violence is prevalent and the large majority of cross-border traders are women and most border officials are men. According to the most recent Demographic and Health Survey data from DRC, 28% of women aged 15-49 in North Kivu and 35% of those in South Kivu have experienced sexual

[1] In 2011, the DRC Government issued a decree officially banning the collection of taxes on the import of foodstuffs (including vegetables and fruits) and addressing the perceptions of cross-border trade as being illegal (Government of the DRC, 2011). While most of the traders engaged in cross-border trade are not smugglers, some smuggling of banned products (e.g., charcoal from Rwanda) does indeed occur along the border (Titeca and Kimanuka, 2012).

[2] This study took place during a period of heightened tension between the DRC and Rwanda against the backdrop of the "March 23" rebel group's armed conflict with the DRC Government (Rono, 2013), with temporary curfews and border closures also occurring.

violence (DHS, 2014).[3]

The large number of official actors at the DRC border, including those who are unauthorized to be there, creates further uncertainty for traders and prolongs their border crossing. For example, while only five government services were authorized to be present at the DRC border during the study period, more than 17 were operating in border posts in North Kivu (Doevenspeck and Mwanabiningo, 2012). The multitude of actors leads to more opportunities for harassment, delays, and potential confiscation if traders do not comply with the often arbitrary demands of officials (Titeca and Kimanuka, 2012). In addition to these authorized and unauthorized officials, traders also encounter young men informally hired by government officials to monitor the borders, illegally expropriate goods from traders, and demand bribes (Brenton et al., 2012).

2.2 Intervention

The "Improving the conditions of cross-border traders in the Great Lakes region of Africa" project was designed by the World Bank's Africa Region Trade Practice (now part of the World Bank's Macroeconomics, Trade and Investment Global Practice) and implemented by the NGO International Alert from March 2012 to July 2013. The project aimed to address multiple constraints[4], including the lack of information about rights, procedures, and tariffs among traders, as well as border officials' lack of awareness about gender issues, and the need to distinguish between legal trading and smuggling.

[3]The conflict in the eastern provinces contributes to the high incidence of GBV: in North Kivu and South Kivu, armed groups perpetrated most of the GBV incidents (Government of the DRC, 2013).

[4]The constraints and conditions of cross-borders traders were examined through a survey in mid-2010 at four key border-crossing points in the Great Lakes region: at Uvira-Bujumbura (between DRC and Burundi); Bukavu-Cyangugu (between DRC and Rwanda); Goma-Gisenyi (DRC and Rwanda) and Kasindi-Mpondwe (DRC and Uganda) (Brenton et al., 2012). In general, the survey results showed that cross-border traders were mostly poor young women (85% of the 181 surveyed traders were female and the average age of a trader was 32) engaged in trading small quantities of cereals, pulses, vegetables, and fruits, typically carried by head. The household income of most traders (77% of respondents) relied primarily on cross-border trading activity. As indicated in García Mora and Roshan (2013), approximately 60 percent of cross-border traders in DRC and Rwanda were officially registered with the Government, implying that they were not seeking to hide from or evade government agencies. Nevertheless, many border officials held the view that cross-border traders were illegal traders, and treated them with abuse at the border. From the survey of 181 cross-border traders in the Great Lakes region, it was reported that 85% of traders were asked to pay bribes; 60% of traders received fines; 54% of traders were subject of acts of violence, threat and sexual harassment; 38% of traders were faced with rude border official's behavior, verbal abuse, and insults; 38% of traders had their goods confiscated; and 19% of traders were forced to wait for a long period before crossing the border (Brenton and Isik, 2012). Payment of bribes followed a usual phrase from border officials, known by all traders: "*sans argent, on ne passe pas*" (no money, no passing).

Focusing on two main border-crossing points between DRC and Rwanda, the "*petite barrière*" in Goma and "Rusizi 1" in Bukavu, the project had two over-arching objectives: (1) to improve the conditions (procedures and infrastructure) at the border and the conduct toward cross-border traders, in particular women, to ensure their safety and improve their economic conditions; and (2) to provide an environment in which cross-border traders can become better informed and organized (International Alert, 2012). Activities for the pilot intervention were carried out between March 2012 and July 2013. The ideal goal of the project was to reach full compliance with the charter for cross-border trade (Brenton et al., 2013) at the crossing points in the Great Lakes region. This charter consists of basic rights and obligations for traders and officials at the border, as summarized in Appendix 1.

The overall project had three components (International Alert, 2012): (1) professionalization of officials in Goma and Bukavu (to reduce harassment of traders and improve conditions for small-scale cross-border trade); (2) empowerment of small-scale traders (via increased knowledge and understanding of regulations and rights and establishment and strengthening of associations and cooperatives); and (3) support for policy dialogue and improved coordination among local actors. It is important to note that, under this component, a set of joint workshops were held between traders and officials. We account for this potential threat to identification in Section 4.[5]

This study focuses on the impact of the training intervention under Component 2. A one-week listing exercise was conducted at border crossings to identify 628 traders (90% of whom were women), from which 314 were initially randomly selected to be trained and 314 selected as a control group.[6] Due to several challenges in tracking the same traders (traders were mobile and wary of being associated with illegal trading), only a total of 174 traders (including 110 traders among those assigned to receive the training)[7] were trained in taxes, cross border regulations, and traders' rights during a set of four training workshops in Goma (December 2012) and Bukavu (February 2013).[8]

[5]Under Component 1, 170 customs officials were trained in Goma and in Bukavu on regulations, taxes and fees applicable in DRC; in addition, their awareness regarding appropriate ways to treat cross-border traders was raised during training sessions on human rights, good governance and gender sensitivity. Under Component 3, activities included policy engagement for cross-border trade facilitation and two joint workshops (in Bukavu and Goma) between small-scale traders and border agencies and officials, to achieve commitments to improving small-scale trade conditions.

[6]See García Mora and Roshan (2013) for a description of the sampling procedure.

[7]In Section 4 of the paper, the issue of two-sided non-compliance is presented along with the challenges of data collection. Non-adherence to the treatment/control assignment is also accounted for in the econometric estimation.

[8]In addition to the empowerment training, several other activities were conducted under Component 2 of the project. There were 16 women traders' associations established in Goma and Bukavu and 142 women traders trained

The underlying rationale for the training intervention was that traders lack the necessary information to navigate safe and legal passage across the border: previous formative research had suggested that they were often ill-informed about their rights, authorized border procedures, and required tariffs and taxes. It was anticipated that equipping traders with better information about their rights and legal obligations would help reduce their exposure to harassment and corruption, reduce smuggling, and increase their feelings of empowerment.

The two-day training workshops covered three modules. The first module provided an overview of the laws and procedures on the small-scale import and export of merchandise and goods, the classification of goods for customs clearance, immigration procedures, authorized crossing routes and times, and a discussion of fraud and corruption. During this session, participants learned that the large majority of fees and taxes they were charged at the border were unauthorized and illegal.[9] For example, the training made clear to participants that they were not required to pay for an immigration ticket (*jeton*) to cross the border. Traders were also informed that plants, vegetables, fruits, and animal products should be duty-free, but the precise duty-free quantity thresholds were not yet made public by the DRC government at the time of the training. When faced with requests for cash or in-kind bribes, traders were advised to avoid doing so, to avoid paying in kind, and – if forced by an official – to request a receipt as proof of payment. This portion of the workshop included participatory role plays, with traders acting out typical scenarios they encountered while crossing the border, and group discussions on how to resolve or mitigate these challenges (International Alert, 2013).

In a second module, the workshop addressed the five services (Immigration; Customs Administration; Import-Export Control; Health and Hygiene; and Border Police) that were authorized to work at the border and their respective roles. Traders further learned to distinguish the uniforms of the border officials from these institutions. It was emphasized that traders should only make payments

on the creation and management of cooperatives. Fifteen radio programs were also produced and broadcast in Kiswahili by radio stations in Bukavu, Goma, and Uvira. The program addressed several cross-border trade themes, including access to finance, problems encountered during the border crossing, and trader associations and cooperatives.

[9]Workshop participants were also informed about the existence of a duty-free trade agreement among the countries of the Great Lakes region that was soon to be revised and about the application of COMESA (Common Market for Eastern and Southern Africa) tariffs. While DRC is a long-standing member of COMESA, its three-year accession to the COMESA free trade area only began in 2016 as it started to lower its tariffs. DRC is also a member of the Southern African Development Community (SADC), though not of the Southern African Development Community (SADC) Free Trade Area. Rwanda, meanwhile, is a member of the East African Community (EAC) (including its customs union) and the Common Market for Eastern and Southern Africa (COMESA) free trade area.

inside offices to uniformed officials, to make these payments in cash rather than in-kind, and to always request a receipt after any payment was made.

The third and final workshop module covered issues of fraud and corruption. Training participants were educated on what constitutes smuggling (fraud) or bribery, and why smuggling and bribery should be avoided. Facilitators instructed the traders to avoid paying bribes, hiding goods, or giving any of their goods to someone as a way of paying a service or receiving a favor. Traders also learned that they must cross the border at the authorized crossing points and at the official crossing times and be courteous during their interactions with border officials.

While the training curriculum provided useful information to the traders, it lacked clarity on key issues that would make the participants more inclined to act against bribery and gender-based violence (GBV) by the border officials. This ambiguity in the curriculum was a direct reflection of the uncertainty around the Congolese government's official rules and regulations. For instance, traders were taught the following: "Plants, vegetables, fruits, fish or seafood, livestock products, and manufactured goods from Rwanda and DRC are duty-free. But we are waiting for the law to set the specific quantities and amounts that will be duty free." In addition, the training did not advise against paying unofficial fees under duress, given the potential for violence if a trader were to categorically refuse. Given this incomplete information, and the prevailing power differentials between officials and traders and weaknesses in rule of law in this setting, border officials could still claim to know the trade rules and regulations better than the traders and exploit any uncertainty in the law to engage in corruption and GBV at the border.

3 Theoretical framework

To analyze how the empowerment training on rights, procedures, and tariffs might affect small-scale cross-border traders, we first model the strategic behavior of cross-border traders and officials during border crossings. We start by presenting and adapting a game based on Hirschman (1970)'s *Exit, Voice, and Loyalty* (EVL) model. The basic EVL model offers a lens through which to analyze how citizens react to weak state policy, how employees respond to job dissatisfaction in the workplace, whether members of an organization decide to maintain their membership or quit, and various other situations involving two interdependent players: citizens versus state, employees versus managers, members versus leaders, etc. In all these events, Player 1 (citizen, employee, member, etc.) is faced with three main reactions: the opt-out alternative where Player 1 breaks the relationship (*exit*); the constructive alternative where Player 1, rather than escaping from the linkage, poses a set of complaints to reverse the situation (*voice*); or the passive alternative where Player 1 waits for the conditions to improve, without attempting to repair the relationship (*loyalty*[10]). Player 2 (state, manager, leader, etc.) exerts two main reactions: either responding to or ignoring Player 1's reaction.

3.1 Cross-border trader and border official game

Notations

Consider the situation where a cross-border trader, denoted by C, faces a negative shock at the border, resulting in a transfer of a bribe to a border official,[11] denoted by B, during official border-crossing times. Let denote:

[10] We disregard the discussion of loyalty as a factor for voice rather than a separate alternative. Some authors restrict the set of options to either exit or voice (Gehlbach, 2006; Hirschman, 1992), arguing that the first actors to exit after any policy represent the pioneers signaling that the policy is deleterious, and the actors complaining or remaining loyal are those just giving the necessary delay, time, effort, and money for realizing the poor quality of the policy and effecting change; thus, loyal actors are actually the activists who will use their voice, and disloyal actors are those who will exit. However, Dowding et al. (2000) make the point that the extensions of the exit or voice framework to models which account for additional alternate options are more realistic. By not considering loyalty as just intervening to adjust between voice and exit, our model follows those of Dowding and John (2008), Wiens (2014), and Clark et al. (2017), who explicitly include loyalty as a third alternative to voice and exit.

[11] Border officials only operate during the official opening hours of the border, while during the non-opening hours the border is either unguarded or under the control of other official guards who are not supposed to authorize border crossings.

ϵ : the quality of the institutional environment (or the level of enforcement), which takes high values in a good institutional environment and low values in a poor environment ($0 \leq \epsilon \leq 1$);

θ_B : the border official's knowledge of law, customs procedures, and gender rights, which varies between 0 and 1, with the highest level taking the value of 1 ($0 \leq \theta_B \leq 1$);

θ_C : the trader's knowledge of cross-border trade regulations and gender rights, varying between 0 and 1, with the highest level taking the value of 1 ($0 \leq \theta_C \leq 1$);

A_C : the trader's wealth endowment;

$b(\cdot)$: the bribe requested by the border official, which is a function mapping from ϵ and θ_B to non-negative real numbers;

$\lambda(\cdot)$: the trader's propensity to pay the bribe, which is a function mapping from ϵ, θ_C, and A_C to the unit interval ($0 \leq \lambda(\epsilon, \theta_C, A_C) \leq 1$);

$x(\cdot)$: the amount of bribe paid by the trader, which differs from b unless when $\lambda(\epsilon, \theta_C, A_C) = 1$ and is defined by the formula $x(\lambda, b) = \lambda(\cdot) * b(\cdot)$;

$\underline{b_t}$: the bribe asked for by guards when a trader inadvertently meets them during border crossings at unofficial times;

R_t : the safety risk incurred by every trader during border crossings at unofficial times;

$c(\cdot)$: the cost for a trader with knowledge θ_C to use her voice in an institutional environment characterized by its quality ϵ;

$F[x(\cdot)]$: the fine applied to the faulty border official in the event of a successful response to voice;

U_C : the trader's utility from trading its products through cross-border trade;

U_B : the remuneration of the border official by the management at official crossing times.

Assumptions

We assume that the requested bribe amount, $b(\epsilon, \theta_B)$, decreases with both ϵ and θ_B, i.e. $\partial b/\partial \epsilon < 0$ and $\partial b/\partial \theta_B < 0$. The two variables, ϵ and θ_B, represent key parameters for the existence of bribe in the system. It requires a good-quality institutional environment plus certain personal characteristics such as education[12] to substantially reduce corruption levels (Lederman et al., 2005;

[12]Based on a theoretical model, (Eicher et al., 2009) suggest that, rather than low or high levels of education,

Mocan, 2008). While we allow a certain level of bribes by relaxing the assumption of a perfect institutional environment combined with highly-educated border officials in this framework, we assume that the bribe amount paid by the trader is much more elastic to the initial amount requested by the official than to the cross-border trader's propensity to pay a bribe, along with $\partial x/\partial b > 0$ and $\partial x/\partial \lambda > 0$.

