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# Corruption Epidemics

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## Abstract

When estimating the determinants of perceived corruption, economists assumed that there is full independence across countries. In the presence of peer-group or learning effects through cross-border economic activity (such as trade or labor migration), this assumption might be violated. We provide evidence that this is the case. Using a cross-section of 123 economies for the year 2000, we illustrate that corruption in one country spills over to adjacent economies. This finding implies that institutional changes reducing corruption in one country lead to smaller but qualitatively similar effects in neighboring countries.

**Keywords:** Perceived corruption; Institutions; Spatial econometrics

**JEL codes:** D72; D73; K42

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# 1 Introduction

Existing work on the determinants of perceived corruption at the country level is characterized by the (explicit or implicit) assumption of independence of corruption perception across countries. In this paper, we depart from this assumption. Recent methods in econometrics allow for an analysis of the dispersion of perceived corruption, which we refer to as epidemic effects here.

We argue that corruption is likely to spread across national borders for three reasons: (i) cross-border business activity has reached a very high level of integration, and business-related interaction among individuals mirrors this fact; accordingly, we argue that (non-) corrupt behavior will spread due to learning and peer-group behavior, and this will happen among countries with intensive business contacts in particular; (ii) corruption will propagate due to increased cross-border activity of criminals, gangs, and other illegal enterprises such as the mafia; (iii) the perception of corruption will spread due to increased sensitivity of individuals asked in surveys and their growing knowledge about de facto corruption as such and their inability to attribute it to activity within national borders.

Our aim is to deliver an empirical model of perceived corruption which allows for *epidemic effects* or, in other words, the *infection* of other countries with (non-)corrupt behavior or the perception thereof. Furthermore, we adjust standard errors to account for cross-sectional interdependence with respect to unobserved determinants of corruption collected in the error term. In particular, we are able to simulate the impact of country-specific shocks on corruption. For instance, we will shed light on the associated total impact on a country, where a shock occurs, and the cross-border-propagation-related, indirect effect on other economies.

Our results first confirm previous findings on key determinants of corruption. Second, we show that corruption does spill across national borders, i.e., that neighborhood effects are empirically relevant. This implies that efforts to dampen corruption in one country are likely to be beneficial in neighboring countries, too.

The remainder of the paper is organized as follows. In Section 2, we give a brief overview of previous research on the determinants of perceived corruption. Section 3 lays out the

econometric model. Section 4 presents the data and estimation results, and Section 5 concludes.

## **2 Previous research on the determinants of perceived corruption**

La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1999) were among the first to investigate empirically what explains government quality in a cross-section of (up to) 152 countries. They provide evidence that the share of Protestants as well as ethno-linguistic homogeneity lead to more efficient government performance and less corruption. In a similar vein, Paldam (2001, 2002) identifies cultural, linguistic, and religious variables as important determinants of corruption beyond economic fundamentals. Moreover, economic prosperity (as measured by per capita income)<sup>1</sup> and larger size of government tend to reduce corruption.

Treisman (2000) derives a number of theoretically plausible hypotheses about the determinants of corruption which he tests by means of OLS regressions in a sample of about 60 countries. He confirms the findings of La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1999) that a higher share of Protestants and higher per-capita income tend to reduce corruption levels. However, ethno-linguistic fragmentation does not matter much for corruption in his data. Instead, a historical tradition of British rule, democracy, and a higher level of international integration (measured by the share of imports in GDP) are found to be crucial for maintaining a low level of corruption. Finally, a federal structure of the government system tends to reduce the extent of corruption as well. These findings are generally supported by Serra (2006) who undertakes a large scale sensitivity analysis to check robustness of previously identified determinants. The results in Serra suggest that, among the relevant explanatory variables of corruption, per capita income, democratic tradition, political stability, Protestantism, and colonial heritage exhibit the most robust impact.

