DISPLACING CORRUPTION:
Evidence from a Tariff Liberalization Program*

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Abstract

This paper investigates how corrupt public officials and firms adjust to policy reforms that change opportunities for bribery deals to take place. I exploit an exogenously determined tariff liberalization program that altered opportunities to extract bribes through a particular method -"selling" tariff evasion-, to study how changes in tariff levels affected the incidence, the distribution, and the level of bribes paid during different stages of the process of importing goods. The reduction in tariff rates was associated with a significant decline (60%) in bribe payments to customs officials for tariff evasion. This was however partially offset by the displacement of corruption into more coercive forms of bribe extraction. I provide suggestive evidence on how these displacement effects can be economically costly given that firms respond to changes in bribe patterns by adjusting their sourcing decisions. While all firms increase imports in response to the tariff reduction, firms experiencing an increase in the probability of paying a coercive bribe following the tariff change are relatively more likely to source inputs domestically, with significant implications for firm performance. These unintended effects of policy reform highlight important policy complementarities in the design of trade and anti-corruption policies.

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1 Introduction

A pervasive type of tax evasion that has received considerable attention in recent decades is the evasion of taxes on imported goods. Tariff evasion is of great policy relevance since most governments throughout the developing world are still heavily reliant on tariffs as their main source of revenue.[1] Moreover, evidence is mounting on how tariff evasion differs across product types and firms, which can distort firm survival and growth rates in non-optimal ways (Bhagwati 1964; Krueger 1974; Fisman and Svensson 2007; Javorcik and Narciso 2008; Sequeira and Djankov 2011).

While central to the trade liberalization debate, the determinants of tariff evasion are not yet well-understood. One line of argument, drawing heavily from the public finance literature on the relationship between marginal tax rates and tax evasion, is that a move toward lower or uniform tariff schedules should reduce incentives for tariff evasion to occur (Allingham and Sandmo 1972; Clotfelter 1983; Panagaryia 1986; Poterba 1987).[2] An alternative argument is that lower tariff rates might increase the ability for private agents to pay bribes through an income effect (Yitzhaki 1974; Feinstein 1991; Alm, Bahl and Murray 1993; Slemrod and Yitzhaki 2000). This unsettled theoretical debate is in part driven by a long-standing challenge in the empirical literature: the difficulty in measuring tax evasion and in identifying exogenous sources of variation in tax policies. Understanding the relationship between tariff levels and evasion is however key as tariff schedules remain a central parameter of trade policy design, particularly in the developing world.

In this paper, I investigate empirically the impact of changes in tariff levels on tariff evasion, in the context of the clearance of goods through ports and land border posts. Given that tariff evasion is just a subset of potential corrupt interactions between firms and border officials, I further consider the possibility of changes in tariff levels displacing corruption into other forms of bribe-taking.

[1] In Madagascar tariff revenue accounts for 62% of tax revenue, in Mozambique for 35% and in Bangladesh for 16%. According to data in Baunsgaard and Keen (2009), the share of trade tax revenue in total tax receipt over the period 2001-2006 amounted on average to 2.5% in high-income countries, 18.1% in middle-income countries and 22% in low-income countries.

[2] Gatti (1999) argues that setting tariff rates at a uniform level can limit tariff evasion, resulting in higher overall tariff revenue. Winters (2004) illustrates this argument with the Chilean experience of uniform tariff rates in the 70s.

I then observe whether firms respond to these changes in corruption patterns by adjusting their sourcing decisions.

Tariff evasion often takes place through the misrepresentation of import prices, the underreporting of quantities or through the misclassification of imported products into lower tariff categories (Panagaryia 1986). Any of these methods can go undetected in exchange for the payment of a bribe to border officials. To measure tariff evasion, I design and implement an original tracking study that collects direct measures of bribes paid by firms clearing imported products through borders. I then exploit an exogenous variation in tariff schedules triggered by the phasing in of a pre-determined trade liberalization agreement, which provided rich variation in tariff levels across product categories, at different moments in time. This variation in tariff rates enables a clear identification of treatment and control groups of products, before and after changes in tariff rates took place. A straightforward differences-in-differences approach then allows me to isolate treatment effects of changes in tariff levels on patterns of corruption.

Bribe payments for duty avoidance are, however, just a subset of the bribe extraction methods available to border officials. Changes in the ability to "sell" tariff evasion are therefore likely to affect incentives to adopt alternative forms of bribe extraction. As public officials attempt to protect bribe rents and private agents seek alternative methods to reduce the cost of clearing goods through borders, changes in tariff schedules can affect not only levels of tariff evasion but also the broader set of corrupt interactions both parties engage in. While the potential for policy reform to trigger the displacement of corruption lies at the core of an extensive literature on law enforcement (Reppetto 1976; Chaiken, Lawless and Stevenson 1974; McPheters, Mann, and Schlagenhauf 1984; Ayres and Levitt 1998; Levitt 1998; Di Tella and Schargrodsky 2004; Yang 2008a; Yang 2008b), displacement effects of corruption in the context of trade policy and trade costs have remained largely unexplored. And yet, should these displacement effects be meaningful, they could imply a distinct view of the determinants of trade costs and suggest very specific policy complementarities between trade facilitation and anti-corruption programmes.

To detect the potential displacement of corruption as public officials and private agents adjust to changes in the opportunity to "sell" or "buy" tariff evasion, I track bribe payments along the entire chain of complementary stages in the clearance of imported goods. In a departure from previous literature, the data enables a clear and precise distinction between changes in bribes across tariff levels, across time, across products but also across stages of the clearing process, and the measurement of treatment effects from the tariff change on each of these separately.

Once I have identified the effects of changes in tariff levels on corruption patterns, I explore the impact of changes in the structure and level of bribe payments on the main users of the public service: importing firms. To do so, I match the bribe data to two waves of an original survey of 120 firms conducted before and after the tariff change. The survey elicits information on firms' decision to source inputs domestically or internationally. Given that corruption patterns can directly affect the price of imports relative to domestically sourced inputs, this is a first order mechanism through which corruption can distort economic activity. This hypothesis is substantiated by growing evidence in the literature on how sourcing decisions can directly affect the productivity of importing firms and, more broadly, the nature of backward and forward linkages in the economy (Feenstra, Markusen and Zeile 1992; Halpern, Koren and Szeidl 2005; Amiti and Konings 2008; Acharya and Keller 2009; Goldberg et al 2008; Bloom, Draca and Van Reenen 2011).

The empirical analysis is guided by the theoretical predictions of a parsimonious model that captures the trade offs faced by public officials when deciding on different methods of bribe extraction, and the responses these methods will elicit from firms. The model is based on two assumptions suggested by the data: i) for any given transaction, officials choose only one method of bribe-taking, and ii) for public officials it is more costly to engage in coercive corruption than in collusive bribe-taking. From these assumptions, I show that tariff liberalization for a given product induces customs officials to switch from collusive to coercive forms of bribe extraction, placing limits to firms' ability to increase imports in response to the tariff reduction.

Consistent with the model, I present three main findings on the impact of tariff liberalization

on corruption in the clearance of imports. First, the reduction in tariff levels is associated with a significant decline both in the probability of paying a bribe for tariff evasion (by 60%) and in the average amount of bribes paid immediately after the tariff change. This result is however partially offset in subsequent years by important substitution and income effects. The first substitution effect is on the demand side of bribes as customs officials adjust from extracting bribes for tariff evasion to extracting bribes for other reasons, namely for irregularities with the clearance documentation (real or fictitious). The structure of the market for clearing services partially determined a second set of income effects driven by the supply side of bribes. The surplus generated by the reduction in bribe payments for tariff evasion enabled clearing agents -the shipping intermediaries who by law every importing firm has to resort to in order to clear its goods through international borders- to make bribe payments to other public officials operating along the clearing chain, but to also capture some of it for themselves. While clearing agents hold full information on patterns of bribe payments in each time period, their client firms are likely to be ill-informed about the actual distribution of changes in the demand for bribes across the clearing process. Clearing agents are then able to exploit this asymmetry of information to go undetected when pocketing part of the former bribes.[3]

As a result, these displacement effects translated into important changes in the overall structure and type of corruption observed, which represents my second main finding. Since extractive opportunities associated with the duty-avoidance method declined with tariff liberalization, corruption was displaced to alternative, and potentially more costly, methods of bribe extraction. I detect a significant shift from collusive forms of corruption - tariff evasion -, which involved an element of rent-sharing between public officials and private agents, to more coercive types of bribe extraction, in which the rent from the illicit transaction was fully captured by the public official. While the former could contribute to a reduction in overall trade costs, the latter is cost-increasing for importers and could potentially be more distortionary (Sequeira and Djankov 2011). In the years following

[3]This practice may be facilitated by the fact that firms often opt for setting a budget for bribe payments to facilitate the clearance process, which are then fully managed by the clearing agents (for further evidence on these practices see Anh 2011).

the tariff reduction, I also observe an increase in the number of border officials taking bribes along the chain of complementary service provision, resulting in lower total bribe payments but higher average bribes per transaction, as predicted by Shleifer and Vishny's (1993) seminal model on the relationship between market structure and corruption.

The third main finding sheds light on how firms respond to changes in corruption patterns. Confirming the predictions of the model, firms using large quantities of an input that experienced a significant tariff reduction import more of the good, but this effect is dampened for firms that experience a subsequent increase in the probability of paying a coercive bribe.[4] Relying on a cross-section of data on firm sales, I then provide suggestive evidence on how the percentage of a firm's main input that is imported matters: firms that source a lower proportion of their main input internationally also experience lower sales.

While I am unable to fully establish the economic costs of these displacement effects of corruption beyond their effect on firms' sourcing strategies due to design and data constraints, taken together, my findings suggest that the effects of any tariff liberalization programme on economic activity are likely to be tempered by the response it elicits from public officials and transport intermediaries motivated to protect their bribe rents.

This paper contributes to a large body of empirical work studying the magnitude, the determinants and the efficiency costs of tariff evasion and corruption on economic activity. While I build on this research, there are four main advantages to the approach I take in this paper.

First, I exploit three sources of variation to identify the overall effect of changes in tariffs on corruption: variation across products, across time and across stages of the clearing process. Using all three sources of variation confers significant advantages over past strategies that have relied solely in variation of tariff levels across products (Fisman and Wei, 2004), or across products and time (Javorcik and Narciso 2007), and have therefore been unable to identify the full effect of changes in tariffs on overall corruption patterns associated with the clearance of goods. Because I observe

[4]These results are robust to restricting the sample to firms that had established their sector of operation, and consequently defined their main input, decades before the tariff changes took place.

the entire chain of public service delivery in a critical public bureaucracy for a long enough time horizon - 4 years-, I am able to provide the first set of evidence on how the demand and supply side of bribes adjust to policy reforms that change opportunities for certain, but not all, corrupt transactions to take place. The magnitude and impact of the displacement effects detected in this paper suggests that tariff evasion, while a central empirical parameter, is not a sufficient statistic for welfare analysis of the impact of changes in tariff policies on corruption.

Second, I exploit an exogenous variation in tariff levels that was pre-determined by a trade agreement to overcome a long-standing challenge in the empirical literature: because changes in tariff levels can be systematically correlated with existing patterns of corruption, firms' lobbying initiatives or with changes in the quality of enforcement across time, previous approaches have been unable to isolate the causal relationship between tariff levels and corruption from other product-level, firm-level or enforcement related reasons for changes in corruption patterns (see section 2 for a more detailed discussion of identification issues).

A third advantage of my analysis is the fact that I rely on directly observed bribe payments as opposed to the indirect measures of tariff evasion often used in the literature, which may be more prone to measurement error.[5]

Finally, I gather primary data on firm behavior and performance, which is then matched to the

[5]Indirect measures of tariff evasion were first suggested by Bhagwati (1964), based on an assumption of differential incentives for misreporting quantities or values of trade between sending and receiving trade partners in different countries: the sending partner has no reason to misreport volumes or values of trade while the receiving partner does, in order to avoid import duties. Matching dyads of trade partners and then comparing reported levels of exports from the sending country to reported levels of imports from the receiving country would therefore yield an indirect measure of tariff evasion. Applying this methodology, Pritchett and Sethi (1994) first detected a weak association between tariff levels and collected duties in four Asian countries. Fisman and Wei (2004) matched exports from China to imports from Hong Kong for a cross-section of 1,600 products, and found that a 1% increase in tariff levels was associated with an increase in tariff evasion of about 2-3%. Other studies applying the same methodology have found similar results, albeit of smaller magnitudes. Javorcik and Narciso (2007) matched trade records between ten Eastern European countries and Germany to exploit variation not only across products but also across time. The authors found that a 1% increase in tariff levels was associated with a 1.7% increase in tariff evasion. Mishra et al (2007) exploits variation in tariff levels triggered by India's trade liberalization reform in the 1990s. The authors find similar results though of much smaller magnitude: a 1% change in tariff rates is associated with a 0.12% increase in tariff evasion. Arndt and van Dunem (2005) apply the same methodology to the case of trade between Mozambique and South Africa while Bout and Roy (2010) look at Nigeria, Kenya and Mauritius. Both studies find a positive and significant elasticity but also smaller in magnitude than the results in Fisman and Wei (2004)

bribe data to measure the impact of changes in corruption patterns on firms. This allows me to map the entire chain between changes in policy, changes in the behavior of public officials and changes in firm behavior, providing a considerably richer understanding of the efficiency and distributional costs corruption can impose on economic activity. Among others, this allows me to build on the results in Fisman and Svensson (2007), which relied on a cross-sectional dataset of reported bribes paid by firms in Uganda to find that a 1% increase in bribery rates was associated with a 3% decline in firm growth rates.

The paper proceeds as follows: section 2 presents the empirical setting; section 3 discusses the data collected for this study; section 4 discusses the main results in the context of a simple model of displacement effects; and section 5 provides suggestive evidence on the impact of corruption on firms' sourcing decisions. Section 6 discusses key robustness checks and section 7 concludes.