In the ruled-out perfect institutional environment, a cross-border trader's propensity to pay a bribe reduces to zero. In the imperfect institutional environment, $\lambda(\epsilon, \theta_C, A_C)$ is assumed to negatively depend on her knowledge θ_C but positively depend on her wealth endowment A_C. The relatively wealthy cross-border passenger has an incentive to pay a bribe whenever asked to facilitate her border crossing (Reid and Weigel, 2019). We assume there is a relatively high level of C's wealth, A_C^*, such that $\lambda(\epsilon, \theta_C, A_C^*) = 1$. But there also is a high level of knowledge θ_C^* such that $\lambda(\epsilon, \theta_C^*, A_C^*) < 1$, and thus, the relatively wealthy trader with a high level of knowledge can still negotiate a reduced bribe payment. For the relatively poor trader ($A_C < A_C^*$) to be able to drop the bribe level initially set by the border official, it requires being trained on border-crossing regulations up to reach the knowledge level θ_C^*. We also assume there is no borrowing for border crossing, so the trader will bargain on the basis on her initial wealth endowment.

A bribe requested while the border is officially closed, $\underline{b_t}$, is set to exist only in the short term since it may simply require the construction of firm and clear borders (such as walls and fences) to close the border and halt the flow of people and goods at non-operating hours, thereby eliminating the existence of bribery at unofficial times. Traders have no power to negotiate $\underline{b_t}$ because not only are they violating the law by crossing at time when the border is officially closed, but they also make themselves vulnerable by crossing a fragile and conflict-affected zone at those hours.

Using voice is not costless for the trader. While in a high-quality institutional environment toll-free numbers or similar mechanisms are available to reduce the cost of exercising one's voice, these options are rarely available in lower-quality institutional environments. In such a scenario, the trader would first collect her prior receipts from bribe payments, identify the border official in question, and then file the complaint with the relevant border management office or oversight body.

some intermediate levels of education can generate corruption rents without a sufficient level of monitoring, thus undermining the institutional environment. However, in practice, there still is evidence that lower levels of education are associated with higher levels of corruption Evrensel (2010); Truex (2011).

The trader could also become a member of a trader's association and use their services to submit the complaint. The cost of using voice, $c(\epsilon, \theta_C)$, requires not just the awareness of border-crossing regulations but also knowledge that one can protest and a familiarity with the ways to express voice. For these reasons, it is assumed that $\partial c/\partial \epsilon < 0$, $\partial c/\partial \theta_C < 0$, and conditional on ϵ, the minimum achievable cost of using voice is $c(\epsilon, \theta_C^*)$. At the high-level knowledge θ_C^*, it is also the case that $c(\epsilon, \theta_C^*) < \underline{b_t} + R_t$ to favor using one's own voice rather than crossing through an illegal border crossing. Under a successful response to voice, the border management applies to the bribe-seeking border official a *Pigouvian*[13] fine, $F[x(\lambda, b)]$, assumed to be lower than U_B and increasing in $x(\lambda, b)$ with an elasticity greater than one. If no bribe was requested by the border official or voice was ignored, the fine would be zero.

We assume that, in the short term, trader C derives a utility U_C from crossing the border to trade her products, which is higher than the corresponding utility for any alternative business to cross-border trade. The exit action for C, thus, is to cross the border for her trading business at unofficial hours rather than shifting to a business that does not require one to cross the border.

Game structure and payoffs

Building upon the EVL framework, the cross-border trader and border official game is an extensive form game of perfect information[14] with two information sets for C and one information set for B, as pictured in Figure 1. The game describes static strategic interactions because border agents do not act collectively at each crossing, and because a given trader faces a border agent somewhat at random.

At the upper decision node in Figure 1, given the regular transfer of bribe $x(\lambda, b)$ to the border official during the official opening hours of the border, despite a declared duty free border, cross-border trader C has three actions: exit border crossing at official hours, voice via complaints, or demonstrate loyalty until things change. If she chooses to exit, she is left with her utility for trading business, U_C, but must pay the bribe $\underline{b_t}$ to the official guards at the border during non-operating hours and incur the safety risk R_t for crossing the border at unofficial hours. For this trader's action,

[13] This is a classical penalty setting. For further review, see (Polinsky and Shavell, 1992) and Mookherjee and Png (1995).

[14] This is a game without moves by Nature and where the choices of player C or B are immediately observed by the opponent.

the border official is left with zero payoff. If C chooses to demonstrate loyalty, she crosses the border during official hours and pays the bribe $x(\lambda, b)$, which leaves her with the payoff $U_C - x(\lambda, b)$ and the border official with the payoff $U_B + x(\lambda, b)$. If C rather decides to voice by complaining about the bribe payment for duty-free goods to improve the situation, border management is called to determine the payoffs.

At the middle decision node in Figure 1, border management has two actions in reaction to the trader's use of voice: respond or ignore. Since border officials are dependent on cross-border traders to exercise their official responsibilities, the border management responds to a trader's use of voice whenever it is perceived that C has a credible exit option and may not use her loyalty strategy; in that case, whatever the loss $F[x(\lambda, b)]$ to be incurred by B, the border management commands the border officials to correctly apply the border regulations. Conditional on the trader's use of voice followed by a response from border management, C is left with the payoff $U_C - c(\epsilon, \theta_C)$, and B with the payoff $U_B - F[x(\lambda, b)]$. Whenever no exit option is perceived, the border management ignores the trader's voice to constrain C's strategy to loyalty.

At the lower decision node in Figure 1, C has two actions left if her voice has been ignored by the border management. She may choose to exit border crossing during official hours, with the payoff $U_C - \underline{b_t} - R_t - c(\epsilon, \theta_C)$, thus leaving the border official with zero payoff. Instead, she may return to adopting the loyalty action rewarding herself $U_C - x(\lambda, b) - c(\epsilon, \theta_C)$, thus letting the border official enjoy the payoff $U_B + x(\lambda, b)$. Applying here a harassment opportunity for the border official to exploit the trader and enjoy the full bribe $b(\epsilon, \theta_B)$ rather than $x(\lambda, b)$ would be reasonable; however, this adds no major change in the main results since voice occurs at the border management workplace, and the border official does not identify the specific trader using voice.

Equilibrium and interpretation

What will the trader's strategic behavior during border crossings be? It will depend on how she assesses the prevailing conditions at the border and envisages the border management's reaction to her use of voice. We solve the game in Figure 1 following the method of backward induction, and determine three sub-game perfect Nash equilibria formulated in three propositions.

Proposition 1: If $x(\lambda, b) \leq \underline{b_t} + R_t$, an equilibrium (Loyalty, Loyalty; Ignore) exists in that the trader's first action is Loyalty, her second action is Loyalty, and the border management ignores the trader's use of voice.

Proof: see Appendix 2.

Proposition 2: If $\underline{b_t} + R_t < min\{x(\lambda, b); c(\epsilon, \theta_C)\}$, an equilibrium (Exit, Exit; Response) exists in that the trader's first action is Exit, her second action is Exit, and the border management responds to the trader's use of voice.

Proof: see Appendix 2.

Proposition 3: If $c(\epsilon, \theta_C) < min\{\underline{b_t} + R_t; x(\lambda, b)\}$, an equilibrium (Voice, Exit; Response) exists in that the trader's first action is Voice, her second action is Exit, and the border management responds to the trader's use of voice.

Proof: see Appendix 2.

The three propositions above offer the delineation of the possible behavior of traders during border crossings with three intuitive explanations. First, Proposition 1 (Loyalty) suggests that the traders prefer to comply with the informal payment system instituted by border officials if the bribe negotiated is so low that it makes it cheaper to pay, compared to the dis-utility when crossing the border at unofficial hours. In this situation, using voice is unnecessary because border crossing at unofficial hours is ruled out after bribe negotiation and the bribe is so marginal that the border management will ignore any complaints that may arise. Second, Proposition 2 (Exit) suggests that, if crossing the border at unofficial hours is less costly and risky than crossing the border at official hours, and if the cost of voice is higher than the dis-utility when exiting from the official border-crossing time, then the traders prefer exit to any other alternative, no matter how responsive the border management is to a use of voice. Finally, Proposition 3 (Voice) suggests that, if traders can bypass the official

border crossing to their benefit, and the redress mechanisms are less costly for the traders than the loss incurred during the non-official border crossing, then the traders prefer to complain, with no chance of the border management ignoring their use of voice. Next, what do these propositions tell us about the impact of a trader's empowerment training on border-crossing activity?

3.2 Theory of change

Empowering cross-border traders through a training on rights, procedures, and tariffs may have effects on (1) the strategies used by traders while crossing the border; (2) the levels of corruption and gender-based violence (GBV) traders would face at the border; and (3) the resulting trading business outcomes (volume, trader's revenues, and profits). In the context of this paper, we do not focus on the outcome set (3), as we assume that there is a market for the traded products such that the trading business outcomes would be a direct consequence of how the border crossing is regulated to reduce trade costs (corruption and GBV) and make trading commercially viable. While set (2) consists of the final outcomes of interest on cross-border traders and are to be obtained ideally through an intervention on traders only, the joint sessions with traders and border officials during the implementation of the training offer a different channel for the same effects – as it may induce a behavior change from the border officials.

The causal pathway is shown in Figure 2 and is described as follows.

Voice mechanism

Suppose the training increases the trader's knowledge on rights, procedures, and tariffs, θ_C, by the ideal level T^* required to reach θ_C^*, without changing the behavior of border officials.

Thus, not only is the minimum possible cost of using voice, $c(\epsilon, \theta_C^*)$, obtained but also using voice becomes less costly than incurring safety costs and paying a bribe to guards during unofficial border-crossing times. Regardless of her wealth level, the trained trader also has some propensity $0 < \lambda(\epsilon, \theta_C^*, A_C) < 1$ to engage in bribe negotiation from $b(\epsilon, \theta_B)$ to $x(\lambda, b) = \lambda(\epsilon, \theta_C^*, A_C) * b(\epsilon, \theta_B)$. Since the training extends only θ_C but not θ_B, $x(\lambda, b)$ is not decreased enough to be at a level lower than $c(\epsilon, \theta_C^*)$. It results in $c(\epsilon, \theta_C^*) < min\{\underline{b_t} + R_t; x(\lambda, b)\}$ for trained traders. By Proposition 3, the impact of the training would be that trained traders cross the border at the official crossing hours,

have a lower likelihood of paying a bribe, collect receipts if they pay a bribe, have a higher likelihood of being members of a trader's association, and are less likely to be victims of gender-based violence.

Exit mechanism

Suppose the training increases the trader's knowledge level, θ_C, by the level $T < T^*$ (that is, the training is not effective enough beyond bringing awareness about rights, procedures, and tariffs), without changing the behavior of border officials.

Thus, the cost of using voice, $c(\epsilon, \theta_C)$ is higher than the transaction costs during unofficial border-crossing times. Since there is little change in the propensity to negotiate a bribe – T^* is not reached – and the training does not influence θ_B, $x(\lambda, b)$ is not at a level lower than the transaction costs during unofficial border crossing. This sums up to $\underline{b_t} + R_t < min\{x(\lambda, b); c(\epsilon, \theta_C)\}$ for trained traders. By Proposition 2, the impact of the training would be that trained traders cross the border at unofficial hours, thus reducing the chances of paying a bribe and experiencing gender-based violence.

Loyalty mechanism

Suppose the training increases the trader's knowledge level, θ_C, by the level $T < T^*$ (that is, the training is not effective enough beyond bringing awareness about rights, procedures, and tariffs), and that it increases border officials' knowledge about gender issues and the difference between trading and smuggling, θ_B, such that border officials ask lower amounts of bribe $b(\epsilon, \theta_B)$.

Given that there is little change in the propensity to negotiate bribe – T^* is not reached – and that the bribe amount paid by the trader is highly elastic to the initial requested amount, $x(\lambda, b)$ is reduced enough to penalize unofficial border crossing. Irrespective of the cost of using voice, by Proposition 1, the impact of the training would be that trained traders cross the border at the official crossing hours, with a lower incidence of corruption in terms of the bribe amount paid and unclear levels of gender-based violence.

Outside the trader's exit, voice, or loyalty mechanism

Suppose the training increases border officials' knowledge about gender issues and difference between trading and smuggling, θ_B, such that fewer border officials request a bribe from traders.

Thus, irrespective of the influence of the training on the trader's knowledge level, θ_C, the impact

of the training would be that trained traders cross the border at official hours, with an increase in the non-payment of bribes and a drop in the incidence of gender-based violence. Such a scenario would occur outside the trader-led pathway in Figure 2.

4 Experimental design, data, and empirical approach

4.1 Experimental design and baseline data

We rely on the random assignment of individual traders to examine the impact of the empowerment training program on corruption and gender-based violence (GBV) at the borders between Eastern DRC and Rwanda. The sample frame was generated based on a listing exercise at the Goma/Gisenyi and Bukavu/Cyangugu border crossings between Eastern DRC and Rwanda. Among the 628 cross-border traders included in the sample, 314 were randomly selected to be invited to the training and 314 selected to be control traders.

There were two rounds of survey data collection conducted by an international survey firm with support from the Catholic University of Bukavu. The baseline survey took place prior to the empowerment training workshops in August 2011, and the end-line survey was carried out in August 2013. The survey instrument was a multi-topic questionnaire covering the trader's demographic characteristics, housing characteristics and assets, expenditure, trade (border crossing, trading activity, corruption, and income), GBV, and access to mobile technology. The questionnaire was piloted prior to the survey, with a particular focus on adapting the survey to the local cultural context. All field staff received training on data collection consisting of instructive lectures and demonstrations followed by practice sessions with non-sampled cross-border traders, and a final briefing about field data collection techniques. A team of researchers from the Catholic University of Bukavu and the World Bank's Gender Innovation Lab closely monitored all field activities.

As expected, given the fragile context, the field survey team confronted a number of challenges during data collection linked to the mobility of traders and their distrust of outsiders. At baseline, some respondents provided fake names to survey enumerators, making it particularly difficult to track them for the follow-up survey. In addition, even among those traders who provided accurate names and contact information at baseline, it was difficult to track respondents who were frequently

ferrying food and other goods across the border on foot or on bikes. As such, an intensive tracking exercise was conducted at endline to retrieve approximately 84% of the baseline sample. In addition, the research team conducted a thorough exercise to confirm and match the time-invariant characteristics of baseline and endline survey respondents.

Table 1 presents the baseline characteristics of the sample of 628 cross-border traders. Nine out of ten traders in the sample are women and three quarters live on the DRC side of the border (Table 1, Panel A). The average trader is 35 years old, has been engaged in cross-border trade for ten years, owns relatively few assets, and relies primarily on trade as her main cash source.[15] Overall, the traders' activity is largely a channel for imports into the DRC from Rwanda: 87% of traders import goods, 12% export, and only 1% do both.

Prior to the training, only a third of traders could correctly identify all authorized and unauthorized institutions at the border (Table 1, Panel B), although traders were relatively more aware of which institutions were not authorized to be at the border (Appendix Table A.1). Table 1 also shows that half of traders cross the border before the official opening time (7:30 a.m.), and they crossed the border 3.4 times a week (Table 1, Panel B). Despite trading small quantities of duty-free goods such as vegetables and fruit, approximately 19% of the traders reported paying some amount to cross the border. In addition, 22% of traders experienced GBV or harassment, primarily in the form of being insulted or spit upon, at the border in the preceding 30 days (Table 1, Panel C).