Apart from providing a very detailed survey of the empirical literature on corruption, Seldadyo and de Haan (2006) test for the impact of about 70 possible determinants of corruption – mostly for the year 2000. They group potential explanatory variables into four categories: (1) economic and socio-demographic, (2) bureaucratic and regulatory, (3) political

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<sup>1</sup> One might argue that per-capita income itself is endogenous and driven by corruption. However, the results in Paldam (2001, 2002) suggest that the causality runs from poverty to corruption and not vice versa. As Gundlach and Paldam (2008, p.1) put it, “*corruption is a poverty driven disease that vanishes when countries develop, so that causality is mainly from the level of income to corruption.*”

and (4) religious and geo-cultural determinants. Using extreme bounds analysis based on Levine and Renelt (1992) and Sala-i-Martin (1997), Seldadyo and de Haan identify variables that are robust with regard to their impact on corruption in a large number of different specifications. The most robust one is a constructed index of 'regulatory capacity' which reduces corruption. Among the other robust determinants are, for instance, population density (–), Scandinavian legal origin (–), ethnic tension (+), ethnic conflict (+), portion of population with no religion (+), latitude (–), fuel export (+).

Herzfeld and Weiss (2003) qualify the 'robust' finding in previous work about rule of law and corruption and, in line with some recent theoretical work on corruption (e.g., Andvig and Moene, 1990; Feichtinger and Wirl, 1994; Dawid and Feichtinger, 1996), argue that the relationship between the two is more complex than previously thought. In particular, their data-set suggests that there may be a two-way relationship between rule of law and corruption: a broader acceptance of established juridical institutions significantly reduces the perceived level of corruption but, at the same time, a higher level of corruption undermines the quality of the judicial system.

However, the aforementioned work generally treated corruption in one country as fully independent of others. This seems convenient from the perspective of econometric analysis but intuitively implausible. For instance, there is evidence from the literature on governance that 'space matters'. In a recent paper, Seldadyo, Elhorst, and de Haan (2008) illustrate that governance indicators exhibit a systematic geographical pattern and better governance in a country is shown to exert positive cross-border spillovers. Also, previous work on the determinants of crime rates suggests that crime is *epidemic* and spills over across regional borders (see Anselin, 1988; Messner and Anselin, 2002; Cracolici and Uberti, 2008). Finally, there is clear evidence by political scientists about cross-border dissemination of institutional characteristics such as democratization (Brinks and Coppedge, 2001), liberalization (Simmons and Elkins, 2004), and policy choices in general (Meseguer, 2006). From that perspective, considering cross-country interdependence in corruption seems natural. Ignoring the presence of such interdependence may lead to biased inference about the impact of shocks on corruption.

We proceed by briefly describing the econometric framework which allows us to treat perceived corruption levels as dependent across countries. Then, we describe the data on

perceived corruption and the explanatory variables in use before we summarize the estimation results and discuss their implications.

### 3 Econometric model

The main goal of this paper is to identify possible epidemic effects of perceived corruption at the country level. Hence, the main question of interest here is whether and to which extent the level of perceived corruption in some country depends on that in other countries. This calls for an econometric model that allows for cross-sectional interdependence. One class of models which supports such interdependence is referred to as *spatial econometric models*. The latter term originates from geographical statistics, which was the main application ground of such methods for long. More recently, economists and political scientists uncovered the potential merit of such methods to identify strategic interaction, learning effects, and interdependence brought about by general equilibrium effects.

Spatial econometric methods for data with cross-sectional interdependence require an assumption about the channel of interdependence. In most applications, geographers, economists, and political scientists assume that interdependence is generally related to geography and space and, more specifically, increases with *adjacency* or declines with *distance* (the term *spatial econometrics* roots in this fact). There are several options for acknowledging adjacency- or inverse-distance-related interdependence econometrically. Here, we allow for two forms thereof: a so-called *spatial lag* and *spatially-autoregressive residuals* (SAR). In our context, the former implies that the level of perceived corruption in some country  $i$  is an adjacency- or inverse-distance-related function of perceived corruption in other countries, and the latter assumes that country  $i$ 's disturbance term in the econometric model is an adjacency- or inverse-distance-related function of the other economies' disturbances. In formal accounts, the model may be written as

$$c_i = \alpha + \lambda \sum_{j=1}^N w_{ij} c_j + \mathbf{x}_i \boldsymbol{\beta} + \mu_i; \quad \mu_i = \rho \sum_{j=1}^N w_{ij} \mu_j + \nu_i, \quad (1)$$

where  $c_i$  denotes the level of perceived corruption in country  $i$ ,  $w_{ij}$  is an adjacency- or inverse-distance-related weight with the properties  $\sum_{j=1}^N w_{ij} = 1$  and  $w_{ii} = 0$ , and  $\mathbf{x}_i$  denotes a