2 Empirical Setting

2.1 Identification

To identify the responsiveness of corruption to changes in tariff levels I exploit a staggered reduction in tariff rates that took place between 2007 and 2012 in Mozambique. The country joined the Southern African Development Community (SADC) in 1992, committing to the SADC Tariff Trade Protocol that required the complete phasing out of tariff rates by 2015. Changes in tariff levels for different types of products were planned to take place in a total of 10 waves between 1995 and 2015. The agreed timeline for the reduction in tariff rates in Mozambique was similar to the reforms adopted by other SADC member countries such as Malawi, Tanzania, Angola, South Africa, Zambia and Zimbabwe, and the goal was to harmonize regional tariff schedules. The most significant reduction in tariff levels took place in 2008, though products originating in neighboring South Africa experienced a second (albeit much smaller) wave of reductions in 2011.[6] The decline

[6] About 12% of the random sample of shipments I track in this study were of South African origin and were therefore affected by this second wave of tariff reductions.

in the average nominal tariff rate was of 5 percentage points (see Figure 1), with the highest decline experienced by products that went from a 20% tariff rate to 0. I exploit this pre-determined and exogenous variation in tariffs across time and products to measure the impact of changes in tariff levels on corruption patterns. I then measure corruption in different stages of the clearance process in 2007, 2008, 2011 and 2012, before and after the changes in tariff levels took place.

A standard econometric challenge when assessing the impact of tariff changes on different types of corruption is establishing a credible counterfactual that allows us to isolate the causal impact of the tariff change from time trends in overall corruption, changes in the quality of enforcement, or from reverse causation (i.e. if corruption is leading to the tariff reform in the first place). A key element of my identification strategy is therefore the existence of a plausible control category of products that did not experience a change in tariff levels during the period under analysis. This allows me to adopt a straightforward difference-in-differences approach that purges the empirical estimates of time trends in the use of various bribe-extraction methods, as well as general changes in enforcement that should affect imports of all products equally, such as changes in rules conditioning clearance procedures or in the salaries of customs' officials.

The validity of the results also hinges on the assumption that the timing and rules of the tariff reductions are exogenous to the levels of corruption and tariff evasion prevalent in Mozambique at the time the changes took place. The SADC Trade Protocol that established the tariff liberalization schedule was driven primarily by the need to harmonize regional tariff codes as quickly as possible. Given that the schedule for the tariff phase out was set in the early 1990s and it was meant to converge to the South African tariff code, it is unlikely to be correlated with corruption patterns in Mozambique in 2008 and 2011, thus mitigating the possibility of reverse causation.[7] Corruption levels at the port of Maputo today can then safely be assumed to be orthogonal to tariff changes agreed to almost two decades before my analysis takes place.

[7]Moreover, previous work documented how patterns of corruption in South Africa's main port of Durban differed significantly from bribe payments in Mozambique (Sequeira and Djankov 2011).

2.2 The Shipping Process and Opportunities for Corruption

Each individual firm-level shipment goes through several different stages in order to clear through a port. For analytical purposes, I define two broad categories of steps in the clearing process that are managed by public officials, who differ in their administrative authority and in their discretion to stop cargo and generate opportunities for bribe payments: customs and port operations.[8]

Customs' officials are in charge of validating clearance documentation and collecting all tariff payments due. As a result, they have greater discretionary power to extract bribes relative to regular port operators given their broader bureaucratic mandate and the fact that they can access full information on each shipment, and each shipper, at all times. In particular, customs' officials possess discretionary power to allow a firm to engage in tariff evasion through three different channels: by misreporting physical quantities of imported products, by misrepresenting prices, or by misclassifying products from high to low tariff categories. Customs' officials have an additional set of tools they can deploy to extract bribes, namely the threat of conducting a physical inspection of the shipment (which can delay clearance for up to 4 days), or citing irregularities -real or fictitious- with the documentation of the shipment. The fact that customs' officials have significant bureaucratic latitude to extract bribes increases the probability of corruption being displaced from "selling" tariff evasion to other forms of bribe extraction, following a widespread tariff reduction program.

While customs' officials have a broad toolkit of bribe extraction methods to draw on, "selling" tariff evasion is likely to be their preferred method. Associating the bribe with tariff evasion combines the desirable features of reducing both the informational costs of bribe-setting and the risk associated with the illicit transaction (Sequeira and Djankov 2011). From the perspective of the customs' official, whether the good falls under a high tariff category or not carries important information on a shipper's willingness-to-pay a bribe. A standard assumption is that all firms would be better off by evading a tariff so bribes should be an increasing function of tariff rates. All other

[8] A similar distinction can be made at the border post between customs' officials and general border officials.

bribe extraction tools are more costly and can potentially yield lower bribe revenue, as they rely on observing shipment characteristics that carry only coarse information on a firm's willingness-to-pay a bribe. This basic informational asymmetry can then force customs' officials to engage in a costly and time-consuming exercise to elicit information on the time sensitivity of the firm's shipment, or on the firm's ability to pay a bribe. For example, the size of the shipment is an imperfect indicator of willingness-to-pay: large shipments may signal a firm carrying higher than average inventories with a lower willingness-to-pay a bribe to expedite clearance, or a large firm with a higher ability to pay for a faster service. A lengthy process of discovering both commitment to an illicit transaction and the reservation costs of a shipper increases both the risk and the cost of setting bribes (Sequeira and Djankov 2011). A corruption deal based on tariff evasion has the additional benefit of lowering the risk of detection of the illicit transaction through a second channel: given that both parties are implicated in the deal, neither side will have an incentive to deviate from it, resulting in a more credible commitment (Schelling 1956).

Regular port operators on the other hand have a narrower mandate to move or protect cargo on the docks, and they sometimes lack access to the shipment's documentation specifying its value or the details of the client firm, among others. Bribes can be paid to different types of port officials along different stages of the clearing process ranging from agents in charge of adjusting reefer temperatures for refrigerated cargo stationed at the port; port gate officials who determine the acceptance of late cargo arrivals; stevedores who auction off forklifts and equipment on the docks; port security who oversee high-value cargo vulnerable to theft; shipping planners who auction off priority slots in shipping vessels, and scanner agents who move cargo through non-intrusive scanning technology (Sequeira and Djankov 2011).

The third type of official involved in the clearing process is the clearing agent. In this setting, by law, no firm is allowed to interact directly with customs or port operators. Firms have instead to resort to private clearing agents who specialize in clearing cargo through the port or border post, mostly through *ad hoc*, shipment-based contracts. Clearing agents submit all the required docu-

mentation, monitor the clearance process and make all necessary payments to customs officials and port operators, including bribes. While their services are optional in the US and in other European countries, they have been made a mandatory fixture of the clearing process in several countries throughout the developing world such as Mali, Burkina Fasu, Honduras, and Venezuela, among others.[9]

3 Data

This paper relies on primary data obtained through two main sources: a tracking study that monitored a random sample of over 2,000 shipments going through the port of Maputo in Mozambique and the border post between Mozambique and South Africa; and an original survey of 120 Mozambican firms.

I began by conducting a listing of all official clearing agents in the region under study. Most were independent clearing agents (76%) working for several client firms, with 50% of them handling between 10 and 50 shipments per month. I then randomly selected 15 clearing agents to participate in the study out of a universe of 117, four of whom were stationed at the border post while the remainder were working at the port of Maputo. Clearing agents first provided us with the list of shipments they were expecting to handle, prior to their arrival. They were then instructed to track every third shipment, providing detailed information on the date, time of arrival and date of clearance; and on a wide range of cargo characteristics such as size, value and product type. Clearing agents also noted the primary recipients of bribes, the bribe amounts requested and the reason for a bribe payment, ranging from the need to jump a long queue of trucks to get into the port, to evading tariffs or lacking important clearance documentation.

The questionnaire used in this tracking exercise was designed in conjunction with the clearing agents who participated in the study to ensure that it captured the most relevant features of the clearing process and, more importantly, that it accommodated any confidentiality concerns regard-

[9]For more detailed information on the role of clearing agents see http://docsonline.wto.org/.

ing how much information clearing agents were willing to report. One such sensitive dimension related to information on the characteristics of their client firms. To satisfy the clearing agents' participation constraint, the questionnaire only collected information on the average size of the client firm and on the frequency of its shipments.

Throughout the data collection exercise, emphasis was placed on capturing all formal and informal costs of importing and exporting goods through the port and border post, in order to minimize the possibility of clearing agents strategically misreporting data on bribe payments. In this setting, there was however limited stigma attached to the payment of bribes to border officials, since clearing agents saw the bribe as a necessary payment made at the request of their clients. Acting as mere intermediaries, clearing agents felt limited moral responsibility for their actions (Sequeira and Djankov 2011).[10]

To measure the impact of changes in corruption patterns on firms I further conducted two waves of an enterprise survey, before and after the tariff changes took place, covering approximately 120 firms in the direct catchment area of the port of Maputo. These surveys elicited important information on firm characteristics and sourcing strategies.[11]

3.1 Experimental Evidence on Data Collection Method

To cross-check the accuracy and reliability of the bribe data collected, I conducted an experiment by which clearing agents were randomly assigned to sequences of monitored and unmonitored data collection. The monitoring was conducted by locally-hired observers who shadowed clearing agents and verified the accuracy of the data reported. The observers had experience in the shipping industry and were therefore familiar with all clearance procedures. To minimize any suspicion, the observers were also similar in age and appearance to any other clerk who normally assists clearing

[10] I also found significant variation in the distribution of bribes paid by each clearing agent, suggesting that bribe payments were primarily determined at the shipment-level.

[11] Firm sales' data were only consistently captured in the follow-up survey.

agents in their interactions with port officials. Given that clearing agents knew from the outset that they would be monitored at some point, it is unlikely that they would try to strategically misreport information on bribe payments while they were not being monitored.

Tables 2 and 3 display the results from this experiment. When monitored, clearing agents reported fewer instances of bribe payments and lower bribe amounts paid (a 11-17% decline in the probability of paying a bribe and a point elasticity of -1.08 of the average bribe amount reported). These results are robust to controlling for important cargo characteristics like size and value, for the characteristics of the client firm and the clearing agent, and for the timing of the shipments.

The general sense of the observers who participated in this experiment was that their presence had changed the nature of the interactions between the clearing agent and the public official, inhibiting certain illicit transactions. Interestingly, this Hawthorne effect was smaller in cases in which corruption may have been more "justified" such as when the bribe was being paid for tariff evasion. In these cases, since both parties were benefitting from the illicit transaction, public officials may have felt less shame (or less fear) in requesting a bribe in the presence of the observer, as suggested by the positive coefficient of the interaction between tariff level and whether a shipment was monitored (see columns 3, 6 and 7 in Table 3).

In line with these results, relying on directly reported evidence from subjects has been common practice in studies of sensitive behavior. An extensive literature in psychology suggests that self-administered questionnaires increase the willingness of respondents to report sensitive behavior in a variety of settings (Barnett, 1998; Bradburn and Sudman 1979; Groves 1989; Turner et al 1995; Waterton and Duffy 1984; Weinrott and Saylor 1991). I therefore restrict the analysis to the data reported directly by the clearing agents, which provided measures of expected bribes at each border (port and land border post), for different types of shippers and different types of shipments, before and after changes in the tariff schedule took place.

4 Determinants of Bribe Payments

4.1 A Simple Model of Displacement Effects

The goal of this paper is to measure the overall impact of changes in tariff levels on corruption. The central hypothesis is that public officials respond to changes in opportunities to extract bribes through different methods and that these behavioral responses to the policy change can directly shape the economic implications of corruption.

To study these displacement effects I consider a simple model of bribe-taking, which provides clear predictions that I then take to the data. Suppose that firm F imports a shipment of goods with value (or volume) M subject to a tariff τ. In the process of clearing the shipment, customs' officials can extract bribes through either collusive or coercive methods. With collusive corruption, the customs' official and the firm collude to steal the tariff τM, and the official keeps a share γ of the rent. With coercive corruption, the customs' official coerces the firm into paying a tax $\widehat{\gamma}$ above and beyond the price of clearing the goods through international borders. The objective function of the customs' official measures the bribe revenue net of the cost of extracting a bribe through each of these methods:[12]

$$B_{coll} = \gamma\tau \cdot M - \gamma^2 \cdot \frac{c}{2} - f, \qquad B_{coer} = \widehat{\gamma} \cdot M - \widehat{\gamma}^2 \cdot \frac{\widehat{c}}{2} - \widehat{f} \tag{1}$$

In this model, an important assumption is that the fixed and marginal costs associated with extracting coercive bribes are high. First, firms are much more likely to denounce *any* coercive action by a customs' official relative to a collusive arrangement; second, the likelihood that the firm being coerced into paying a bribe denounces the officials increases rapidly in the bribe amount requested and third, it is significantly harder in principle for a customs' official to elicit the willingness for a firm to engage in coercive corruption relative to a collusive deal. This suggests that $\widehat{c} > c$ and

[12]The bribe levels $\gamma, \widehat{\gamma}$ correspond to the expected bribes, which depend both on the frequency of bribe-taking and the actual bribe tax conditional on a bribe being taken. We assume customs officials and firms are risk neutral so this decomposition is immaterial.

$\widehat{f} > f \sim 0$.[13] For simplicity, I also assume that only one method can be used per shipment. This assumption is confirmed in the data.

The bribe extraction method employed by the public official shapes the firm's objective function:

$$F_{coll} = (1 - \gamma\tau) \cdot M - M^2 \cdot \frac{k}{2}, \qquad F_{coer} = (1 - \tau - \widehat{\gamma}) \cdot M - M^2 \cdot \frac{k}{2} \tag{2}$$

where k is the marginal cost for the firm to import goods.

