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Foreign Direct Investment & Petty Corruption in Sub-Saharan Africa: An Empirical Analysis at the Local Level

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Abstract: Inspired by a recent and ongoing debate about whether foreign direct investment (FDI) represents a blessing for or an impediment to economic, social, and political development in FDI host countries this paper addresses two issues: Does the presence of foreign investors impact the occurrence of petty corruption? If so, what are the main underlying mechanisms? Geocoding an original firm-level dataset and combining it with georeferenced household survey data, this is a first attempt to analyze whether the presence of foreign investors is associated with changes in local corruption around foreign-owned production facilities in 19 Sub-Saharan African countries. Applying an estimation strategy that explores the spatial and temporal variation in the data, we find strong and consistent evidence that the presence of foreign firms increases bribery among people living nearby. When examining two potential channels, we find no support that FDI-induced economic activity leads to more corruption. In contrast, the results provide evidence that FDI affects corruption via norm transmission.

Keywords: FDI, corruption, georeferenced data, Sub-Saharan Africa

JEL Classification: D1, F21, F23, O12

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Julian Donaubauer
Helmut-Schmidt University
Holstenhofweg 85
22043 Hamburg
Germany
julian.donaubauer@hsu-hh.de

Peter Kannen
Helmut.Schmidt University
Holstenhofweg 85
22043 Hamburg
Germany
peter.kannen@hsu-hh.de

Frauke Steglich
Kiel Centre for Globalization
Kiel Institute for the World Economy
Kiellinie 66
24105 Kiel
Germany
frauke.steglich@ifw-kiel.de

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1 Introduction

The African Union declared 2018 as the African Anti-Corruption Year[1] because corruption continues to be a serious problem in many (Sub-Saharan) African countries with negative implications for democratic governance, the quality of public services, inequality, and social and economic development. Sub-Saharan African countries have been struggling since decades against high corruption levels and according to Transparency International's most recent Corruption Perception Index (CPI), in 2018 most countries in this region are far behind at the bottom of the CPI ranking with an average score of 32 (out of 100).[2] At the same time, FDI to Sub-Saharan Africa has increased dramatically over the last decades (UNCTAD, 2018). Between 2000 and 2017 FDI stocks into Sub-Saharan African economies have more than quadrupled, reaching an all-time record of 618.25 billion US$ in 2017.[3] There is, however, a recent and ongoing debate about whether foreign investments represent a blessing for or an impediment to economic, social, and political development. On the one hand, FDI advocates often argue that FDI ''brings with it not only resources, but technology, access to markets, and (hopefully) valuable training, an improvement in human capital" (Stiglitz, 2000, p. 1076). On the other hand, many fear that strong reliance on foreign investments creates harmful dependencies, undermines political accountability, worsens institutions, and creates incentives for corrupt behavior (OECD, 2008; Zhu, 2017).

Motivated by these recent developments and to shed light on the link between FDI and corruption, this paper addresses two issues: Does the presence of foreign investors impact the occurrence of corruption in the FDI host countries? If so, what are the main underlying mechanisms? To answer these questions, we geocode data on foreign firms and match them

[1] http://aga-platform.org/node/152 (last retrieved on 2 May 2019).

[2] https://www.transparency.org/news/feature/cpi2018-subsaharan-africa-regional-analysis (last retrieved on 10 May 2019).

[3] Data taken from https://unctadstat.unctad.org/wds (last retrieved on 14 May 2019).

with already geocoded individual-level data on petty corruption over the 2002-2013 period from 19 Sub-Saharan African countries.

Theoretically, two main channels of how the presence of foreign investors impacts corruption are discussed in the literature, namely 1) the transmission of norms and 2) an increase in economic activity (Sandholtz & Gray, 2003). First, FDI may affect corruption by means of norm transmission (Kwok & Tadesse, 2006). Norms can be transmitted if multinational companies (MNCs) – which usually have strong bargaining power – exert pressure on host countries' local/regional governments in order to enforce their interests. This becomes more likely and effective if foreign investment has a high share in the local economy. Many MNCs, for instance, commit to policies that strengthen institutions in the FDI host countries and raise awareness of problems with corruption. Facing pressure from actors of the civil society or the government in their home country, MNCs may act as promoters of anti-corruption policies in the host country. However, FDI might also fuel corruption via norm transmission if, for example, corrupt behavior is widespread in the FDI source economy. Thus, heterogeneity with respect to corruption levels in the FDI source countries is likely to play a role. Further, norm transmission might work indirectly with foreign firms facilitating norm spillovers to domestic firms. As foreign firms often create backward or forward linkages with local firms (e.g. through procurement or subcontracting), suppliers or customers may be forced to adopt management styles and practices in order to stay competitive. The handling of corrupt behavior within a firm and the composition of the workforce (e.g. the share of foreign workers employed in a firm) might also drive norm transmission. The interaction between foreign and domestic employees within a firm may influence employees' behavior and enable transmission of norms (Gong, 2003). In sum, it is not clear from a theoretical perspective whether the transmission of norms has positive or negative effects on local corruption in the FDI host countries.

Second, FDI may impact corruption via increased economic activity (Ades & Di Tella, 1999). The presence of foreign investors in a region arguably raises local economic activity and thus rents that could be shared between investors and government officials, potentially creating economic incentives to engage in corrupt behavior. If officials increase their demand for bribes in line with citizens' increased ability to pay, FDI-induced economic growth may negatively impact people's experiences with corruption. This second channel via increased economic activity is usually believed to be more relevant in countries endowed with large reserves of mineral resources. Especially multinational investors in extractive industries are often accused of supporting corrupt elites and of complicity in host-country corruption (see, e.g. Moran, 2011). Nevertheless, stronger competition resulting from intensified economic activity through FDI could also lead to a more efficient allocation of resources and thereby reduce economic rents and thus drive down bribe payments (Ades & Di Tella, 1999; Sandholtz & Gray, 2003). Pinto & Zhu (2016) argue that this corruption-reducing competition effect should be more relevant in developed countries, whereas in developing countries FDI-induced competition could, due to the relatively low productivity of domestic firms, crowd out domestic firms and thus result in restricted competition. This creates available economic rents and can increase the incentives for government officials to demand bribes, resulting in more corruption.

So far, we have discussed channels and mechanisms through which the presence of foreign investors in a region could augment or reduce corruption of individuals. Taken together, from a theoretical perspective the literature on the FDI-corruption nexus makes ambiguous predictions. This ambiguity is also reflected in the existing empirical literature that examines the effects of FDI on corruption. The few existing papers use mostly country-level data, which could be one reason for the mixed results in the literature.[4] Robertson & Watson (2004)

[4] An exception is the study by Zhu (2017) who investigates the influence of multinational companies on

look at the impact of changes in FDI on national perceived levels of corruption in a cross-country setting. Their results indicate that the more rapid the change in FDI inflows, the higher the level of corruption. Although they are not able to directly test the underlying mechanisms, Robertson & Watson (2004) relate their findings to increased economic activity associated with an expansion of the opportunities for corrupt behavior. Pinto & Zhu (2016) argue that the effect of FDI on corruption depends on whether the entry of foreign firms changes market dynamics in the host economy. They find a positive effect of FDI on corruption for developing countries but no effect for developed countries, explaining this finding with higher rents that government officials can claim due to increased market concentration resulting from FDI in developing countries. Neglecting the countries' status of development, Kwok & Tadesse (2006) use a sample of 140 countries for a time period of 30 years and show that corruption levels are significantly lower in countries with high FDI inflows in the past. They argue that this corruption-reducing effect of FDI is mainly due to norm transmission. Similarly, Larrain & Tavares (2007) find for a cross-country sample that FDI inflows as a share of host country GDP significantly decrease corruption in the host country. Within their simple cross-country framework they are, however, not able to analyze the different channels and mechanisms through which FDI decreases corruption. The same is true for the analysis in Bojanic (2014). In his country study for Bolivia he finds higher shares of FDI in GDP to decrease corruption levels.

