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Economics of Governance


# Trade intensity, country size and corruption

**Stephen Knack**[1], **Omar Azfar**[2]

[1] World Bank, 1818 H St. NW, Washington DC 20433, USA (e-mail:Sknack@worldbank.org)
[2] IRIS Center of the University of Maryland, College Park, MD 20742, USA
(e-mail: omar@iris.econ.umd.edu)

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**Abstract.** Several authors claim to provide evidence that governmental corruption is less severe in countries where trade intensity is higher or populations are smaller. We argue that theory is highly ambiguous on these questions, and demonstrate that empirical links between corruption and trade intensity – or country size, strongly related to trade intensity – are sensitive to sample selection bias. Most available corruption indicators provide ratings only for those countries in which multinational investors have the greatest interest: these tend to include almost all large nations, but among small nations only those that are well-governed. We find that the relationship between corruption and trade intensity disappears, using newer corruption indicators with substantially increased country coverage. Similarly, the relationship between corruption and country size weakens or disappears using samples less subject to selection bias.

**Key words:** corruption, governance, openness, trade, population

**JEL classification:** O00, O10, O40

## 1. Introduction

Concerns about governance, and corruption in particular, have become central to the concerns of development specialists and policy makers. Theoretical analyses (e.g. Shleifer and Vishny, 1993), and a wealth of statistical (e.g. Mauro, 1995) and anecdotal evidence emphasize corruption's destructive impacts on economic

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development. Consequently a number of primarily cross-country empirical analyses have been undertaken addressing the causes of corruption, including Ades and Di Tella (1999), Fisman and Gatti (2002), Goldsmith (1999), Root (1999), Swamy et al. (2001), Treisman (2000) and Wei (2000). Several of these studies conclude that higher trade intensity and/or small populations are associated with lower corruption levels. We demonstrate in this paper that these relationships are largely an artifact of sample selection bias.

The underlying problem is the way in which commonly-used governance data sets are often constructed. Most available corruption indicators provide ratings only for those countries in which multinational investors have the greatest interest: these tend to include almost all large nations, but among small nations only those that are well-governed. Trade intensity is strongly related to country size: smaller nations tend to specialize in producing a narrower range of goods than large nations, so a greater share of economic activity crosses national boundaries. Therefore, empirical links between trade intensity and corruption are potentially sensitive to selection bias. When country size is not controlled for, or when it is used as an instrument for openness as in Ades and Di Tella (1999) and Wei (2000), the exclusion of small, poorly-governed nations from corruption samples produces an association between corruption and trade intensity. We show that the relationship between trade intensity and corruption is not robust to the use of newer corruption indicators that are less subject to sample selection bias. Similarly, the relationship between corruption and country size weakens or disappears.

Sections 2 and 3 below summarize existing theoretical arguments and empirical evidence from other studies on, respectively, the impact of trade intensity and country size on corruption levels. Section 4 presents evidence that small and poorly-governed countries tend to be excluded from the commonly-used corruption data sets, potentially biasing coefficients on trade intensity and population in corruption regressions. Tests using newer corruption measures that are much less subject to selection bias demonstrate, in Sect. 5, that there is little if any relationship between country size and corruption. This result is extended in Sect. 6 to the case of trade intensity. Section 7 concludes.

## 2. Trade intensity

Several arguments link trade openness to lower corruption. It is often claimed that competition from foreign firms will reduce rents enjoyed by domestic firms, reducing rewards from corrupt behavior by government officials (e.g. Ades and Di Tella, 1999).

Wei (2000)[1] argues that countries that have a "natural" propensity to trade, because of their small size and favorable locations, will "find it optimal to devote more resources to building strong institutions" that constrain corrupt behavior. Smaller nations trade more because fewer goods are domestically produced in small countries. The market discipline imposed by being an open economy in turn imposes good governance. This argument is somewhat paradoxical, in claiming

[1] This paper was the subject of a full-page article in *The Economist* (September 9, 2000).

that the quality of the government is improved, relative to larger nations, by a more restricted choice set. It also neglects the possibility that small size could increase the per-capita rents that can be extracted by customs officials for precisely the same reasons that small economies are more open: a larger share of goods cross national boundaries, so corrupt customs officials have more opportunities to solicit bribes.[2] Higher "natural openness" could then be associated with a higher incidence of corruption.

Trade intensity could be endogenous to corruption through another potentially important channel. In corrupt environments where bureaucrats can effectively extract bribes from importers, bribes may act as a tax, reducing trade levels. Empirical associations between high trade and low corruption may thus reflect a mix of several effects operating in both directions. Ades and Di Tella (1999) instrument for trade intensity (measured as the share of imports in GDP) with population and land area, finding that high trade levels continue to be associated with lower corruption levels.

Wei (2000) divides trade intensity (measured by exports + imports as a share of GDP) into "natural openness" – the part explained by population and several geographic variables – and "residual openness." He finds that natural openness, but not residual openness, is significantly related to lower corruption levels. The absence of any link between corruption and residual openness – the only part of trade intensity that can be influenced by policy – suggests little room for policy responses. To the extent that trade intensity reflects policies conducive to trade, any favorable effects on corruption should have shown up in a positive coefficient on residual openness in Wei's corruption regressions. Nevertheless, the World Bank (2002: chs. 1 and 5) cites Wei's findings (and those of Ades and Di Tella, 1999) in advocating greater openness to trade as a means of combating corruption.