To analyze this setup, I assume that officials and firms simultaneously choose their moves: when the tariff level τ is announced, the customs official chooses the bribe method (collusive or coercive) and the corresponding bribe level γ or $\widehat{\gamma}$ that maximizes his revenue, as in (1). Knowing τ, the firm correctly predicts the bribe method and bribe level, and chooses the volume of goods imported M accordingly. For simplicity, I consider only pure strategy equilibria.

Let $\tau \geq 0$. From equations (1), the optimal collusive bribe level satisfies $\gamma^* = \tau M/c$. In response to such a bribe, the firm's optimal import volume level satisfies $M^* = (1-\gamma\tau)/k$, yielding $\gamma^* = \frac{1}{kc/\tau+\tau}$ and $M^* = \frac{1}{k+\tau^2/c}$. Note that the share γ^* of the tariff taken by the official is increasing in τ for $\tau^2 < kc$. Hereafter, I assume that this condition holds.[14] Overall, the volume imported by the firm decreases in the tariff level, just as it would even in the absence of bribes. In this regime, the bribe revenue extracted by customs is $B^*_{coll} = \frac{1}{2c}(\tau M^*)^2$, which increases in τ (provided that $\tau^2 < kc$).

Suppose now that the customs' official chooses the coercive method. The optimal bribe level satisfies $\widehat{\gamma}^* = M/\widehat{c}$ and the optimal volume level satisfies $M^* = (1 - \tau - \widehat{\gamma})/k$. Together, this implies that $\widehat{\gamma}^* = \frac{1-\tau}{k\widehat{c}+1}$ and $M^* = \frac{1-\tau}{k+1/\widehat{c}}$. An increase in tariff τ now causes a drop in volume M^*, as well as in bribe share $\widehat{\gamma}$. This leads to a compound loss of revenue for the customs official, which depends on $\widehat{\gamma} \cdot M$. Therefore, this method of extraction is unlikely to be implemented when tariff

[13] The marginal cost of a collusive bribe c will be low, (though still positive) due to the risk of the government detecting a shortfall in tariff revenue and the positive fixed cost f is the cost the customs' official has to incur in to hide the illicit transaction.

[14] Since tariffs are relatively low (typically below 20%) this condition may be satisfied. See remaining proofs in online Appendix B.

levels are high. The revenue for the customs official under this method is $B^*_{coer} = \frac{1}{2\widehat{c}}(M^*)^2$, which unambiguously decreases in τ.

The customs' official chooses the regime that maximizes his objective function (1). For goods subject to high tariff levels, a collusive arrangement provides high revenue at a small cost, so it is likely to be preferred. Low tariff levels, in contrast, strongly limit the revenue stream from this method, making a coercive bribe more attractive. The analysis formalizes this intuition: provided that $\widehat{f}$ is not sufficiently large to exclude any coercive bribe-taking, a threshold tariff level $\tau^* \in (0, \sqrt{kc})$ exists such that the customs' official extracts a collusive bribe for goods with high tariffs, $\tau > \tau^*$, and he extracts a coercive bribe for goods with low tariffs $\tau < \tau^*$.

This model has three main predictions: complete tariff liberalization for a given product will induce customs' officials to switch to alternative forms of bribe extraction (since $0 = B^*_{coll} < B^*_{coer}$ when $\tau = 0$); the magnitude of these displacement effects ($\widehat{\gamma}$) decreases with the marginal cost of engaging in coercive corruption ($\widehat{c}$); and firms will import most when they experience a tariff reduction of their main input, but this effect can be dampened by any increase in coercive corruption (as captured by M^*). The following sections document how both the central assumptions and the main implications of the model are consistent with what I observe in the data.

4.2 Tariff levels and Corruption

To identify the relationship between tariff levels and corruption I begin by estimating the impact of tariff levels on both the probability of paying a bribe and on the amount of bribe paid. In the main specification, the dependent variable is denoted by $Bribe_{it}$ for shipment i in time t, equalling 1 if a bribe was paid and 0 otherwise. To identify the determinants of the amount of bribe paid, conditional on paying a bribe, the dependent variable becomes the natural log of the amount of bribe paid, for each shipment in the sample. The vector of independent variables consists of:

$$p_i + \omega_t + \beta_1 LogTariff\ Level_{it} + \phi X_i + \epsilon_{it} \tag{3}$$

where the coefficient of interest β_1 represents the semi-elasticity of bribe payments with respect to tariff levels. I also include a vector of product and shipper level characteristics X_i consisting of a dummy variable signalling if the shipper is a large firm (defined as having more than 100 employees); dummy variables categorizing the product as perishable, a consumer good or an agricultural product; the baseline tariff level at the beginning of the study (2007); the terminal that cleared the cargo; controls for whether the shipment is observed at the border post or at the port; as well as industry dummies p_i and year fixed effects ω_t.

Tariff evasion can take place through the misrepresentation of import prices (underinvoicing), underreporting of quantities or through the misclassification of goods into lower tariff categories. A growing literature has tested the hypothesis that certain types of products that lack fixed prices in the market may be more prone to corrupt practices due to the difficulty in assessing the tariff duties that are due. In these situations, honest customs officials find it more difficult to detect an invoice stating an incorrect price while corrupt customs officers have a plausible excuse for why they did not detect underinvoicing. I follow the classification conventionally used in the trade literature to identify differentiated products as those that lack a reference price in the market (Rauch 1999). Examples of differentiated goods are clothes and cars, while non-differentiated goods could be oil or wheat. Several studies on tariff evasion have resorted to this classification in the past, but have found mixed results. Fisman and Wei (2004) failed to find a significant relationship between differentiated goods and tariff evasion whereas Javorcik and Narciso (2007) and Mishra et al (2007) find that the positive relationship between tariff evasion and tariff levels is stronger for differentiated goods. I test this hypothesis by including a dummy variable that equals 1 if the product is differentiated and 0 otherwise. Rauch's classification is at the 4-digit SITC level, which I match to the data based on the concordance in Feenstra (1996). Standard errors are clustered at the level of the product's 4 digit harmonization code to allow for within product type correlation across time, while accounting for this coarser industry classification.

To directly test for changes in the relationship between tariff levels and corruption across time

I augment the model by interacting the tariff level with year dummies:

$$p_i + \omega_t + \beta_{1t} LogTariff\,Level_i * Year_t + \phi_t X_i + \epsilon_{it} \tag{4}$$

with β_{1t} now denoting year-specific coefficients. The difference between β_{1t}, β_{1t+1} and β_{1t+2} tells us how tariff levels affected bribe payments in years 2008, 2011 and 2012 relative to the baseline in 2007. X_i denotes the same vector of product and shipper characteristics considered in equation 3.

Table 4 presents the results. Columns (1) through (3) denote the determinants of the probability of paying a bribe, and columns (4) through (7) the determinants of the amount of bribe paid. The omitted year category corresponds to our baseline year of 2007, prior to the tariff change. Year-specific coefficients remain fairly stable and insignificant following the tariff change, but the results suggest a negative and statistically significant relationship between tariff levels and bribe payments.

4.3 Tariff Changes and Corruption: Differences-in-Differences

To identify a causal relationship between tariff levels and corruption I adopt a straightforward difference-in-differences framework applied to the pooled cross-section of shipments tracked between 2007 and 2012. In the main specification, the dependent variables are again a binary variable that equals 1 if a bribe was paid and 0 otherwise, and the amount of bribe paid in logarithmic form, for each shipment in the sample. The first vector of independent variables includes the main differences-in-differences estimator, the main effect of a product falling in a tariff category that changed tariffs in 2008, as well as key controls:

$$\begin{aligned} p_i + \omega_t + \gamma_1 Tariff\,Change\,Category_i * POST + \\ +\mu POST + \gamma_2 Tariff\,Change\,Category_i + \beta_2 Baseline\,Tariff + \phi X_i + \epsilon_{it} \end{aligned} \tag{5}$$

The coefficient of interest is γ_1, capturing the difference in the probability of paying a bribe for

products that changed tariff level, before and after the tariff change took place, relative to products that did not experience any change in tariffs throughout the period under analysis. I also include in the base model the product's initial tariff level (2007 baseline), as well as the same vector of product, shipment and firm-level characteristics included in equations 3 and 4. This differences-in-differences specification controls for any general time trends in corruption patterns and in the quality of enforcement of clearance regulation that do not vary across products. I include product-level controls (at the 4 digit harmonization code level) and industry level dummies to account for underlying product and sector heterogeneity.

I then augment the base model to include a triple differences estimator, interacting the main treatment indicator with the year of the treatment and the baseline tariff level of each product in the sample. The goal is to test for a differential impact of the tariff change, depending on whether products were starting from a high or low tariff level at the time the change in tariff took place. This allows me to exploit both sets of control groups available: products that remained in a high tariff group and products that remained in a low tariff group.

$$
\begin{aligned}
& p_i + \omega_t + \gamma_1 Tariff\,Change\,Category_i * POST + \\
& \delta_1 Tariff\,Change\,Category_i * Baseline\,Tariff_i * POST + \\
& \beta_2 BaselineTariff_i + \mu POST + \gamma_2 Tariff\,Change\,Category_i + \\
& \gamma_3 Tariff\,Change\,Cat._i * Baseline_i + \phi X_i + \epsilon_{it}
\end{aligned} \tag{6}
$$

δ_1 is the triple differences coefficient that captures the differential effect of the tariff change on products that started with a higher tariff level at baseline, relative to products that did not change tariff category and remained in a low tariff group throughout.

Finally, I adapt the differences-in-differences framework to exploit the variation in the magnitude of the tariff change, by replacing the binary treatment variable with both a categorical variable indicating whether the tariff reduction was above or below the mean tariff change observed for all

products in 2008, and a continuous variable that captures the percentage point decline in tariffs experienced by each product. In all cases, the remainder of the specification remains unchanged.

4.4 Discussion of Results

In Table 5, columns (1) through (3) present the results for the differences-in-differences estimation while columns (4) and (5) present the triple-differences estimates. Consistent with the predictions from the model, in the differences-in-differences specification, products that changed tariff level are associated with a sizable decline (between 30 and 60%) in the probability of paying a bribe. These changes are significantly different from zero, providing strong evidence that the tariff change discouraged public officials from engaging in corruption to sell tariff evasion for these products. The result is robust to the inclusion of interactions between the post-treatment indicator ($POST$) and the covariates of interest, as shown in column (2). I find no support in the data that shipping an agricultural, consumer or differentiated good had an impact on the probability of paying a bribe, before or after the tariff change.[15] The decline in the probability of paying a bribe is driven mostly by changes taking place in 2008, relative to subsequent years.

Columns (4) and (5) show the differential impact of the tariff change on the probability of paying a bribe for products that started from a higher tariff category at baseline (in 2007). The triple-differences estimate indicates that products starting from a higher tariff category had a significantly higher probability of paying a bribe, even after the tariff change (a 1% increase in the baseline tariff rate is associated with a 0.12% increase in the probability of paying a bribe after the tariff change).

Table 6 presents the determinants of the amount of bribe paid, conditional on paying a bribe. The results are similar to those in Table 5 given that products changing tariff category paid lower bribes on average relative to those that remained in the same tariff category. The elasticity of bribes to the tariff change is -6.3. In columns (7) through (10), the triple-differences estimates reveal that

[15] I find that goods that were pre-inspected at origin to determine their value and tariff rate are 3% less likely to pay a bribe, even more so after the tariff change, though this result is unstable across specifications (results not shown). Results are also robust to the inclusion of several temperature controls interacted with a subjective categorization of the perishability of the good.

products with high tariffs at baseline experienced a less pronounced decline in average bribe amount paid. Columns (2), (4), (6), (8) and (10) confirm that the results are robust to a specification that takes into consideration the count nature of the dependent variable. Given over-dispersion in the data, I estimate a negative binomial model and find that the results become even stronger and more significant. When I include interactions between the level of the baseline tariff and both the value and the volume of the shipment, the main results are unchanged. This accounts for the possibility that the "size of the pie" from which bribes can be extracted would affect the probability of paying a bribe and the bribe level paid.

In Table 7 I exploit the variation in the magnitude of the tariff change that occurred differentially across products. These estimates are consistent with the previous results, showing that a higher decline in tariffs is associated with a stronger decline in the probability of paying a bribe. In columns (1) through (6) the treatment variable is a categorical variable indicating whether the tariff reduction was above or below the mean tariff change in the sample. In Columns (7) through (12) the treatment variable captures the percentage point decline in tariff level per product category. The results are similar across the different specifications. A one percent reduction in tariffs is associated with an average 20% reduction in the probability of paying a bribe and a 0.2% decline in the amount of bribe paid.

4.5 Displacement Effects

Despite the overall decline in corruption levels associated with the reduction in tariff rates, the results so far suggest significant non-linearities in the relationship between tariff levels and overall levels of corruption for different products (which were not captured in section 4.2). This section discusses how these results may be driven by important substitution and income effects, as public and private agents adjust their behavior to changes in the opportunity to "sell" or "buy" tariff evasion.

A closer look at Tables 4 through 7 reveals that there are important substitution effects at

play on the demand side of bribes. The first substitution effect occurs as customs agents extract more frequent and higher bribes from products that started in a higher tariff category in 2007 and experienced a reduction in tariffs. This suggests that customs agents are replacing their preferred strategy -"selling" tariff evasion- with other forms of bribe extraction, but targeting the same products. This stickiness of bribe payments may be explained by the fact that shippers of these products had already signalled a high willingness-to-pay bribes (or a higher reference point of what was an "acceptable" bribe payment to clear a shipment) and would therefore be more likely to pay bribes for other reasons, relative to shippers who were less accustomed to paying bribes altogether. In the context of the model presented in section 4.1, targeting products that in the previous period paid a high collusive bribe can be interpreted as a way to decrease the informational costs of identifying willing bribe-payers, and thus represents a reduction in the marginal cost of extracting a coercive bribe ($\widehat{c}$), which will increase the officials' bribe revenue stream under this alternative method.