A related literature focusses on the role of foreign investors in paying bribes since it is often argued that foreign firms lack dense local networks and are thus disadvantaged when competing with domestic firms. Bribes might then be paid to level the playing field. In a similar vein, it is sometimes claimed that especially foreign firms from rich FDI source

corruption at a more disaggregated level. For a panel of Chinese provinces, he finds that the presence of multinational companies increases corruption and argues that this is driven by rent creation through foreign activity.

countries are more inclined to bribe than their domestic counterparts because, from their perspective, relatively small amounts can make a difference in poor FDI host countries. Indeed, Malesky et al. (2015) find for Vietnam that foreign firms entering sectors with restricted access are more likely to pay bribes compared to domestic firms in the same sectors. In contrast, others do not detect clear evidence for differences in corruption behavior between foreign and domestic firms. Looking at provinces in Vietnam, Gueorguiev & Malesky (2012) show that corruption occurs during both registration and procurement procedures and they find no clear evidence for differences between foreign and domestic firms when it comes to bribe payments. Similarly, Webster & Piesse (2018) use firm-level data for 41 emerging countries to analyze the likelihood of firms' bribe payments and find no difference between domestic and foreign firms regarding the payment of bribes.

While existing studies have yielded valuable insights into the nature of the relationship between foreign firm presence in terms of FDI and the occurrence of corruption, they have also been limited in several dimensions. First, FDI inflows are very unevenly distributed within countries. This implies that the presence of foreign investors might have clear-cut effects on corruption in specific areas of a country and no effects in other areas. At the same time, positive and negative effects might cancel out or might not be large enough to be observable at the country level. Second, we argue that the relevance of the mechanisms discussed above generating this relationship is not clear because literally all of the previous literature has used highly aggregated country data, regressing national measures of corruption on aggregate FDI inflows. Third, all existing studies have limited their attention to the national level for a single country (e.g. Bojanic, 2014) or to the national level across several very heterogeneous countries (e.g. Pinto & Zhu, 2016). Forth, most studies rely on a measure of corruption perceptions, which is often found to be biased due to potential measurement errors (Olken, 2009). What is more, the measures used do typically not distinguish between the two types of corruption, namely grand or petty corruption. Grand corruption refers to large

scale corruption occurring at the highest government level and most often affects the country as a whole, whereas small scale petty corruption is the everyday type of corruption that usually involves smaller payments and bribes to people low in the hierarchy (UNDP, 2008). Despite its relatively small magnitude, petty corruption causes economic damage as the habit of petty corruption can have widespread impacts on countries' development. Jahnke & Weisser (2018), for instance, show that petty corruption undermines the tax morale in Sub-Saharan African countries.

In this study, we try to overcome the above-mentioned limitations of the existing literature by examining the local corruption effects of foreign firm presence in a multi-country sample using different measures for corrupt behavior (see below for details). The focus is on the individual experience with petty corruption rather than on corruption in government. Further, we examine people's direct experiences with petty corruption and not reported corruption perceptions. To this end, we employ georeferenced data.[5] Compared to the predominant macro-level literature on the FDI-corruption nexus, this approach enables us to analyze more precisely the impact of foreign firm presence on corruption. Our results indicate a positive and robust effect of foreign firm presence on petty corruption, which we find to be mainly driven by norm transmission.

The paper proceeds as follows. In Section 2, we provide details on the data and our empirical approach. We present our results in Section 3, and conclude in Section 4.

[5] The analysis of this kind of data has become more and more popular in economic research over the last years. Recent examples include Knutsen et al. (2017) who examine the impact of mining on corruption, or Achten and Lessmann (2019) who analyze the effect of spatial inequality on economic activity.

2 Data and empirical approach

2.1. Data description: Georeferenced household and firm data

Firm survey data

For the purpose of this paper we draw on two main datasets, namely household and firm-level survey data, which we match based on geographical information. To gather information on foreign investor presence in Africa we use a very rich and original firm-level dataset collected through United Nations Industrial Development Organization's (UNIDO) Africa Investor Survey. The survey was conducted in 19 African countries in 2010 covering nearly 7,000 firms (UNIDO, 2011).[6] The data were collected through face-to-face interviews by highly-trained interviewers with top-level managers for firms with 10 or more employees. The dataset includes, among other things, detailed information on firm characteristics, such as size, age, ownership structure, employment, sectors, country of origin/mode of entry (for foreign firms), and detailed information on the linkages between domestic and foreign buyers/suppliers. Table A1 provides an overview of the composition of domestic and foreign firms, respectively. Foreign firms are larger in terms of employment and turnover. Moreover, foreign firms are more capital intensive and export-oriented than domestic firms, and they also employ a higher share of foreign workers. In terms of supplier linkages these firms are also much more connected to both foreign and domestic suppliers than their domestic counterparts. Foreign firms are also more engaged in the primary sector. Finally, the Africa Investor Survey captures location details of firms, which no other study has used so far. For each firm, the city of the firm's location is reported. In order to match this data to the

[6] The UNIDO data was kindly provided by UNIDO on request. For details see UNIDO (2011).

household locations form the Afrobarometer survey, we manually geocoded 227 different firm locations.[7]

In the Africa Investor Survey, the sample of the firms was chosen based on sector, firm size, and ownership structure and is supposed to represent the scope of firms in each country. Note that the Africa Investor Survey dataset does not necessarily reflect representative samples of firms in each of the surveyed firm locations. While being clearly representative in terms of the above mentioned criteria at the country level we cannot rule out that some types of firms might be under-represented in certain regions of a country. If this is the case, resulting measurement issues can affect cross-country and cross-regional comparisons. Below we provide details on how we handle potential measurement problems.

Household survey data

The household survey data come from four Afrobarometer cross-sectional survey waves conducted between 2002 and 2013 across up to 35 Sub-Saharan African countries[8] and were geocoded by BenYishay et al. (2017). In our analysis below we only include those individuals for which there is precise geographic information.[9] It is also worth noting that the Afrobarometer survey is usually carried out in different areas in different years, so we cannot follow specific individuals over time. To measure corruption, we employ questions on peoples' experience with corruption from the Afrobarometer. Based on these questions, our dependent variable is coded as a dummy variable equal to one if the respondent experienced corruption, or, more precisely, if the respondent had to pay a bribe to the police or to

[7] For each city, longitude and latitude information are added based on the city center (using the website https://www.latlong.net). Note that we had to exclude 334 observations from the analysis because no information on the location of the firm was provided.

[8] The Afrobarometer data are available at http://www.afrobarometer.org.

[9] Corresponding to precision codes 1 and 2 in the Afrobarometer. A precision code of 1 indicates that the assigned geographical information corresponds to an exact location, such as a populated place, whereas a precision code of 2 is used when the respective location is up to 25 km away from an exact location. See Strandow et al. (2011) for details.

government officials in order to gain access to certain public services or documents during the year before the respective survey took place.[10,11] Figure 1 shows the share of respondents who had to pay a bribe at least once over the Afrobarometer rounds 2 to 5. About 18% of respondents in our sample declared to have paid bribes for getting a document or permit, which is also our preferred measure for petty corruption.[12] Irrespective of the type of bribe payments, about 30% of respondents paid bribes at least once in the respective year prior to the survey.

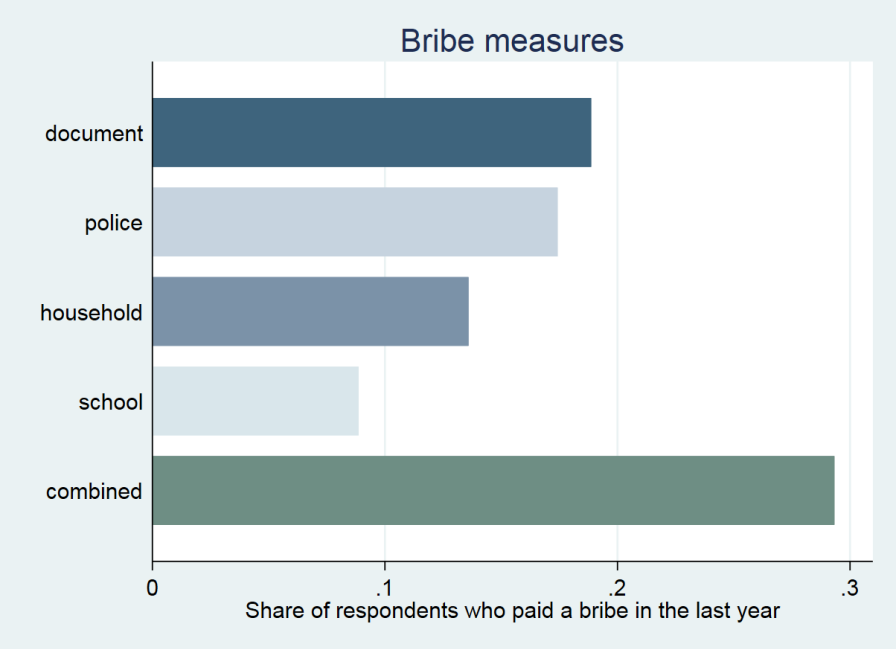

Figure 1: Share of respondents who paid bribes by type of bribe over Afrobarometer rounds 2 to 5.