By instrumenting for trade intensity with population, Wei (2000) and Ades and Di Tella (1999) are assuming that country size has no independent effect on corruption levels.[3] However, the following section discusses several other theoretical links between population and corruption proposed by researchers. Moreover, trade intensity – whether or not instrumented by population – will be affected by sample selection bias as described in later sections, because of its strong correlation with population.

## 3. Country size

The post-cold war era has seen a dramatic increase in the number of new nations and new and increasingly plausible independence movements. Twenty new nations were created between 1990 and 1994 (Alesina, Spolaore and Wacziarg, 2000), mostly due to the fragmentation of the Soviet Union and Yugoslavia, and the divisions of Ethiopia and Czechoslovakia. These breakups, coupled with the EU monetary

[2] Anderson et al. (1999) find that customs officials are among the more corrupt government agencies in their empirical analysis of anti-corruption surveys from the former Soviet republic of Georgia.

[3] Ades and Di Tella report that a Hausman test of overidentifying restrictions does not reject this assumption. Wei does not report Hausman tests.

union and the spread of "globalization," have led to an increased interest in the issue of the optimal size of nation-states. A *Wall Street Journal* feature extolled the economic performance of small nations, arguing that globalization – with freer trade and increased mobility of labor and capital – has reduced the costs of being small.[4] A theoretical paper by Alesina and Spolaore (1998) on "The Number and Size of Nations" was the subject of a full-page article in The Economist.[5] Public goods provision has implications for the optimal size of nations, as the benefits of internalizing spillovers must be balanced against the costs of imposing a common set of policies on heterogeneous groups (Alesina and Wacziarg, 1999; Alesina and Spolaore, 1998). Alesina, Spolaore and Wacziarg (2000) have formally modeled the relationship between openness and the equilibrium number and size of nations. In cross-country tests, they find that the impact of country size on income growth depends on trade openness. If trade levels are sufficiently high, larger size carries lesser growth benefits.

Arguments for the benefits of small manageable countries date back thousands of years. Plato (1988) declared that the optimal size of the state is 5040 citizens, and prescribed population control to keep it at this precise level.[6] Aristotle (1932) stated "experience has also shown that it is difficult, if not impossible, for a populous state to be run by good laws" and prescribes that a state should be large enough to be self sufficient, but small enough to be manageable and easily surveyed. More recently, Jalan suggests (1982: 85–86) that smaller nations benefit from greater social cohesion and fewer vested interests, making it easier to adapt policies efficiently to new challenges and opportunities.

On the other hand, larger polities may benefit from economies of scale in establishing political and administrative structures (Srinivasan, 1986).[7] Knack (2002) found that more populous U.S. states had higher-quality management practices in their state governments, controlling for per capita income, education levels and other variables; causation may be reciprocal, however, if good management attracts in-migration through better-quality public services. As Aristotle noted, the survivability of small states in a hostile environment is also problematic (Sardar, 1995; Harden, 1985).

Based on Transparency International's Corruption Perceptions Index for 1998, Root (1999) – in a cross-country regression using a sample of 60 countries – finds that higher population is significantly associated with lower ratings (i.e. more corruption), controlling for several other variables. Root attributes this pattern to economies of scale in governance: in large nations rulers can extract significant resources from the country and pay off the constituencies necessary for them to maintain power. In small countries, economies of scale paradoxically imply that the state must be run well to be financially viable. While the argument is ingenious, it seems at least as plausible to argue that small nations are less likely to have the

[4] "An Era for Mice to Roar: From Iceland to Botswana, Small Nations Prosper," February 25, 1999.

[5] See "A Wealth of Nations" (*The Economist*, April 29 1995).

[6] A state of 5040 citizens implies a population closer to 50,000 by modern standards as women, slaves and many other adult permanent residents were not included as citizens.

[7] However, some functions are often delegated by small states to supranational bodies to exploit economies of scale. The Eastern Caribbean Central Bank is one example.

fiscal resources to afford capable and honest civil servants, and may therefore suffer from more corruption and incompetence.

Fisman and Gatti (2002) conjecture that in large countries, which may have fewer government officials per citizen–due to economies of scale again–citizens may be tempted to bribe officials to jump the queue. But if these economies of scale really existed, the time spent in the queues may not be very long.