Prior to the tariff change, the most frequently cited reason for a bribe payment to customs was tariff evasion. In 2008, 2011 and 2012, the most common type of bribe extraction involved selling "speed" in the clearance queue, overlooking irregularities with the clearance documentation (real or fictitious), or allowing the cargo to skip normal clearing procedures such as the scanning process. While overall port volumes increased substantially during the period under study (by 13 and 18% in 2008 and 2011 respectively), clearing times remained fairly stable (see Table 9). There is also no statistically significant difference in clearing times between products that paid and did not pay bribes, before and after the tariff change. This substitution effect is therefore consistent with a move from collusive forms of corruption (tariff evasion) to coercive bribe extraction in which no part of the rent generated by the illicit transaction is captured by the private firm. The model discussed in section 4.1, (and a straightforward revealed preference argument) suggests however that this shift is potentially suboptimal for customs' officials relative to the possibility of extracting bribes by selling tariff evasion in the context of high tariffs. First, the option of extracting bribes through these methods was present even before the tariff change, and yet it was overlooked in favor

of taking bribes for tariff evasion for high tariff goods. Second, customs' officials continued to extract bribes from products that remained in high tariff categories, primarily by selling tariff evasion. Finally, despite customs' officials' attempt to protect their bribe rents by resorting to alternative forms of bribe extraction, the total amount of bribes received by customs after the tariff change (in 2008, 2011 and 2012) represented only 46% of their previous intake in 2007, confirming that the tariff liberalization program, and consequently the reduced possibility of selling tariff evasion, was associated with a significant decline in their overall bribe revenue. This is consistent with the theoretical predictions of the model described in section 4.1.

I then detect further income effects triggered by adjustments on the supply side of bribes. Following the main tariff change in 2008, I recorded the first set of cases in which the clearing agents would report to their clients that the cargo was retained in customs or at other stages of the clearing process, in order to justify the payment of a fictitious bribe. These bribes were pocketed by the clearing agents themselves. While data and design limitations prevent me from fully understanding how clearing agents are able to capture part of this surplus, one possible reason is that firms have limited knowledge of the exact nature and distribution of clearing costs, becoming accustomed to transferring a "bribe budget" for clearing agents to manage (Ahn 2009). This appropriation of the bribe surplus may have gone undetected as long as it remained within the bribe budget set by each firm, discounted by the expectation of having to pay lower bribes for tariff evasion.[16]

Following the tariff change, I also detect an increase in the number of payments made to port officials outside of customs, at different stages of the clearing process (see Table 9). Data limitations prevent me from firmly establishing whether this result is demand driven, as other border officials become aware of the appropriable bribe surplus created by the reduction in tariff levels; or if it is supply driven, as firms and clearing agents continue to earmark budgets towards facilitating clearance and, given the reduction in tariffs, now have more liquidity to make payments at other stages of the clearing process. Given that port officials do not however have full information on

[16]While more prone to misreporting relative to the bribe data, the enterprise survey confirmed very low levels of firm awareness of the nature and distribution of actual clearance costs, including bribes.

each shipment and may therefore struggle to identify products that were previously paying high bribes, I am inclined to believe that this effect is mostly supply driven. Overall, following the tariff reduction, the percentage of payments made to customs officials declined to 71%, with an increase in payments appropriated by clearing agents to 10%, and of 19% to other port or border officials. Figure 3 clearly illustrates these trends: a shift in bribe payments from customs to other port officials, and a second shift from payments to customs officials to clearing agents. Taken together, these results suggest that while the tariff reduction is associated with an overall decline in the probability of paying a bribe, this is partially offset by an increase in other forms of bribe extraction, both within customs and across agents involved in the clearing process.

To verify that these shifts in the patterns of bribes paid are causally driven by changes in tariff levels, I re-estimate equation 5 with an ordered probit model, placing as the dependent variable an indicator that equals 0 if no bribe was paid, 1 if a collusive bribe was paid and 1 if a coercive bribe was paid. Collusive bribe payments are defined by an element of rent-sharing between the public official and the private agent while coercive bribe payments indicate that the rent from the illicit transaction was fully captured by the public official. This categorization is based on the information reported by the clearing agents. Table 10 reports the results, with both the ordered probit specification and a specification that restricts the analysis to the subset of products that paid bribes, and places as a dependent variables a binary indicator that equals 1 when the bribe is coercive and 0 when the bribe is collusive. In all specifications, products that changed tariff in 2008 were more likely to pay coercive bribes following the tariff change. A 1% percentage point increase in the tariff reduction is associated with a 3% increase in the probability of paying a coercive bribe.

Overall, these results are consistent with the theoretical predictions of section 4.1: displacement responded positively to the size of the rents threatened by the tariff change as it was more pronounced for products that went from being in a high tariff category to being a low tariff good, and it was driven by the marginal costs of different bribe extraction methods. Customs officials continued to extract bribes for tariff evasion from goods that remained in the high tariff category (the least

costly method) but switched to extracting bribes through alternative methods for products that experienced the most significant decline in tariff rates.

The tariff reduction also triggered changes in the market structure of corruption. While in the short-run the tariff liberalization program was associated with a decline in the total and average bribe amounts paid per transaction, in the medium-run, there was an increase in the number of public agents extracting bribes along the clearing chain at the expense of customs officials. Confirming the theoretical predictions in the Shleifer and Vishny (1993) model, this shift resulted in an increase (of almost 70%) in average bribes per transaction and a three-fold increase in average bribes per ton (see Table 9 and Figure 4).

Finally, the tariff liberalization programme is associated with important changes in the type of corruption observed. In particular, there is a significant shift from collusive to coercive forms of corruption, as opportunities to engage in collusive corruption decline with the reduction in tariff levels. These trends are made clear in Figures 4, 5 and 6. Taken together, the increase in competitive bribe extraction (for complementary services) and the shift from collusive to coercive forms of corruption can potentially represent important sources of economic inefficiency. In fact, depending on the impact of these changes on users of the public service, it is possible that the erosion in the tariff-defined bribe base experienced in this study is suboptimal: slightly higher tariff rates may have resulted, under certain conditions, in a more efficient, and less distortionary pattern of corruption.

5 The Impact of Changes in Corruption on Importing Firms

In this section I provide suggestive reduced-form evidence of the economic impact of changes in corruption patterns triggered by the tariff liberalization programme on firms' sourcing strategies. To do so, I follow a sample of approximately 120 firms - the primary users of the border services-, before and after the tariff change took place. My main focus is on firms' sourcing decision: the underlying assumption is that bribes directly affect the relative price of imports and as such, can

have an impact on firms' decision to source inputs domestically or internationally. How firms decide to source inputs matters not only because it affects the productivity of the firm itself and its cost structure, but also because it can have significant spillover effects in the economy as a whole, by affecting the nature and the extent of backward and forward linkages between firms. In fact, a growing literature has begun to document how imports can be an important channel of total factor productivity growth (Feenstra, Markusen and William Zeile 1992; Halpern, Koren and Szeidl 2005; Amiti and Konings 2008; Goldberg et al 2008; Bloom, Draca and Van Reenen 2011) and international technology transfer (Acharya and Keller (2009).[17] Assuming downward sloping demand curves for imported goods, if corruption increases the cost of clearing imported goods through a port, firms should have an incentive to decrease demand for imported inputs, while the opposite would happen if corruption decreases these costs. Consequently, if corruption is of the cost-reducing collusive type, I would expect this to translate into an increase in the international sourcing of inputs. If corruption is mostly of the cost-increasing coercive type, I would expect the reverse (Sequeira and Djankov 2011).

Capturing this intuition, the model in section 4.1 predicts that a tariff reduction should increase the volume of imports but that this effect will be lessened for firms affected by an increase in the probability of paying a coercive bribe following the tariff change. To test the importance of these displacement effects, I investigate whether changes in the percentage of imported inputs are associated with important measures of firm performance such as firm sales. Firmly establishing the impact of changes in imported inputs on firm performance is however beyond the scope of this paper, due to several data limitations. This final correlation should be interpreted with caution, and its purpose is solely to provide suggestive evidence that confirms previous results in the literature.

[17]This empirical literature was motivated by early theoretical work by Ethier (1982), Markusen (1989) and Grossman and Helpman (1991). In these models, lower input tariffs are associated with higher firm productivity due to increased access to input variety and higher quality, and through learning effects due to the technology embodied in foreign inputs. Amiti and Joseph Konings (2008) estimate that a 10 percentage point fall in input tariffs leads to a 12 percent productivity gain for importing firms and Halpern, Koren and Szeidl (2005) show that imports contributed in 30 percent to TFP growth in Hungary in the 1990s.

5.1 Data and Estimation Strategy

To study the impact of changes in corruption patterns on firm behavior I rely on an original panel survey of 120 firms, through which I elicit the percentage of each firm's main input that is sourced internationally.[18] The survey further gathers general firm-level characteristics such as the age of the firm, its export patterns, the structure of ownership and firm size.[19]

To analyze the impact of changes in the probability of a bribe being paid across time on firm behavior, I estimate a reduced-form model with the following specification:

$$Pctg\,Imported\,Inputs_k = \alpha + \phi\Delta Probability\,of\,Bribe_k + \omega\Delta Probability\,of\,Bribe_k * Firm\,Size_k + \beta_2 FirmSize_k + \xi Tariff\,Baseline_k + \pi Tariff\,Post_k + \eta X_k + \lambda_k + \nu_k \quad (7)$$

where $Pctg\,Imported\,Inputs_k$ represents the percentage of each firm k's main input that is imported and $\phi(\Delta Probability\,of\,Bribe)$ a function capturing the change between 2007 and 2011 in the probability of the input each firm is using paying a bribe. I estimate this function non-parametrically, with a probit regression of equation 5, which exploits an exogenous variation in tariff levels to predict changes in the probability of a product paying a bribe, before and after the tariff change took place. The firm survey data elicited a product description in accordance with the categorization in Appendix A. For each input, changes, in predicted bribes are then estimated at this aggregate sectoral level. This level of aggregation can mitigate endogeneity concerns as the estimates are less likely to be correlated with unobserved product-level characteristics. I then exploit variation in exposure to changes in the probability of paying a bribe on firms's sourcing

[18] A clear limitation is that I lack an indicator of total expenditures on imported inputs or the number of total inputs imported. While this is a concern, existing evidence suggests that firms' import spending tends to be concentrated on a few core products, spending smaller amounts on the remaining imports (Halpern et al 2011).

[19] This firm survey was conducted in 2006 and 2011, before and after the major change in tariffs took place in 2008 and consists of a balanced panel of 120 firms. Attrition rates in the second wave of the survey were approximately 15%, and about 13% of the firm panel is missing information on its main input. I assume however that these values are missing at random since standard tests for equality of means and equality in the distributions of important firm-level characteristics - size of the firm, age, ownership structure and sales levels- cannot be rejected at conventional levels of significance (see Table 12).

decisions given their size. $Firm\,Size$ represents the size of the firm in 2006, before the tariff change took place. The underlying assumption is that larger firms, within a given sector, consume more inputs and would therefore be more affected by the tariff change relative to a smaller firm. The coefficient of interest is therefore ω.

X_k represents a vector of firm k characteristics that control for firm size; the proportion of each firm's sales that are directly exported to capture the degree to which firms are familiar with operating in international markets and dealing with clearance procedures; the age of the firm; the gender of the manager of the firm; the manager's experience in a given sector; whether the firm is foreign or domestic; and the ethnic group the manager of the firm belongs to in order to capture any effect of ethnicity in trade networks and decisions to import. λ represents sector fixed effects and $Tariff\,Baseline_k$ and $Tariff\,Post_k$ denote the average tariff levels each firm's main input fell under, before and after the tariff change, given the country of origin of their main input.[20] ν_k represents a stochastic error term that is allowed to be correlated at the sector level. In all cases, I make an assumption, standard in the literature, that technology and input mix choices remain constant throughout this period.

I then re-estimate the model in first differences, thus eliminating time-invariant effects specific to a particular product, imported by a particular firm. The estimating equation takes the following form:

$$\Delta Percentage\,of\,Imported\,Inputs_k = \omega\,\Delta Prob.\,of\,Paying\,a\,Bribe_k * FirmSize_k + \\ +\phi Prob.\,of\,Paying\,a\,Bribe_k + \theta Firm\,Size_k + \gamma\,\Delta Tariff Levels_k + \lambda_k + \nu_k \qquad (8)$$

To further investigate whether a change in the type of corruption experienced by a product due to the tariff change affects firms' sourcing decisions I augment this model to include an interaction between changes in the probability of paying a coercive bribe and the size of the firm in 2006,

[20] In the firm sample, while I observe variations on the intensive margin of imports - the percentage of inputs that were imported- I detect no reported change in the country of origin of the main inputs between 2006 and 2011.

conditional on paying a bribe. The estimating equation becomes:

$$\begin{aligned}\Delta Percentage\,of\,Imported\,Inputs = \eta \Delta Prob.\,of\,Paying\,Coercive_k * Firm\,Size_k + \\ +\beta\,\Delta Prob.\,of\,Paying\,a\,Coercive\,Bribe_k + \theta Firm\,Size_k + \\ +\gamma\,\Delta Tariff\,Levels_k + \lambda_k + \nu_k \qquad (9)\end{aligned}$$

where η is the coefficient of interest, capturing the effect of changes in the probability of paying a coercive bribe on changes in the percentage of imported inputs.

Finally, to investigate the importance of changes in sourcing decisions, I explore the correlation between changes in the percentage of imported inputs and firm sales:

$$Log\,Revenue = \alpha_i + \omega Percentage\,Imported\,Inputs_k + \eta X_k + \lambda_k + \nu_k \qquad (10)$$

where X_k represents a vector of firm and product-level characteristics that include the age of the firm; the sector it operates in; its number of workers and export behavior; the tariff level of the main input and the personal characteristics of the manager of the firm (gender, ethnicity and level of experience). A clear limitation in the data is the absence of data on firm sales before the tariff change took place in 2006. Equation 10 is therefore estimated based on the cross-section for the year 2011 only.