Source: Own calculation based on Afrobarometer waves 2 to 5.

Note: Combined is equal to 1 if the respondent paid a bribe at least once (document, police, household, or school) in the year before the respective survey.

[10] Bribes in order to a) get a document or permit; b) avoid problems with the police; c) get a school placement; d) get household services.

[11] Naturally, definitions of corruption and also perceptions of what constitutes corruption might vary across cultures and countries, leading to a potential measurement error and an associated bias. However, with country (or regional / city) dummies we are able to control for these differences.

[12] We prefer this corruption measure over other measures available in the Afrobarometer for two main reasons: First, it is a very general measure for the everyday type of corruption and not related to the provision of very specific public services (like avoiding problems with the police or getting a school placement). Second, it helps minimizing the loss of observations because this measure is available over all survey rounds and the number of missing values is comparatively low. Nevertheless, we show in the results section below that our main findings are robust to using other, less general measures for petty corruption.

Combining individual and firm-level data

To analyze the effect of foreign firm presence on individuals' bribe experience we geographically match respondents from the household surveys to firms from the UNIDO dataset. First, we assume individuals to be affected by foreign firm presence only if firms are relatively close. Therefore, we define a "range of influence" (which is 25km for the baseline specification) and draw the respective zone around each individual. The underlying assumption is that corruption is only affected within this range of influence. In contrast, the corruption experience of individuals living sufficiently far away from an investment project is assumed to be unaffected. Second, we define whether the individual is exposed to foreign firm presence. This is done by taking the share of foreign firms over all firms within the 25km zone and assigning the individual to be treated if this share is greater than a certain threshold (explained below in more detail). Certainly, the higher the ratio of foreign firms over the total number of firms the higher the probability that these foreign firms impact the behavior of local individuals. The use of a relative measure of foreign firm presence (instead of simply using the absolute number of foreign and domestic firms in each firm location) also helps mitigating problems resulting from a potential sample selection bias in each of the surveyed firm locations. The rationale is that a sample selection bias should be present in both groups of firms (foreign and domestic) in a similar way, implying that changes in our relative measure of foreign firm presence over time should indeed reflect varying degrees of foreign firm presence and not be the outcome of sample selection. Nevertheless, we discuss other ways of handling possible sample selection in the robustness section below.

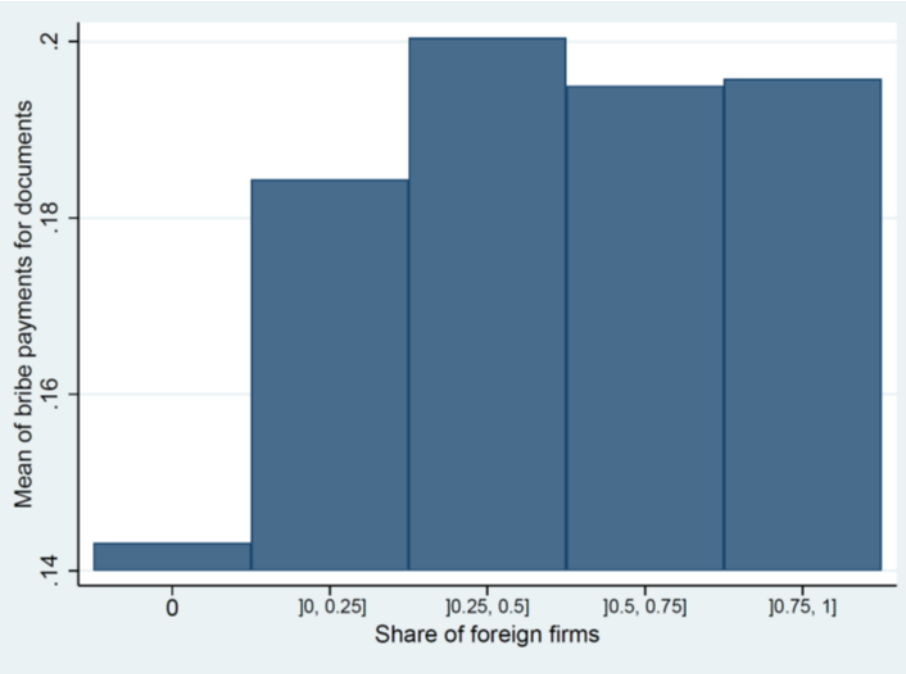

Figure 2: Share of foreign firms and mean of bribe payments

Source: Own visualization based on UNIDO and Afrobarometer data.

Figure A1 visualizes the matching of firms and individuals. As can be seen in Figure 2, bribe payments are indeed higher in areas with foreign firms. While about 14% of the individuals with only domestic firms in their buffer zone pay bribes in order to get documents or permits, this share increases to over 18% for individuals with up to 25% of foreign firms in their buffer zone and to over 19 % for a foreign firm presence exceeding 25%.

When matching firms and individuals, we end up with a sample consisting of 5,724 firms in 187 locations and 1,981 Afrobarometer survey clusters (consisting of geographically close villages or a neighborhood in an urban area) with on average 8.56 surveyed individuals in 19 countries.[13] The distribution of firm locations and survey clusters is shown in Figure 3. We allow for cross-border interactions in cases where firms are located close to borders: In particular, we assume that individuals surveyed in South Africa close to the border (within the range of influence) of Lesotho or Mozambique are affected by foreign firm presence in

[13] Burkina Faso, Burundi, Cameroon, Cape Verde, Ghana, Kenya, Lesotho, Madagascar, Malawi, Mali, Mozambique, Niger, Nigeria, Senegal, South Africa, Tanzania, Uganda, Zambia, and Zimbabwe.

Lesotho or Mozambique, respectively. Respondents in Zimbabwe close to the border of Zambia are assigned to firms located in the border region in Zambia. Since informal cross-border trade plays a crucial role in Africa (Golub, 2015) and as national borders in Africa seem not to prevent people from crossing them, we argue that the impact of foreign investors on corruption does not stop at the border either.[14]

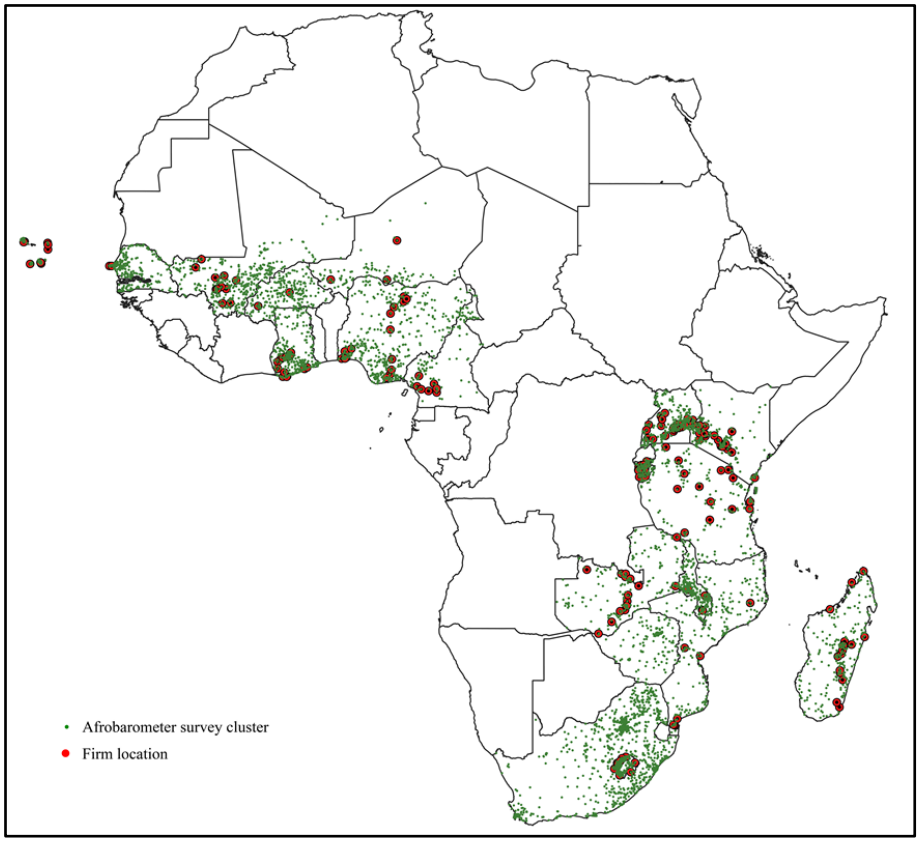

Figure 3: Location of firms and Afrobarometer survey clusters.