If anti-corruption agencies must remain small to avoid infection by corrupt officers, Treisman's conjecture regarding diseconomies of scale in combating corruption might be justified. Elliot Ness's early attempts to combat Al Capone failed because of such an infection; eventually he snared Capone by relying on a small band of "Untouchables." Two of the three successful experiences of anti-corruption reform described by Klitgaard (1988) were in the small city states of Hong Kong and Singapore. On the other hand, Klitgaard's later *Tropical Gangsters* (1991) described rampant corruption in tiny Equatorial Guinea. Klitgaard's account of Equatorial Guinea suggests that small size might facilitate corrupt activity, by making it easier for the government to suppress the media and the opposition.[8]

A recent report on challenges facing small states[9] suggests additional reasons to expect corruption to be more severe in small nations. Inability to take advantage of scale economies in the public sector can result in inadequate compensation levels for civil servants, increasing their temptation to solicit or accept bribes. Queues for public services could be longer, encouraging citizens to offer bribes – as Fisman and Gatti hypothesized for *larger* countries. Particularly for non-tradeables, or where markets are less open to foreign trade, there are likely to be more monopolies and oligopolies in smaller nations, with associated rents that public officials may be tempted to extract. In small nations where "everybody knows everybody" the regulators and the regulated are more likely to have family or other personal ties. Objective performance appraisal of civil servants can be inhibited, with incompetent or corrupt behavior going unsanctioned (World Bank, 2001).

Because arguments can be made either way, the relationship between corruption and country size is ultimately an empirical issue. Depending on the data set chosen, it is easy to find – as did Root (1999) and Fisman and Gatti (2002) – a strong pattern indicating that smaller countries are less corrupt than larger ones. This relationship is potentially important because there is strong evidence linking corruption – and the quality of governance more generally – to economic performance (e.g. Mauro, 1995; Knack and Keefer, 1995; Hall and Jones, 1999). If small size helps in controlling corruption, international support for autonomy or independence movements in highly-corrupt nations could be grounded not only on principles of self-determination and concern for human rights, but also on "good governance" considerations. Moreover, bilateral donors and the international finan-

[8] A recent article in the *New York Times* stated that there is not a single newsstand in the capital of Malabo, and that the president had bought off every opposition politician in the recent election. See "Oil Riches, and Risks, in a Tiny African Nation" (23 July 2000).

[9] See Commonwealth Secretariat/World Bank Joint Task Force on Small States (2000). According to the report, the median public sector wage bill is 31% of GDP in developing nations with less than 1.5 million people, compared to 21% for larger developing countries.

cial institutions have begun conditioning aid on the quality of governance, allocating less to recipient countries with more severe corruption problems. If it is intrinsically more difficult for larger nations to control corruption, donors might want to take this into account in determining aid allocations for nations such as Bangladesh, China, Indonesia, and Pakistan. We show in this paper that there is in fact no clear relationship between country size and corruption, and therefore no reason to lower the corruption bar for larger countries.

## 4. Sample selection in corruption data sets

This section presents direct evidence indicating that country size and corruption levels are each significant determinants of inclusion in the corruption data sets. The corruption data used in cross-country studies are obtained from firms that specialize in providing assessments of "political risk" to overseas investors. Generally, these risk assessment firms provide assessments for only a limited number of countries. The selection of countries will obviously reflect the interest of overseas investors – the clients of the risk assessment firms. Countries that constitute large markets – such as Brazil, India, Indonesia, Nigeria, Russia and the USA – will be of interest whether the country is well-governed or not. In contrast, among smaller countries only those that are well governed (or rich) are likely to be of much interest to overseas investors. For example, Iceland and Luxembourg show up in many more of the standard data sources on governance than does Equatorial Guinea, despite similar population sizes.

Clearly, selecting countries in this way can potentially create a spurious relationship between country size and corruption. Samples will tend to include all large nations, whether corrupt or not, but only the less corrupt nations among the smaller ones.

The most widely-known corruption indicator is Transparency International's (TI) Corruption Perceptions Index. This corruption indicator is used by Root (1999), Sandholtz and Koetzle (2000), Treisman (2000), Wei (2000), and other studies. It is constructed by standardizing and equally weighting values from numerous other indicators, including expert assessments – such as the International Country Risk Guide's (ICRG) "corruption in government" rating – and surveys of investors and citizens.[10] Values range from 0 (worst corruption) to 10 (least corrupt). Countries are rated by TI only if data are available from at least three underlying sources. For example, if the ICRG is the only source from which TI can find data on a given country, that country is not included in TI's index.

As interest in corruption has increased in recent years, more data from surveys and other sources have become available to TI. Accordingly, the number of countries included in TI's index rose from 41 in 1995 to 54 in 1996, 52 in 1997, 85 in 1998 and 99 in 1999. Table 1 reports summary statistics for the TI indexes.

As the number of countries increases, representation of smaller and more corrupt nations will tend to increase, if larger and less corrupt nations were already well

[10] For the 1999 TI index, 17 sets of ratings from 10 separate sources were used. See Lambsdorff (2000) for detailed methodology.