$1 \times K$  vector of covariates. Greek letters in equation (1) refer to unknown parameters that have to be estimated.  $\alpha$  is a constant and  $\boldsymbol{\beta}$  is a  $K \times 1$  parameter vector for the covariates

collected in  $\mathbf{x}_i$ . There are two parameters, measuring the strength of interdependence:  $\lambda$  is the *spatial lag parameter*, and  $\rho$  is the parameter reflecting spatial correlation in the residuals. Under the assumption that  $\sum_{j=1}^N w_{ij} = 1$ , they need to have the properties  $|\lambda| < 1; |\rho| < 1$ , due to our assumptions about  $w_{ij}$  (see Kelejian and Prucha, 1999, 2007). However, we will focus on  $\lambda$  in the discussion, since interdependence in terms of observable characteristics seems more interesting to economists than interdependence in the disturbances.<sup>2</sup> Finally,  $\mu_i$  denotes the overall (spatially correlated) disturbance term and  $\nu_i$  is the remainder disturbance term which is independently (but not necessarily identically) distributed across all countries  $i$ .

For the sake of a more convenient discussion of the econometric approach, let us rewrite the model in (1) in matrix form:

$$\mathbf{c} = \alpha \mathbf{1} + \lambda \mathbf{Wc} + \mathbf{X}\boldsymbol{\beta} + \boldsymbol{\mu}; \quad \boldsymbol{\mu} = \rho \mathbf{W}\boldsymbol{\mu} + \mathbf{v}. \quad (2)$$

There, all bold letters in lower case denote  $N \times 1$  vectors. In particular,  $\mathbf{1}$  is an  $N \times 1$  vector of ones. As to the capital letters in (2),  $\mathbf{W}$  denotes an  $N \times N$  interdependence matrix with elements  $w_{ij}$  and  $\mathbf{X}$  is an  $N \times K$  matrix of covariates.

Following Kelejian and Prucha (1999, 2007), consistent parameter estimates for the model in (2) can be obtained in a generalized moments (GM) estimation framework which obtains parameter estimates in two steps. In a first step, two-stage least squares with instruments  $\mathbf{WX}$ ,  $\mathbf{W}^2\mathbf{X}$ ,  $\mathbf{W}^3\mathbf{X}$ , etc., for the endogenous  $\mathbf{Wc}$  leads to consistent estimates of  $\alpha$ ,  $\lambda$ ,  $\boldsymbol{\beta}$ , and  $\boldsymbol{\mu}$ . Notice that this two-stage least-squares model is not efficient, since it ignores the spatial autocorrelation in the disturbance vector  $\boldsymbol{\mu}$ . However, efficiency can be achieved either by a generalized least-squares routine after estimating  $\rho$  (see Kelejian and Prucha, 1999) or by means of a heteroskedasticity- and spatial autocorrelation-consistent (HAC) estimator of the variance-covariance matrix (see Kelejian and Prucha, 2007). Since our primary interest is on  $\lambda$  and the HAC procedure relies on even less restrictive assumptions than generalized least-squares,<sup>3</sup> we base our estimates on the latter.

<sup>2</sup> Also, ignorance of a relevant spatial lag leads to inconsistent parameters, while ignorance of spatial autocorrelation of the residuals ‘only’ leads to an efficiency loss and less precise estimates.

<sup>3</sup> In particular, the HAC estimator of Kelejian and Prucha (2007) allows for specific types of measurement error of spatial interdependence in the disturbances while generalized least-squares does not.

## 4 Empirical analysis

### 4.1 Data on perceived corruption and its determinants

Our analysis is based on cross-sectional data for 123 countries for the year 2000 including all major developed and developing economies.<sup>4</sup> The available set of countries encompasses about 93 percent of the world population and 98 percent of world GDP. Transparency International's corruption index is the dependent variable. It takes on values between zero and ten with lower numbers indicating a *higher* level of corruption (reflecting a poorer performance).<sup>5</sup> We use the following variables as elements of **X**.

