Corruption, Trade Costs and Gains from Tariff Liberalization:
Evidence from Southern Africa

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I   Online Appendix

This section discusses additional robustness checks to the analyis included
in the main paper. Section 9.1 re-estimates trade elasticities relying on im-
plicit tariff rates that account for corruption before and after the tariff change,
section 9.2 shows that the corruption analysis is insensitive to the removal of
clearing agent fixed effects and section 9.3 discusses the potential displacement
effects of corruption in more detail.

A   Estimating Trade Elasticities with Implicit Tariff Rates that Account for Corruption

In this section I re-estimate the trade elasticities computed in section 3.1, ac-
counting for the possibility that corruption may have reduced the effective
tariff rates faced by firms. According to the audit study described in section
4, prior to the tariff change, products falling under a high tariff category faced
an 80 percent probability of paying a bribe. This would allow shippers to
reduce in approximately 50 percent the value of the shipment on which tariff
duties would be calculated. Based on this information, I adjust the implicit

tariff level prior to the tariff change (for years 2006 and 2007) to 60 percent of the nominal tariff rate. Post tariff change, the probability of paying a bribe decreased to 16 percent. I therefore adjust the implicit tariff rate for this period to correspond to 92 percent of the nominal tariff rate.[1]

Table 20, columns 1 through 4, show the estimated elasticities relying on implicit as opposed to nominal tariff rates. Under all specifications, we observe a significant increase in the estimated elasticity. In columns (5) through (8), I include a control for products that experienced a decrease in the tariff rate in 2008 and in columns (9) through (12) I restrict the analysis to the subset of products that experienced the largest tariff reductions in 2008 (between 7.5 and 20 percent), since these products were more likely to be disproportionately affected by corruption prior to the tariff change. Overall, there is a 24 percent to a five-fold increase in the estimated elasticities relative to the elasticities estimated in section 3.1, which only considered nominal tariff rates. This adjustment would also lead to the estimation of more reasonable gains associated with the tariff reduction. Taken together, these results further suggest that tariff evasion can potentially attenuate estimated trade elasticities.

B   Clearing Agents Fixed Effects

Table 21 shows that the results on the determinants of the probability of paying a bribe are insensitive to the removal of clearing agent fixed effects.

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[1]Note that these are back of the envelope calculations that are based on the audit data and on the fact that clearing agents reported a 50 percent rule of thumb reduction in the tariff rate whenever a bribe was paid.

C Additional Displacement Effects

As described in sections 4 and 5.6, bribe payments for tariff avoidance are just a subset of the bribery deals available to border officials and firms during the import process. As 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 the levels of tariff evasion but also the broader set of corrupt interactions both parties engage in.[2] If these displacement effects are large enough, they could help explain the observed small elasticities.

Section 5.6 discusses the first set of substitution effects observed in the displacement of corruption: products that changed tariff in 2008 were more likely to pay coercive bribes following the tariff change due to irregularities with the documentation. There were no changes in the required documentation for clearance during the period under analysis and the distribution of origin countries for imports remained fairly stable. The clearing agents providing the audit data were the same throughout the study suggesting that irregularities with shipment documentation were more likely to be fictitious than real. This substitution effect in corruption patterns represents a move from collusive forms of corruption -tariff evasion- to coercive bribe extraction in which no substantive part of the rent generated by the illicit transaction is

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[2]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), displacement effects of corruption in the context of trade policy and trade costs have remained largely unexplored with the exception of Yang (2008a, 2008b)

captured by the private firm.

The data further suggest that a second type of displacement effect occurred 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 appear to have been pocketed by the clearing agents themselves. While data and design limitations prevent a full understanding of how clearing agents are able to capture part of this surplus, a 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 (Cole and Tran 2011). 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 expected decline in bribe payments for tariff evasion.[3]

Following the tariff change, there is also an increase in the number of bribe payments made to port officials outside of customs, at different stages of the clearing process. 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. Since port

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[3]While more prone to misreporting relative to the bribe data, our enterprise survey confirmed relatively low levels of firm awareness of the distribution of actual clearance costs, with the exception of tariff costs.

officials do not interact with customs' officials and lack full information on each shipment, it is reasonable to assume that they would be unable to precisely identify products that were previously paying high bribes (as discussed in section 4). The effect is therefore more likely to be supply driven. Following the tariff reduction, the percentage of bribe payments made to customs' officials declined to 72 percent, with an increase in payments appropriated by clearing agents to 10 percent, and of 18 percent to other port or border officials. Overall, displacement effects in this particular context were, however, relatively small, dampening the effect of the tariff reduction by less than 10 percent.