Balance tests indicate that treatment and control assignment groups had largely similar baseline characteristics, except for the type of trade they did and their experience with GBV. At a 10% level of significance, there were 5% more exporters among traders randomly selected to receive the training than among those assigned to the control group (Table 2). This could give incentives to traders from the treatment group to cross the border early at unofficial morning times, to avoid meeting with border officials, and sell their products in the neighboring country to avoid paying fees on their return border crossing. However, there was no significant difference in the border crossing times between the assignment groups at baseline (Table 3). While Table 3 shows no significant treatment-control differences in trader knowledge, crossing patterns, or bribes, it does reveal an imbalance in the incidence of GBV. Approximately 19% of traders assigned to the control group

[15] A comparison of this sample with DHS data from DRC and Rwanda suggests that these traders' households are at a similar welfare level to other urban households along the border (García Mora and Roshan, 2013).

reported GBV of any kind in the preceding 30 days, while those selected to receive the training were significantly more likely (7 p.p.) to report GBV. This imbalance is accounted in the empirical approach (Section 4.3).

4.2 Attrition and non-compliance

The end-line survey conducted an intensive tracking exercise to ensure paneling of the respondents. This led to a match of 525 cross-border traders to the original baseline sample (84% of the sample), as 103 traders could not be re-identified due to the fake names and contacts they gave during the baseline survey. As shown in Figure 3, the 16% attrition rate of the sample was distributed evenly across assignment groups.

There were several univariate differences between the attrited and non-attrited groups, including along baseline covariates measures (Appendix A.2) and study outcomes of interest (Appendix A.3). Econometric estimations (probit and linear probability model) indicated that, at the 1% level of significance, traders not retained in the final sample were less experienced traders on average. At the 5% level of significance, attrited traders also owned fewer bikes and more radios, and more were likely to reside in the DRC (Table 4). This suggests that the final sample included slightly more experienced small-scale traders who were more likely to rely on bicycles to cross the border from Rwanda to DRC for their small-scale trading activities and were less likely to access border information through radio broadcasts. Attrited traders (at the 10% significance level) were also more likely to have electricity access and be married when compared with "non-attrited" traders (Table 4). Based on the Ramsey RESET test, we did not reject the null hypothesis that there were no additional attrition correlates.

The end-line sample of 525 traders comprised 262 traders assigned to receive the training and 263 traders assigned to be control traders (Figure 3). However, the program implementers found it challenging to ensure the compliance with the randomized assignment. Despite the familiarity of the implementing NGO with the study zone, only 110 of the 262 traders assigned to the treatment group actually attended the training (take-up of 42%). In addition, there were 64 traders among the 263 traders assigned to the control group who attended the training. This yielded a compliance rate of 35% in the treatment group and of 63% in the control group. This two-sided non-compliance

is addressed further in the empirical approach (Section 4.3).

4.3 Empirical approach

This study estimates the Intent to Treat Effect (ITT) and Local Average Treatment Effect (LATE) of the trader's empowerment training on knowledge, border crossing, corruption, and GBV outcomes. The ITT measures the expected difference in outcome between cross-border traders who were randomly assigned to the treated group and those to the control group. If the intervention had met the ideal 100% compliance, the ITT would have been equal to the average treatment effect. With the non-compliance illustrated in Figure 3 and presented above (Section 4.2), the ITT instead offers a likely lower bound of the causal impact. An alternative estimator, the LATE, provides the average treatment effect among the compliers. In the presence of two-sided non-compliance, the LATE corrects the average treatment effect by dividing the ITT by the difference between the take-up in the treatment group and the take-up in the control group (Gerber and Green, 2012; Glennerster and Takavarasha, 2013).

ITTs are estimated using ordinary least squares regressions, while LATEs are estimated using two-stage least squares regressions. We use two specifications to estimate these effects: Difference-in-Differences (DD) and Analysis of Covariance (ANCOVA). The difference-in-differences specification draws on data from the two survey rounds to estimate differences in outcomes across treatment and control traders before and after the training. The ANCOVA specification estimates the difference in end-line values of each outcome, after controlling for the baseline values of the outcome. Given the imbalance of selected outcomes (particularly the GBV outcomes) at baseline in Table 3, the ANCOVA estimates are preferred over the difference-in-differences estimates (McKenzie, 2012).

For the difference-in-differences models, we first estimate the following equation:

$$Y_{it} = \alpha_1 + \beta T_i + \gamma Post_t + \delta_1 (T_i * Post_t) + X_{it}^{'} \phi_1 + \varepsilon_{it} \tag{1}$$

where Y_{it} is the outcome for the cross-border trader i in period t, T_i is a dummy variable taking the value one if cross-border trader i is randomly assigned to receive the training, $Post_t$ is a dummy variable equal to one for the end-line survey, and X_{it} is a vector of covariates (gender, education,

access to electricity, ownership of home, and location of residence) in period t, and ε_{it} is the error component. In Equation 1, we are interested in the coefficient δ_1 which represents the ITT effect of the training. Ignoring non-compliance issues, the ITT δ_1 is consistently identified given that the individual trader-level assignment of the training is random, that the time effect γ is common across assignment groups, and that we control for the unbalanced covariates and attrition correlates.

To adjust the estimation of the ITT to the two-sided non-compliance problem, we conduct a two-stage estimation of a corrected difference-in-difference model using the following equation:

$$Y_{it} = \omega_1 + \kappa \hat{Treated}_i + \rho Post_t + \theta_1(\hat{Treated}_i * Post_t) + X_{it}^{'}\psi_1 + u_{it} \tag{2}$$

where $\hat{Treated}_i$ is the predicted value of the observed treatment status using the first-stage equation specified below:

$$Treated_i = \sigma + \tau T_i + v_i \tag{3}$$

In Equation 3, the observed or actual treatment status for the cross-border trader i, $Treated_i$, is regressed on the randomly assigned treatment status, T_i. It is expected that the estimated value of τ would be 0.18 because τ represents the difference in take-up between the treatment group and the control group.[16] In Equation 2, we are interested in the coefficient θ_1 which represents the LATE estimated for the training. The LATE θ_1 is consistently estimated given that the randomly assigned treatment status is correlated with the actual treatment status[17] and uncorrelated with the error term u_i (since Equation 2 controls for the unbalanced covariates in X_i).

In the ANCOVA models to estimate the ITTs and LATEs, we include enumerator-fixed effects to account for the intensive tracking exercise and the availability of enumerator data during the end-line survey and to control for the difficulties in interviewing cross-border traders on sensitive questions such as corruption and GBV. We estimate the ITT δ_2 using the following ANCOVA model:

$$Y_{ij,t} = \alpha_2 + \delta_2 T_i + X_{ij,t-1}^{'}\phi_2 + \pi Y_{ij,t-1} + \eta_2 Enumerator_j + \varepsilon_{ij,t} \tag{4}$$

where $Y_{ij,t}$ is the end-line value of the outcome for the cross-border trader i interviewed by Enumer-

[16] (110/262)-(64/263)=0.18.

[17] Column 1 of Appendix Table A4 shows that the estimated τ is significant.

ator j, $X_{ij,t}$ is a vector of baseline covariates (gender, education, access to electricity, ownership of home, and location of residence), $Y_{ij,t-1}$ is the baseline value of the outcome, and $\varepsilon_{ij,t}$ is the error term.

We estimate the LATE θ_2 using the following ANCOVA model:

$$Y_{ij,t} = \omega_2 + \theta_2 \hat{Treated}_i + X'_{ij,t-1}\psi_2 + \iota Y_{ij,t-1} + \zeta_2 Enumerator_j + u_{ij,t} \tag{5}$$

where $\hat{Treated}_i$ is the predicted value of the observed treatment status using Equation 3 estimated on the end-line data.

We can conduct a preliminary test of the exit mechanism using Equations 1, 2, 4, and 5 and examining the significance and sign of the ITT and LATE estimates on key outcomes of interest. An insignificant impact on traders' self-reported knowledge, coupled with a drop in GBV and bribe payments and an earlier border crossing on average, would provide evidence in support of the exit mechanism (see Figure 2), without a formal rejection of the hypotheses that the impact on corruption and GBV arises from trader's voice or from the border officials themselves. [18]

Following the estimation of effects on border crossing, corruption, and GBV, determining the prevailing mechanism hinges on whether traders rely on voice and whether border officials change their demand for bribes (outside of the EVL framework). Traders exhibit voice if they employ any of the following strategies: (1) paying a bribe but requesting a receipt; (2) paying no bribe or paying a bribe but requesting a receipt; and (3) being a member of a trader's association. To evaluate the impact of the training on voice, we estimate the ITTs and LATEs on the variables capturing the three voice channels stated above, using Equations 1, 2, 4, and 5.

The demand for bribes by border officials is examined using three outcome variables: (1) whether the trader has been asked to pay a fee in the preceding 30 days; (2) whether the trader has seen or heard about other traders being asked to pay a fee in the preceding 30 days; and (3) the value of bribes requested by officials. Data on these variables are collected during the end-line survey. To evaluate the impact of the training on the demand for bribes by border officials, we use Equations

[18] Moreover, in the absence of an effect on border-crossing strategies, we would not be able to clearly evaluate the alternative hypotheses of trader's voice, trader's loyalty, or a change in border official behavior.

6 and 7 as follows:

$$Y_{ij,t} = \alpha_3 + \delta_3 T_i + X'_{ij,t-1}\phi_3 + \eta_3 Enumerator_j + e_{ij,t} \tag{6}$$

$$Y_{ij,t} = \omega_3 + \theta_3 \hat{Treated}_i + X'_{ij,t-1}\psi_3 + \zeta_3 Enumerator_j + w_{ij,t} \tag{7}$$

Equation 6 is the counterpart of Equation 4 without the baseline adjustment. It is estimated on the end-line data using ordinary least squares. The coefficient of interest, δ_3, is the ITT estimated on the demand for bribes by border officials.

Equation 7 is the counterpart of Equation 5 without the baseline adjustment. It is estimated on the end-line data using two-stage least squares, where Equation 3 is the first stage for the estimation of Equation 5. The coefficient of interest, θ_3, is the LATE estimated on the demand for bribes by border officials.

4.4 Caveats

There are several limitations of our study. First, the challenges stemming from two-sided non-compliance with the study assignment lead us to rely on a more conservative ITT estimate of the "true" impact of the program. We further address this limitation by measuring LATE estimates for those who received the training.

Second, we do not experiment with border officials to evaluate their behavioral change. Instead, we rely on the experiment with traders and interview these traders about the demands for bribes that they experienced by border officials during our end-line survey. This is due to the impracticality of randomization within a small sample of border officials at the concerned crossings. Interviewing border officials about their demand for bribes could also influence their behavior at the border crossings, thus confounding the results from the trader's experiment. The baseline survey instrument does not include specific questions on the demand for bribes prior to paying bribes because previous reports indicated that the demand for bribes was widespread (Brenton and Isik, 2012). However, by estimating variation in bribe requests across treated and control traders in the end-line survey, our analysis can test whether the impact of the training is imputable to the trader's workshop sessions

rather than the joint sessions with traders and border officials.

Third, we do not measure the transaction costs during unofficial border crossings and the sanctions, if any, applied to border officials after a trader's use of voice. The availability of such data could have pushed the empirical analysis to investigate the Coase argument that the prevailing governance mechanism for border crossing (exit, loyalty, voice) evolves in a transaction-cost-minimizing way. Instead, we use a set of proxy variables for the demand for bribes and the use of voice to test the EVL mechanisms.

Finally, we do not measure traders' knowledge perfectly. We rely on awareness about gender rights and the self-reported knowledge about border institutions (binary dependent variables in our regressions) given the ambiguity in the cross-border trade regulations on the DRC side of the border. Measurement errors in binary variables capturing knowledge would necessarily be negatively correlated with the underlying true value of these variables while measurement errors in continuous dependent variables would not affect the unbiasedness of the impact estimates. However, using continuous knowledge score variables as those defined in Appendix Table A.1 changes neither the direction nor the significance of the ITTs and LATEs estimated on traders' knowledge, implying our impact estimates on traders' knowledge remain unbiased.

5 Results

Results from the econometric estimations of Equations 1, 2, 4, and 5 are presented for the impact of the training on trader knowledge and border-crossing outcomes (Table 5) and on corruption and GBV levels (Table 6). In these two tables, the average intent-to-treat effects across the entire non-attrited sample are presented without baseline adjustment in Panel A and with baseline adjustment in Panel C. After adjusting for the two-sided non-compliance with the treatment, the local average treatment effects (LATEs) are presented without baseline adjustment in Panel B and with baseline adjustment in Panel D.

The estimated effects of the training on traders' knowledge are statistically insignificant. Columns 1 of Table 5 shows no change in the awareness of all authorized border institutions following the training workshops. Nearly two-thirds of traders assigned to the control group accurately identify the authorized institutions, which suggests that traders have a relatively high level of knowledge even without the training workshop.

Columns 2 and 3 of Table 5 show the same pattern as in column 1, with insignificant effects on knowledge of unauthorized institutions and on both types of institutions. This finding is likely tied to the ambiguity of the tariff schedules and border procedures on the DRC side of the border.

The estimated effects of the training on all border-crossing times (Table 5, columns 4-6) are statistically significant at the 5% level. Column 6 shows that the intent-to-treat effects on crossing the border before 7:30 a.m. are positive and about 8.4 to 11.9 percentage points, reflecting an increase in early border crossing by 15.7 to 22.2 percent relative to control traders. The local average treatment effects on early border crossing are substantially higher, ranging from 47.5 to 67.3 percentage points. Column 5 shows that the training leads traders to cross the border an average of 23 to 29 minutes earlier, or a 5.1 to 6.5 percent drop across the sample. The local average treatment effects on crossing time in minutes correspond to a 29 to 37 percent decrease on average among the compliers. Column 4 expresses the results in Column 5 in terms of hours and reveals that, among control traders, the average border-crossing time is approximately 7:30 am (when the border officially opens).

While the impact estimates on border crossing before 7:30 a.m. and on the time at which the trader

crosses the border suggest that traders opt for the exit strategy, results on the intensity of border crossing indicate that this strategy suggest an exit from cross-border trade altogether. The final column of Table 5 reveals no change in the number of border crossings per week among treated traders. Trained traders thus continue to cross the border at similar level (around three times a week) as control traders.

Table 6 presents the impact of the training on final outcomes related to corruption and GBV. Although column 1 of Table 6 shows that the value of bribes paid remains unchanged after the training, ANCOVA estimations with baseline adjustment in column 2 show that, at the 10% significance level, there is an increase in the non-payment of bribes at any border by 5 percentage points on average across the sample and by 27.5 percentage points on average among compliers. This finding is consistent with the adoption of an exit strategy following the training.