Source: Own visualization based on UNIDO and Afrobarometer data.

2.2. Empirical strategy

The identification of the effect of FDI on corruption poses an empirical challenge as it is well known that FDI decisions are not random, i.e. foreign investors prefer certain regions within a country over others. These investment decisions are also partly driven by pre-existing

[14] Our results remain unaffected if we restrict our sample to countries where we observe both firms and individuals.

corruption levels (Javorcik & Wei, 2009) and are thus not exogenous to a region's level of corruption. For example, an investor that is not willing to pay bribes may not implement an investment project in a highly corrupt area. Against this backdrop we would ideally analyze the effects of FDI on corruption using panel data for individuals and firms and apply difference-in-differences regressions. Unfortunately, some limitations of both the household and the firm survey data prevent us from pursuing this approach. First, neither the Afrobarometer nor the UNIDO dataset do have a panel structure. To overcome this restriction, we rely on information on the year of first foreign investment from the UNIDO dataset to incorporate a time dimension in the firm dataset. This enables the analysis of differences in the extent of corruption before and after the establishment of foreign firms. Figure A2 visualizes the assignment of the individuals to the different groups and the constructed time variation. Second, we are not able to observe corruption in a specific region before and after the establishment of foreign investment because Afrobarometer usually choses to survey different locations in different years. To tackle this limitation, we use individuals in regions where we do not observe foreign firms but where we have (domestic) firm-level information as our control group. In order to deal with the above-mentioned identification problem and given the limitations of our data, we use a spatial-temporal estimation approach similar to the one employed in Isaksson & Kotsadam (2018): we compare the corruption experience of individuals living in regions where foreign firms are present (*treatment*) with the corruption experience of individuals living in regions which will be selected as locations by foreign firms in the future but where investments were yet to begin at the survey date (*futuretreatment*). Thus, our identifying assumption is that individuals living in regions with planned foreign investment projects are valid counterfactuals for those living in regions with currently active foreign investment projects. This allows us to identify the effect of foreign firm presence although we cannot follow specific individuals or households over time. Thus, we estimate the following regression model:

$$Y_{it} = \beta_0 + \beta_1 \times treatment_{it-1} + \beta_2 \times futuretreatment_{it-1} + \alpha_s + \delta_t + \gamma \times X_{it-1} + \epsilon_{it} \quad (1)$$

where Y_{it} denotes the corruption outcome for an individual *i* in year *t*. The lagged binary variable *treatment* captures whether individual *i* is exposed to strong FDI presence around its place of residence. *Treatment* is coded as 1 if the share of foreign firms over all firms (foreign and domestic) within 25km around an individual's place of residence is greater than a certain threshold and 0 otherwise.[15] The appropriate threshold, above which a region around an individual will be considered a FDI region, is an empirical question leading to a trade-off between the size of the treatment group and noise. We therefore experiment with different thresholds, choosing one third in our baseline estimations, although our core findings are robust to thresholds smaller and larger than in the baseline model (results available on request). A similar reasoning applies with regard to the appropriate cut-off distance from an investment project. When choosing a very small distance, the sample of treated/future-treated individuals gets very small. With a too large distance, we fail to capture the foreign investment footprint (see, e.g. Isaksson & Kotsadam, 2018). Thus, a distance of 25km is chosen considering practical commuting distances (see e.g. Kung et al., 2014). In a robustness test below we use an alternative distance of 50km. Analogously, *futuretreatment* captures whether individual *i*'s region of residence will have strong foreign firm presence in the future and thus *i* will be treated in the future.

We further include country α and year dummies δ. To account for individual determinants of corrupt behavior, we include a vector of respondent control variables (*X*): the individual's present living conditions (self-assessment on a 1-5 scale), its education (on a 0-9 scale, ranging from ‘‘no formal education” to ‘‘post-graduate”), gender, age, and a dummy for

[15] Arguably, an employment-weighted measure might better reflect the strength of foreign presence in a specific region. As firm-specific employment data are only available for one year in our sample we do not employ these weights throughout our analysis but instead use this employment-weighted measure in a robustness test below.

urban/rural residence (Mocan, 2004).[16] Standard errors are clustered at the geographical clusters of individuals (i.e. village, town, or neighborhood).

As mentioned above, we compare the corruption experience of individuals living in regions where foreign firms are present with the corruption experience of individuals living in regions which will be selected as locations by foreign firms in the future but where investments were yet to begin at the survey date. This implies that we can compare the corruption experience of individuals in regions before an investment has been carried out with the corruption experience of individuals in regions where an investment has already been made. That is why our focus is on the parameter difference between *treatment* and *futuretreatment* ($\beta_1 - \beta_2$), which can be interpreted as the effect of FDI on corruption. Thus, similar to difference-in-differences regressions, this estimation strategy controls for unobservable time-invariant characteristics that may influence investment decisions of foreign firms. In other words, with this approach we are able to difference away potential selection effects such as pre-existing local corruption that may influence the investment decision of foreign firms.

3 Results

3.1. Main results

Table 1 presents easy-to-interpret OLS regression results for different corruption measures with our baseline estimates in column 2.[17] The coefficient on *treatment* is positive, indicating that bribe payments are more frequent in regions where foreign firms are present. *Futuretreatment* is found to be negatively correlated with corruption experience, indicating a lower probability of paying bribes before strong foreign firm presence. This can be interpreted as foreign firms' preference for less corrupt locations. Nevertheless, due to the potentially

[16] Summary statistics for the main variables are presented in Table A2.

[17] Using logit regressions does not qualitatively change our findings (see Table A3 for our baseline results from Table 1).

endogenous investment decision we focus on the difference between treated and future-treated individuals (*net effect*). Our baseline estimates in column 2 imply that individuals living near FDI locations are 7.9 percentage points more likely to have paid a bribe when requesting for documents or permits compared to individuals living close to a location where foreign firm presence will be strong (i.e. above the chosen threshold) in the future but where major investments were yet to begin at the survey date. Given that 18.5 percent of the people in our sample have paid bribes at least once in order to get a document or permit this estimate implies a sizeable increase in corruption by more than 42 percent. Regarding individual characteristics, it seems that women are less likely to pay bribes. This is in line with the existing literature (see, e.g. Gatti et al., 2003) and appears plausible since it is usually men that are heads of households and more likely to engage with government officials. With this argument one could also explain why older people seem to be less prone to paying bribes. Besides differences in gender and age, we find bribe experience also to differ by education. Higher education is associated with a higher likelihood of bribe experience. Again, this can be explained by a higher likelihood of meeting government officials. Better education enables people to obtain better jobs including management positions, which in turn might increase the chance of engaging with government officials. With respect to the individuals' residence, it appears that bribe payments are higher in urban areas. Further, the better individual living conditions are rated the lower is people's bribe experience.

These findings are robust across alternative corruption measures, namely bribe payments to avoid problems with the police, to get household services or a place in a school for a child (columns 3-5). The last column reports the result for a specification with a combined corruption measure as dependent variable. The latter is equal to one if at least one of the single corruption measures is one. The combined corruption measure thus captures general experience with corruption independent of the occasion. The *net effect* indicates that people

living in regions with strong foreign firm presence are 10.4 percentage points more likely to have paid a bribe compared to those living in regions where foreign firm presence is low.

3.2. Robustness tests

In order to check the robustness of our results, we return to our preferred corruption measure (bribe payments when requesting official documents or permits) and explore different model specifications. The results for these robustness tests are presented in Table 2. First, we carry out two falsification tests to minimize the probability that our results are driven by hidden omitted features (Rosenbaum, 2002). In column (1) we use a measure of perception of corruption at the country rather than the local level as dependent variable, i.e. an outcome supposed to be unaffected by the treatment.[18] Given that national corruption is the same for all citizens in a country, individuals in all three groups (control, treated, and future-treated) should not differ regarding perceived national corruption, which is clearly confirmed here. Both the individual coefficients (on *treatment* and *futuretreatment*) as well as the *net effect* turn insignificant when a country-level measure of corruption is used as dependent variable. Column (2) shows the results of a "placebo" type regression. Here we randomly assign individuals to either the control, the treatment, or the future-treatment group. As before, the *net effect* becomes insignificant. As expected, we find no effect of FDI on individuals' corruption experience when randomly assigning them to be treated, future-treated, or not treated.