**Table 1.** Descriptive statistics for corruption indexes

| | N | Mean | Standard deviation | Median pop. in sample | Median graft-CPIA | % with graft-CPIA $< 0$ |
|---|---|---|---|---|---|---|
| TI 1995 | 41 | 5.93 | 2.55 | 31.7 | 0.83 | 73.2 |
| TI 1996 | 54 | 5.35 | 2.60 | 27.2 | 0.62 | 63.0 |
| TI 1997 | 52 | 5.67 | 2.53 | 22.5 | 0.65 | 69.2 |
| TI 1998 | 85 | 4.89 | 2.40 | 11.5 | 0.06 | 52.9 |
| TI 1999 | 99 | 4.60 | 2.36 | 10.5 | −0.14 | 47.5 |
| Graft index (1999) | 155 | 0 | 1 | 9.2 | −0.24 | 38.7 |
| CPIA (1999) | 136 | 2.89 | 0.86 | 6.1 | −0.37 | 19.9 |
| Graft-CPIA | 184 | −0.06 | 0.85 | 7.1 | −0.30 | 40.2 |

represented in the data. Table 1 shows how the median population in the TI sample declines markedly over time. The biggest one-year decline, from 22.5 million to 11.5 million, occurred between 1997 and 1998 – the year in which TI's country coverage expanded the most, from 52 to 85.

Using two recently-available and more inclusive corruption indicators, we can also show how the TI sample improves its coverage over time of more corrupt countries. Kaufmann, Kraay and Zoido-Lobaton (1999) have constructed a "Graft" index using data from 11 sources (mostly the same as used by TI), and a methodology which weights more heavily those indicators that tend to be most highly correlated with the others. In practice, the differences in data and methodology matter little, as the Graft index is correlated at 0.98 with the TI 1999 index. The major difference between the indexes is country coverage, as Kaufmann et al. provide ratings even where there are only one or two underlying data sources.[11] The Graft index provides ratings for 155 countries, compared to 99 for the 1999 TI index. Values are standardized, so that a Graft index value of 1.5 indicates that a nation is 1.5 standard deviations above the mean value for all nations. The lowest value is −1.567 (Niger) and the highest is 2.085 (Finland, Sweden).

A second new corruption indicator, constructed for internal use by the World Bank, rates every member country which is an active borrower (in practice, most members that are not high-income nations).[12] As part of the Bank's annual "Country Policy and Institutional Assessment" (CPIA), it rates 136 countries on 20 aspects of policies and governance on a 1–6 scale. One of these items measures "transparency, accountability, and corruption in the public sector." Of the 136 nations covered by

[11] Kaufmann et al. also provide "standard errors" associated with each country value; these standard errors increase with the level of disagreement among the underlying sources, and decrease with the number of sources from which data are available.

[12] Unfortunately the CPIA index is not yet available to researchers outside the World Bank. Although country coverage of the CPIA index is independent of country size, it has other potential disadvantages. Unlike the case with ICRG and other commercial firms that produce many of the ratings used to construct the TI and Graft indexes, there is no financial incentive for accuracy in constructing the CPIA ratings. The CPIA also may contain more measurement error than the TI and Graft indexes, which aggregate information from numerous sources.

the CPIA corruption indicator, 29 (mostly small) nations are not represented in the Graft sample. By estimating missing Graft index data from CPIA ratings, corruption ratings for 1999 can be generated for 184 nations.[13] Henceforth, "Graft-CPIA" will refer to the Graft index values, augmented by predicted values based on CPIA ratings for those nations missing data on the Graft index.

Table 1 shows how TI's coverage expanded over time, to include more countries that are poorly governed. The median Graft-CPIA value fell from .83 (nearly a standard deviation above the mean) in the TI 1995 index to −0.14 in TI's 1999 index. The percentage of countries in the TI sample with better-than-average corruption ratings, as indicated by Graft-CPIA values, fell from 73% in 1995 to 47.5% in 1999. Even in 1999, however, the TI sample retained a modest bias toward less-corrupt nations, relative to the Graft-CPIA sample.

Among more than 30 independent nations with populations under one million, only Iceland (274,000) and Luxembourg (426,000) – which both scored far above average on the TI index and on the Graft-CPIA index – were included in TI's index for 1999, which covered 99 countries. In contrast, the most populous 8 nations are all included, as are 25 of the largest 30.

The greater tendency for well-governed nations to be included in the TI indexes is not attributable merely to their higher income levels. Table 2 reports logit regressions in which the dependent variable is a dummy, indicating whether each country is included in the relevant corruption data set. Independent variables include population, per capita income, and corruption levels, as measured by the Graft-CPIA index.

The coefficient on population is positive and significantly associated with the likelihood of inclusion in each of the TI indexes and the Graft index, but not for the CPIA index. These results are all as expected, because the TI and Graft indexes are constructed by aggregating ratings provided by firms assessing risks to overseas investors, while the CPIA covers all World Bank borrowers whether large or small. The coefficient on per capita income is positively and significantly (except in the case of TI 1996) associated with inclusion in the TI and the Graft indexes. Income is negatively and significantly associated with CPIA coverage, because high-income members of the World Bank tend not to be borrowers.

Lower corruption levels (as indicated by higher values on the Graft-CPIA index) are associated with a significantly greater probability that nations are included in the TI samples. This result suggests that, even after taking into account income differences, risk ratings firms and other sources of corruption data often choose not to devote resources to providing regular assessments of nations which are not sufficiently well governed to generate interest among their clients (mostly overseas investors and lenders).