When disaggregating the non-payment of bribes across both Rwanda and DRC (columns 2-3), we observe a significant effect (at the 5% level) on the Rwanda side of the border. Column 3 of Table 6 indicates that the intent-to-treat effects on the non-payment of bribes at the Rwanda border are about 4.4 to 5.1 percentage points, or an increase in the non-payment of bribes by 4.6 to 5.3 percent. The local average treatment effects at the Rwanda border are estimated to be about 25.1 to 28.7 percentage points. Nevertheless, the corresponding point estimates for the DRC side are statistically indistinguishable from those in Rwanda.

The training also registers a statistically significant drop in GBV incidence. In light of the imbalance in GBV outcomes at baseline, the preferred ANCOVA specification (column 5, Panel C) reveals a 5.4 percentage point decline (significant at the 10% level) in the likelihood of a trader experiencing GBV at the border. The corresponding effect among compliers is a 30.5 percentage point drop (10% level). Analysis of the sub-indicators for this summary measure suggests that the effect is driven by a decline in the incidence of being insulted or spat upon (see Appendix Tables A.11 and A.12).

Our findings up to this point suggest that increased information about gender issues and the ambiguity in cross-border trade regulations do not increase traders' knowledge *per se* and create incentives for early border crossing at unofficial hours to avoid steep bribe requests and insults from border officials. As depicted in the theory of change (Figure 2 in Section 3.2) and described in the empirical approach, the observed escape from the border followed by the drop in bribe payments and

the reduction of GBV levels provide evidence for the exit mechanism. But the observed impact on corruption and GBV could arise from either traders' exit or voice, or even from the border officials themselves following the joint training sessions. Therefore, a firm rejection of the voice mechanism and the outside EVL mechanism is required to conclude that the impact of the training is achieved via the exit mechanism.

6 Probing the theory of change

The use of voice by traders is tested by examining the impact of treatment on (1) paying a bribe but requesting a receipt (since this could be used to protest bribe requests with senior officials); (2) *either* paying no bribe *or* paying a bribe but requesting a receipt; and (3) being member of a traders' association. Table 7 presents the ITTs and LATEs on these voice proxy variables. The last two columns of Table 7 indicate no use of voice through these channels, as the impact estimates on the non-payment of bribes or payment of bribe with receipts, as well trader association membership, are all statistically insignificant.

Moreover, estimations with baseline adjustment in column 1 show that the training lowers the incidence of receipt requests by 2.4 percentage points across the entire sample and 13.7 percentage points among compliers at the 5% significance level. Hence, as a result of the training, fewer traders paying bribes during border crossings retain any proof of corruption to complain about. Rather than using knowledge and skills from the training to make claims or protest mistreatment, traders are actually reducing their interactions with officials. This helps to rule out the competing "voice" mechanism for the trader-led reduction in corruption and GBV.

To test whether the drop in corruption and GBV is instead led by changes in border official behavior, we examine the significance and the sign of the impact estimates on (1) officials having asked the interviewed trader to pay a bribe in the preceding 30 days; (2) officials having asked other traders to pay a bribe in the preceding 30 days; and (3) the value of the bribes requested by officials. Table 8 presents the ITT and LATE on these proxy variables for the demand for bribes by border officials.

All impact estimates on the demand for bribes by border officials are statistically insignificant. Column 1 of Table 8 shows that the training does not significantly change the likelihood of a border official asking the respondent or some other trader for a fee in the preceding 30 days. However, the coefficients in columns 1 and 2 are similar in magnitude and of the opposite sign, which is suggestive of a displacement effect from the exit of trained traders. The insignificant results in column 3 also rule out the training effect on the levels of bribe asked to be paid.

Overall, the findings suggest that the desired impact of the trader's empowerment training on corruption and GBV happens at the expense of voice and without a drop in demands of bribes by border officials. This conclusion strengthens the evidence of the exit mechanism that predicts early border crossings at unofficial hours.

7 Conclusion

This study investigates whether the impact of a trader's empowerment training on corruption and gender-based violence happens via the traders' use of voice, or through alternative mechanisms (trader's loyalty, trader's exit, or border official's influence) at the border between eastern DRC and Rwanda.

Our results rule out the voice, loyalty, and border official influence mechanisms. There is no change in knowledge accruing from the trader training workshops (duty-free regulations were not fully clarified by the DRC government at the time of the training workshops) or in terms of membership in a trader's association (a proxy for voice). The training instead triggered a change in border-crossing behavior. Following the intervention, trained traders were 47.5 percentage points more likely to cross the border before it officially opened at 7:30 a.m. This finding coincided with a decline in bribe payments, a drop in the request for receipts for unofficial payments, and a reduction

in the incidence of GBV – pointing to exit as the mechanism for these effects. Moreover, there is no evidence that border officials stopped demanding bribes or lowered the amounts of bribes they requested.

Although the traders' exit contributes to the desired impact of the training on corruption and GBV, it may not be sustainable. For effective cross-border trade facilitation and a lasting reduction in corruption and GBV, there is a clear need for improved governance and service delivery at the DRC border. In addition, the following steps could contribute to improved conditions for small-scale traders at the border: (1) establishing clear trade regulations and "rules of the game" at all borders, especially in the DRC; (2) strengthening training through an additional component aiming at increasing awareness of small-scale cross-border traders about the potential drawbacks of unofficial border crossing; (3) setting up claim/complaint mechanisms at no cost for small-scale cross-border traders that would ensure anonymity of the claimants and increase the returns to using voice; and (4) strengthening training through an additional component aimed at increasing traders' use of voice mechanisms.

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Table 1: Descriptive statistics of baseline characteristics

	Obs	Min	Mean	Std. Dev.	Max
Panel A: Covariates					
female[†]	628	0	0.898	0.303	1
age (years)	623	18	34.68	10.29	90
not educated[†]	628	0	0.174	0.379	1
married[†]	628	0	0.812	0.391	1
experience as trader (years)	628	0	10.20	8.873	50
trader as main occupation[†]	628	0	0.984	0.125	1
registered trader[†]	628	0	0.580	0.494	1
cross-border trade as main cash source[†]	628	0	0.947	0.223	1
trader type: importer only[†]	628	0	0.874	0.332	1
trader type: exporter only[†]	628	0	0.116	0.321	1
trader type: both importer and exporter[†]	628	0	0.00955	0.0974	1
number of bikes owned	628	0	0.0573	0.259	3
number of motorbikes owned	628	0	0.0525	0.269	4
number of radios owned	628	0	0.720	0.622	5
number of TVs owned	628	0	0.371	0.531	3
electricity as primary lighting[†]	628	0	0.234	0.424	1
owns home[†]	628	0	0.549	0.498	1
refugee[†]	628	0	0.0159	0.125	1
North Kivu province[†]	628	0	0.396	0.490	1
South Kivu province[†]	628	0	0.350	0.477	1
DRC country[†]	628	0	0.747	0.435	1
Rwanda country[†]	628	0	0.253	0.435	1
Panel B: Intermediate outcomes (knowledge and border crossing)					
knows all authorized institutions[†a]	628	0	0.522	0.500	1
knows all unauthorized institutions[†a]	628	0	0.678	0.467	1
knows all authorized and unauthorized institutions[†a]	628	0	0.333	0.472	1
usual time at which trader crossed border (hours)	628	1	7.612	1.845	18
usual time at which trader crossed border (minutes)	628	60	456.7	110.7	1080
crosses before 7:30 am[†]	628	0	0.500	0.500	1
intensity of border crossings in a week (number of times)	628	1	3.420	1.840	7
Panel C: Final outcomes (corruption and GBV)					
log of real value of tariffs and unofficial taxes paid (USD)	628	0	1.010	2.291	7.245
pays no amount at any border[†]	628	0	0.812	0.391	1
pays no amount at the Rwanda border[†]	628	0	0.960	0.196	1
pays no amount at the DRC border[†]	628	0	0.814	0.390	1
has been insulted/spit upon/groped or sexually touched[†b]	628	0	0.221	0.415	1
has been insulted/spit upon[†b]	628	0	0.215	0.411	1
has been groped[†b]	628	0	0.0271	0.162	1
has been sexually touched[†b]	628	0	0.0303	0.171	1

[†] Indicates dummy variables.

[a] Appendix Table A.1 gives the descriptive statistics for the correct knowledge of each authorized institution and each unauthorized institution.

[b] Reference period is the last 30 days.

Table 2: Balance tests on baseline covariates

Variable	(1) Control N	(1) Control Mean/SE	(2) Treated N	(2) Treated Mean/SE	T-test Difference (1)-(2)
female	314	0.901	314	0.895	0.006
		(0.017)		(0.017)	
age (years)	311	34.920	312	34.449	0.471
		(0.603)		(0.563)	
not educated	314	0.194	314	0.153	0.041
		(0.022)		(0.020)	
married	314	0.803	314	0.822	-0.019
		(0.023)		(0.022)	
experience as trader (years)	314	10.309	314	10.086	0.223
		(0.533)		(0.467)	
trader as main occupation	314	0.990	314	0.978	0.013
		(0.005)		(0.008)	
registered trader	314	0.576	314	0.583	-0.006
		(0.028)		(0.028)	
cross-border trade as main cash source	314	0.955	314	0.939	0.016
		(0.012)		(0.013)	
trader type: importer only	314	0.898	314	0.850	0.048*
		(0.017)		(0.020)	
trader type: exporter only	314	0.092	314	0.140	-0.048*
		(0.016)		(0.020)	
trader type: both importer and exporter	314	0.010	314	0.010	0.000
		(0.005)		(0.005)	
number of bikes owned	314	0.057	314	0.057	0.000
		(0.015)		(0.014)	
number of motorbikes owned	314	0.054	314	0.051	0.003
		(0.017)		(0.013)	
number of radios owned	314	0.729	314	0.710	0.019
		(0.036)		(0.035)	
number of TVs owned	314	0.357	314	0.385	-0.029
		(0.030)		(0.030)	
electricity as primary lighting	314	0.229	314	0.239	-0.010
		(0.024)		(0.024)	
own home	314	0.541	314	0.557	-0.016
		(0.028)		(0.028)	
refugee	314	0.010	314	0.022	-0.013
		(0.005)		(0.008)	
North Kivu province	314	0.411	314	0.382	0.029
		(0.028)		(0.027)	
South Kivu province	314	0.350	314	0.350	0.000
		(0.027)		(0.027)	
DRC country	314	0.761	314	0.732	0.029
		(0.024)		(0.025)	
Rwanda country	314	0.239	314	0.268	-0.029
		(0.024)		(0.025)	

Notes: The value displayed for t-tests are the differences in the means across the groups. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

Table 3: Balance tests on baseline outcomes

Variable	(1) Control N	(1) Control Mean/SE	(2) Treated N	(2) Treated Mean/SE	T-test Difference (1)-(2)
knows all authorized institutions	314	0.516	314	0.529	-0.013
		(0.028)		(0.028)	
knows all unauthorized institutions	314	0.659	314	0.697	-0.038
		(0.027)		(0.026)	
knows all authorized and unauthorized institutions	314	0.309	314	0.357	-0.048
		(0.026)		(0.027)	
usual time at which trader crossed border (hours)	314	7.565	314	7.660	-0.095
		(0.100)		(0.108)	
usual time at which trader crossed border (minutes)	314	453.895	314	459.580	-5.685
		(6.007)		(6.481)	
crosses before 7:30 a.m.	314	0.519	314	0.481	0.038
		(0.028)		(0.028)	
intensity of border crossings in a week (number of times)	314	3.373	314	3.468	-0.096
		(0.103)		(0.105)	
log of real value of tariffs and unofficial taxes paid (USD)	314	1.072	314	0.949	0.123
		(0.136)		(0.123)	
pays no amount at any border	314	0.815	314	0.809	0.006
		(0.022)		(0.022)	
pays no amount at the Rwanda border	314	0.971	314	0.949	0.022
		(0.009)		(0.012)	
pays no amount at the DRC border	314	0.818	314	0.809	0.010
		(0.022)		(0.022)	
has been insulted/spit upon/groped or sexually touched	314	0.185	314	0.258	-0.073**
		(0.022)		(0.025)	
has been insulted/spit upon	314	0.182	314	0.248	-0.067**
		(0.022)		(0.024)	
has been groped	314	0.022	314	0.032	-0.010
		(0.008)		(0.010)	
has been sexually touched	314	0.035	314	0.025	0.010
		(0.010)		(0.009)	

Notes: Reference period is the last 30 days for the GBV outcomes. The value displayed for t-tests are the differences in the means across the groups. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

Table 4: Attrition correlates

	Probit (1)	Probit (2)	LPM (1)	LPM (2)
randomly assigned to treated group†	-0.003		-0.002	
	(0.12)		(0.03)	
female†	-0.127		-0.025	
	(0.20)		(0.05)	
married†	0.288*	0.284*	0.053	
	(0.17)	(0.17)	(0.04)	
experience as trader (years)	-0.045***	-0.043***	-0.007***	-0.007***
	(0.01)	(0.01)	(0.00)	(0.00)
number of bikes owned	-0.620**	-0.624**	-0.106***	-0.103**
	(0.31)	(0.32)	(0.04)	(0.04)
number of radios owned	0.242**	0.259**	0.053**	0.056**
	(0.10)	(0.10)	(0.02)	(0.02)
electricity as primary lighting†	0.268*	0.273*	0.068*	0.070*
	(0.14)	(0.14)	(0.04)	(0.04)
own home†	0.068		0.010	
	(0.13)		(0.03)	
DRC country†	0.347**	0.336**	0.087**	0.085**
	(0.14)	(0.14)	(0.04)	(0.04)
Constant	-1.437***	-1.520***	0.055	0.076
	(0.33)	(0.27)	(0.08)	(0.06)
Number of traders	628	628	628	628
R-squared			0.0690	0.0653
Pseudo R-squared	0.0912	0.0900		
F			6.13	10.49
Wald chi-square	37.70	37.78		
Prob.	0.000	0.000	0.000	0.000

Dependent variable, attrited (1=yes, 0=no), is estimated using linear probability model (LPM) and probit model.

All independent variables are baseline variables. Models (2) restrict models (1) to the significant attrition correlates.

Ramsey RESET test using powers of the fitted values of attrited, Ho: LPM (2) has no omitted variables, F(3, 619) = 1.86, Prob. = 0.1352.

Robust standard errors are in parentheses. Significance levels: *** 1%, ** 5%, * 10%.

† Indicates dummy variables.