Second, our results are robust towards using an employment-weighted (future-) treatment measure (column 3). To do so, we calculate the share of foreign firms' employees over total employees within the "buffer zone" around each individual and again define whether an individual is treated, future-treated, or not treated given our threshold. The estimated *net effect*

[18] National corruption is proxied by perceived corruption concerning national government officials' involvement in corruption (also taken from the Afrobarometer).

of FDI remains positive and significant in this setting although the effect decreases to 4.2 percentage points. As mentioned before, firm-specific employment data are only available for one year in our sample. Using this information requires the rather unrealistic assumption that the number of employees within a firm was more or less stable over our sample period, which clearly is a too strong assumption. Therefore, we do not employ these weights throughout our analysis although an employment-weighted measure might better reflect the strength of foreign presence in a specific region. Third, we use an alternative cutoff distance of 50km (column 4). In favor of our argument on the local perspective, the *net effect* is smaller (though still highly significant) when considering a larger radius. Fourth, to alleviate remaining concerns about sample selection (discussed above) we now control for more disaggregated differences in locations and include either region or city fixed effects (columns 5-6). The isolated effect on *treatment* becomes statistically insignificant when we control for administrative regions, whereas *futuretreatment* stays significant. More important, the *net effect*, the difference between treated and future-treated individuals, remains positive and statistically significant at the 5 percent level in both alternative specifications, again corroborating our core findings. As a final check concerning sample selection, we restrict the analysis to individuals which have at least 20 (foreign and domestic) firms within their commuting distance of 25km (column 7). Naturally, the underlying assumption is that any bias resulting from a potential non-randomness of our firm data should be less pronounced the more firms we observe in an individual's neighborhood. Importantly, our main findings carry over as the *net effect* remains statistically significant at the 1 percent level.[19]

Overall, our results pass our falsification tests and are robust with respect to the definition of *treatment* and *futuretreatment*, the chosen cutoff distance, different levels of fixed effects for locations, and when restricting the sample to individuals with at least 20 firms nearby.

[19] Results are also unaffected for larger thresholds of 30 or 50 firms. However, the sample becomes considerably smaller then.

3.3. Exploring potential channels

We now turn to the exploration of potential channels and mechanisms that might explain why foreign firm presence leads to higher corruption in its surroundings. In Table 3 and Table 4 we present suggestive evidence for the two previously discussed channels through which FDI potentially affects corruption. Although data limitations prevent us from clearly identifying these channels, we try to approximate the extent to which they play a role.

Economic activity channel

First, we explore whether increased corruption around foreign firms is driven by a rise in economic activity (Table 3). Following the argument of Isaksson & Kotsadam (2018), we would expect a) an impact of FDI on economic activity, and b) an impact of economic activity on corruption for the 'economic activity channel' to hold. Therefore, we control for economic activity using satellite nightlight intensity data (*nightlight*).[20,21] When regressing the median night light around individuals on *treatment* and *futuretreatment* we find a strong and positive *net effect* of FDI on local economic activity (column 1). This indicates that foreign firm presence is indeed associated with increases in economic activity. We then include nightlight intensity as a control variable in our baseline regression to test whether it is economic activity that is associated with bribe payments and not the presence of foreign firms per se. The insignificant coefficient on *nightlight* implies that this is not the case (column 2). Lastly, we include *nightlight* together with *treatment* and *futuretreatment* in our regression (column 3). We find the *net effect* of foreign firm presence on corruption almost unchanged when controlling for nightlight intensity indicating that FDI does not affect corruption via higher economic activity in general.

[20] We thank Julian Hinz for operationalizing data from the National Oceanic and Atmospheric Administration (NOAA) and providing these data.

[21] See Henderson et al. (2012) for a justification of using nightlight intensity as proxy for economic activity.

However, it might be that particular types of FDI impact local corruption behavior. Usually it is argued that the effects of FDI on host economies depend on the characteristics and sector of the investment. There is a large literature exploring the different impacts of greenfield investment compared to mergers and acquisitions (M&As) on host countries (Harms & Méon, 2018 is a very recent example). In line with the existing evidence we consider differences in foreign investors' entry modes to test whether it is not FDI per se that influences local corruption but rather a specific type of FDI. We expect newly established production units (greenfield investment) to have stronger effects at the local level compared to a change in ownership resulting from foreign investors' acquisition of existing capital (M&As). The former investment type is more likely associated with pronounced economic and social changes. Therefore, we include the share of greenfield investment over all foreign investment per region (around an individual's place of residence) as explanatory variable. In column (4) we report the result for this test. It appears that the type of FDI, which dominates a region, does not affect corruption and the *net effect* remains almost unchanged.

Other specifics of foreign investors could originate from the sector in which the investor is active. Especially in the African context, FDI in extractive industries plays a major role and is worth a closer look. Foreign investors in extractive industries in resource rich countries are often blamed for environmental damage, engagement in corruption, and repression of domestic businesses (Moran, 2011). The positive impact of FDI on corruption that we have found could thus be explained by sector-specific characteristics. To test that, we include the share of foreign investment in the primary sector over total foreign investment per (column 5). Again we find no support for a sector-specific explanation. Neither is the point estimate of the sector-specific variable (*primary sector investment*) significant nor does the *net effect* of FDI on corruption change when controlling for sector-specific characteristics. However, this finding should be interpreted carefully. It could be driven by data limitations as we observe only a small fraction of firms active in the primary sector. In contrast, Knutsen et al. (2017)

find evidence that corruption is higher around (foreign-owned) mines in Sub-Saharan African countries.

Norm transmission channel

Second, we attempt to capture different drivers of norm transmission (Table 4). We explore the role of both workers and suppliers for norm transmission. As mentioned above there is evidence that foreign employees enable the transfer of technological and managerial practices to domestic workers (Gong, 2003). We therefore argue that foreign workers may promote the transmission of norms to local workers. In order to approach this potential channel, we control for the share of foreign employees in a region (column 1). The extent to which foreign workers are employed is statistically not significant and our main findings remain qualitatively unchanged, which indicates that foreign workers do not drive norm transmission.

Analogously, we take a look at the role of supplier linkages since the importance of linkages with local suppliers is usually emphasized when the benefits of FDI for domestic firms are analyzed (i.a. Javorcik, 2014; Amendolagine et al., 2013). Strong ties between foreign firms and their local suppliers could also lead to spillovers in terms of norms. To begin with, we include the share of foreign suppliers over all suppliers in a region to explore linkages with suppliers as a potential norm transmission channel (column 2). The share of foreign suppliers turns out to be insignificant and the *net effect* of FDI on corruption remains unchanged. This might not be surprising as it might not be the mere number of local suppliers that matters but rather the *quality* of the relationship between the foreign investor and its local suppliers. Therefore, we draw on a question on supplier interactions from the UNIDO investor survey.[22]

[22] The specific question is: ‘‘Does this company interact with local suppliers/sub-contractors with the intention of helping them to improve their operations in any of the following ways: Upgrade the efficiency of their production processes, upgrade the quality of their products, improve their access to working capital/finance/equity, upgrade the quality of their workforce (provision of training), transfer of technology or know-how through designs or process know-how, or conduct joint product design/product development/specifications etc.”

We define foreign investors to have active interactions with their local suppliers if they indicate that they actively assist their local suppliers in, among other things, upgrading production processes, products, or workforce training. We then use the share of foreign firms with active linkages to local suppliers over all foreign investors in a region to explore linkages with local suppliers as a potential norm transmission channel (column 3). The point estimate of this supplier linkages measure is negative and statistically significant at the 10% level which suggests that strong ties between foreign investors and their local suppliers and/or active local supplier interactions reduce the local level of corruption. Overall, the difference between treated and future-treated locations (*net effect*) is almost unchanged when supplier linkages are considered. This finding is driven by a less pronounced effect of *treatment* and more pronounced effect of *futuretreatment* on corruption as compared to our baseline specification.