- Average of log *GNP per capita* for the period 1970-1995 as calculated by La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1999) on the basis of the World Bank's World Development Indicators captures the level of development. In line with previous research, we would expect that more developed economies (i.e., ones with a higher level of log GNP per capita) should exhibit a lower level of corruption.
- To capture the role of religion, we employ the *share of Protestants* in 1980 as suggested and used by La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1999).
- Additionally, we use an annual indicator of *business freedom* from Heritage Foundation's Index of Economic Freedom to proxy the level of competition and economic freedom in the respective countries for the year 2000. Business freedom is understood as the ability to create, operate and shut down a company quickly and without burdensome obstacles. The indicator takes on values between 0 and 100 with a higher figure reflecting more freedom.<sup>6</sup>
- Previous research suggested that stable political and institutional environments are less prone to corruption than unstable ones. To capture this relationship, we employ data on the political *regime durability* of a country from Marshall and Jaggers' (2007) Polity IV Project.
- *Natural resources* imply high rents and thus increase the incentives for being corrupt. We capture this effect by using the sum of exports and imports of oil, metals and ores as an explanatory variable, provided by World Bank's World Development Indicators.

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<sup>4</sup> A full list of countries is documented in Appendix A.

<sup>5</sup> Notice that the definition of the corruption perception index requires care with the interpretation of the regression coefficients. If an estimated parameter of an explanatory variable is *positive*, it means that this variable *reduces* corruption.

<sup>6</sup> More details can be obtained from the Heritage Foundation webpage at [www.heritage.org/Index/](http://www.heritage.org/Index/).



As indicated in Section 2, there is a larger number of variables that can explain corruption. Of course, we have also tested the most important ones for our baseline regression. However, we could not find a robust statistical significance and eventually suppressed them. For instance, we cannot claim that countries with common law systems have on average lower corruption levels. Although this variable turns out with the right sign and statistically significant for a subset of countries (used in the Treisman study), the effect becomes insignificant if we increase the number of countries to 123. Another variable to consider is ethno-lingual heterogeneity of the population. This influence was not always statistically significant in previous studies and we also do not find a strong and stable link with corruption levels. We also checked whether federal organization of the state explains part of the corruption level. However, the effect is insignificant in most specifications we considered. As a consequence of this finding, we do not use this dummy variable. Overall, we focus in the presentation on specifications which are admittedly parsimonious but could not easily be improved by the inclusion of other obvious determinants of (perceived) corruption.<sup>7</sup>

With regard to interdependence, we need to capture all or a subset of the other countries in the sample in weighted form. As to the weights, we rely on an  $N \times N$  adjacency-related and, alternatively, an  $N \times N$  inverse-distance-related weights matrix. Adjacency is reflected by a dummy variable that is equal to one whenever two countries  $i$  and  $j$  have a common border and zero else. Bilateral distance between two countries is measured by the great-circle distance between the two economies' economic centers. For a country pair  $i$  and  $j$ , denote the elements of the weighting matrix as  $w_{ij}$ , the indicator value for adjacency as  $adj_{ij}$  and the value of bilateral distance in kilometers from adjacent countries as  $dist_{ij}$ . Then, the adjacency-based matrix has row-normalized entries of the form  $w_{ij} = b_{ij} / \sum_{j=1}^N b_{ij}$  and the inverse-distance-based matrix has entries  $w_{ij} = [\exp(-dist_{ij} / 100)] / \sum_{j=1}^N [\exp(-dist_{ij} / 100)]$ .

< Table 1 – Descriptive statistics >

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<sup>7</sup> In particular, we have estimated models which included import openness or an index of freedom of press. However, it turns out that these variables do not enter significantly when controlling for the determinants described before.

Table 1 provides descriptive statistics for the dependent and the independent variables in use. Note that we do not report statistics for the weighted corruption index, since the moments are very close to the unweighted score due to the row-normalization of  $\mathbf{W}$ . The table indicates that the average corruption score is about 4.3. It is useful to consider the variation of the corruption perception index and other variables in Table 1 for interpreting the associated regression coefficients later on.