Table 5: Impact estimates on intermediate outcomes

	(1) knows legal[a]	(2) knows illegal[b]	(3) knows both[c]	(4) time (hours)[d]	(5) time (min.)[e]	(6) before 7:30AM[f]	(7) nb. of crossings[g]
Panel A: DD estimations (Eq.1)							
ITT (δ_1)	-0.070	-0.005	-0.082	-0.488**	-29.282**	0.119**	-0.102
	(0.057)	(0.057)	(0.051)	(0.218)	(13.081)	(0.053)	(0.186)
Observations	1049	1049	1049	1027	1027	1027	1027
Panel B: DD estimations (Eq.2)							
LATE (θ_1)	-0.398	-0.029	-0.467	-2.765**	-165.903**	0.673**	-0.580
	(0.326)	(0.321)	(0.288)	(1.235)	(74.116)	(0.301)	(1.056)
Observations	1049	1049	1049	1027	1027	1027	1027
Panel C: ANCOVA estimations (Eq.4)							
ITT (δ_2)	-0.021	0.001	-0.043	-0.379**	-22.731**	0.084**	-0.096
	(0.034)	(0.033)	(0.026)	(0.164)	(9.811)	(0.042)	(0.153)
Observations	525	525	525	502	502	502	502
Panel D: ANCOVA estimations (Eq.5)							
LATE (θ_2)	-0.117	0.004	-0.246	-2.146**	-128.788**	0.475**	-0.547
	(0.193)	(0.188)	(0.150)	(0.926)	(55.584)	(0.236)	(0.868)
Observations	525	525	525	502	502	502	502
Control Means	0.628	0.536	0.255	7.448	446.9	0.536	3.451

[a] Knows all authorized institutions at the border (1=yes, 0=no).

[b] Knows all unauthorized institutions at the border (1=yes, 0=no).

[c] Knows all authorized and unauthorized institutions at the border (1=yes, 0=no).

[d] Usual time at which trader crossed border (hours).

[e] Usual time at which trader crossed border (minutes).

[f] Crosses before 7:30AM (1=yes, 0=no).

[g] Intensity of border crossings in a week (number of times).

Standard errors clustered at the individual trader-level are reported in parentheses. Significance levels: *** 1%, ** 5%, * 10%.

DD: Difference-in-Difference. Full estimation results are in Appendices A.4 (First-stage for LATE estimations), A.5 & A.6 (ITTs & LATEs on knowledge outcomes), and A.7 & A.8 (ITTs & LATEs on border crossing outcomes). ANCOVA estimations include enumerator fixed effects.

Table 6: Impact estimates on final outcomes

	log tax[a]	no payment[b]	no payment (RW)[c]	no payment (DRC)[d]	GBV[e]
Panel A: DD estimations (Eq.1)					
ITT (δ_1)	-0.046	0.045	0.051**	0.042	-0.125***
	(0.238)	(0.043)	(0.024)	(0.042)	(0.043)
Observations	1049	1049	1049	1049	1048
Panel B: DD estimations (Eq.2)					
LATE (θ_1)	-0.262	0.256	0.287**	0.237	-0.710***
	(1.348)	(0.246)	(0.134)	(0.239)	(0.244)
Observations	1049	1049	1049	1049	1048
Panel C: ANCOVA estimations (Eq.4)					
ITT (δ_2)	-0.136	0.049*	0.044**	0.036	-0.054*
	(0.121)	(0.026)	(0.019)	(0.023)	(0.031)
Observations	525	525	525	525	523
Panel D: ANCOVA estimations (Eq.5)					
LATE (θ_2)	-0.770	0.275*	0.251**	0.206	-0.305*
	(0.687)	(0.145)	(0.107)	(0.130)	(0.174)
Observations	525	525	525	525	523
Control Means	0.787	0.847	0.963	0.859	0.196

[a] Log of real value of tariffs and unofficial taxes paid (USD).

[b] Pays no amount at any border (1=yes, 0=no).

[c] Pays no amount at the Rwanda border (1=yes, 0=no).

[d] Pays no amount at the DRC border (1=yes, 0=no).

[e] Has been insulted/spit upon/groped or sexually touched (1=yes, 0=no).

Standard errors clustered at the individual trader-level are reported in parentheses. Significance levels: *** 1%, ** 5%, * 10%.

DD: Difference-in-Difference. Full estimation results are in Appendices A.4 (First-stage for LATE estimations), A.9 & A.10 (ITTs & LATEs on corruption outcomes), and A.11 & A.12 (ITTs & LATEs on GBV outcomes). ANCOVA estimations include enumerator fixed effects.

Table 7: Impact estimates on voice

	(1) receipt[a]	(2) no_pay or receipt[b]	(3) association[c]
Panel A: DD estimations (Eq.1)			
ITT (δ_1)	-0.037	0.008	0.019
	(0.033)	(0.032)	(0.050)
Observations	1049	1049	1026
Panel B: DD estimations (Eq.2)			
LATE (θ_1)	-0.211	0.045	0.105
	(0.187)	(0.180)	(0.285)
Observations	1049	1049	1026
Panel C: ANCOVA estimations (Eq.4)			
ITT (δ_2)	-0.024**	0.024	-0.026
	(0.012)	(0.023)	(0.042)
Observations	525	525	501
Panel D: ANCOVA estimations (Eq.5)			
LATE (θ_2)	-0.137**	0.135	-0.145
	(0.069)	(0.133)	(0.237)
Observations	525	525	501
Control Means	0.0827	0.930	0.252

[a] Pays tariffs and unofficial taxes but requests receipt (1=yes, 0=no).

[b] Pays no tariffs and unofficial taxes or pays but requests receipt (1=yes, 0=no).

[c] Member of a traders association (1=yes, 0=no).

Standard errors clustered at the individual trader-level are reported in parentheses. Significance levels: *** 1%, ** 5%, * 10%.

DD: Difference-in-Difference. Full estimation results are in Appendices A.4 (First-stage for LATE estimations), A.13 (ITTs on voice), and A.14 (LATEs on voice). ANCOVA estimations include enumerator fixed effects.

Table 8: Impact estimates on the demand of bribes by border officials

	(1) been asked to pay fee[a]	(2) others been asked to pay fee[b]	(3) log bribe asked[c]
Panel A: OLS estimations (Eq.6)			
ITT (δ_3)	-0.040	0.037	-0.159
	(0.029)	(0.034)	(0.127)
Observations	514	516	507
Panel B: 2SLS estimations (Eq.7)			
LATE (θ_3)	-0.228	0.209	-0.903
	(0.165)	(0.195)	(0.719)
Observations	514	516	507
Control Means	0.158	0.233	0.443

[a] Has been asked to pay fee in the last 30 days (1=yes, 0=no).

[b] Has seen or heard about other traders been asked to pay fee in the last 30 days (1=yes, 0=no).

[c] Log bribe asked to be paid (USD).

Standard errors clustered at the individual trader-level are reported in parentheses. Significance levels: *** 1%, ** 5%, * 10%.

Full estimation results are in Appendices A.4 (First-stage for LATE estimations), A.15 (ITTs on the demand of bribes), and A.16 (LATEs on the demand of bribes). All estimations include enumerator fixed effects.

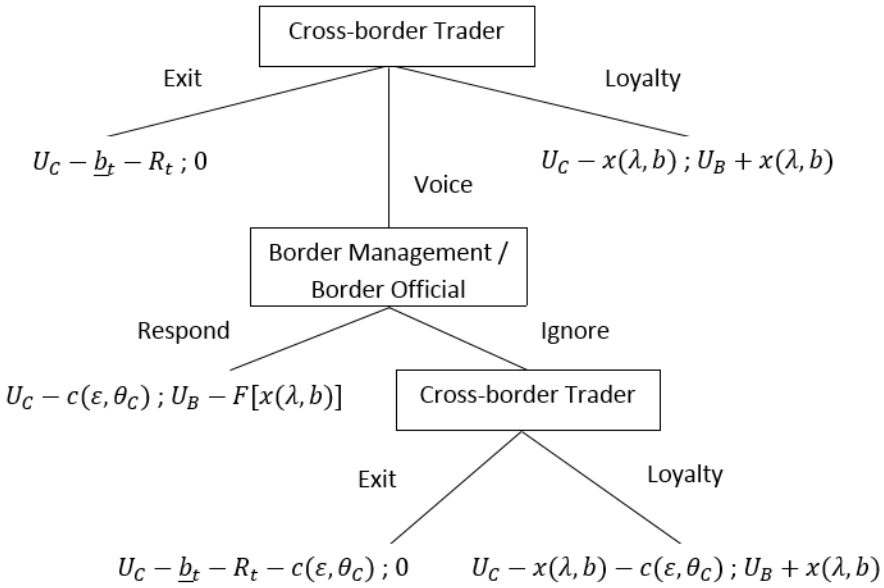

Figure 1: EVL-based cross-border trader and border official game

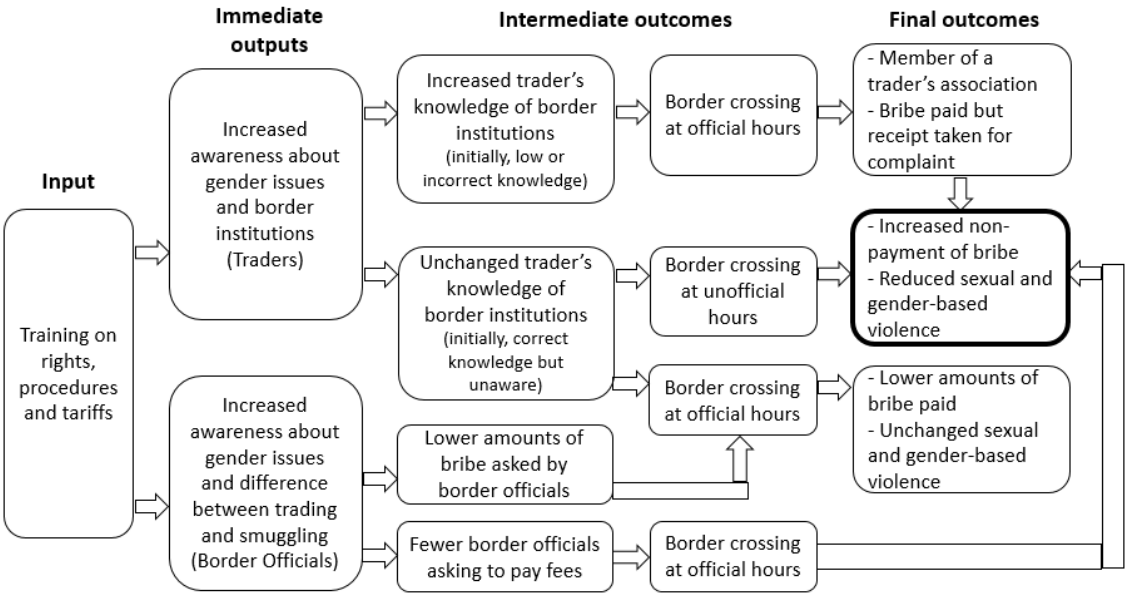

Figure 2: Theory of change

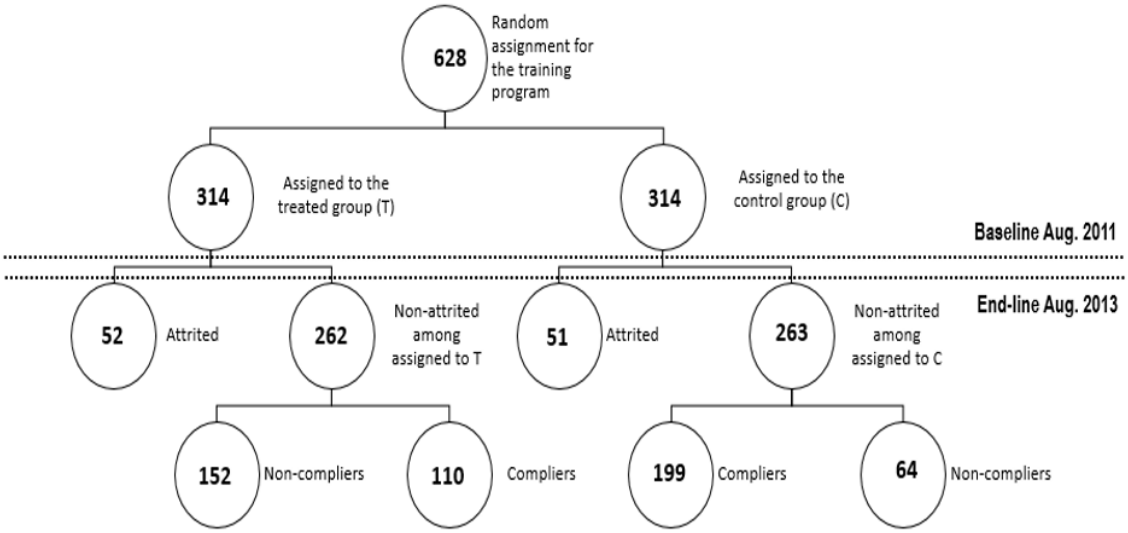

Figure 3: Attrition and two-sided non-compliance in the sample

Appendices

Appendix 1: Basic rights and obligations for traders and officials at the border

1. All individuals shall be able to cross the border without verbal or physical abuse or harassment, including but not limited to gender-based violence.

2. Traders shall be processed at the border in an efficient and timely manner without discrimination. A receipt must be provided to the trader for any payment made and the payment properly recorded.

3. Only officials of the approved agencies shall be present at the border, and all border officials shall wear uniforms or identification badges that indicate their respective agency.

4. Physical checks of traders must be recorded with the reason and outcome provided. Female traders have the right to receive a physical check by female officials in a private but regulated and accountable environment.

5. All duties, fees, and taxes and the basis for their calculation shall be publicly available at the border. Any change to duties, fees, and taxes must be publicly announced at the border, with reasonable time allowed for traders to prepare, before their application. No unpublished fees or charges shall be demanded at the border.

6. Documentary requirements shall be clearly stated and publicly available at the border. Any change in required documentation must be publicly announced at the border with reasonable time for traders to prepare before implementation. Simplified procedures should be applied to small traders.

7. Traders should be aware of their rights and obligations when crossing the border. Traders must present required documentation and pay appropriate duties at the border and obtain a receipt for any payments made to an official. Traders shall not attempt to bribe any official to avoid payment of duties or to obtain preferential treatment in any way, including avoiding queues.