Some clients of risk ratings firms are exporters, and may also have a greater interest in countries with higher trade intensity, controlling for their per capita incomes and populations. Accordingly, we added the import share of GDP (or,

[13] Missing Graft values are imputed from the regression Graft$= -1.637 + 0.436$(CPIA). In this regression, N = 107, t = 10.33, and $R^2$ = 0.50. This augmented corruption measure covers all countries for which both population and per capita income data are available for 1998, with the sole exception of Antigua.

**Table 2.** Logit regressions. Dependent variable = dummy for corruption data availability

| Dependent Variable = dummy for: | Intercept | Log Population | Log Per capita income | Graft-CPIA | N | Pseudo $R^2$ |
|---|---|---|---|---|---|---|
| TI 1995 | −27.90 | 2.47** | 2.27** | 2.41** | 163 | 0.78 |
| | (8.42) | (0.61) | (0.84) | (0.84) | | |
| TI 1996 | −10.71 | 1.92** | 0.65 | 2.26** | 163 | 0.67 |
| | (3.64) | (0.34) | (0.42) | (0.64) | | |
| TI 1997 | −19.49 | 2.03** | 1.61** | 2.51** | 165 | 0.74 |
| | (5.45) | (0.39) | (0.58) | (0.78) | | |
| TI 1998 | −7.13 | 1.16** | 0.64* | 1.60** | 165 | 0.46 |
| | (2.42) | (0.21) | (0.28) | (0.48) | | |
| TI 1999 | −7.75 | 0.99** | 0.81** | 0.91* | 165 | 0.38 |
| | (2.35) | (0.18) | (0.27) | (0.42) | | |
| Graft index | −14.54 | 1.90** | 1.92** | 1.04 | 165 | 0.61 |
| | (4.54) | (0.38) | (0.57) | (0.80) | | |
| CPIA | 46.35 | −0.15 | −4.92** | 0.13 | 165 | 0.74 |
| | (11.40) | (0.20) | (1.23) | (0.69) | | |
| BI (1980–83) | −22.15 | 0.92** | 0.93** | 0.73* | 124 | 0.41 |
| | (4.35) | (0.18) | (0.33) | (0.37) | | |
| WCR (1989–90) | −44.19 | 1.76** | 1.48 | 2.93** | 152 | 0.73 |
| | (11.96) | (0.45) | (0.77) | (0.84) | | |

Cells contain logit coefficients and standard errors. A *(**) indicates significance at 0.05 (.01) level for 2-tailed tests. Population and per capita income are lagged one year relative to the respective corruption indicator.

alternatively, the log of this share) to our selection regressions. Imports turns out not to be a significant predictor of inclusion in corruption samples, unless country size is omitted. Whether or not imports is included, population remains significant in every case.

Figures 1 and 2 plot the relationship between (log of) population and the Graft index; countries represented in the TI 1996 (Fig. 1) and TI 1997 (Fig. 2) data sets are marked by black diamonds, and countries without TI data are marked by white diamonds. The figures illustrate the sample selection problem in the TI data very clearly. Overall, there appears to be no strong relationship between population and the Graft ratings in the figures. However, among those countries for which TI values are available (those marked by black diamonds), the relationship is strongly negative. The figures provide obvious visual evidence that data availability on TI is highly dependent on population and on corruption levels: only the well-governed countries among small nations are represented in the TI index, and only the large nations among the poorly-governed ones are represented.