## 4.2 Benchmark results

Using the dependent variable as  $\mathbf{c}$  in equation (2) and collecting the aforementioned variables in  $\mathbf{X}$ , we obtain two-stage least-squares parameter estimates which are summarized in Table 2. In particular, we report parameter estimates from three models in the table. Model 1 is an ordinary least-squares approach which assumes that  $\lambda = \rho = 0$ . This provides the benchmark results for marginal effects of variables which can be compared to those of the spatial models in the table. Of the latter, Model 2 assumes that the elements of  $\mathbf{W}$  are row-normalized, binary entries for adjacency. Model 3 assumes inverse-distance-related entries.

< Table 2 – Estimation results >

The results suggest the following conclusions. First, the parameter estimates broadly confirm previous findings about the role of economic and institutional variables for corruption. Recall that a higher score value for perceived corruption reflects a *lower* level of corruption. For instance, a higher degree of business freedom, a higher index value for a country's political stability, or a larger fraction of people with Protestant denomination are all negatively related to corruption. Similarly, a higher level of (log) income per capita is negatively related to corruption. On the contrary, a country's dependence on natural resources such as metals or oil—which typically goes hand in hand with a low degree of economic development and an unequal income distribution—is positively related to the level of perceived corruption. Hence, more favorable institutional or economic conditions reduce perceived corruption in an economy, all else equal. All of that can be seen from Model 1 and does not change in qualitative terms, if we account for cross-country interdependence in perceived corruption in Models 2 and 3.

Model 2 indicates that there are indeed positive spillovers in perceived corruption among neighbors: a higher level of perceived corruption in an adjacent economy leads to a domestic increase in perceived corruption. In contrast to Model 1, we also allow for interdependence in the disturbance vector  $\boldsymbol{\mu}$  by means of HAC estimation of the variance-covariance matrix. Accounting for immediate interdependence through  $|\lambda| > 0$  in equation (2) leads to a fundamental change for the implied quantitative impact of, say, a marginal change in the institutional and economic explanatory variables: while all variables contained in  $\mathbf{X}$  had a linear impact on  $\mathbf{c}$  in Model 1, interdependence through the inclusion of  $\mathbf{W}\mathbf{c}$  renders the impact of each exogenous variable in  $\mathbf{X}$  on  $\mathbf{c}$  non-linear. To see this, collect all terms involving  $\mathbf{c}$  on the left-hand side of the econometric model. A unitary increase in the  $k^{\text{th}}$  explanatory variable for all observations captured by the vector  $\mathbf{1}$  then translates into an effect on  $\mathbf{c}$  of  $\beta_k(\mathbf{I} - \lambda\mathbf{W})^{-1}\mathbf{1}$ . Hence, the linear impact of  $\beta_k\mathbf{1}$  is amplified by  $(\mathbf{I} - \lambda\mathbf{W})^{-1}$ . Suppose that  $\beta_k\mathbf{1} = \mathbf{1}$ , then, the results of Model 3 in Table 2 suggest that the corruption perception index score in each country increases by  $1/(1 - 0.080) \cong 1.08$ . Hence, interdependence across countries implies that any behavioral parameter estimate in Model 3 is amplified by almost 10 percent. In other words, a specification which ignores interdependence such as Model 1 leads to downward biased estimates of the marginal effects of the determinants of corruption.

### 4.3 Geographical versus cultural or economic neighborliness

In the above empirical analysis, we assumed that neighborliness was strictly geographical in nature. However, it may well be that geography as such is too narrow a concept to analyze interdependence in corruption perception. It is this sub-section's purpose to explore that matter. In particular, we shed light on alternative weighting schemes to geographical weighting (adjacency or inverse-distance-based) to analyze third-country effects in corruption perception. The corresponding results are summarized in Table 3.