As a final test of norm transmission, we take the degree of corruption in the investors' country of origin into account (column 4).[23] This is driven by the observation that not all investors are alike. The literature on FDI spillovers and growth effects of FDI, for instance, finds differences depending on the investors' home countries (Javorcik & Spatareanu, 2011). When examining source country heterogeneity in terms of corruption, we find that the corruption environment of investors' country of origin does indeed play a role: FDI from highly corrupt source countries increases local corruption. Similarly to the findings for supplier linkages, the *net effect* of FDI on corruption is marginally larger compared to the baseline specification. Given that FDI from developing and emerging countries – which tend to have higher corruption levels compared to developed countries – plays a major role in most Sub-Saharan economies this finding is plausible. The isolated effect of *treatment* on corruption becomes (smaller and) insignificant and the effect of *futuretreatment* becomes stronger in comparison

[23] Where higher values imply less corruption. These country-level data are taken from the Worldwide Governance Indicators available at http://info.worldbank.org/governance/wgi.

to the baseline specification when we control for the investors' country of origin. This drives the minor increase in the *net effect*.

Summing up, we find some indication that the effect of foreign investor presence is driven by norm transmission. We approximate norm transmission via three potential drivers: foreign workers, local suppliers (both number and active local supplier interactions), and source country corruption levels. Our results suggest that strong linkages between foreign firms and local suppliers as well as investors originating from low corrupt countries reduce corruption at the local level. Linkages with suppliers and source country characteristics thus seem to be relevant factors of norm transmission. These results should be regarded as first attempt to capture underlying mechanisms of how foreign firm presence influences petty corruption and should thus be interpreted cautiously. The limited interpretability of our results is driven by shortcomings of our data at hand. Most importantly, our sample is restricted to the period before 2011 and thus excludes the most recent developments, which have taken place in many African economies and are accompanied with increasing FDI inflows and changes in stakeholder composition.

4 Conclusion

FDI to Sub-Saharan Africa has increased tremendously over the last decades. At the same time, corruption and other forms of rent-seeking behavior continue to be a serious problem in many Sub-Saharan countries. Against this backdrop, our paper addresses two previously unanswered questions namely whether the presence of foreign investors impacts the occurrence of petty corruption in the FDI host countries and what the main underlying mechanisms are.

Using fine-grained data on domestic and foreign firms and on corruption experience across 19 Sub-Saharan African countries and relying on a spatial-temporal estimation technique, we

show that the presence of foreign firms positively impacts host countries' local corruption measured by individuals' corruption experience. Our baseline results indicate a statistically and economically significant increase in different forms of petty corruption, like payments to get documents or permits or payments to the police, around foreign firms.

When examining two potential channels, we find no support that FDI-induced economic activity leads to more corruption. In contrast, the results provide first evidence that FDI affects corruption mainly via norm transmission. Norm transmission via foreign employee linkages seems to play a minor role, whereas it makes a difference whether foreign investors come from relatively corrupt countries or not. FDI from countries with less corruption lowers corruption levels in the host economy. Further, local supplier interactions are found to decrease local corruption. Our findings suggest that it is not sufficient for FDI host countries to create the necessary domestic conditions to facilitate direct investment inflows. At the same time, FDI host countries should 1) be aware of potentially negative effects of investments from relatively corrupt source countries, and 2) emphasize the fight against corruption by strengthening domestic anti-corruption legislation and institutions. This would enable countries to reap the full benefits of getting more integrated into the global economy via foreign investment while at the same time associated costs resulting from increased corruption are reduced. There is evidence that high corruption levels discourage investment from countries that have signed anti-bribery laws and encourage investment from countries with high levels of corruption (Cuervo-Cazurra, 2006). As a consequence, the enforcement of anti-bribery laws could facilitate the attraction of FDI from countries with low levels of corruption. The crux is, however, that in weak states like Mali or Nigeria, central governments and local authorities often lack the capacity to regulate commercial operations.

An important question is to what extent the findings from Sub-Saharan Africa can be generalized to other developing countries. Apparently, this question cannot be answered

conclusively without further research and data gathering. Especially, more (micro) data collection and detailed case studies are needed to demonstrate the link between the presence of foreign firms and corruption in other developing countries. Further research is also needed to gain deeper understanding of the underlying mechanisms on the micro level. For example, little is known about the role of foreign firms lobbying for anti-bribery laws and their influence on policy makers at the regional level in general. There might be a crucial difference between locations where foreign investors actively engage in anti-corruption campaigns with local authorities and those with 'passive' foreign investors. Additional research is necessary to understand the behavior of firms in countries where corruption is present. We do not know much about how firms handle corruption. Do firms actively train their employees or local business partners to raise awareness of problems with bribery? Or do they tacitly accept habits of corruption? What is more, our data exclude the most recent years, which, as it is well known, came along with increasing engagement of investors from emerging economies. Chinese investors currently play a major role in many African economies and it would be interesting to understand the impact of these non-traditional investors on petty corruption in comparison to investors from developed countries. Related to the role of non-traditional investors, it would be worth considering the link between foreign investments, development aid, and corruption. In the context of Sub-Saharan economies, foreign aid, and especially aid from non-traditional donors like China, plays a prominent role. Finally, it could be that not the firms' headquarter country of origin matters but rather the background of the employed managers. In this context, it would be interesting to further explore the role of the firms' management in handling corruption in the host country.

Table 1: Baseline results

	(1)	(2)	(3)	(4)	(5)	(6)
	bribe document	bribe document	bribe police	bribe school	bribe household	bribe combined
treatment	0.035***	0.023**	0.009	0.006	0.036***	0.023**
	(0.011)	(0.011)	(0.011)	(0.008)	(0.009)	(0.012)
futuretreatment	-0.056***	-0.056***	-0.047**	-0.069***	-0.023	-0.080***
	(0.016)	(0.015)	(0.020)	(0.017)	(0.020)	(0.025)
ln(age)		-0.014*	-0.011	0.004	0.007	-0.015*
		(0.008)	(0.008)	(0.006)	(0.006)	(0.009)
female		-0.055***	-0.087***	-0.012***	-0.023***	-0.076***
		(0.006)	(0.006)	(0.005)	(0.004)	(0.006)
urban		0.033***	0.047***	0.022***	0.027***	0.047***
		(0.008)	(0.008)	(0.006)	(0.007)	(0.009)
education		0.017***	0.013***	0.002	0.006***	0.016***
		(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
living conditions		-0.015***	-0.013***	-0.011***	-0.008***	-0.018***
		(0.003)	(0.003)	(0.002)	(0.002)	(0.003)
Constant	0.164***	0.194***	0.189***	0.142***	0.101***	0.410***
	(0.022)	(0.039)	(0.039)	(0.030)	(0.034)	(0.043)
Observations	14,534	14,363	12,994	13,218	16,789	16,931
R-squared	0.072	0.089	0.133	0.061	0.111	0.140
net effect	0.0910***	0.0791***	0.0567***	0.0751***	0.0600***	0.104***
F-test	34.19	28.66	8.541	17.75	9.100	18.26
p-value (*F*-test)	5.81e-09	9.64e-08	0.00351	2.67e-05	0.00259	2.02e-05

Notes: Time and country dummies included in all estimations. The dependent variable is coded as 0 if the respondent did not pay a bribe or 1 if the respondent paid a bribe at least once. *Bribe combined* is coded as 1 if *bribe document*, *bribe police*, *bribe school*, or *bribe household* is 1 and 0 otherwise. The effect of FDI on corruption is given by the parameter difference *net effect* and associated *F*-tests and *p*-values below. Robust standard errors (in parentheses) are clustered by the survey clusters: * p<0.1, ** p<0.05, *** p<0.01.