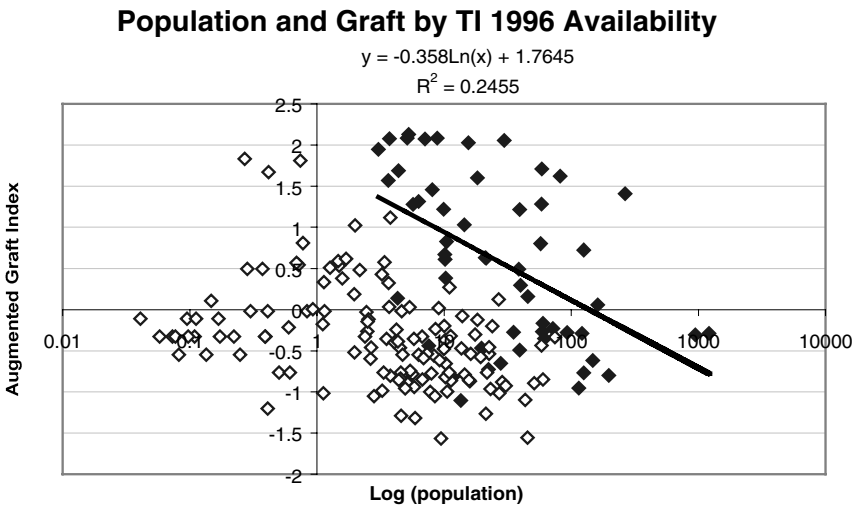


**Fig. 1**

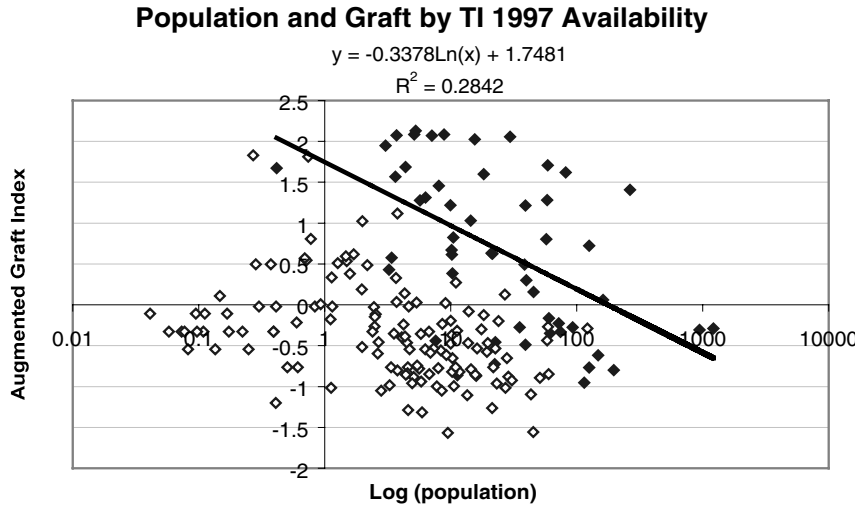


**Fig. 2**

## 5. Are larger nations really more corrupt?

We show in this section that the econometric relationship between country size and corruption identified elsewhere (e.g., Root, 1999; Fisman and Gatti, 2002) is a statistical artifact created by sample selection in the availability of corruption data. In samples that do not systematically exclude small and poorly governed nations, the association between population and corruption weakens substantially or disappears.

**Table 3.** Correlations of corruption and log of population

| Corruption variable | Full sample | | Pop. > 1 million | |
|---|---|---|---|---|
| TI 1995 | −0.64** | (40) | −0.64** | (40) |
| TI 1996 | −0.56** | (53) | −0.56** | (53) |
| TI 1997 | −0.57** | (52) | −0.56** | (51) |
| TI 1998 | −0.34** | (85) | −0.26* | (83) |
| TI 1999 | −0.25* | (99) | −0.17 | (97) |
| Graft index | −0.17* | (154) | −0.08 | (142) |
| CPIA | −0.11 | (136) | −0.09 | (112) |
| Graft-CPIA | −0.05 | (183) | −0.07 | (150) |

Population is lagged one year relative to the respective corruption indicator. A * (**) indicates significance at 0.05 (0.01) level for 2-tailed tests.

Table 3 shows the simple correlations between country size and the TI corruption index for 1995 through 1999. The correlation with the log of population is −0.64 for 1995. If this relationship is driven by sample selection, then we would expect that this correlation would decline as the number of countries with TI ratings rises over time. This is exactly the pattern found in Table 3. As the TI sample more than doubles to 99 nations in 1999, the correlation with population drops by more than half to −0.25.

This relationship weakens even further using either of the two newer corruption measures – the Graft and CPIA indexes – that are far more inclusive of smaller nations than are the TI indexes and thus less subject to selection bias. Tables 1 and 2 show that country size is positively associated with inclusion in the Graft sample, although median population (9.2 million) is somewhat lower than in the TI samples. However, corruption ratings as measured by Graft-CPIA are not a significant determinant of country coverage in the Graft index, controlling for population and income (Table 2). The sample composition of CPIA is largely unrelated to population. The median country size among the 136 CPIA nations in 1999 was 6.4 million, not much larger than the median of 5.3 million among all 207 nations with population data. Coverage in the CPIA is significantly associated with lower income (as expected for World Bank borrowers), but is not significantly related to country size or to Graft-CPIA corruption ratings (Table 2).

Table 3 demonstrates that in these samples less subject to selection bias, the association between country size and corruption weakens or disappears entirely. Deleting countries with population under one million also weakens the association between country size and corruption ratings. As shown in the second column of Table 3, the correlation of population with the 1999 TI index drops from −0.25 to an insignificant −0.17 when the two small nations in the sample (Luxembourg and Iceland) are deleted. These results are consistent with the hypothesis that the country size-corruption relationship is dependent on the use of samples that tend to exclude small, corrupt nations.