< Table 3 – Alternative weighting schemes >

Table 3 reports the adjacency-based benchmark results in a first column. In the second column, we report the results from a regression which uses trade weights instead of geographical weights. Obviously, the results do not support any role for trade in generating epidemic corruption effects. In column three, we use the Euclidean distance between the fractions of religious denominations for any country-pair as weights. Again, the results point to an impact of weighted foreign corruption perception which is not statistically different from

zero. In column four, we employ a weighting scheme which relies upon *actual* language use (rather than only *official* languages spoken in two countries) according to the ethnolinguistic variables provided by the Centre d'Études Prospectives et d'Informations Internationales (CEPII). In the last column, we report data on a regression which is based on an *official* (rather than *actual*) language-based weighting scheme. Interestingly, the results suggest that a common language in use per se does not generate epidemic corruption effects which are statistically significant. However, this is not the case for official languages. The reason for the latter may be found in common cultural heritage brought about by colonial relationships or other forms of historical ties which lead to synchronized behavior of economic agents through learning or imitation across national borders.

#### 4.4 Quantifying the importance of interdependence across countries

Of course, an individual change in some country causes different effects across economies by virtue of the construction of  $\mathbf{W}$ . The latter can be illustrated as follows, using the results for Model 3 in Table 2. For instance, consider a shock in the political regime durability index by one standard deviation (28.2 according to Table 1) in one country at a time. The immediate effect of this on the country facing the shock is an increase in the corruption perception index score of  $0.025 \cdot 28.2 = 0.705$  which amounts to about one third of the standard deviation in the score and, hence, a sizable decline in corruption. Notice that the immediate effect according to Model 3 is very similar to the one of Model 1, which rules out any cross-border spillover effects. However, the associated total effect is different, as we would expect from the above discussion. The total effect on country  $i$  amounts to  $(\mathbf{I} - \lambda \mathbf{W})^{-1} \mathbf{e}_i$ , where  $\mathbf{e}_i$  is a vector with entry 0.705 in the  $i$ -th row and zeros otherwise. For all countries, we may define  $0.705(\mathbf{I} - \lambda \mathbf{W})^{-1} \mathbf{I}$ . The latter obtains an  $N \times N$  matrix, whose diagonal element for country  $i$  corresponds to the  $i$ -th element of the vector  $(\mathbf{I} - \lambda \mathbf{W})^{-1} \mathbf{e}_i$ . These elements are the total effects in the countries experiencing an immediate shock of 0.705 in corruption. Notice that countries differ in terms of the total effects, even though we treat them identical with regard to their exposure to immediate shocks. Ultimately the same shock will be amplified differently, depending on a country's geographical location. This is illustrated in Table 4.

< Table 4 – Simulation results >

In the first column of that table, we report the largest total own effect of the aforementioned shock by continent. It turns out that the largest direct effect world-wide occurs for Ireland and the United Kingdom, followed by the United States. Of course, the own effect on a country where the shock occurs is slightly smaller than that associated with a world-wide shock in each country as discussed before. However, there is variation in the impact across continents, due to different degrees of geographical neighborhood.

Apart from own effects, there are spillovers to other countries on the same continent. These are the effects triggered by the aforementioned shock on all other countries than  $i$ , if  $i$  is exposed to a shock of 0.705. The corresponding results are averages of the non- $i$ -effects. Formally, these averages correspond to  $(\mathbf{1}'(\mathbf{I} - \lambda\mathbf{W})^{-1}\mathbf{e}_i - e_{ii})/(N-1)$ , after defining  $e_{ii}$  as the  $i$ -th element of vector  $\mathbf{e}_i$  and  $\mathbf{1}'$  to be a  $1 \times N$  row-vector of ones. Again, these average indirect effects depend on the location of countries. Notice that our evidence points to a positive interdependence parameter  $\lambda$  which is significantly different from zero but fairly small. As a result, not only the spatial multiplier effect  $(\mathbf{I} - \lambda\mathbf{W})^{-1}$  but also the indirect effects  $(\mathbf{1}'(\mathbf{I} - \lambda\mathbf{W})^{-1}\mathbf{e}_i - e_{ii})/(N-1)$  are fairly small.<sup>8</sup> According to Table 4, the largest spillover or propagation effects at different continents are induced by shocks in China, Germany, and Senegal.