5.2 Discussion of Results

Table 11 presents the results. In columns (1) through (4) the dependent variable denotes changes in the percentage of imported inputs for each firm, before and after the major tariff change took place. Columns (1) and (2) reveal that the increased exposure to changes in the probability of paying a bribe due to the tariff change is inversely related to the change in the percentage of inputs sourced internationally (with a point estimate of -0.02). Larger firms that were exposed to a larger

reduction in the probability of paying a bribe due to the tariff change in 2008 were more likely to have a higher percentage of imported inputs in 2011. These results are confirmed in column (3) when the model is estimated in first differences.

Column (4) reveals that an increase in a firm's exposure to the probability of paying a coercive bribe is associated with a smaller increase in the percentage of imported inputs. As suggested by the model, this shift from collusive to coercive corruption negatively affects imports, though this effect is still smaller than the overall increase in imports driven by the reduction in bribe costs brought about by the tariff change.[21]. Column (7) confirms previous findings that firms importing a higher proportion of their main input experience higher sales, with a statistically significant point estimate of 0.01.

6 Robustness Checks

As in any difference-in-differences estimation, the validity of the estimates hinges on the key identifying assumption that in the absence of the tariff change, corruption trends would have been similar between products that changed tariffs and products that remained in the same tariff grouping. To investigate this assumption further and directly test for the parallel trend hypothesis, I would ideally observe corruption patterns for both treatment and control products for several years, prior to the tariff changes that took place in 2008 and 2011. Since data on overall corruption are not available for this period, I resort to an indirect measure of corruption in the clearance of goods that has been commonly used in the literature: the trade gap between declared exports from sending countries and declared imports from receiving countries (Bhagwati, 1964, Fisman and Wei 2004, Javorcik and Narciso 2007). While this measure can only capture corruption related to tariff evasion and smuggling, prior to the tariff changes in 2008 and 2011, tariff evasion appeared to be the most

[21] In all cases I observe that changes in predicted corruption are a strong and statistically significant predictor of changes in the intensive margin of firms' sourcing decisions. I detect however no changes in the extensive margin of importing decisions, reflecting perhaps the high fixed costs associated with sourcing from international markets (results not shown)

common form of corruption in the particular setting under study. To avoid any bias introduced by differential reporting capabilities across trading partners, I focus on trade between Mozambique and its main trading partner, South Africa, across time. For this type of trade, tariff changes took place in 2007, 2008 and 2011, as illustrated by Figure 1.

The UN Comtrade database provides data on reported exports and imports from 2006 until 2010, both measured in terms of the value and volume of trade. I identify four categories of products: products in category A that experienced a change in tariffs in 2007; products in category B, which experienced a change in tariffs in 2007 and 2008; products in category C1, which experienced a change in tariffs in 2009; and finally, products in category C21-23, which only experienced a tariff change in 2011. Figures 7 and 8 reveal trends in the trade gap for each product category, measured in terms of both quantities and values of trade. By and large, products that experienced no change in tariffs (categories C21, C22, C23) exhibit similar trends in tariff evasion to products that did.

The parallel trend hypothesis would be violated if customs' officials increased bribe extraction from a given product category immediately before a change in tariffs took place. This is a plausible hypothesis since these tariff changes were in principle well-known in advance by all officials. If so, this "anticipation effect" could have led me to overestimate the elasticity of bribe payments to changes in tariffs in Section 4. Figures 7 and 8 do not however suggest that this is a real concern: there is no clear spike in tariff evasion -measured as the trade gap in either quantities or values of imports- for any product in the sample before changes in tariff levels took place (years in which tariff reductions occurred are signalled by a black rectangle). Furthermore, if I restrict the analysis to the 24 months prior to the tariff change in 2011 for products in categories C21-23, I detect a clear parallel trend across both treatment and control products, as shown in Figures 10 and 11.

The main results also depend on the assumption that the error terms are uncorrelated with my measure of bribes. This assumption would be violated if, among other reasons, the measure of bribes in the period 2007-2012 came from very different samples of products tracked each year. The pattern of bribe payments observed could then be driven not by the tariff reduction but by changes

in the composition of shipments in the sample. Table 8 shows the p-values for a test of equality of means for important product and shipment level characteristics for each period under analysis. For the most part, I fail to reject the hypothesis of equality of means for important variables like the average value and size of the shipments in each year. Similarly, the main results are also robust to the inclusion of sampling weights to account for tracking samples of different sizes in different years.

A final potential concern in section 6 is that my regressions suffer from multicollinearity, particularly between the constructed measure of changes in predicted bribes and tariff changes. In all cases, variance inflation factors are however below 2.5 for all the variables included in the model and approximately one for the two variables of interest that are most likely to be collinear.

7 Conclusions

This paper investigates how corrupt officials and private agents respond to important policy reforms that alter their ability to engage in bribery deals. To do so, I exploit an exogenous variation in tariff levels that took place between 2007-2011 and an unusually rich and original dataset of bribe payments at different borders in a major transport corridor in Southern Africa. The data allow me to identify how bribe patterns vary across tariff levels, across products, across time and across different phases of the process of clearing goods through international borders, before and after the tariff changes took place.

Motivated by theories of crime displacement I first develop a simple model that captures both the behavioral responses of public agents to policy reforms that challenge bribe rents, and firms' responses to changes in the cost of accessing the public service. This model suggests a clear set of predictions, which are then taken to the data.

Overall, I find a significant reduction in the probability of paying a bribe after the tariff reduction took place. This result is however partially offset by important substitution and income effects. The first substitution effect is a mechanic decline in the method of extracting bribes by "selling" tariff

evasion, and a displacement of corruption to alternative forms of bribe extraction by customs' officials, such as citing irregularities with clearance documentation (real or fictitious). Confirming the theoretical predictions of the model, displacement was greatest for products with higher tariff rates. This is consistent with the existence of fixed costs in the extraction of bribes through a given method and the fact that the costs of coercive corruption are reduced when customs officials are better able to elicit willingness-to-pay for a bribe. I then detect important income effects driven by the structure of the market for clearance services. As the probability of paying a bribe to customs for tariff evasion decreased, I observe an increase both in the frequency of bribe payments to other port officials and in the number of bribes that were appropriated by clearing agents (the shipping intermediaries in charge of clearing goods on behalf of importing firms).

The analysis yields additional results on the impact of tariff changes on both the market structure of corruption and the type of corruption observed. Consistent with predictions from the Shleifer and Vishny (1993) model, I find that an increase in the number of public officials selling complementary services who extract bribes is associated with an increase in average bribes per transaction. These substitution and income effects represent an important shift from collusive to coercive forms of corruption.

Finally, I find that changes in corruption patterns distort the behavior of the users of the public service. For a sample of 120 firms, I find that inputs experiencing an increase in the probability of paying a coercive bribe, are more likely to be domestically sourced rather than imported following the tariff liberalization program. Sourcing a higher proportion of inputs domestically appears in turn to be associated with lower firm sales.

The immediate implication of these results is that the elasticity of tariff evasion to changes in tariff levels is insufficiently rich to capture important aspects of behavioral adjustments to changes in bribe extraction opportunities triggered by tariff reform. In fact, the results suggest that any reduction in tariffs may not yield a proportional reduction in corruption based on the elasticity of tariff evasion alone, due to important displacement effects. Understanding the "anatomy" of these

responses to changes in tariff levels is however critical as they can represent important sources of economic inefficiency and deadweight loss (Slemrod 1996).

Overall, these findings lend strong support to theories predicting that policy reforms affecting one particular type of bribe extraction method can lead to important displacement effects of corruption, with significant implications for economic activity. Displacement effects can at best dampen returns to policy reforms, and at worst lead to more costly, inefficient and distortionary methods of bribe extraction in the long-run.

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9 Appendix A

Table 1: **Industry Distribution**

Harmonization Code	**Industry Grouping**
01-05	Animal and Animal Products
06-15	Vegetable Products
16-24	Foodstuffs
25-27	Mineral Products
28-38	Chemicals and Allied Industries
39-40	Plastics and Rubbers
41-43	Raw Hides, Skins, Leather, Furs
44-49	Wood and Wood Products
50-63	Textiles
64-67	Footwear and Headgear
68-71	Stone and Glass
72-83	Metals
84-85	Machinery and Electrical
86-89	Transportation
90-97	Miscellaneous
98-99	Service

10 Appendix B (Online)

Consider what happens when there is a tariff reduction transforming a high tariff $\tau_h > \tau^*$ into a lower tariff $\tau_l \in [0, \tau_h)$.

- if $\tau_l > \tau^*$, then after the shock the customs' official continues to adopt the collusive method. As a consequence, the firm imports larger volumes after the tariff cut, $M^*(\tau_l, coll) > M^*(\tau_h, coll)$. Moreover, the optimal bribe level (γ^*) also decreases, leading to a significant reduction in the customs' official revenues.

- if $\tau_l < \tau^*$, the customs' official switches to the coercive method after the tariff cut. In response, firm imports M^* fall relative to the case where the official would have kept the collusive regime with tariff t_l. The extent of the firm's reduction in imports depends on the magnitude of the bribe, given by $\widehat{\gamma}^* = \frac{1-\tau_l}{k\widehat{c}+1}$. If the cost $\widehat{c}$ of coercion is high, the extractive power of the official is limited in this regime. The complete displacement of corruption and its effect on firm imports is therefore bounded by the differential costs imposed by coercive forms of corruption. Therefore, both the firm's imports and its profits increase relative to the scenario under the original high tariff τ_h, namely, $M^*(\tau_l, coll) > M^*(\tau_l, coer) > M^*(\tau_h, coll)$. This is the empirically more relevant case, since in the data I mostly observe $\tau_l \sim 0$.

Provided the marginal cost of coercion is high, the firm's imports (and its profits) increase, but the customs official's revenue decreases. Recall that $M^*(\tau, coll) = \frac{1}{k+\tau^2/c}$ and $M^*(0, coer) = \frac{1}{k+1/\widehat{c}}$, so that $M^*(\tau, coll) > M^*(0, coer)$ if and only if $\tau^2\widehat{c} > c$. In either regime, the firm's profits are given by $F = (M^*)^2/2k$, so that firm profits rise with import volume. Finally, the customs revenues shift from $B^*_{coll} = (\tau M^*)^2/2c$ to $B^*_{coer} = (M^*)^2/2\widehat{c} - \widehat{f}$. For $\widehat{f} = 0$, the official's revenue drops as long as $\tau^2\widehat{c} > c$. If $\widehat{f} > 0$, the revenues from coercive bribe-taking are even lower.

At $\tau = 0$, $B_{coll} = 0$ and $B_{coer} = \frac{\widehat{c}}{2}(k\widehat{c}+1)^{-2} - \widehat{f}$, so that $B_{coll} < B_{coer}$ provided the fixed cost $\widehat{f}$ of coercive bribe-taking is not too large. At $\tau = \sqrt{kc}$, B_{coer} is lower than at $\tau = 0$, while B_{coll} reaches

its maximum value of $1/8k$. It is easy to show that the maximum value of B^*_{coll} is larger than the maximum value of B_{coer}, namely $1/8k > \frac{\widehat{c}}{2}(k\widehat{c}+1)^{-2} - \widehat{f}$ for any non-negative $\widehat{f}$. Therefore, there exists a threshold $\tau^* \in (0, \sqrt{kc})$ such that the customs' official extracts a collusive bribe for goods with high tariffs, $\tau > \tau^*$, and he extracts a coercive bribe for goods with low tariffs, $\tau < \tau^*$.

To see why $M^*(\tau, coll) > M^*(\tau, coer)$ for any given level of tariff τ, notice that both volumes decrease in the tariff level, but under the collusive method, M^* decreases from $1/k$ to $1/(k+1/c) > 0$ while under the coercive method M^* decreases linearly from $1/(k + 1/\widehat{c})$ down to zero. Formally, $M^*(\tau, coll) > M^*(\tau, coer)$ leads to $\tau^3 - \tau^2 + \tau kc + c/\widehat{c} > 0$. This cubic polynomial has a single real root which occurs for negative τ, so the condition holds for any $\tau \in [0, 1]$.

11 Figures

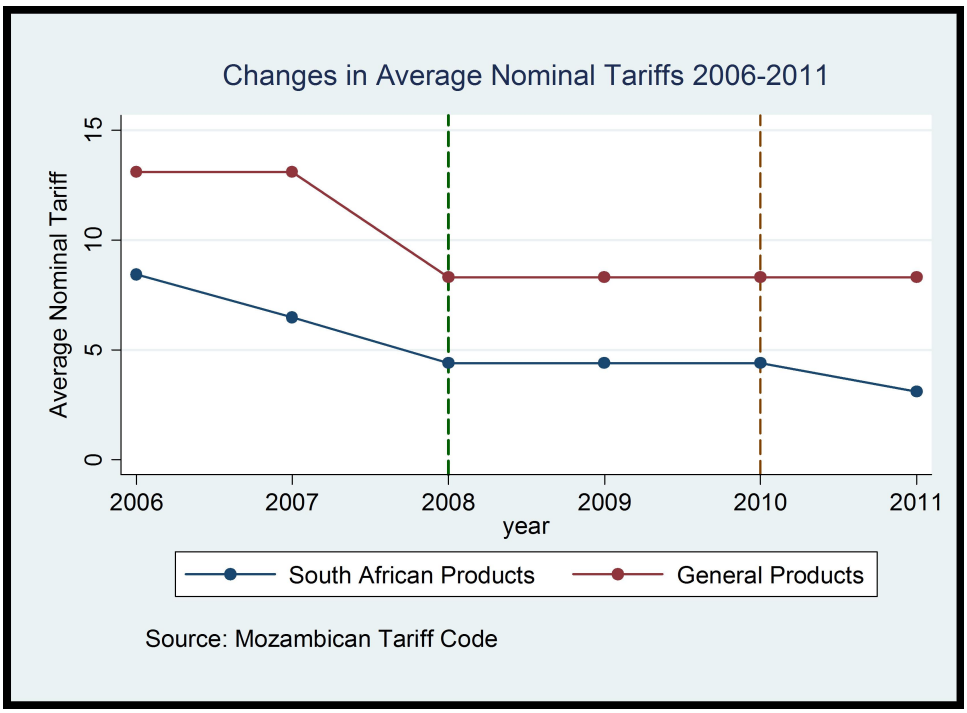

Figure 1: Changes in Nominal Tariffs in 2008 and 2011 for products originating in South Africa and the Rest of the World (General Products).