Source: Charter for Cross-Border Traders (Brenton et al., 2013)

Appendix 2: Proof of Propositions 1, 2, and 3

Proof of Proposition 1:

In the sub-game starting at the lower decision node in Figure 1, the trader remains loyal rather than exits border crossing at official hours if $U_C - x(\lambda, b) - c(\epsilon, \theta_C) \geq U_C - \underline{b_t} - R_t - c(\epsilon, \theta_C)$. This yields the first required condition $x(\lambda, b) \leq \underline{b_t} + R_t$ for loyalty. Conditional on the trader being loyal down in the game tree, Border management will always ignore the trader's use of voice because "Ignore" dominates "Respond" ($U_B + x(\lambda, b) > U_B - F[x(\lambda, b)]$). Thus, at the upper decision node, the trader must choose whether to exit with payoff $U_C - \underline{b_t} - R_t$, demonstrate loyalty with payoff $U_C - x(\lambda, b)$, or use voice with payoff $U_C - x(\lambda, b) - c(\epsilon, \theta_C)$. Since using voice is not costless and $x(\lambda, b) \leq \underline{b_t} + R_t$, she rules out both the exit and voice alternatives at this node. It results the equilibrium (Loyalty, Loyalty; Ignore) if $x(\lambda, b) \leq \underline{b_t} + R_t$. □

Proof of Proposition 2:

In the sub-game starting at the lower decision node in Figure 1, the trader chooses to exit border crossing at official hours rather than remaining loyal if $U_C - \underline{b_t} - R_t - c(\epsilon, \theta_C) > U_C - x(\lambda, b) - c(\epsilon, \theta_C)$, i.e. if $\underline{b_t} + R_t < x(\lambda, b)$. Since the trader has a credible exit alternative and $U_B - F[x(\lambda, b)] > 0$, Border management responds to the threat by being responsive to voice at any loss for border officials. At the upper decision node, the trader rules out the loyalty alternative since less rewarding as compared to exit ($\underline{b_t} + R_t < x(\lambda, b)$). Thus, it remains to compare exit with voice at that decision node, which turns into the choice of the exit alternative if $\underline{b_t} + R_t < c(\epsilon, \theta_C)$. This sums up to the condition $\underline{b_t} + R_t < min\{x(\lambda, b); c(\epsilon, \theta_C)\}$ for an equilibrium (Exit, Exit; Response) to occur. □

Proof of Proposition 3:

At the lower decision node in Figure 1, under the existence of a credible exit threat ($\underline{b_t} + R_t < x(\lambda, b)$), the trader chooses to exit border crossing at official hours rather than remaining loyal. At the middle decision node, "Respond" becomes sequentially rational for the Border management since $U_B - F[x(\lambda, b)] > 0$. At the upper decision node, the trader compares exit with voice since loyalty is ruled out in favor of exit ($\underline{b_t} + R_t < x(\lambda, b)$). If it is the case that $c(\epsilon, \theta_C) < \underline{b_t} + R_t$, then the choice of voice is made. Therefore, an equilibrium (Voice, Exit; Response) prevails provided that $c(\epsilon, \theta_C) < min\{\underline{b_t} + R_t; x(\lambda, b)\}$. □

Table A.1: Descriptive statistics of baseline knowledge variables

	Obs	Min	Mean	Std. Dev.	Max
Panel A: Knowledge of authorized institutions at the border					
Immigration office authorized[†]	628	0	0.873	0.334	1
Customs administration office authorized[†]	628	0	0.790	0.408	1
Quality checking office authorized[†]	628	0	0.758	0.429	1
Border hygiene office authorized[†]	628	0	0.753	0.432	1
Border Police authorized[†]	628	0	0.704	0.457	1
Knows all authorized institutions[†]	628	0	0.522	0.500	1
Score knowledge of authorized institutions[a]	628	0	0.775	0.290	1
Panel B: Knowledge of unauthorized institutions at the border					
Military unauthorized[†]	628	0	0.747	0.435	1
Police unauthorized[†]	628	0	0.868	0.339	1
National Intelligence Agency unauthorized[†]	628	0	0.951	0.217	1
Intelligence office unauthorized[†]	628	0	0.990	0.0974	1
Military Direction of Anti-Patriotic Activities unauthorized[†]	628	0	0.995	0.0690	1
Knows all unauthorized institutions[†]	628	0	0.678	0.467	1
Score knowledge of unauthorized institutions[b]	628	0	0.910	0.151	1
Panel C: Knowledge of authorized and unauthorized institutions at the border					
Knows all authorized and unauthorized institutions[†]	628	0	0.333	0.472	1
Score knowledge of authorized and unauthorized institutions[c]	628	0.4	0.843	0.153	1

[†] Indicates dummy variables: 1=yes/correct, 0=no/incorrect.

[a] Arithmetic mean knowledge of the five authorized institutions at the border.

[b] Arithmetic mean knowledge of the five unauthorized institutions at the border.

[c] Arithmetic mean knowledge of the ten institutions at the border.

Table A.2: Attrition t-tests on baseline covariates

Variable	(1) Non-attrited N	(1) Non-attrited Mean/SE	(2) Attrited N	(2) Attrited Mean/SE	T-test Difference (1)-(2)
female	525	0.901	103	0.883	0.017
		(0.013)		(0.032)	
age (years)	520	35.129	103	32.437	2.692**
		(0.454)		(0.950)	
not educated	525	0.177	103	0.155	0.022
		(0.017)		(0.036)	
married	525	0.806	103	0.845	-0.039
		(0.017)		(0.036)	
experience as trader (years)	525	10.945	103	6.388	4.556***
		(0.400)		(0.583)	
trader as main occupation	525	0.985	103	0.981	0.004
		(0.005)		(0.014)	
registered trader	525	0.596	103	0.495	0.101*
		(0.021)		(0.050)	
cross-border trade as main cash source	525	0.949	103	0.942	0.007
		(0.010)		(0.023)	
trader type: importer only	525	0.888	103	0.806	0.082**
		(0.014)		(0.039)	
trader type: exporter only	525	0.103	103	0.184	-0.082**
		(0.013)		(0.038)	
trader type: both importer and exporter	525	0.010	103	0.010	-0.000
		(0.004)		(0.010)	
number of bikes owned	525	0.063	103	0.029	0.034
		(0.012)		(0.017)	
number of motorbikes owned	525	0.055	103	0.039	0.016
		(0.012)		(0.019)	
number of radios owned	525	0.691	103	0.864	-0.173***
		(0.027)		(0.059)	
number of TVs owned	525	0.377	103	0.340	0.037
		(0.024)		(0.047)	
electricity as primary lighting	525	0.213	103	0.340	-0.126***
		(0.018)		(0.047)	
own home	525	0.549	103	0.553	-0.005
		(0.022)		(0.049)	
refugee	525	0.017	103	0.010	0.007
		(0.006)		(0.010)	
North Kivu province	525	0.404	103	0.359	0.045
		(0.021)		(0.048)	
South Kivu province	525	0.368	103	0.262	0.105**
		(0.021)		(0.044)	
DRC country	525	0.771	103	0.621	0.150***
		(0.018)		(0.048)	
Rwanda country	525	0.229	103	0.379	-0.150***
		(0.018)		(0.048)	

Notes: The value displayed for t-tests are the differences in the means across the groups. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

Table A.3: Attrition t-tests on baseline outcomes

Variable	(1) Non-attrited N	(1) Non-attrited Mean/SE	(2) Attrited N	(2) Attrited Mean/SE	T-test Difference (1)-(2)
knows all authorized institutions	525	0.510	103	0.583	-0.072
		(0.022)		(0.049)	
knows all unauthorized institutions	525	0.693	103	0.602	0.091*
		(0.020)		(0.048)	
knows all authorized and unauthorized institutions	525	0.335	103	0.320	0.015
		(0.021)		(0.046)	
usual time at which trader crossed border (hours)	525	7.542	103	7.972	-0.430**
		(0.076)		(0.228)	
usual time at which trader crossed border (minutes)	525	452.509	103	478.291	-25.783**
		(4.532)		(13.697)	
crosses before 7:30AM	525	0.512	103	0.437	0.075
		(0.022)		(0.049)	
intensity of border crossings in a week (number of times)	525	3.467	103	3.184	0.282
		(0.081)		(0.178)	
log of real value of tariffs and unofficial taxes paid (USD)	525	1.062	103	0.744	0.318
		(0.102)		(0.194)	
pays no amount at any border	525	0.808	103	0.835	-0.027
		(0.017)		(0.037)	
pays no amount at the Rwanda border	525	0.962	103	0.951	0.010
		(0.008)		(0.021)	
pays no amount at the DRC border	525	0.810	103	0.835	-0.025
		(0.017)		(0.037)	
has been insulted/spit upon/groped or sexually touched	525	0.215	103	0.252	-0.037
		(0.018)		(0.043)	
has been insulted/spit upon	525	0.211	103	0.233	-0.022
		(0.018)		(0.042)	
has been groped	525	0.019	103	0.068	-0.049***
		(0.006)		(0.025)	
has been sexually touched	525	0.021	103	0.078	-0.057***
		(0.006)		(0.027)	

Notes: Reference period is the last 30 days for the GBV outcomes. The value displayed for t-tests are the differences in the means across the groups. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

Table A.4: First stage regressions for LATE estimations

	(1) First-stage for DD	(2) First-stage for ANCOVA
randomly assigned to treated group†	0.18***	0.18***
	(0.04)	(0.04)
Constant	0.24***	0.24***
	(0.03)	(0.03)
Number of traders	1,050	525
R-squared	0.04	0.04
F	19.06	19.04
Prob.	0.000	0.000

First stage regressions for the LATE estimates on the outcome variables, using difference-in-difference (DD) and ANCOVA estimation methods (Eq.3).

Dependent variable: treated (1=yes, 0=no).

Standard errors clustered at the individual trader-level are reported in parentheses. Significance levels: *** 1%, ** 5%, * 10%.

† Indicates dummy variables.

Table A.5: ITTs on knowledge outcomes

	(1) knows legal (DD)[a]	(2) knows legal (ANC)[a]	(3) knows illegal (DD)[b]	(4) knows illegal (ANC)[b]	(5) knows both (DD)[c]	(6) knows both (ANC)[c]
treat_assign	0.036	-0.021	0.027	0.001	0.055	-0.043
	(0.044)	(0.034)	(0.040)	(0.033)	(0.041)	(0.026)
post	0.251***		-0.349***		-0.146***	
	(0.040)		(0.041)		(0.036)	
treat_assign#post	-0.070		-0.005		-0.082	
	(0.057)		(0.057)		(0.051)	
female	-0.034	0.052	-0.003	-0.004	-0.042	0.003
	(0.052)	(0.061)	(0.050)	(0.052)	(0.046)	(0.052)
noneduc	-0.020	0.003	0.064	-0.009	0.062*	0.007
	(0.041)	(0.045)	(0.040)	(0.050)	(0.037)	(0.038)
electricity	0.031	0.003	-0.016	-0.058	0.006	-0.015
	(0.038)	(0.042)	(0.038)	(0.039)	(0.034)	(0.034)
own_home	0.014	0.042	0.046	-0.027	0.029	0.023
	(0.031)	(0.034)	(0.030)	(0.034)	(0.027)	(0.028)
northkivu	0.091**	0.121**	-0.025	-0.061	0.078**	0.064*
	(0.041)	(0.047)	(0.042)	(0.044)	(0.035)	(0.034)
southkivu	0.000	0.101**	0.042	-0.010	0.031	0.075**
	(0.041)	(0.048)	(0.041)	(0.046)	(0.034)	(0.034)
know_legal_ante		0.022				
		(0.034)				
know_illegal_ante				0.007		
				(0.035)		
know_both_ante						0.010
						(0.029)
Constant	0.476***	0.564***	0.644***	0.400***	0.275***	0.098
	(0.068)	(0.078)	(0.067)	(0.070)	(0.060)	(0.063)
Number of traders	1,049	525	1,049	525	1,049	525
R-squared	0.0589	0.3468	0.1313	0.4302	0.0610	0.3226
F	8.01	1.20	18.99	0.83	7.63	1.41
Prob.	0.000	0.298	0.000	0.573	0.000	0.189
Control Means	0.628	0.628	0.536	0.536	0.255	0.255

[a] Knows all authorized institutions at the border (1=yes, 0=no).

[b] Knows all unauthorized institutions at the border (1=yes, 0=no).

[c] Knows all authorized and unauthorized institutions at the border (1=yes, 0=no).

Standard errors clustered at the individual trader-level are reported in parentheses. Significance levels: *** 1%, ** 5%, * 10%.
DD: Difference-in-Difference estimation. ANC: ANCOVA estimation. ANCOVA estimations include enumerator fixed effects.

Table A.6: LATEs on knowledge outcomes

	(1) knows legal (DD)[a]	(2) knows legal (ANC)[a]	(3) knows illegal (DD)[b]	(4) knows illegal (ANC)[b]	(5) knows both (DD)[c]	(6) knows both (ANC)[c]
treated_instrumented	0.206	-0.117	0.154	0.004	0.311	-0.246
	(0.248)	(0.193)	(0.228)	(0.188)	(0.234)	(0.150)
post	0.348***		-0.342***		-0.032	
	(0.111)		(0.111)		(0.099)	
post#c.treated_instrumented	-0.398		-0.029		-0.467	
	(0.326)		(0.321)		(0.288)	
female	-0.034	0.052	-0.003	-0.004	-0.042	0.003
	(0.052)	(0.061)	(0.050)	(0.052)	(0.046)	(0.052)
noneduc	-0.020	0.003	0.064	-0.009	0.062*	0.007
	(0.041)	(0.045)	(0.040)	(0.050)	(0.037)	(0.038)
electricity	0.031	0.003	-0.016	-0.058	0.006	-0.015
	(0.038)	(0.042)	(0.038)	(0.039)	(0.034)	(0.034)
own_home	0.014	0.042	0.046	-0.027	0.029	0.023
	(0.031)	(0.034)	(0.030)	(0.034)	(0.027)	(0.028)
northkivu	0.091**	0.121**	-0.025	-0.061	0.078**	0.064*
	(0.041)	(0.047)	(0.042)	(0.044)	(0.035)	(0.034)
southkivu	0.000	0.101**	0.042	-0.010	0.031	0.075**
	(0.041)	(0.048)	(0.041)	(0.046)	(0.034)	(0.034)
know_legal_ante		0.022				
		(0.034)				
know_illegal_ante				0.007		
				(0.035)		
know_both_ante						0.010
						(0.029)
Constant	0.425***	0.592***	0.606***	0.399***	0.199**	0.158*
	(0.105)	(0.099)	(0.100)	(0.093)	(0.097)	(0.081)
Number of traders	1,049	525	1,049	525	1,049	525
R-squared	0.0589	0.3468	0.1313	0.4302	0.0610	0.3226
F	8.01	1.20	18.99	0.83	7.63	1.41
Prob.	0.000	0.298	0.000	0.573	0.000	0.189
Control Means	0.628	0.628	0.536	0.536	0.255	0.255

[a] Knows all authorized institutions at the border (1=yes, 0=no).

[b] Knows all unauthorized institutions at the border (1=yes, 0=no).

[c] Knows all authorized and unauthorized institutions at the border (1=yes, 0=no).

Standard errors clustered at the individual trader-level are reported in parentheses. Significance levels: *** 1%, ** 5%, * 10%.
DD: Difference-in-Difference estimation. ANC: ANCOVA estimation. ANCOVA estimations include enumerator fixed effects.