## 5 Conclusions

This paper casts doubt on a ubiquitously applied assumption about perceived corruption, namely that corruption is completely independent across countries and there is no dissemination thereof, neither through peer group effects nor through learning or migration. This assumption is not only contradicted by economic intuition but also by data. We provide evidence on the latter in a large cross-section of 123 economies.

Our results suggest that a country's corruption disseminates to its neighbors and, more generally, the degree of dissemination declines with geographical distance. This finding does not allow us to test whether dissemination mainly occurs through peer group or learning effects through migration or cross-border criminal activity. However, it implies that a change

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<sup>8</sup> Since cross-border propagation of corruption is most likely related to (legal or illegal) migration, it would be surprising if not implausible to find huge propagation effects. However, even small but statistically significant propagation effects should not be ignored in empirical work.

in a country's institutional setting which discourages corruption will also reduce corruption beyond this country's borders. This bit of evidence indicates that economic and political institutions which are favorable to the functioning of markets and unfavorable to market-avoiding activities such as corruption have a value that cannot be accounted for when looking at national consequences only. Assuming that corruption mainly brings about inefficiencies rather than avoiding them, such institutions have public good character at the international level and are of global interest.

We provide evidence of infectious or epidemic effects of corruption, but the magnitude of cross-border propagation is moderate. Overall, this suggests that countries should be interested in cooperating with their neighbors for the sake of reducing corruption, but such cooperation will most likely have smaller effects on a country's corruption than national policies or changes in the domestic institutional setting.

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## Appendix

### A List of countries

Albania, Algeria, Argentina, Armenia, Australia, Austria, Azerbaijan, Bahrain, Bangladesh, Belarus, Belgium, Bolivia, Botswana, Brazil, Bulgaria, Burkina Faso, Cambodia, Cameroon, Canada, Chile, China, Colombia, Costa Rica, Cote d'Ivoire, Croatia, Cyprus, Czech Republic, Denmark, Ecuador, Egypt, El Salvador, Estonia, Fiji, Finland, France, Gabon, Gambia, Georgia, Germany, Ghana, Greece, Guatemala, Guinea, Guyana, Honduras, Hungary, Iceland, India, Indonesia, Iran, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Kuwait, Kyrgyz Republic, Latvia, Lebanon, Luxembourg, Madagascar, Malawi, Malaysia, Mali, Mauritius, Mexico, Moldova, Mongolia, Morocco, Mozambique, Namibia, Netherlands, New Zealand, Nicaragua, Niger, Nigeria, Norway, Oman, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Portugal, Republic of Korea, Republic South Africa, Romania, Russian Federation, Saudi Arabia, Senegal, Singapore, Slovak Republic, Slovenia, Spain, Sudan, Swaziland, Sweden, Switzerland, Syrian Arabic Republic, Tajikistan, Tanzania, Thailand, Togo, Trinidad and Tobago, Tunisia, Turkey, Turkmenistan, Uganda, Ukraine, United Arab Emirates, United Kingdom, United States, Uruguay, Venezuela, Vietnam, Yemen, Zambia and Zimbabwe.

### B Results

Table 1 - Descriptive statistics

Variable	Mean	Std. Dev.	Minimum	Maximum
Corruption index	4.3	2.3	1.0	10.0
Log GNP per capita	7.4	1.3	4.7	9.9
Natural resource dependency (trade share)	26.1	29.4	0.0	99.7
Business freedom index	65.8	12.1	40.0	100.0
Regime durability index	23.6	28.2	0.0	96.0
Share of protestants in 1980	12.2	22.0	0.0	97.8