Table 1: Trade Elasticities and Implicit Tariff Rates: Aggregate Import Data (2006-2014)

Dependent Variable — Log Share of Imports from South Africa relative to the Rest of the World

| | FE (1) | FD (2) | LD (3) | IV (4) | FE (5) | FD (6) | LD (7) | IV (8) | Restricted Sample | | | |
									FE (9)	FD (10)	LD (11)	IV (12)
Log Tariff Rate Adjusted	-0.020 (0.042)			-0.120 (0.052)	-0.033 (0.047)			-0.181 (0.057)	-0.159 (0.174)			-0.538 (0.030)
Δ Log Tariff Rate Adjusted		0.031 (0.036)	-0.103 (0.045)			0.030 (0.037)	-0.075 (0.043)			-0.129 (0.137)	-0.472 (0.131)	
Controls												
Product Experienced Tariff Change in 2008	No	No	No	No	No	Yes	Yes	Yes	No	No	No	No
Period Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	21,782	16,395	13,018	15,326	21,520	16,353	12,971	15,326	8,314	6,574	5,240	6,239
Mean Dependent Variable	1.091	1.050	1.052	1.130	1.094	1.051	1.050	1.129	1.242	1.210	1.221	1.290

[a] Sources: United Nations Comtrade Database and Mozambican Customs' Tariff Code.

[b] NOTES: Log Share Import Volumes corresponds to the quantity of South African imports as a share of the total quantity of imports from the rest of the world into Mozambique, in logarithmic form. Restricted sample corresponds to the sample of products that experienced the largest tariff reduction in 2008 (between 7.5 and 20 percent). Robust standard errors clustered at the level of the product's 4 digit Harmonized System (HS) code.

Table 2: **Difference-in-Differences: Determinants of the Probability of Paying a Bribe**

Dependent Variable	Probability of Paying a Bribe [0-1] Linear Probability Model			
	(1)	(2)	(3)	(4)
Tariff Change Category x POST	-0.484	-0.277		
	(0.162)	(0.124)		
Tariff Change Category	0.498	0.332		
	(0.145)	(0.103)		
Tariff Reduction x POST			-0.030	-0.021
			(0.009)	(0.010)
Tariff Reduction			0.027	0.022
			(0.007)	(0.007)
POST	-0.134	-0.604	-0.167	-0.776
	(0.120)	(0.219)	(0.124)	(0.260)
Differentiated Product	0.099	-0.005	0.053	-0.106
	(0.085)	(0.104)	(0.077)	(0.111)
Agricultural Product	0.048	-0.199	0.071	0.055
	(0.032)	(0.084)	(0.033)	(0.028)
Pre-Shipment Inspection	-0.007	0.084	0.011	0.115
	(0.021)	(0.061)	(0.019)	(0.074)
Perishable Product	-0.094	0.198	-0.095	0.110
	(0.089)	(0.125)	(0.083)	(0.129)
Large Firm	0.098	0.162	0.114	0.185
	(0.051)	(0.057)	(0.056)	(0.070)
Log Shipment Value per Ton	0.006	-0.039	0.009	-0.042
	(0.008)	(0.011)	(0.008)	(0.014)
Controls				
Clearing Agent Fixed Effects	No	No	No	No
Industry Fixed Effects	Yes	Yes	Yes	Yes
Product 4 digit HS Code	Yes	Yes	Yes	Yes
Terminal	Yes	Yes	Yes	Yes
Day of the week arrival	Yes	Yes	Yes	Yes
Product from South Africa	Yes	Yes	Yes	Yes
Baseline Tariff	Yes	Yes	Yes	Yes
Covariates x POST	No	Yes	No	Yes
Observations	1,084	1,084	1,084	1,084
F-statistic	187.72	785.17	158.10	250.05
R-squared	0.335	0.374	0.326	0.364

[a] Sources: Audit study conducted by the author and Mozambican Customs' Tariff Code.

[b] NOTES: The dependent variable equals 1 if a bribe was paid and 0 otherwise. Tariff Change Category indicator equals 1 if the product experienced a tariff change in 2008 and 0 otherwise. Tariff Reduction variable corresponds to the percentage point reduction in tariffs experienced by each product in 2008. Robust standard errors clustered at the level of the 4 digit Harmonized System (HS) code.