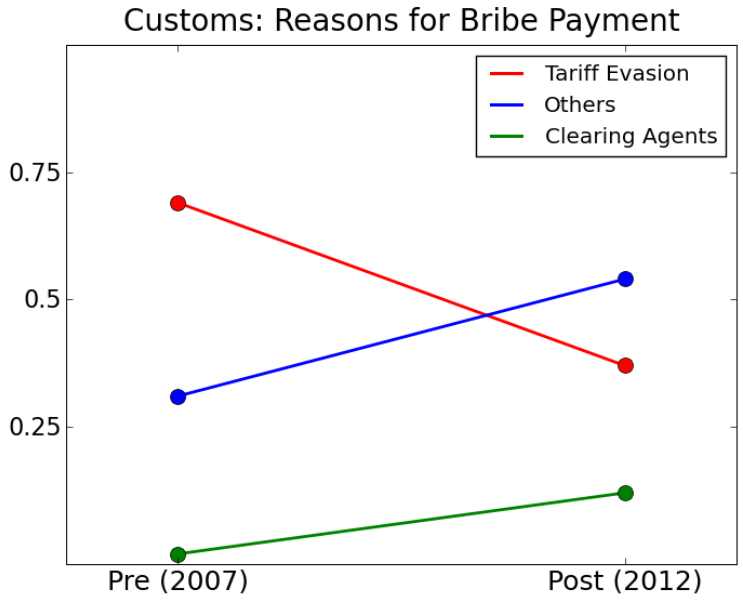

Figure 2: Changes in the reason for bribes payments to customs before and after the change in tariff levels.

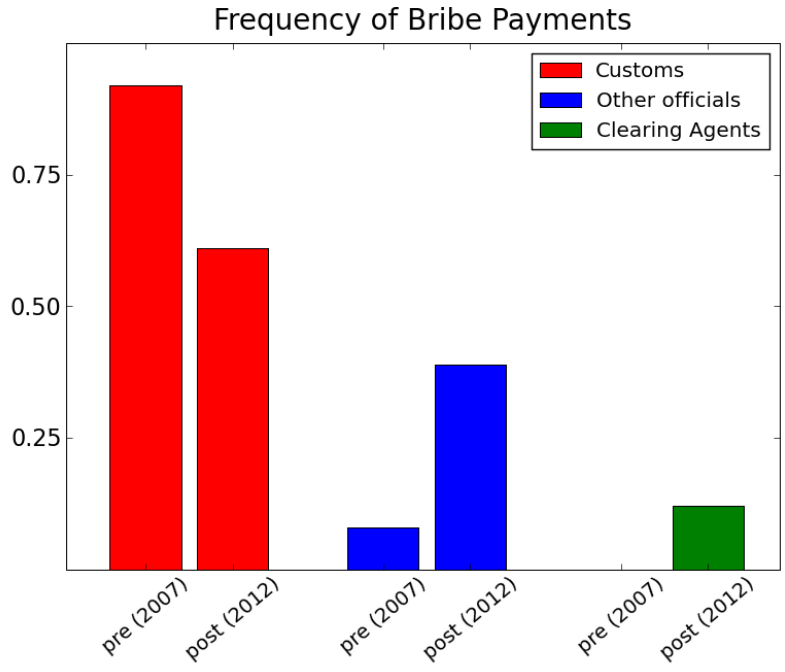

Figure 3: Changes in the frequency of bribe payments across different types of officials involved in the clearing process, before and after the tariff change.

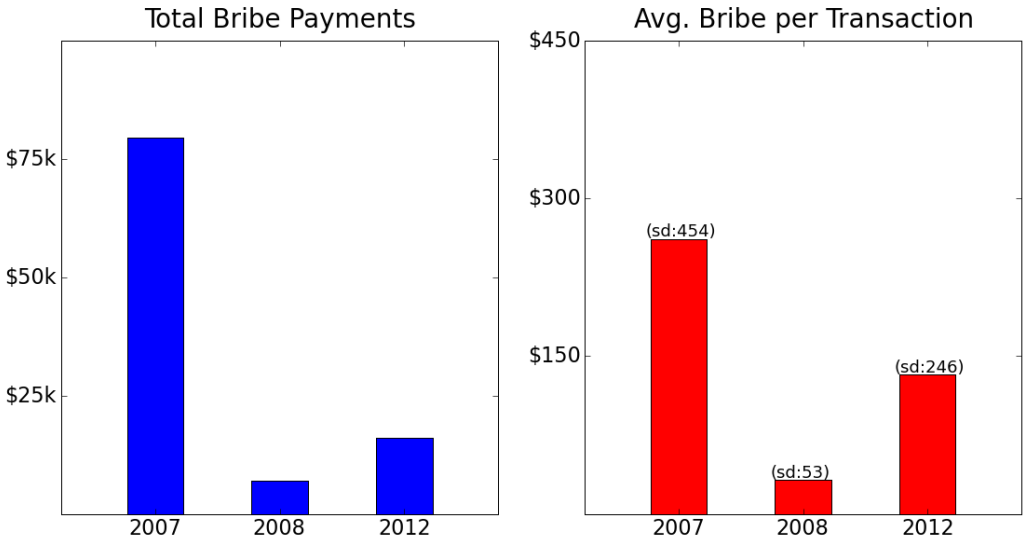

Figure 4: Changes in total bribe payments and average bribes per transaction per ton, before and after the tariff change took place.

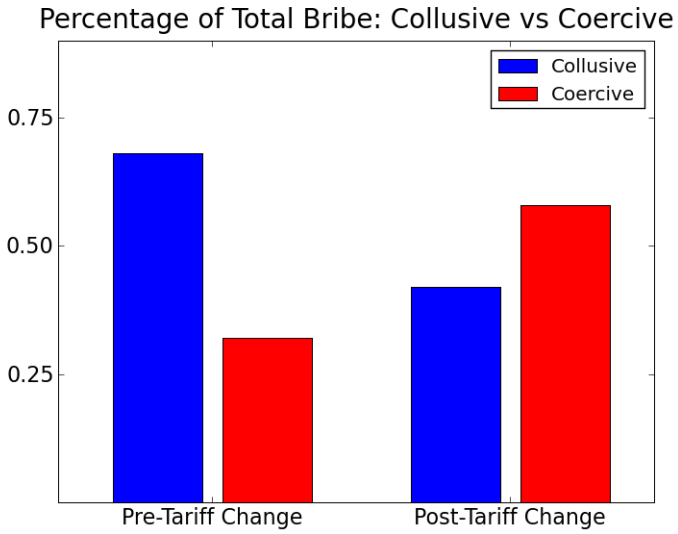

Figure 5: Corruption type as a percentage of total bribe amounts before and after the 2008 tariff change.

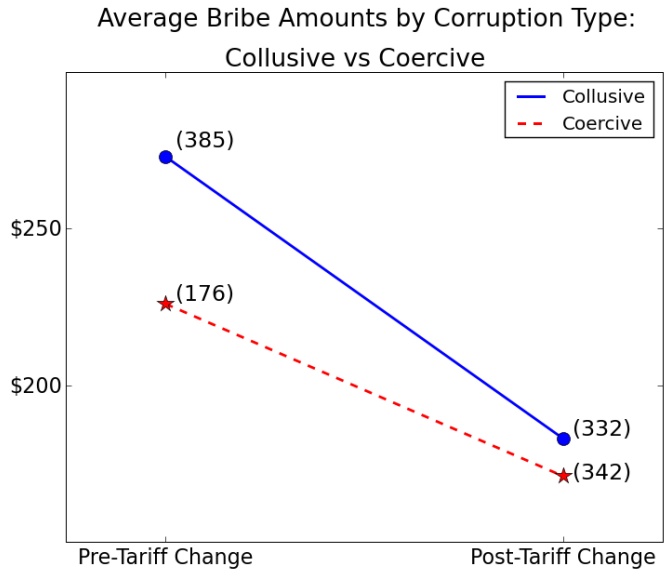

Figure 6: Average Bribe per transaction by corruption type, before and after the 2008 tariff change. Standard deviations in parentheses

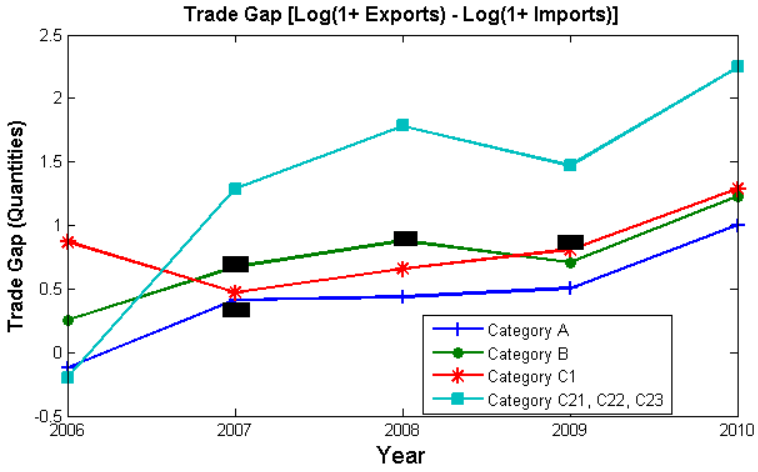

Figure 7: Trade Gap in Quantities for all products between 2006 and 2011. The black rectangles represent a tariff change year for products in categories A, B and C1

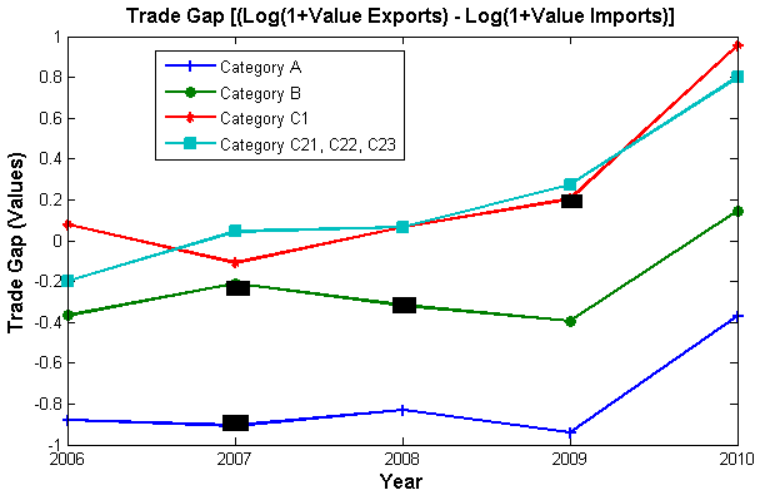

Figure 8: Trade Gap in Values for all products between 2006 and 2011. The black rectangles indicate a tariff change year for products in categories A, B and C1

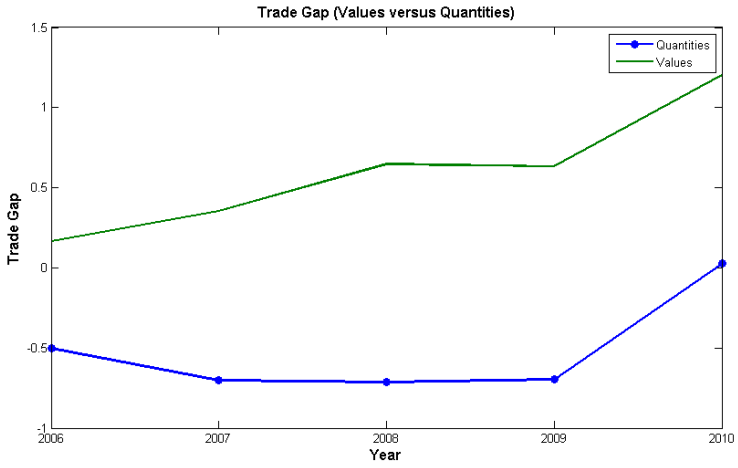

Figure 9: Trade Gap in Quantities versus Trade Gap measured in Values for all products between 2006 and 2010.

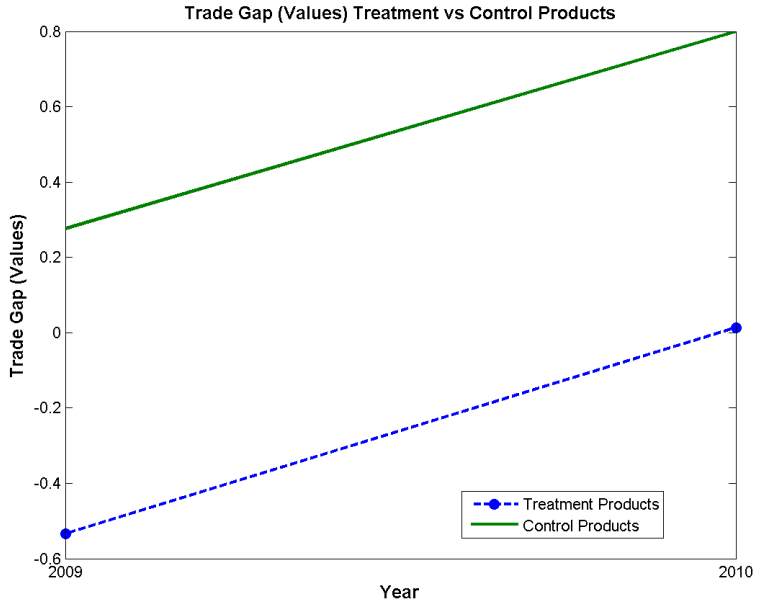

Figure 10: Trade Gap in Values for Treatment Products (which changed tariff in 2011) and Control Products (which changed tariffs in 2008).