Table 2 - Estimation of neighborhood effects in corruption

Explanatory variables	Model 1		Model 2 - contiguity-based <b>W</b>		Model 3 - inv.dist.-based <b>W</b>	
	coef.	simple s.e.	coef.	HAC s.e.	coef.	HAC s.e.
Spatially weighted corruption index ( <b>Wc</b> )			0.083	0.044 **	0.080	0.044 **
Log GNP per capita	0.638	0.107 ***	0.578	0.101 ***	0.582	0.101 ***
Natural resource dependency (trade share)	-0.009	0.003 ***	-0.008	0.003 ***	-0.008	0.003 ***
Business freedom index	0.045	0.012 ***	0.047	0.012 ***	0.047	0.012 ***
Regime durability index	0.026	0.004 ***	0.025	0.004 ***	0.025	0.004 ***
Share of protestants in 1980	0.019	0.005 ***	0.020	0.004 ***	0.020	0.004 ***
Constant	-4.042	0.594 ***	-4.069	0.571 ***	-4.052	0.572 ***
Number of observations	123		123		123	
R <sup>2</sup>	0.838		0.842		0.841	
Instrument relevance (p-value of F-test)	-		0.000		0.000	
Instrument adequacy (p-value of Sargan-test)	-		0.078		0.146	

Notes: \*, \*\* and \*\*\* indicate parameters that are significantly different from zero at 10, 5 and 1 percent, respectively. **Wc** is endogenous in Model 2 and 3.  
Heteroskedasticity and (spatial) autocorrelation consistent (HAC) standard errors are based on Kelejian and Prucha (2007).  
For data sources, see main text and Appendix A.

Table 3 - Estimation of neighborhood effects in corruption

Explanatory variables	Model 2 - contiguity-based <b>W</b> (1)		Trade-based <b>W</b> (2)		Religious distance-based <b>W</b> (3)		Actual language-based <b>W</b> (4)		Official language-based <b>W</b> (5)	
	coef.	HAC s.e.	coef.	HAC s.e.	coef.	HAC s.e.	coef.	HAC s.e.	coef.	HAC s.e.
Spatially weighted corruption index ( <b>Wc</b> )	0.083	0.044 **	-0.101	0.467	0.174	0.333 ***	0.014	0.042	0.074	0.035 **
Log GNP per capita	0.578	0.101 ***	0.637	0.104 ***	0.625	0.106 ***	0.641	0.104 ***	0.670	0.105 ***
Natural resource dependency (trade share)	-0.008	0.003 ***	-0.009	0.003 ***	-0.009	0.003 ***	-0.009	0.003 ***	-0.009	0.003 ***
Business freedom index	0.047	0.012 ***	0.045	0.012 ***	0.046	0.012 ***	0.045	0.012 ***	0.043	0.012 ***
Regime durability index	0.025	0.004 ***	0.026	0.004 ***	0.026	0.004 ***	0.026	0.004 ***	0.024	0.004 ***
Share of protestants in 1980	0.020	0.004 ***	0.020	0.005 ***	0.017	0.007 ***	0.020	0.005 ***	0.019	0.004 ***
Constant	-4.069	0.571 ***	-3.456	2.572 ***	-4.718	1.556 ***	-4.104	0.611 ***	-4.341	0.601 ***
Number of observations	123		123		123		123		123	
R <sup>2</sup>	0.842		0.838		0.838		0.838		0.842	
Instrument relevance (p-value of F-test)	0.000		0.000		0.000		0.000		0.000	
Instrument adequacy (p-value of Sargan-test)	0.078		0.249		0.330		0.560		0.473	

Notes: \*, \*\* and \*\*\* indicate parameters that are significantly different from zero at 10, 5 and 1 percent, respectively. **Wc** is endogenous in Model 2 and 3.  
Heteroskedasticity and (spatial) autocorrelation consistent (HAC) standard errors are based on Kelejian and Prucha (2007).  
For data sources, see main text and Appendix A.

Table 4 - Simulation of the effects of a one-standard deviation change in the regime durability index (equiv. to a direct shock on corruption of 0.705) on the corruption perception score

Continent	Maximum total own effect		Max. average spillover effect on others	
	Countries	Effect	Countries	Effect × 1000
Africa	Senegal	0.707	Senegal	0.560
Americas	USA	0.709	Brazil	0.519
Asia	Malaysia	0.708	China	1.246
Europe	Ireland and United Kingdom	0.710	Germany	0.770
Pacific	Papua New Guinea	0.706	Papua New Guinea	0.064

Notes: The direct shock is derived as  $0.705 = 28.2 \times 0.025$ , where 28.2 is the standard deviation of the regime durability index and 0.025 is the coefficient of the regime durability variable in Model 2 of Table 2.