Table A.7: ITTs on border crossing outcomes

	(1) hours_cross (DD)[a]	(2) hours_cross (ANC)[a]	(3) mins_cross (DD)[b]	(4) mins_cross (ANC)[b]	(5) before 7:30 am (DD)[c]	(6) before 7:30 am (ANC)[c]	(7) int_cross (DD)[d]	(8) int_cross (ANC)[d]
treat_assign	0.053	-0.379**	3.154	-22.731**	-0.027	0.084**	0.026	-0.096
	(0.144)	(0.164)	(8.640)	(9.811)	(0.040)	(0.042)	(0.156)	(0.153)
post	-0.183		-10.994		0.044		-0.104	
	(0.148)		(8.897)		(0.039)		(0.134)	
treat_assign#post	-0.488**		-29.282**		0.119**		-0.102	
	(0.218)		(13.081)		(0.053)		(0.186)	
female	-0.358**	-0.425*	-21.475**	-25.470*	0.034	0.095	0.157	0.359
	(0.176)	(0.243)	(10.573)	(14.591)	(0.050)	(0.073)	(0.213)	(0.247)
noneduc	-0.166	0.339	-9.946	20.354	-0.016	-0.137**	0.103	-0.273
	(0.142)	(0.228)	(8.501)	(13.651)	(0.041)	(0.057)	(0.160)	(0.204)
electricity	-0.242	-0.083	-14.493	-5.003	-0.007	0.065	-0.182	-0.177
	(0.149)	(0.189)	(8.911)	(11.345)	(0.038)	(0.048)	(0.140)	(0.200)
own_home	0.016	-0.095	0.967	-5.671	0.003	0.022	-0.378***	-0.210
	(0.110)	(0.170)	(6.599)	(10.217)	(0.030)	(0.043)	(0.122)	(0.153)
northkivu	-1.128***	-0.372	-67.704***	-22.330	0.436***	0.207***	-1.108***	-0.534**
	(0.171)	(0.249)	(10.290)	(14.927)	(0.039)	(0.064)	(0.168)	(0.225)
southkivu	-0.882***	-0.295	-52.945***	-17.691	0.385***	0.198***	-0.786***	-0.755***
	(0.176)	(0.246)	(10.584)	(14.774)	(0.040)	(0.062)	(0.169)	(0.221)
hours_cross_ante		0.087						
		(0.053)						
mins_cross_ante				0.087				
				(0.053)				
before730_ante						0.157***		
						(0.049)		
int_cross_ante								0.274***
								(0.047)
Constant	8.690***	7.278***	521.409***	436.691***	0.180***	0.266***	4.277***	2.767***
	(0.248)	(0.535)	(14.906)	(32.106)	(0.063)	(0.094)	(0.271)	(0.391)
Number of traders	1,027	502	1,027	502	1,027	502	1,027	502
R-squared	0.0792	0.2122	0.0792	0.2122	0.1350	0.1629	0.0714	0.1884
F	10.48	2.33	10.48	2.33	21.22	6.95	6.86	10.30
Prob.	0.000	0.018	0.000	0.018	0.000	0.000	0.000	0.000
Control Means	7.448	7.448	446.9	446.9	0.536	0.536	3.451	3.451

[a] Usual time at which trader crossed border (hours).

[b] Usual time at which trader crossed border (minutes).

[c] Crosses before 7:30 am (1=yes, 0=no).

[d] Intensity of border crossings in a week (number of times).

Standard errors clustered at the individual trader-level are reported in parentheses. Significance levels: *** 1%, ** 5%, * 10%.
DD: Difference-in-Difference estimation. ANC: ANCOVA estimation. ANCOVA estimations include enumerator fixed effects.

Table A.8: LATEs on border crossing outcomes

	(1) hours_cross (DD)[a]	(2) hours_cross (ANC)[a]	(3) mins_cross (DD)[b]	(4) mins_cross (ANC)[b]	(5) before 7:30 am (DD)[c]	(6) before 7:30 am (ANC)[c]	(7) int_cross (DD)[d]	(8) int_cross (A
treated_instrumented	0.298	-2.146**	17.867	-128.788**	-0.153	0.475**	0.148	-0.547
	(0.816)	(0.926)	(48.952)	(55.584)	(0.229)	(0.236)	(0.884)	(0.868)
post	0.490		29.378		-0.119		0.037	
	(0.416)		(24.938)		(0.105)		(0.365)	
post#c.treated_instrumented	-2.765**		-165.903**		0.673**		-0.580	
	(1.235)		(74.116)		(0.301)		(1.056)	
female	-0.358**	-0.425*	-21.475**	-25.470*	0.034	0.095	0.157	0.359
	(0.176)	(0.243)	(10.573)	(14.591)	(0.050)	(0.073)	(0.213)	(0.247)
noneduc	-0.166	0.339	-9.946	20.354	-0.016	-0.137**	0.103	-0.273
	(0.142)	(0.228)	(8.501)	(13.651)	(0.041)	(0.057)	(0.160)	(0.204)
electricity	-0.242	-0.083	-14.493	-5.003	-0.007	0.065	-0.182	-0.177
	(0.149)	(0.189)	(8.911)	(11.345)	(0.038)	(0.048)	(0.140)	(0.200)
own_home	0.016	-0.095	0.967	-5.671	0.003	0.022	-0.378***	-0.210
	(0.110)	(0.170)	(6.599)	(10.217)	(0.030)	(0.043)	(0.122)	(0.153)
northkivu	-1.128***	-0.372	-67.704***	-22.330	0.436***	0.207***	-1.108***	-0.534**
	(0.171)	(0.249)	(10.290)	(14.927)	(0.039)	(0.064)	(0.168)	(0.225)
southkivu	-0.882***	-0.295	-52.945***	-17.691	0.385***	0.198***	-0.786***	-0.755***
	(0.176)	(0.246)	(10.584)	(14.774)	(0.040)	(0.062)	(0.169)	(0.221)
hours_cross_ante		0.087						
		(0.053)						
mins_cross_ante				0.087				
				(0.053)				
before730_ante						0.157***		
						(0.049)		
int_cross_ante								0.274***
								(0.047)
Constant	8.618***	7.801***	517.061***	468.031***	0.218**	0.150	4.241***	2.900***
	(0.370)	(0.570)	(22.184)	(34.210)	(0.097)	(0.121)	(0.395)	(0.484)
Number of traders	1,027	502	1,027	502	1,027	502	1,027	502
R-squared	0.0792	0.2122	0.0792	0.2122	0.1350	0.1629	0.0714	0.1884
F	10.48	2.33	10.48	2.33	21.22	6.95	6.86	10.30
Prob.	0.000	0.018	0.000	0.018	0.000	0.000	0.000	0.000
Control Means	7.448	7.448	446.9	446.9	0.536	0.536	3.451	3.451

[a] Usual time at which trader crossed border (hours).

[b] Usual time at which trader crossed border (minutes).

[c] Crosses before 7:30 am (1=yes, 0=no).

[d] Intensity of border crossings in a week (number of times).

Standard errors clustered at the individual trader-level are reported in parentheses. Significance levels: *** 1%, ** 5%, * 10%.
DD: Difference-in-Difference estimation. ANC: ANCOVA estimation. ANCOVA estimations include enumerator fixed effects.

Table A.9: ITTs on corruption outcomes

	(1) log tax (DD)[a]	(2) log tax (ANC)[a]	(3) no_pay (DD)[b]	(4) no_pay (ANC)[b]	(5) no_pay_RW (DD)[c]	(6) no_pay_RW (ANC)[c]	(7) no_pay_DRC (DD)[d]	(8) no_pay_DRC (ANC)[d]
treat_assign	-0.039	-0.136	-0.012	0.049*	-0.016	0.044**	-0.015	0.036
	(0.206)	(0.121)	(0.035)	(0.026)	(0.017)	(0.019)	(0.035)	(0.023)
post	-0.613***		0.070**		-0.034*		0.094***	
	(0.173)		(0.032)		(0.018)		(0.030)	
treat_assign#post	-0.046		0.045		0.051**		0.042	
	(0.238)		(0.043)		(0.024)		(0.042)	
female	-0.120	-0.191	0.019	0.049	-0.023***	-0.010	0.024	0.049
	(0.204)	(0.237)	(0.036)	(0.049)	(0.006)	(0.021)	(0.035)	(0.048)
noneduc	0.027	-0.226*	0.012	0.042	0.010	0.033	0.012	0.026
	(0.169)	(0.136)	(0.029)	(0.029)	(0.015)	(0.021)	(0.026)	(0.027)
electricity	-0.054	-0.211	-0.010	0.049*	-0.006	0.019	-0.001	0.044*
	(0.153)	(0.143)	(0.029)	(0.028)	(0.018)	(0.023)	(0.027)	(0.023)
own_home	-0.096	-0.168	0.015	0.038	-0.008	0.017	0.008	0.029
	(0.126)	(0.122)	(0.022)	(0.025)	(0.012)	(0.017)	(0.022)	(0.023)
northkivu	0.181	-0.208	0.031	0.093**	0.119***	0.111***	-0.004	0.043
	(0.159)	(0.156)	(0.031)	(0.038)	(0.024)	(0.032)	(0.029)	(0.033)
southkivu	0.096	-0.299*	0.052*	0.116***	0.123***	0.116***	0.015	0.054
	(0.158)	(0.165)	(0.031)	(0.038)	(0.024)	(0.032)	(0.028)	(0.033)
log_tax_ante		0.031						
		(0.030)						
no_pay_ante				0.003				
				(0.033)				
no_pay_RW_ante						0.012		
						(0.071)		
no_pay_DRC_ante								-0.021
								(0.029)
Constant	1.142***	1.007***	0.757***	0.713***	0.901***	0.827***	0.785***	0.813***
	(0.268)	(0.265)	(0.049)	(0.067)	(0.024)	(0.078)	(0.047)	(0.061)
Number of traders	1,049	525	1,049	525	1,049	525	1,049	525
R-squared	0.0285	0.1419	0.0234	0.1599	0.0726	0.1571	0.0317	0.0910
F	3.47	1.92	3.50	2.54	4.85	2.46	4.35	1.66
Prob.	0.000	0.055	0.000	0.010	0.000	0.013	0.000	0.106
Control Means	0.787	0.787	0.847	0.847	0.963	0.963	0.859	0.859

[a] Log of real value of tariffs and unofficial taxes paid (USD).

[b] Pays no amount at any border (1=yes, 0=no).

[c] Pays no amount at the Rwanda border (1=yes, 0=no).

[d] Pays no amount at the DRC border (1=yes, 0=no).

Standard errors clustered at the individual trader-level are reported in parentheses. Significance levels: *** 1%, ** 5%, * 10%.
DD: Difference-in-Difference estimation. ANC: ANCOVA estimation. ANCOVA estimations include enumerator fixed effects.

Table A.10: LATEs on corruption outcomes

	(1) log tax (DD)[a]	(2) log tax (ANC)[a]	(3) no_pay (DD)[b]	(4) no_pay (ANC)[b]	(5) no_pay_RW (DD)[c]	(6) no_pay_RW (ANC)[c]	(7) no_pay_DRC (DD)[d]	(8) no_pay_DRC (ANC)[d]
treated_instrumented	-0.223	-0.770	-0.065	0.275*	-0.091	0.251**	-0.084	0.206
	(1.165)	(0.687)	(0.197)	(0.145)	(0.094)	(0.107)	(0.196)	(0.130)
post	-0.549		0.007		-0.104**		0.036	
	(0.468)		(0.086)		(0.048)		(0.083)	
post#c.treated_instrumented	-0.262		0.256		0.287**		0.237	
	(1.348)		(0.246)		(0.134)		(0.239)	
female	-0.120	-0.191	0.019	0.049	-0.023***	-0.010	0.024	0.049
	(0.204)	(0.237)	(0.036)	(0.049)	(0.006)	(0.021)	(0.035)	(0.048)
noneduc	0.027	-0.226*	0.012	0.042	0.010	0.033	0.012	0.026
	(0.169)	(0.136)	(0.029)	(0.029)	(0.015)	(0.021)	(0.026)	(0.027)
electricity	-0.054	-0.211	-0.010	0.049*	-0.006	0.019	-0.001	0.044*
	(0.153)	(0.143)	(0.029)	(0.028)	(0.018)	(0.023)	(0.027)	(0.023)
own_home	-0.096	-0.168	0.015	0.038	-0.008	0.017	0.008	0.029
	(0.126)	(0.122)	(0.022)	(0.025)	(0.012)	(0.017)	(0.022)	(0.023)
northkivu	0.181	-0.208	0.031	0.093**	0.119***	0.111***	-0.004	0.043
	(0.159)	(0.156)	(0.031)	(0.038)	(0.024)	(0.032)	(0.029)	(0.033)
southkivu	0.096	-0.299*	0.052*	0.116***	0.123***	0.116***	0.015	0.054
	(0.158)	(0.165)	(0.031)	(0.038)	(0.024)	(0.032)	(0.028)	(0.033)
log_tax_ante		0.031						
		(0.030)						
no_pay_ante				0.003				
				(0.033)				
no_pay_RW_ante						0.012		
						(0.071)		
no_pay_DRC_ante								-0.021
								(0.029)
Constant	1.196***	1.194***	0.773***	0.646***	0.924***	0.766***	0.805***	0.763***
	(0.457)	(0.331)	(0.080)	(0.081)	(0.037)	(0.087)	(0.078)	(0.073)
Number of traders	1,049	525	1,049	525	1,049	525	1,049	525
R-squared	0.0285	0.1419	0.0234	0.1599	0.0726	0.1571	0.0317	0.0910
F	3.47	1.92	3.50	2.54	4.85	2.46	4.35	1.66
Prob.	0.000	0.055	0.000	0.010	0.000	0.013	0.000	0.106
Control Means	0.787	0.787	0.847	0.847	0.963	0.963	0.859	0.859

[a] Log of real value of tariffs and unofficial taxes paid (USD).

[b] Pays no amount at any border (1=yes, 0=no).

[c] Pays no amount at the Rwanda border (1=yes, 0=no).

[d] Pays no amount at the DRC border (1=yes, 0=no).

Standard errors clustered at the individual trader-level are reported in parentheses. Significance levels: *** 1%, ** 5%, * 10%.
DD: Difference-in-Difference estimation. ANC: ANCOVA estimation. ANCOVA estimations include enumerator fixed effects.