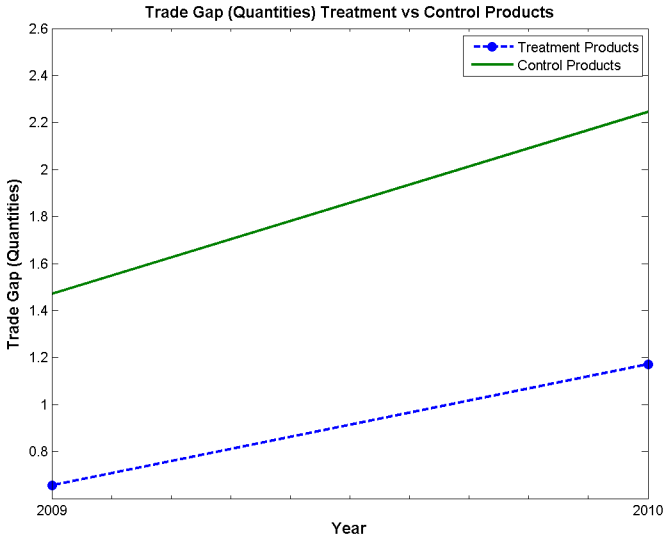

Figure 11: Trade Gap in Quantities for Treatment Products (which changed tariff in 2011) and Control Products (which changed tariffs in 2008).

12 Tables

Table 2: **Monitoring Experiment**

Differences in Means	**Monitored**	**Not Monitored**	**P-value**
Probability of Paying a Bribe	2%	18%	0 (chi2)
Amount of Bribe Paid (USD)	63.7	1079	0 (t-stat)
	(36.2)	(122.9)	

Table 3: **Monitoring Experiment**

Dependent Variable	Bribe Paid			Log Bribe Amount			
	LPM	LPM	LPM	OLS	OLS	OLS	Neg. Binomial
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Monitored Shipment	-0.17***	-0.11***	-0.2**	-1.28***	-1.01***	-2.06***	-4.2***
	(0.03)	(0.03)	(0.097)	(0.197)	(0.25)	(0.22)	(1.46)
Monitored Shipment * Log Tariff Level			0.09**			0.44**	0.84*
			(0.04)			(0.22)	(0.48)
Controls							
Industry Dummies	No	Yes	Yes	No	Yes	Yes	Yes
Clearing Agent	No	Yes	Yes	No	Yes	Yes	Yes
Product 4 Digit Harmonization Code Grouping	No	Yes	Yes	No	Yes	Yes	Yes
Terminal	No	Yes	Yes	No	Yes	Yes	Yes
Month Arrival	No	Yes	Yes	No	Yes	Yes	Yes
Differentiated Product	No	Yes	Yes	No	Yes	Yes	Yes
Consumer Product	No	Yes	Yes	No	Yes	Yes	Yes
Agricultural Product	No	Yes	Yes	No	Yes	Yes	Yes
Perishable	No	Yes	Yes	No	Yes	Yes	Yes
Pre-Inspected Cargo	No	Yes	Yes	No	Yes	Yes	Yes
Large Client Firm	No	Yes	Yes	No	Yes	Yes	Yes
Day of the week arrival	No	Yes	Yes	No	Yes	Yes	Yes
Log Value of Shipment	No	Yes	Yes	No	Yes	Yes	Yes
Log Tonnage of Shipment	No	Yes	Yes	No	Yes	Yes	Yes
Tariff Level	No	Yes	No	No	Yes	No	No
Log Tariff Level	No	No	Yes	No	No	Yes	Yes
Non Containerized Shipments	No	Yes	Yes	No	Yes	Yes	No
Year	No	Yes	Yes	No	Yes	Yes	Yes
Observations	1,824	919	353	1,824	919	919	919
F Test	34.35	9.76	34.35	4.43	42.5	11.9	19.63
Wald							3688.74
Adjusted R2	0.02	0.04	0.02	0.02	0.02	0.03	0.03
Log Pseudo Likelihood							-677.932

[a] Sources: Tracking Study.

[b] NOTES: In columns (1)-(3) the dependent variable equals 1 if a bribe was paid and 0 otherwise, while in columns (4)-(7) the dependent variable corresponds to the amount of bribe paid in logarithmic form [ln(x+1)]. Columns (1) -(3) fit linear probability models while columns (4)-(7) fit standard ordinary least squares and column (7) a negative binomial, given the count nature of the data, with mean dispersion. Differentiated Product corresponds to products without a set international market price as conservatively defined in Rauch (1999). Pre-Inspected at origin corresponds to shipments subjected to Pre-Shipment Inspection when shipped from overseas. Industry level dummies are determined by the two digit harmonization code grouping in Appendix A. Robust standard errors are clustered at the 4 digit harmonization code grouping of each product. Results significant at *** 1%, **5% and *1%

Table 4: **Tariff Levels and Corruption**

Dependent Variable	Bribe Paid			Log Bribe Amount			
	LPM	LPM	LPM	OLS	OLS	OLS	Neg Bin
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Tariff Level	-0.008***			-0.06***			
	(0.002)			(0.01)			
Log Tariff Level		-0.04**	-0.08*		-0.24**	-0.28	-0.33**
		(0.02)	(0.05)		(0.12)	(0.47)	(0.16)
Log Tariff Level * Year 2008			0.12			0.29	0.38
			(0.08)			(0.75)	(0.37)
Log Tariff Level * Year 2011			0.077*			0.26	0.17
			(0.05)			(0.46)	(0.17)
Log Tariff Level * Year 2012			0.023			-0.13	-0.09
			(0.05)			(0.51)	(0.18)
Controls							
Clearing Agent	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Product 4 Digit HC Grouping	No	Yes	Yes	No	Yes	Yes	Yes
Terminal	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Differentiated Product	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Consumer Product	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Agricultural Product	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Perishable Product	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pre-Inspected Cargo	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Large Client Firm	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Day of the week arrival	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Log Shipment Value	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Log Tonnage of Shipment	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Product from South Africa	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1084	1084	1084	1084	1084	1084	1084
F Statistic	98.35	96.03	98.5	85.48	89.47	79.97	
Wald Statistic							3254.21
Adjusted R2	0.33	0.33	0.38	0.32	0.32		
Log Pseudo Likelihood							-1007.29

[a] Sources: Tracking Study.

[b] NOTES: In columns (1) through (3), the specification is a linear probability model (LPM) and the dependent variable equals 1 if a bribe was paid and 0 otherwise. In columns (4) through (7), the dependent variable corresponds to the natural log of the bribe amount paid, conditional on paying a bribe. Results are robust to the exclusion of all the zeroes from the bribe amount variable. Column (7) denotes the estimates for a negative binomial specification, assuming constant dispersion. Robust standard errors are correlated at the level of the 4 digit grouping of product harmonization codes. Results significant at *** 1%, **5% and *1%.

Table 5: **Differences-in-Differences: Determinants of the Probability of Paying a Bribe**

Dependent Variable: Probability of Paying a Bribe	DD (1)	DD (2)	DD (3)	DDD (4)	DDD (5)
Tariff Change Category	0.14**	0.16**	0.32**	0.16**	0.17**
	(0.06)	(0.06)	(0.13)	(0.08)	(0.08)
Tariff Change Category * Year 08	-0.45**	-0.77**	-0.93**	-0.99***	-0.83***
	(0.19)	(0.37)	(0.35)	(0.24)	(0.53)
Tariff Change Category * Year 11			-0.4*		
			(0.21)		
Tariff Change Category * Year 12			-0.19		
			(0.25)		
Baseline Tariff	-0.01***	-0.01***	-0.007	-0.012***	-0.01***
	(0.002)	(0.02)	(0.004)	(0.003)	(0.003)
Baseline Tariff * Tariff Change Category * Year 08				0.07***	0.12**
				(0.03)	(0.05)
Baseline Tariff * Tariff Change Category				-0.0004	-0.0015
				(0.004)	(0.004)
Baseline Tariff * Year 08				-0.025*	-0.08
				(0.01)	(0.07)
Controls					
Clearing Agent	Yes	Yes	Yes	Yes	Yes
Product 4 Digit HC Grouping	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes
Terminal	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes
Log Tariff Rate	Yes	Yes	Yes	Yes	Yes
Differentiated Product	Yes	Yes	Yes	Yes	Yes
Consumer Product	Yes	Yes	Yes	Yes	Yes
Agricultural Product	Yes	Yes	Yes	Yes	Yes
Pre-Inspected Shipment	Yes	Yes	Yes	Yes	Yes
Large Firm	Yes	Yes	Yes	Yes	Yes
Day of the week arrival	Yes	Yes	Yes	Yes	Yes
Covariates*Year 08	No	Yes	Yes	No	Yes
Log Shipment Value	Yes	Yes	Yes	Yes	Yes
Log Tonnage Shipment	Yes	Yes	Yes	Yes	Yes
Product from South Africa	Yes	Yes	Yes	Yes	Yes
Observations	1084	1084	1084	1084	1084
F statistic	104.28	139.06	176.49	121	86.24
Adjusted R2	0.34	0.34	0.35	0.34	0.34

[a] Sources: Tracking Study.

[b] NOTES: The dependent variable equals 1 if a bribe was paid and 0 otherwise. LPM stands for a Linear Probability Model. Columns (1), (2) and (3) represent the standard differences in differences model and columns (4) and (5) represent present the estimates from a triple differences specification, interacting the treatment variable (being in a tariff change category) with the tariff level at baseline and the year in which the tariff change occurred (year 08). In columns including the interaction between covariates and year 08, the interaction between being a product from South Africa and year 08 drops out due to collinearity. Results are robust to the inclusion of sample weights that capture different sample sizes each year. Robust standard errors are correlated at the level of the 4 digit grouping of product harmonization codes. Results significant at *** 1%, **5% and *1%.

Table 6: **Differences in Differences: Determinants of the Amount of Bribe Paid**

	Differences-in-Differences						Triple Differences			
Dependent Variable: Log Bribe Amount	OLS	Neg Bin	OLS	Neg Bin	OLS	Neg Bin	OLS	Neg Bin	OLS	Neg Bin
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Tariff Change Category	1.086**	0.21	1.10**	0.26	2.6**	0.43*	0.98	0.09	1.02*	0.06
	(0.46)	(0.24)	(0.46)	(0.24)	(1.1)	(0.26)	(0.61)	(0.4)	(0.61)	(0.44)
Tariff Change Category * Year 08	-3.93**	-2.54**	-6.26**	-5.22***	-8.85***	-5.7***	-7.83***	-23.08***	-6.4	
	(1.61)	(1.2)	(2.97)	(1.9)	(1.77)	(1.98)	(1.9)	(1.2)	(4.32)	(1.5)
Baseline Tariff	-0.09***	-0.03**	-0.09***	-0.03**	-0.06*	-0.05*	-0.11***	-0.04**	-0.1***	-0.04**
	(0.021)	(0.01)	(0.02)	(0.01)	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)
Tariff Change Category * Year 2011					-3.33*	-0.88				
					(1.74)	(0.62)				
Tariff Change Category* Year 2012					-1.73	0.39				
					(2.01)	(0.91)				
Baseline Tariff * Tariff Change Category * Year 08							0.55***	1.27***	1.11**	5.66***
							(0.19)	(0.13)	(0.42)	(0.95)
Tariff Change Category* Baseline Tariff							0.03	0.01	0.02	0.009
							(0.04)	(0.02)	(0.04)	(0.02)
Baseline Tariff * Year 08							-0.22**	-0.12	-0.86	-4.33***
							(0.1)	(0.11)	(0.53)	(0.84)
Controls										
Clearing Agent	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Product 4 Digit HC Grouping	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Terminal	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Log Tariff Rate	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Differentiated Product	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Consumer Product	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Agricultural Product	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pre-Inspected Shipment	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Large Firm	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Day of the week arrival	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Covariates*Year 08	No	No	Yes	Yes	Yes	Yes	No	No	Yes	Yes
Log Shipment Value	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Log Tonnage Shipment	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Product from South Africa	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,084	1,084	1,084	1,084	1,084	1,084	1,084	1,084	1,084	1,084
F statistic	95.19		150.27		129.99		107.57		80.5	
Wald statistic		4845.19		10634.9		11889.6		5162.1		8259.11
Adjusted R2	0.33		0.34		0.34		0.33		0.33	
Log Pseudo-Likelihood		-1005.6		-1001.79		-997.9		-1002.4		-1000.38

[a] Sources: Tracking Study.

[b] NOTES: The dependent variable in all specifications corresponds to the amount of bribe paid in logarithmic form [log(x+1)]. Columns (1) through (6) display the standard differences-in-differences specification. Columns (7) through (10) denote the triple differences estimates. Columns (1), (3), (5), (7), (9) represent a standard ordinary least squares model and the remaining columns a negative binomial model that accounts for over dispersion in our count data (assuming constant dispersion across all observations). Results are robust to a specification that excludes the zeros from the dependent variable and to the inclusion of sample weights to account for different sample sizes each year. In Columns (4), (6) and (10), the interaction between the dummy variables agricultural, consumer, product from South Africa, large firm and year 08 drop out due to collinearity. The main coefficients of interest remain stable when I remove the main effect of these variables. Robust standard errors are correlated at the level of the 4 digit grouping of product harmonization codes. Results significant at *** 1%, **5% and *1%.