**Table 4.** Corruption regressions

| Equation | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Dependent variable | TI 1995 | TI 1996 | TI 1997 | TI 1998 | TI 1999 | Graft | CPIA | Graft-CPIA |
| Log (population) | −0.542** | −0.504** | −0.361** | −0.313** | −0.257** | −0.033 | −0.043 | −0.026 |
| | (0.165) | (0.106) | (0.105) | (0.088) | (0.067) | (0.028) | (0.038) | (0.019) |
| Log (per capita income) | 1.224** | 1.433** | 1.356** | 1.255** | 1.276** | 0.421** | 0.409** | 0.382** |
| | (0.342) | (0.125) | (0.187) | (0.165) | (0.175) | (0.058) | (0.091) | (0.055) |
| Ex-British colony | 1.141** | 0.845** | 0.986** | 1.138** | 1.098** | 0.244** | 0.332* | 0.226** |
| | (0.359) | (0.258) | (0.279) | (0.234) | (0.235) | (0.090) | (0.137) | (0.087) |
| Stable democracy | 1.915** | 1.792** | 2.032** | 2.176** | 2.131** | 0.944** | 0.549 | 1.007** |
| | (0.484) | (0.409) | (0.399) | (0.418) | (0.433) | (0.168) | (0.901) | (0.165) |
| Intercept | −4.797 | −6.810 | −6.782 | −6.231 | −6.523 | −3.685 | −0.271 | −3.369 |
| | (3.499) | (1.049) | (1.762) | (1.431) | (1.503) | (0.473) | (0.756) | (0.447) |
| N | 40 | 53 | 52 | 84 | 98 | 141 | 125 | 162 |
| Adj. $R^2$ | 0.77 | 0.85 | 0.82 | 0.80 | 0.79 | 0.69 | 0.21 | 0.67 |
| Mean, dep. variable | 5.9 | 5.4 | 5.7 | 4.9 | 4.6 | 0.03 | 2.9 | −0.01 |
| Standardized coeff. on log(population) | −0.31 | −0.27 | −0.22 | −0.18 | −0.16 | −0.06 | −0.13 | −0.06 |

Heteroskedasticity-consistent standard errors in parentheses. Population, per capita income and political freedoms are lagged one year relative to the respective corruption indicator. A * (**) indicates significance at 0.05 (.01) level for 2-tailed tests.

Evidence from multivariate tests confirms evidence from these simple correlations that the population-corruption relationship is driven by sample selection bias. Regressions in Table 4 control for several other variables shown elsewhere to be associated with corruption levels. Per capita income is included in most studies analyzing determinants of corruption, although it is commonly recognized that corruption can in turn influence income levels. We lag income and population by one year behind the dependent variable. Treisman (2000) finds that former British colonies, and long-lasting democracies, have significantly better corruption ratings other things equal. We include dummies for each of these variables, defining durable democracies as countries which maintained a rating of 1 or 2 on the Freedom House index of political freedoms from the early 1970s to the present.[14] We avoided using other regressors that plausibly are related to corruption but which would reduce the sample size substantially.

[14] Results on population are not sensitive to using the contemporaneous values of the Freedom House index, lagged by one year, rather than the durable-democracy dummy. The latter variable has much more explanatory power than the former. Income coefficients are much larger when the contemporaneous value of freedoms is used.


**Fig. 3**

In equations 1–5 of Table 4, corresponding to the years 1995–99, the TI sample increases substantially, and the coefficient on population declines dramatically. For the indexes with broader country coverage in equations 6–8, population is no longer significant. Because these indexes use different scales from the TI index, we report standardized coefficients for population in the bottom row of Table 4, to facilitate comparisons across regressions. These coefficients decline steadily as the sample increases. In equation 8, with 162 countries, the standardized coefficient is only one fifth of its value in equation 1, with only 40 countries represented. Figure 3 illustrates graphically this strong link between sample coverage and the standardized estimate of population's impact on corruption. The country size and corruption relationship thus appears to be entirely due to the use of samples which systematically exclude smaller and more corrupt nations.[15]

Measurement error in the corruption ratings is conceivably responsible in part for the declining impact of population as country coverage increases from left to right in Table 4. Although random measurement error in the dependent variable does not bias coefficients downward, errors that are systematically in the direction of the sample mean could create such a bias. Suppose experts are less knowledgeable about corruption in those (mostly small and poor) countries not included in the TI index. Assessments provided for those countries may well be conservative; e.g. in the absence of any information whatsoever the logical "best guess" is simply to assign a country a value equal to the sample mean. The data, however, show little evidence of such a pattern. Among the 136 countries with CPIA ratings, the 71 countries that are included in the 1999 TI index on average deviate 0.67 from the CPIA sample mean. Of the 65 not represented in the TI index – and for which

[15] We do not report estimates from Heckman sample selection models in tables, because an extended search failed to identify any variables that strongly affect selection but not corruption. However, the availability of the Graft and (especially) the CPIA indexes obviates the need for using Heckman selection methods to generate corrected estimates of the effects of country size.

less information may be available – CPIA ratings on average deviate 0.64 from the sample mean. The difference in these mean deviations is not statistically significant.

By demonstrating that the commonly-found relation between country size and corruption is an artifact of sample selection, the results here provide no support for partition or secession as a means to better governance. Our findings also suggest there is no reason for donors that condition aid on the quality of governance to grade larger countries such as Pakistan on a different curve. Our findings also have implications for researchers. Until data on the quality of governance are available for all countries, care must be taken in making inferences regarding independent variables such as population, per capita income, and the quality of governance, that influence which countries are included in the governance data sets.

## 6. Trade intensity and corruption

The sample selection problems documented above also have implications for analyses of the impact on corruption of variables highly correlated with population, such as trade intensity. Trade intensity is included as a determinant of corruption levels by Ades and Di Tella (1999), Sandholtz and Koetzle (2000) and Treisman (2000).