Table A.11: ITTs on GBV outcomes

	(1) gbv (DD)[a]	(2) gbv (ANC)[a]	(3) insulted (DD)[b]	(4) insulted (ANC)[b]	(5) groped (DD)[c]	(6) groped (ANC)[c]	(7) touched (DD)[d]	(8) touched (ANC)[d]
treat_assign	0.092***	-0.054*	0.083**	-0.028	0.015	0.002	0.005	-0.008
	(0.035)	(0.031)	(0.035)	(0.028)	(0.012)	(0.014)	(0.012)	(0.010)
post	-0.007		-0.046*		0.008		-0.001	
	(0.028)		(0.027)		(0.010)		(0.012)	
treat_assign#post	-0.125***		-0.090**		-0.007		-0.007	
	(0.043)		(0.042)		(0.017)		(0.015)	
female	0.086***	-0.001	0.076**	-0.010	0.018***	0.005	0.010***	-0.000
	(0.031)	(0.043)	(0.031)	(0.041)	(0.005)	(0.020)	(0.004)	(0.007)
noneduc	-0.010	-0.014	-0.013	-0.001	-0.018**	-0.016**	0.002	-0.017**
	(0.032)	(0.039)	(0.031)	(0.037)	(0.008)	(0.008)	(0.010)	(0.008)
electricity	-0.031	0.020	-0.022	-0.005	-0.002	0.034	0.022	0.008
	(0.029)	(0.037)	(0.029)	(0.032)	(0.011)	(0.021)	(0.013)	(0.014)
own_home	0.016	-0.005	0.023	0.006	-0.001	-0.003	-0.010	-0.000
	(0.025)	(0.030)	(0.024)	(0.027)	(0.010)	(0.014)	(0.009)	(0.010)
northkivu	-0.075**	-0.107**	-0.071*	-0.088**	-0.014	-0.025	-0.032*	-0.059***
	(0.038)	(0.045)	(0.037)	(0.042)	(0.016)	(0.020)	(0.017)	(0.021)
southkivu	-0.141***	-0.109**	-0.123***	-0.076*	-0.035**	-0.034*	-0.045***	-0.054***
	(0.035)	(0.044)	(0.035)	(0.041)	(0.014)	(0.020)	(0.016)	(0.019)
gbv_ante		0.136***						
		(0.043)						
insulted_ante				0.124***				
				(0.040)				
groped_ante						0.069		
						(0.100)		
touched_ante								0.055
								(0.083)
Constant	0.174***	0.224***	0.170***	0.175***	0.018	0.036	0.040**	0.062**
	(0.047)	(0.063)	(0.047)	(0.059)	(0.012)	(0.026)	(0.016)	(0.025)
Number of traders	1,048	523	1,048	523	1,046	521	1,045	520
R-squared	0.0439	0.1594	0.0441	0.1621	0.0154	0.0699	0.0252	0.1176
F	5.07	2.49	4.90	1.85	2.28	1.09	1.85	1.01
Prob.	0.000	0.012	0.000	0.065	0.016	0.367	0.057	0.427
Control Means	0.196	0.196	0.183	0.183	0.0186	0.0186	0.0172	0.0172

[a] Has been insulted/spit upon/groped or sexually touched (1=yes, 0=no).

[b] Has been insulted/spit upon (1=yes, 0=no).

[c] Has been groped (1=yes, 0=no).

[d] Has been sexually touched (1=yes, 0=no).

Standard errors clustered at the individual trader-level are reported in parentheses. Significance levels: *** 1%, ** 5%, * 10%.
DD: Difference-in-Difference estimation. ANC: ANCOVA estimation. ANCOVA estimations include enumerator fixed effects.

Table A.12: LATEs on GBV outcomes

	(1) gbv (DD)[a]	(2) gbv (ANC)[a]	(3) insulted (DD)[b]	(4) insulted (ANC)[b]	(5) groped (DD)[c]	(6) groped (ANC)[c]	(7) touched (DD)[d]	(8) touched (ANC)[d]
treated_instrumented	0.521***	-0.305*	0.471**	-0.156	0.087	0.011	0.027	-0.048
	(0.200)	(0.174)	(0.199)	(0.159)	(0.067)	(0.080)	(0.071)	(0.059)
post	0.166**		0.078		0.018		0.009	
	(0.080)		(0.078)		(0.030)		(0.031)	
post#c.treated_instrumented	-0.710***		-0.511**		-0.038		-0.040	
	(0.244)		(0.236)		(0.096)		(0.087)	
female	0.086***	-0.001	0.076**	-0.010	0.018***	0.005	0.010***	-0.000
	(0.031)	(0.043)	(0.031)	(0.041)	(0.005)	(0.020)	(0.004)	(0.007)
noneduc	-0.010	-0.014	-0.013	-0.001	-0.018**	-0.016**	0.002	-0.017**
	(0.032)	-0.014	(0.031)	(0.037)	(0.008)	(0.008)	(0.010)	(0.008)
electricity	-0.031	0.020	-0.022	-0.005	-0.002	0.034	0.022	0.008
	(0.029)	(0.037)	(0.029)	(0.032)	(0.011)	(0.021)	(0.013)	(0.014)
own_home	0.016	-0.005	0.023	0.006	-0.001	-0.003	-0.010	-0.000
	(0.025)	(0.030)	(0.024)	(0.027)	(0.010)	(0.014)	(0.009)	(0.010)
northkivu	-0.075**	-0.107**	-0.071*	-0.088**	-0.014	-0.025	-0.032*	-0.059***
	(0.038)	(0.045)	(0.037)	(0.042)	(0.016)	(0.020)	(0.017)	(0.021)
southkivu	-0.141***	-0.109**	-0.123***	-0.076*	-0.035**	-0.034*	-0.045***	-0.054***
	(0.035)	(0.044)	(0.035)	(0.041)	(0.014)	(0.020)	(0.016)	(0.019)
gbv_ante		0.136***						
		(0.043)						
insulted_ante				0.124***				
				(0.040)				
groped_ante						0.069		
						(0.100)		
touched_ante								0.055
								(0.083)
Constant	0.047	0.299***	0.055	0.213***	-0.003	0.034	0.033	0.074**
	(0.076)	(0.087)	(0.076)	(0.080)	(0.022)	(0.036)	(0.026)	(0.035)
Number of traders	1,048	523	1,048	523	1,046	521	1,045	520
R-squared	0.0439	0.1594	0.0441	0.1621	0.0154	0.0699	0.0252	0.1176
F	5.07	2.49	4.90	1.85	2.28	1.09	1.85	1.01
Prob.	0.000	0.012	0.000	0.065	0.016	0.367	0.057	0.427
Control Means	0.196	0.196	0.183	0.183	0.0186	0.0186	0.0172	0.0172

[a] Has been insulted/spit upon/groped or sexually touched (1=yes, 0=no).

[b] Has been insulted/spit upon (1=yes, 0=no).

[c] Has been groped (1=yes, 0=no).

[d] Has been sexually touched (1=yes, 0=no).

Standard errors clustered at the individual trader-level are reported in parentheses. Significance levels: *** 1%, ** 5%, * 10%.
DD: Difference-in-Difference estimation. ANC: ANCOVA estimation. ANCOVA estimations include enumerator fixed effects.

Table A.13: ITTs on voice

	(1) receipt (DD)[a]	(2) receipt (ANC)[a]	(3) no_pay_or_receipt (DD)[b]	(4) no_pay_or_receipt (ANC)[b]	(5) association (DD)[c]	(6) association (ANC)[c]
treat_assign	0.010	-0.024**	-0.001	0.024	-0.060*	-0.026
	(0.030)	(0.012)	(0.021)	(0.023)	(0.034)	(0.042)
post	-0.094***		-0.025		0.102***	
	(0.024)		(0.022)		(0.037)	
treat_assign#post	-0.037		0.008		0.019	
	(0.033)		(0.032)		(0.050)	
female	0.007	0.028**	0.026	0.075	-0.094*	-0.085
	(0.027)	(0.011)	(0.028)	(0.048)	(0.050)	(0.071)
noneduc	0.025	-0.019	0.036**	0.022	-0.134***	-0.069
	(0.024)	(0.014)	(0.016)	(0.026)	(0.030)	(0.051)
electricity	-0.019	-0.021***	-0.029	0.028	0.015	0.125**
	(0.021)	(0.008)	(0.021)	(0.027)	(0.033)	(0.051)
own_home	-0.002	-0.024*	0.013	0.014	0.004	0.015
	(0.017)	(0.013)	(0.016)	(0.022)	(0.028)	(0.041)
northkivu	-0.029	-0.033*	0.003	0.060*	0.113***	0.069
	(0.023)	(0.020)	(0.023)	(0.033)	(0.040)	(0.057)
southkivu	-0.007	-0.017	0.045**	0.098***	-0.073**	-0.074
	(0.023)	(0.022)	(0.021)	(0.033)	(0.035)	(0.056)
receipt_ante		-0.031***				
		(0.011)				
no_pay_or_receipt_ante				-0.010		
				(0.051)		
association_ante						0.129**
						(0.054)
Constant	0.137***	0.053**	0.893***	0.775***	0.322***	0.352***
	(0.039)	(0.023)	(0.033)	(0.072)	(0.062)	(0.093)
Number of traders	1,049	525	1,049	525	1,026	501
R-squared	0.0497	0.0809	0.0145	0.1645	0.0693	0.1323
F	7.18	1.40	2.17	1.88	9.67	4.18
Prob.	0.000	0.194	0.023	0.061	0.000	0.000
Control Means	0.0827	0.0827	0.930	0.930	0.252	0.252

[a] Pays tariffs and unofficial taxes but requests receipt (1=yes, 0=no).

[b] Pays no tariffs and unofficial taxes or pays but requests receipt (1=yes, 0=no).

[c] Member of a traders association (1=yes, 0=no).

Standard errors clustered at the individual trader-level are reported in parentheses. Significance levels: *** 1%, ** 5%, * 10%.
DD: Difference-in-Difference estimation. ANC: ANCOVA estimation. ANCOVA estimations include enumerator fixed effects.

Table A.14: LATEs on voice

	(1) receipt (DD)[a]	(2) receipt (ANC)[a]	(3) no_pay_or_receipt (DD)[b]	(4) no_pay_or_receipt (ANC)[b]	(5) association (DD)[c]	(6) association (ANC)[c]
treated_instrumented	0.058	-0.137**	-0.007	0.135	-0.341*	-0.145
	(0.169)	(0.069)	(0.118)	(0.133)	(0.194)	(0.237)
post	-0.043		-0.036		0.076	
	(0.066)		(0.060)		(0.100)	
post#c.treated_instrumented	-0.211		0.045		0.105	
	(0.187)		(0.180)		(0.285)	
female	0.007	0.028**	0.026	0.075	-0.094*	-0.085
	(0.027)	(0.011)	(0.028)	(0.048)	(0.050)	(0.071)
noneduc	0.025	-0.019	0.036**	0.022	-0.134***	-0.069
	(0.024)	(0.014)	(0.016)	(0.026)	(0.030)	(0.051)
electricity	-0.019	-0.021***	-0.029	0.028	0.015	0.125**
	(0.021)	(0.008)	(0.021)	(0.027)	(0.033)	(0.051)
own_home	-0.002	-0.024*	0.013	0.014	0.004	0.015
	(0.017)	(0.013)	(0.016)	(0.022)	(0.028)	(0.041)
northkivu	-0.029	-0.033*	0.003	0.060*	0.113***	0.069
	(0.023)	(0.020)	(0.023)	(0.033)	(0.040)	(0.057)
southkivu	-0.007	-0.017	0.045**	0.098***	-0.073**	-0.074
	(0.023)	(0.022)	(0.021)	(0.033)	(0.035)	(0.056)
receipt_ante		-0.031***				
		(0.011)				
no_pay_or_receipt_ante				-0.010		
				(0.051)		
association_ante						0.129**
						(0.054)
Constant	0.122*	0.086**	0.895***	0.743***	0.405***	0.387***
	(0.067)	(0.036)	(0.050)	(0.086)	(0.089)	(0.121)
Number of traders	1,049	525	1,049	525	1,026	501
R-squared	0.0497	0.0809	0.0145	0.1645	0.0693	0.1323
F	7.18	1.40	2.17	1.88	9.67	4.18
Prob.	0.000	0.194	0.023	0.061	0.000	0.000
Control Means	0.0827	0.0827	0.930	0.930	0.252	0.252

[a] Pays tariffs and unofficial taxes but requests receipt (1=yes, 0=no).

[b] Pays no tariffs and unofficial taxes or pays but requests receipt (1=yes, 0=no).

[c] Member of a traders association (1=yes, 0=no).

Standard errors clustered at the individual trader-level are reported in parentheses. Significance levels: *** 1%, ** 5%, * 10%.
DD: Difference-in-Difference estimation. ANC: ANCOVA estimation. ANCOVA estimations include enumerator fixed effects.

Table A.15: ITTs on bribe-asking by border officials

	(1) been asked to pay fee[a]	(2) others been asked to pay fee[b]	(3) log bribe asked[c]
treat_assign	-0.040	0.037	-0.159
	(0.029)	(0.034)	(0.127)
female	0.010	-0.031	-0.236
	(0.038)	(0.061)	(0.249)
noneduc	-0.045	-0.045	-0.220
	(0.034)	(0.042)	(0.142)
electricity	0.014	0.017	-0.223
	(0.036)	(0.043)	(0.149)
own_home	0.009	-0.021	-0.161
	(0.030)	(0.035)	(0.127)
northkivu	-0.026	-0.054	-0.196
	(0.040)	(0.048)	(0.161)
southkivu	-0.048	-0.043	-0.285
	(0.039)	(0.048)	(0.173)
Constant	0.189***	0.294***	1.095***
	(0.057)	(0.078)	(0.281)
Number of traders	514	516	507
R-squared	0.2639	0.2377	0.1423
F	0.70	0.70	2.01
Prob.	0.670	0.674	0.052
Control Means	0.158	0.233	0.443

[a] Has been asked to pay fee in the last 30 days (1=yes, 0=no).

[b] Has seen or heard about other traders been asked to pay fee in the last 30 days (1=yes, 0=no).

[c] Log bribe asked to be paid (USD).

Standard errors clustered at the individual trader-level are reported in parentheses. Significance levels: *** 1%, ** 5%, * 10%.

All estimations include enumerator fixed effects.

Table A.16: LATEs on bribe-asking by border officials

	(1) been asked to pay fee[a]	(2) others been asked to pay fee[b]	(3) log bribe asked[c]
treated_instrumented	-0.228	0.209	-0.903
	(0.165)	(0.195)	(0.719)
female	0.010	-0.031	-0.236
	(0.038)	(0.061)	(0.249)
noneduc	-0.045	-0.045	-0.220
	(0.034)	(0.042)	(0.142)
electricity	0.014	0.017	-0.223
	(0.036)	(0.043)	(0.149)
own_home	0.009	-0.021	-0.161
	(0.030)	(0.035)	(0.127)
northkivu	-0.026	-0.054	-0.196
	(0.040)	(0.048)	(0.161)
southkivu	-0.048	-0.043	-0.285
	(0.039)	(0.048)	(0.173)
Constant	0.244***	0.243**	1.315***
	(0.081)	(0.103)	(0.351)
Number of traders	514	516	507
R-squared	0.2639	0.2377	0.1423
F	0.70	0.70	2.01
Prob.	0.670	0.674	0.052
Control Means	0.158	0.233	0.443

[a] Has been asked to pay fee in the last 30 days (1=yes, 0=no).

[b] Has seen or heard about other traders been asked to pay fee in the last 30 days (1=yes, 0=no).

[c] Log bribe asked to be paid (USD).

Standard errors clustered at the individual trader-level are reported in parentheses. Significance levels: *** 1%, ** 5%, * 10%.

All estimations include enumerator fixed effects.