Table 7: **Differences-in-Differences: Magnitude of Tariff Reduction**

Dependent Variable	Difference in Differences						Triple Differences					
	Bribe Paid		Log Bribe Amount				Bribe Paid		Log Bribe Amount			
	LPM	LPM	OLS	Neg Bin	OLS	Neg Bin	LPM	LPM	OLS	Neg Bin	OLS	Neg Bin
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Tariff Reduction	0.11**	0.09*	0.93*	0.44*	0.88**	0.49**	0.02*	0.02**	0.11	0.06	0.14	0.08
	(0.04)	(0.05)	(0.36)	(0.25)	(0.36)	(0.24)	(0.01)	(0.01)	(0.09)	(0.08)	(0.09)	(0.08)
Tariff Reduction * Year 08	-0.38**	-0.48*	-0.38**	-3.4**	-2.47**	-4.41**	-0.13***	-0.16***	-1.08***	-3.47***	-1.3***	-3.54***
	(0.17)	(0.26)	(1.42)	(1.2)	(2.007)	(1.52)	(0.03)	(0.05)	(0.3)	(0.22)	(0.3)	(0.63)
Baseline Tariff	-0.008***	-0.005***	-0.07***	-0.05***	-0.07***	-0.06***	-0.009***	-0.008***	-0.07***	-0.05***	-0.06***	-0.05***
	(0.002)	(0.001)	(0.02)	(0.01)	(0.02)	(0.01)	(0.002)	(0.002)	(0.02)	(0.02)	(0.02)	(0.02)
Baseline Tariff*Tariff Reduction* Year08							0.007***	0.009***	0.05***	0.17***	0.07***	0.19***
							(0.002)	(0.002)	(0.01)	(0.01)	(0.02)	(0.02)
Baseline Tariff*Tariff Reduction							-0.0008	-0.001	-0.004	-0.002	-0.005	-0.003
							(0.0006)	(0.002)	(0.004)	(0.004)	(0.004)	(0.004)
Baseline Tariff* Year08		0.002			0.02	0.19**	-0.02*	-0.04***	-0.2*	-0.14	-0.06	-0.02
		(0.02)			(0.13)	(0.09)	(0.01)	(0.01)	(0.1)	(0.13)	(0.08)	(0.24)
Controls												
Clearing Agent	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Product 4 Digit HC Grouping	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Terminal	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Differentiated	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Consumer Product	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Agricultural Product	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pre-Inspected Shipment	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Large Firm	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Day of the week arrival	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Covariates*Year 08	No	Yes	No	No	Yes	Yes	No	Yes	No	No	Yes	Yes
Log Shipment Value	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,084	1,084	1,084	1,084	1,084	1,084	1,084	1,084	1,084	1,084	1,084	1,084
F statistic	100.69	111.95	91.12		89.18		115.69	93.85	93.56		144.03	
Wald statistic				5420.38		5452.64				4912.3		5855.97
Adjusted R2	0.34	0.34	0.33		0.33		0.34	0.34	0.32		0.33	
Log Pseudo-likelihood				-1005.45		-1000.18				-1002.45		-999.35

[a] Sources: Tracking Study.

[b] NOTES: In Columns (1) and (2), and (7) and (8) the dependent variable equals 1 if a bribe was paid and 0 otherwise. LPM stands for a Linear Probability Model. In Columns (3) through (6) and (9) through (12) the dependent variable corresponds to the natural log of the amount of bribe paid [log(x+1)]. Columns (3), (5), (9) and (11) fit an ordinary least squares model while Columns (4), (6), (10) and (12) fit a negative binomial model that takes into consideration the count nature of the dependent variable and evidence of over-dispersion. In Columns (1) through (6) the treatment variable corresponds to a binary variable that equals 1 if the tariff reduction was above or below the mean of the distribution, and in Columns (7) through (12) the treatment variable corresponds to a continuous variable capturing the tariff reduction experienced by the product shipped. Columns (1) through (6) represent the standard differences in differences estimates and Columns (7) through (12) triple differences estimates. The results are also robust to removing all the zeros from the dependent variable and to the inclusion of sample weights to reflect different sample sizes each year. In Columns (5), (6), (11) and (12) the interaction term between agricultural, consumer and large firm dummies and the treatment year 2008 drops out due to collinearity. The coefficients of interest remain stable if I remove the main effects of these variables. Robust standard errors are correlated at the level of the 4 digit grouping of product harmonization codes. Results significant at *** 1%, **5% and *1%.

Table 8: **Summary Statistics: Shipment Characteristics**

Shipment Characteristics	**Pre Tariff Change**	**Post Tariff Change**	**Difference (P-Value/Chi-Square)**
Panel A: **All Products**			
Average Shipment Size (tons)	22	148	0.1
	(4.2)	(23.6)	
Average Shipment Value (local currency)	58,772	287,964	0.18
	(9816)	(59414)	
Percentage Bulk Cargo	5	4	0.34
Percentage Pre-Inspected at Origin	58	59	0.72
Percentage of Differentiated Goods	75	78	0.2
Day of the Week Arrival	Wednesday	Wednesday	0.94
Panel B: **Treatment Products**			
Average Shipment Size (tons)	24	222	0.11
	(6)	(65)	
Average Shipment Value (Metical)	56,307	358,097	0.35
	(12,773)	(150,298)	
Percentage Bulk Cargo	4	4	0.09
Percentage Pre-Inspected at Origin	33	22	0.003
Day of the Week Arrival	Wednesday	Wednesday	0.66
Panel C: **Control Products**			
Average Shipment Size (tons)	17	127	0.38
	(2.4)	(23)	
Average Shipment Value (Metical)	57,758	244,778	0.31
	(14,544)	(48,825)	
Percentage Bulk Cargo	7	4	0.85
Percentage Pre-Inspected at Origin	42	50	0.14
Percentage of Differentiated Goods	64	80	0
Day of the Week Arrival	Wednesday	Wednesday	0.97
Panel D: **High-High Tariff Products**			
Average Shipment Size (tons)	19	54	0.38
	(3)	(7)	
Average Shipment Value (Metical)	45,778	117,430	0.26
	(15,909)	(16,978)	
Panel E: **High-Low Tariff Products**			
Average Shipment Size (tons)	15	415	0.21
	(4)	(352)	
Average Shipment Value (Metical)	25,798	204,770	0.29
	(5,627)	(141,706)	
Panel F: **Low-Low Tariff Products**			
Average Shipment Size (tons)	14	271	0.42
	(3)	(69)	
Average Shipment Value (Metical)	75,443	426,436	0.43
	(27,334)	(115,631)	

[a] Source: Tracking Study.

[b] High-High represents products that remained in the high tariff category; High-Low represents products that went from being a high tariff to being a low tariff product and Low-Low represents products that remained in a low tariff category throughout the period under analysis.

Table 9: **Summary Statistics: Bribes**

	Pre Tariff Change 2007	**Post Tariff Change** 2008	**Post Tariff Change** 2011-2012
Probability of Paying a Bribe	53	26	16
Average Bribe Amount (Metical 2007, CPI Adjusted)	5,372	531	928
	(10,721)	(1,199)	(4,638)
Probability of Paying a Bribe for Tariff Evasion	63%	31%	21%
Average Amount of Bribe for Tariff Evasion (Metical)	4,765	592	928
	(15,532)	(1,316)	(4,638)
Primary Bribe Recipient	Customs (95%)	Customs (84%)	Customs (71%)
Primary Reason for Bribe Payment	Tariff Evasion (48%)	Congestion (65%)	Jump Queues/Reg (38%)
Average Clearing Time for all shipments (days)	1.9	3	3.4
	(1.7)	(1.25)	(7.6)
Average Clearing Time with bribe (days)	2.3	2.4	3.1
	(1.85)	(0.8)	(7)
Average Clearing Time without bribes (days)	1.1	3.1	3.4
	(0.5)	(1.25)	(8)

[a] Source: Tracking Study.

[b] Average Clearing Times moved in tandem with increases in the overall volume of cargo handled at the port between 2007 and 2011. Total volumes increased by 13% in 2008 and 18% in 2011.

Table 10: **Shift from Collusive to Coercive Corruption**

	Difference in Differences								
Dependent Variable	Probability of Paying a Coercive Bribe LPM						Shift from Collusive to Coercive Ordered Probit		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Tariff Change[b] $*$ $Year2008$	0.68***	0.65***	0.83***	0.83***	0.03***	0.35***	5.3***	0.45**	0.1*
	(0.17)	(0.2)	(0.15)	(0.16)	(0.01)	(0.14)	(1.4)	(0.17)	(0.05)
Tariff Change[b]	0.31***	0.33***	0.1	0.09	0.03***	0.02***	0.91***	5.71***	0.04***
	(0.08)	(0.09)	(0.11)	(0.11)	(0.006)	(0.007)	(0.2)	(1.64)	(0.01)
Baseline Tariff	0.01	0.009	0.006	0.003	0.002	-0.002	-0.04***	-0.05***	-0.05***
	(0.007)	(0.007)	(0.007)	(0.008)	(0.008)	(0.008)	(0.01)	(0.01)	(0.01)
Controls									
Clearing Agent	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Product 4 Digit HC Grouping	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Terminal	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Differentiated Product	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Consumer Product	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Agricultural Product	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pre-Inspected Shipment	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Large Firm	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Day of the week arrival	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Value of shipment	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Covariates * Year 2008	No	Yes	No	Yes	No	Yes	Yes	Yes	Yes
Observations	220	220	220	220	220	220	1083	1083	1083
F statistic	39.78	715.46	40.5	50.42	24.09	68.13			
Wald statistic							7698.3	6880.36	2574.6
Log Pseudo-Likelihood							-525.04	-538.55	-542.277
Adjusted R2	0.22	0.21	0.2	0.16	0.18	0.18			

[a] Sources: Tracking Study.

[b] NOTES: Columns (1) through (6) represent a Linear Probability Model, where the dependent variable equals 1 if a coercive bribe was paid and 0 if the bribe paid was collusive. Columns (7) through (9) represent an ordered probit in which the dependent variable equals 0 if no bribe was paid, 1 if a collusive bribe was paid and 2 if a coercive bribe was paid. All columns represent the standard difference-in-differences specification. In Columns (1), (2) and (7) the treatment variable equals 1 if the product falls under a tariff category that experienced a tariff reduction in 2008 and 0 otherwise; in Columns (3), (4) and (8) the treatment variable equals 1 if the product experienced a high tariff reduction (above the mean) and 0 otherwise and in Columns (5),(6) and (9) the treatment variable corresponds to the actual tariff reduction experienced by each product. In columns (2), (4),(6) and (9) the dummy variables denoting agricultural, consumer and differentiated products interacted with the treatment year 2008 drop out due to collinearity. The results are robust to excluding the main effects of these covariates from the specification. Robust standard errors are correlated at the level of the 4 digit grouping of product harmonization codes. Results significant at *** 1%, **5% and *1%.

Table 11: **The Impact of Changes in Corruption on Firms' Sourcing Decisions**

Dependent Variable	Pctg Imported Inputs Post		Δ Pctg Imported Inputs		Log Sales Post
	(1)	(2)	(3)	(4)	(5)
Δ Predicted Bribe * Firm Size	-0.02***	-0.02**	-0.04**		
	(0.006)	(0.0084)	(0.01)		
Δ Predicted Bribe	1.4**	1.58***	2.62***		
	(0.5)	(0.38)	(0.7)		
Δ Tariff Change			0.75	-0.76	
			(1.22)	(0.87)	
Δ Predicted Coercive Bribe				1.28***	
				(0.3)	
Δ Predicted Coercive Bribe * Firm Size				-0.01*	
				(0.006)	
Percentage Imported Inputs					0.01***
					(0.004)
Controls					
Age of the Firm	Yes	Yes	Yes	Yes	Yes
Baseline Tariff Level	Yes	No	No	No	No
Tariff Level Post Change	Yes	No	No	No	No
Firm Size (Number of Employees)	Yes	Yes	Yes	Yes	Yes
Sector Dummies	Yes	Yes	Yes	Yes	Yes
Firm Exports	Yes	Yes	Yes	Yes	Yes
Foreign ownership	Yes	Yes	Yes	Yes	Yes
Ethnic group of the Manager	Yes	Yes	Yes	Yes	Yes
Female Managed Firm	Yes	Yes	Yes	Yes	Yes
Experience of the Manager	Yes	Yes	Yes	Yes	Yes
Observations	108	86	86	86	86
F Statistic	5.97	85.93	19.03	29.26	381.16
Adjusted R2	0.05	0.3	0.15	0.13	0.72

[a] Sources: Tracking Study and Enterprise Surveys (2006 and 2010).

[b] NOTES: Columns (1), (2) and (5) rely on the cross section of data from 2011. Columns (3) and (4) present the results in first differences. In columns (1) through (3) the treatment variable is the change in predicted bribes between 2006 and 2011, before and after the change in tariffs, constructed from estimates of a probit model fitted to equation (5), interacted with the size of the firm in 2006. In columns (3) and (4), the main variable of interest is the interaction between changes in predicted coercive bribes and firm size. Column (5) reveals the correlation between the percentage of a firms' inputs that are imported and sales. Robust standard errors are correlated at the sector level in all specifications. Results significant at ***1%, **5% and *1%.

Table 12: **Firm Characteristics: Selection**

Characteristics	**T-Test P-value**	**Kolmogorov-Smirnov P-value**	**Chi Square P-value**
Firm Age	0.17	0.14	
Workers in 2006	0.13	0.22	
Sales in 2006	0.43	0.13	
Firm Exports in 2006			0.387
Firm Imports in 2006			0.92
Experience of Firm Manager			0.24
Female Ownership			0.55

[a] Sources: Enterprise Surveys (2006).

[b] NOTES: P-values for T-test of equality of means of continuous variables, Kolmogorov-Smirnov non-parametric test for equality of distributions of continuous variables and Chi Square test for equality of categorical variables.