Table 2: Robustness

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Falsification	Falsification	Employment-weighted	50km	Region FE	City FE	Large firm locations
	corruption government	random assignment	bribe document	bribe document	bribe document	bribe document	bribe document
treatment	0.005	0.005		0.010	0.004	-0.005	0.037**
	(0.009)	(0.007)		(0.009)	(0.022)	(0.020)	(0.018)
futuretreatment	0.003	-0.007		-0.040***	-0.039*	-0.056**	-0.061**
	(0.020)	(0.017)		(0.014)	(0.022)	(0.026)	(0.029)
treatment (emp.)			0.023**				
			(0.010)				
futuretreatment (emp.)			-0.018*				
			(0.010)				
ln(age)	-0.018**	-0.014*	-0.014*	-0.010	-0.012	-0.011	-0.017
	(0.008)	(0.008)	(0.008)	(0.007)	(0.008)	(0.008)	(0.011)
female	-0.007	-0.055***	-0.055***	-0.052***	-0.055***	-0.056***	-0.063***
	(0.005)	(0.006)	(0.006)	(0.005)	(0.006)	(0.006)	(0.008)
urban	0.029***	0.037***	0.033***	0.041***	0.029***	0.021**	0.028**
	(0.009)	(0.008)	(0.008)	(0.007)	(0.010)	(0.009)	(0.012)
education	0.017***	0.017***	0.017***	0.017***	0.016***	0.016***	0.016***
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
living conditions	-0.012***	-0.015***	-0.015***	-0.015***	-0.015***	-0.015***	-0.020***
	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)
Constant	0.907***	0.191***	0.183***	0.151***	0.157	0.141***	0.234***
	(0.038)	(0.039)	(0.039)	(0.033)	(0.101)	(0.046)	(0.051)
Observations	13,211	14,363	14,363	19,927	14,363	14,363	8,849
R-squared	0.097	0.088	0.088	0.081	0.105	0.107	0.094
net effect	0.00186	0.0125	0.0418***	0.0503***	0.0427**	0.0516**	0.0980***
F-test	0.00922	0.501	10.61	14.76	4.589	5.780	16.52
p-value (*F*-test)	0.924	0.479	0.00115	0.000125	0.0323	0.0163	5.12e-05

Notes: Time and country dummies included in columns (1)-(4) and (7). Columns (5) and (6) include time dummies and region or city dummies, respectively. In column (1) the dependent variable is a measure for country-level corruption (measured by perceived corruption concerning national government officials' involvement in corruption). In all other cases, the dependent variable is coded as 0 if the respondent did not pay a bribe or 1 if the respondent paid a bribe at least once. Column (2): Individuals were randomly assigned to either the control, treatment, or future-treatment group. Column (3): *Treatment* and *futuretreatment* are defined based on employment and not on the number of firms. Column (4): A 50km instead of 25km zone around individuals is used. Column 7: Only individuals with at least 20 firms within the firms' range of influence are considered in this regression. The effect of FDI on corruption is given by the parameter difference *net effect* and associated *F*-tests and *p*-values below. Robust standard errors (in parentheses) are clustered by the survey clusters: * p<0.1, ** p<0.05, *** p<0.01.

Table 3: Mechanisms and channels – Economic activity

	(1)	(2)	(3)	(4)	(5)
	Night light	Night light	Night light	Entry mode	Primary sector
	median light	bribe document	bribe document	bribe document	bribe document
treatment	3.123***		0.023**	0.023**	0.024**
	(0.239)		(0.011)	(0.011)	(0.011)
futuretreatment	-1.024**		-0.058***	-0.056***	-0.056***
	(0.492)		(0.015)	(0.015)	(0.015)
ln(age)		-0.013	-0.013	-0.014*	-0.014*
		(0.008)	(0.008)	(0.008)	(0.008)
female		-0.055***	-0.056***	-0.055***	-0.055***
		(0.006)	(0.006)	(0.006)	(0.006)
urban		0.035***	0.031***	0.033***	0.033***
		(0.008)	(0.008)	(0.008)	(0.008)
education		0.017***	0.017***	0.017***	0.017***
		(0.002)	(0.002)	(0.002)	(0.002)
living conditions		-0.015***	-0.015***	-0.015***	-0.015***
		(0.003)	(0.003)	(0.003)	(0.003)
night light (regional median)		0.001	0.000		
		(0.001)	(0.001)		
greenfield investment (regional share)				0.001	
				(0.011)	
primary sector investment (regional share)					-0.035
					(0.027)
Constant	5.917***	0.190***	0.195***	0.194***	0.201***
	(0.646)	(0.039)	(0.039)	(0.039)	(0.039)
Observations	14,256	14,256	14,256	14,363	14,363
R-squared	0.536	0.088	0.090	0.089	0.089
net effect	4.147***		0.0817***	0.0790***	0.0806***
F-test	61.65		30.08	27.86	29.60
p-value (*F*-test)	0		4.68e-08	1.44e-07	5.95e-08

Notes: Time and country dummies included in all estimations. Column (1): The dependent is median light per region. Columns (2)-(5): The dependent variable is coded as 0 if the respondent did not pay a bribe or 1 if the respondent paid a bribe at least once. The effect of FDI on corruption is given by the parameter difference *net effect* and associated *F*-tests and *p*-values below. Robust standard errors (in parentheses) are clustered by the survey clusters: * p<0.1, ** p<0.05, *** p<0.01.

Table 4: Mechanisms and channels – Norm transmission

	(1) Foreign employees	(2) Foreign suppliers	(3) Local supplier interactions	(4) Investor origin
	bribe document	bribe document	bribe document	bribe document
treatment	-0.002	0.020	0.006	-0.007
	(0.014)	(0.014)	(0.014)	(0.013)
futuretreatment	-0.080***	-0.061***	-0.078***	-0.096***
	(0.022)	(0.022)	(0.021)	(0.021)
ln(age)	-0.016*	-0.014	-0.016*	-0.017*
	(0.010)	(0.010)	(0.010)	(0.010)
female	-0.062***	-0.067***	-0.062***	-0.063***
	(0.007)	(0.007)	(0.007)	(0.007)
urban	0.036***	0.039***	0.035***	0.036***
	(0.010)	(0.011)	(0.010)	(0.010)
education	0.016***	0.016***	0.016***	0.016***
	(0.002)	(0.002)	(0.002)	(0.002)
living conditions	-0.015***	-0.014***	-0.015***	-0.015***
	(0.004)	(0.004)	(0.004)	(0.004)
foreign employees (regional share)	-0.009			
	(0.091)			
foreign suppliers (regional share)		-0.001		
		(0.017)		
interactions with local suppliers (regional share)			-0.035*	
			(0.019)	
corruption source country (regional average)				-0.001*
				(0.000)
Constant	0.239***	0.212***	0.255***	0.304***
	(0.045)	(0.048)	(0.046)	(0.056)
Observations	11,038	10,149	11,038	11,075
R-squared	0.087	0.089	0.088	0.089
net effect	0.0775***	0.0809***	0.0839***	0.0866***
F-test	16.05	15.87	19.50	23.07
p-value (*F*-test)	6.47e-05	7.11e-05	1.07e-05	1.71e-06

Notes: Time and country dummies included in all estimations. The dependent variable is coded as 0 if the respondent did not pay a bribe or 1 if the respondent paid a bribe at least once. The effect of FDI on corruption is given by the parameter difference *net effect* and associated *F*-tests and *p*-values below. Robust standard errors (in parentheses) are clustered by the survey clusters: * p<0.1, ** p<0.05, *** p<0.01.

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Appendix

Table A1: Summary statistics for foreign and domestic firms (2010)

	Domestic firms				Foreign firms			
	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
employment	166.97	602.99	10	17,601	268.69	793.41	10	16,000
age of the firm (in years)	19.40	15.10	1	163	18.49	16.43	1	142
sales (in US$ million)	7.87	48.51	0	1,544.55	20.07	89.00	0	1,865
foreign employees (% full-time workforce)	1.99	6.91	0	209	9.30	12.41	0	108
foreign suppliers (number)	3.73	11.49	0	200	7.44	12.80	0	100
interactions with local suppliers (dummy)	0.04	0.20	0	1	0.56	0.50	0	1
capital intensity (fixed assets in 1,000 US$/empl.)	50.52	371.54	0	9,595.38	132.64	2,033.10	0	81,111.11
export intensity (exports/sales)	7.36	20.85	0	100	19.53	34.05	0	100
primary sector (%)	3.55	18.51	0	100	7.40	26.18	0	100

Notes: Summary statistics are based on the sample and variables in column (2) of Table 1. N=3,831 for domestic and N=1,893 for foreign firms.

Table A2: Summary statistics for household characteristics

	Observations	Mean	Std. Dev.	Min	Max
bribe document	14,363	0.185	0.388	0	1
treatment	14,363	0.372	0.483	0	1
futuretreatment	14,363	0.048	0.214	0	1
ln(age)	14,363	3.498	0.390	2.890	4.605
female	14,363	0.490	0.500	0	1
urban	14,363	0.654	0.476	0	1
education	14,363	3.612	1.998	0	9
living conditions	14,363	2.682	1.099	1	5

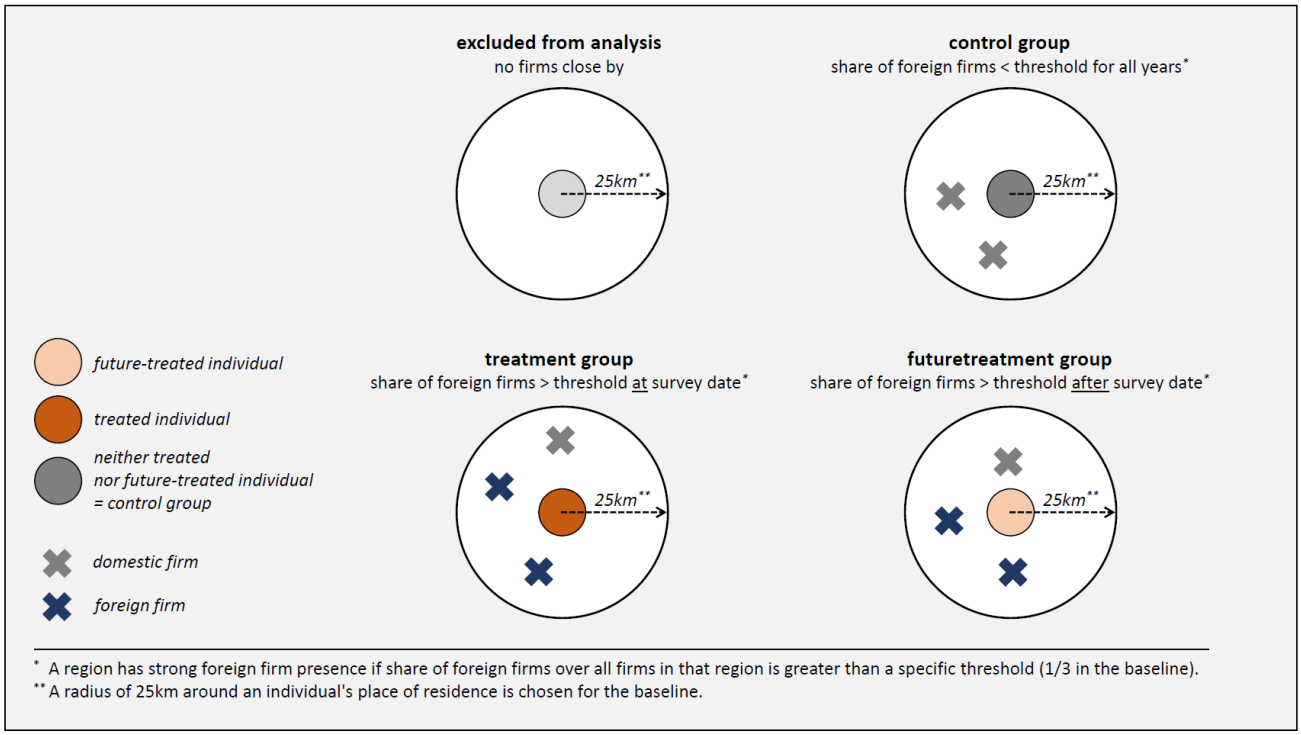
Notes: Summary statistics are based on the sample and variables in column (2) of Table 1.

Table A3: Baseline results (logit estimators)

	(1) bribe document	(2) bribe document	(3) bribe police	(4) bribe school	(5) bribe household	(6) bribe combined
treatment	0.222***	0.112	-0.000	0.037	0.337***	0.097
	(0.069)	(0.073)	(0.078)	(0.097)	(0.090)	(0.062)
future treatment	-0.481***	-0.509***	-0.392**	-0.920***	-0.163	-0.472***
	(0.145)	(0.143)	(0.183)	(0.236)	(0.200)	(0.151)
ln(age)		-0.164***	-0.168**	0.054	0.059	-0.129**
		(0.062)	(0.074)	(0.087)	(0.069)	(0.051)
female		-0.406***	-0.725***	-0.157**	-0.232***	-0.436***
		(0.043)	(0.050)	(0.063)	(0.046)	(0.036)
urban		0.299***	0.470***	0.405***	0.381***	0.324***
		(0.068)	(0.079)	(0.107)	(0.080)	(0.059)
education		0.112***	0.093***	0.022	0.052***	0.087***
		(0.013)	(0.016)	(0.020)	(0.016)	(0.011)
livingconditions		-0.103***	-0.095***	-0.145***	-0.089***	-0.098***
		(0.022)	(0.024)	(0.030)	(0.023)	(0.017)
Constant	-1.560***	-1.172***	-1.415***	-1.832***	-2.540***	-0.177
	(0.162)	(0.285)	(0.328)	(0.396)	(0.371)	(0.246)
Observations	14,518	14,347	12,994	13,163	16,773	16,931
net effect	0.703***	0.621***	0.392**	0.957***	0.500**	0.570***
Chi2-test	24.99	20.48	4.700	16.49	6.586	14.94
p-value, *Chi2*-test	5.77e-07	6.01e-06	0.0302	4.89e-05	0.0103	0.000111

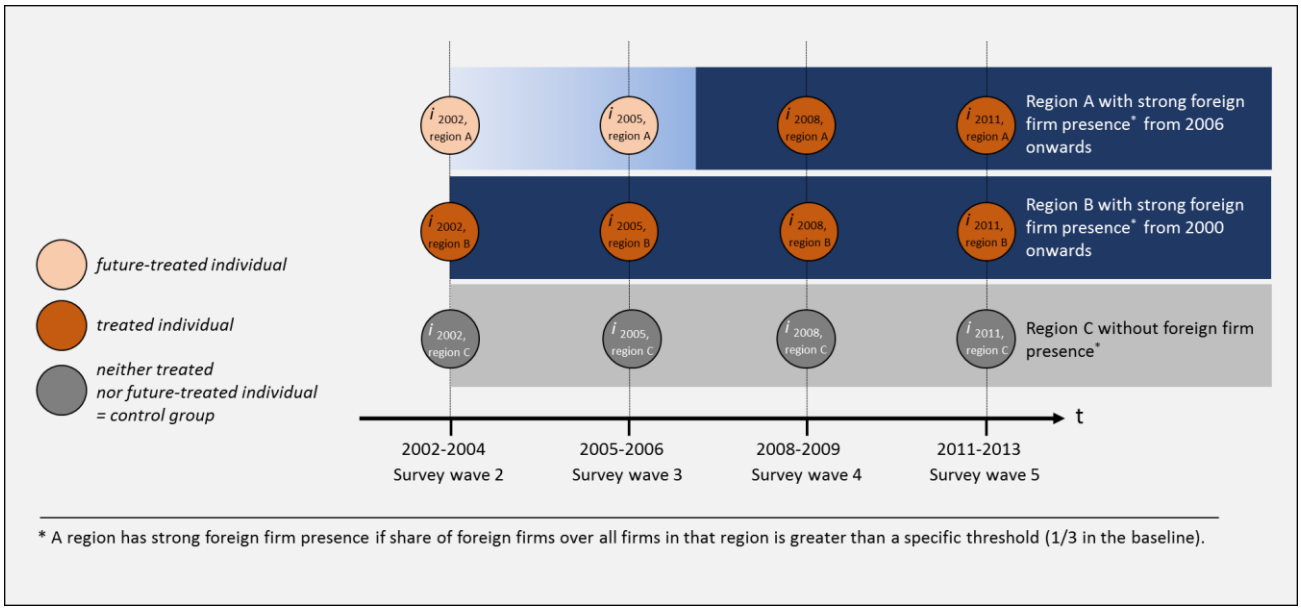
Notes: Time and country dummies included in all estimations. The dependent variable is coded as 0 if the respondent did not pay a bribe or 1 if the respondent paid a bribe at least once. *Bribe combined* is coded as 1 if *bribe document*, *bribe police*, *bribe school*, or *bribe household* is 1 and 0 otherwise. The effect of FDI on corruption is given by the parameter difference *net effect* and associated *Chi2*-tests and *p*-values below. Robust standard errors (in parentheses) are clustered by the survey clusters: * p<0.1, ** p<0.05, *** p<0.01.

Figure A1: Assignment of individuals to different groups



Source: Own visualization.

Figure A2: Visualization of treated and future-treated status



Source: Own visualization.