Ades and Di Tella instrument for imports/GDP with the log of population and the log of land area, and find that higher imports are associated with lower corruption, as reflected in ratings produced by Business International (BI) and the World Competitiveness Report (WCR). The import share of GDP is strongly related to population, with a correlation of −0.61 for a sample of 160 countries in 1997. Because Ades and Di Tella – like Sandholtz and Koetzle (2000) and Treisman (2000) – do not control for population, the coefficient on imports/GDP in their tests is likely to reflect selection bias. Selection regressions in Table 2 (see bottom two rows) indicate that country coverage in their BI and WCR corruption indexes is determined in large part by country size and the quality of governance. Their 31-nation WCR sample is particularly instructive on how investor interest drives selection: it is composed of 24 OECD members (including new members Korea and Mexico), 2 small and 2 medium-sized fast-growing East Asian nations (Hong Kong, Singapore, Malaysia and Thailand), and the 3 largest non-Communist developing nations (India, Indonesia and Brazil).

Sandholtz and Koetzle (2000) find that trade intensity, measured by exports plus imports as a share of GDP, is associated with higher ratings on the TI 1996 index, with a sample of 50 countries. Treisman (2000) also finds imports/GDP is associated with better ratings on the BI index and the 1996 and 1997 TI indexes. However, the relationship disappears for the 1998 TI index. Treisman does not link this latter result to the larger sample provided by the 1998 TI index. Adding the import share of GDP to our corruption regressions based on the Graft and CPIA indexes in Table 4, we find that imports/GDP is unrelated to corruption in samples less subject to selection bias.[16]

[16] These results are not reported in tables, because they are similar to those reported below in Table 5. However, they are available from the authors on request.

**Table 5.** Natural openness and corruption

| Equation | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Dependent var. | TI 1995 | TI 1996 | TI 1997 | TI 1998 | TI 1999 | Graft | CPIA | Graft-CPIA |
| Natural openness | 2.044* | 2.398** | 2.199** | 1.799** | 0.905* | 0.228 | 0.213 | 0.185 |
| | (0.961) | (0.614) | (0.685) | (0.451) | (0.410) | (0.141) | (0.221) | (0.137) |
| Residual openness | −0.029 | −0.080 | 0.005 | −0.234 | 0.051 | −0.041 | −0.224 | −0.072 |
| | (0.670) | (0.474) | (0.615) | (0.404) | (0.403) | (0.148) | (0.215) | (0.144) |
| Log (per capita income) | 2.160** | 1.813** | 2.007** | 1.635** | 1.547** | 0.468** | 0.353** | 0.479** |
| | (0.508) | (0.290) | (0.314) | (0.247) | (0.225) | (0.053) | (0.094) | (0.052) |
| Political freedoms | −0.093 | −0.027 | −0.039 | −0.043 | 0.139 | 0.122** | 0.076 | 0.094** |
| | (0.275) | (0.161) | (0.211) | (0.121) | (0.105) | (0.025) | (0.043) | (0.026) |
| Intercept | −21.924 | −20.600 | −21.656 | −16.714 | −13.328 | −5.442 | −1.078 | −5.218 |
| | (4.021) | (2.769) | (2.896) | (2.338) | (2.315) | (0.622) | (0.970) | (0.610) |
| N | 40 | 53 | 49 | 81 | 95 | 133 | 111 | 144 |
| Adj. $R^2$ | 0.63 | 0.75 | 0.69 | 0.64 | 0.64 | 0.63 | 0.23 | 0.61 |
| Standardized coeff. on natural openness | 0.29 | 0.31 | 0.30 | 0.25 | 0.13 | 0.09 | 0.09 | 0.07 |

Heteroskedasticity-consistent standard errors in parentheses. Population, per capita income and political freedoms are lagged one year relative to the respective corruption indicator. A * (**) indicates significance at 0.05 (.01) level for 2-tailed tests.

Wei's result that "natural openness" leads to better governance also turns out to be driven by sample selection. "Natural openness" is constructed by taking the predicted values from a regression of trade intensity on (log) population and several other variables. Population is easily the most powerful predictor of trade in these regressions. "Natural openness" averaged over 1994–96 is in fact correlated at −0.91 with (log) population for 1995. Wei's corruption regressions using the BI corruption index include 66 or fewer countries, and those using the TI 1998 index include 82 or fewer countries. Table 2 shows that country coverage for these indexes is a function of population and of the quality of governance.

Table 5 shows the relationship between natural openness and corruption for various samples. We replicated Wei's regressions of corruption on natural openness, residual openness, log of per capita income, and the Freedom House political freedoms indicator. As shown in equations 4 and 5 of Table 5, the coefficient on natural openness is halved simply by substituting the TI 1999 index (with 14 additional countries) for TI 1998. Using the Graft index (equation 6), and particularly the CPIA index (equation 7), the relationship weakens further and is not significant.[17]

[17] We obtain very similar results using the Frankel and Romer (2000) predicted trade shares, also constructed from regressions of trade intensity on population and geographic variables. Inclusion in the BI sample, as for TI, is significantly related to population, per capita income, and corruption levels as

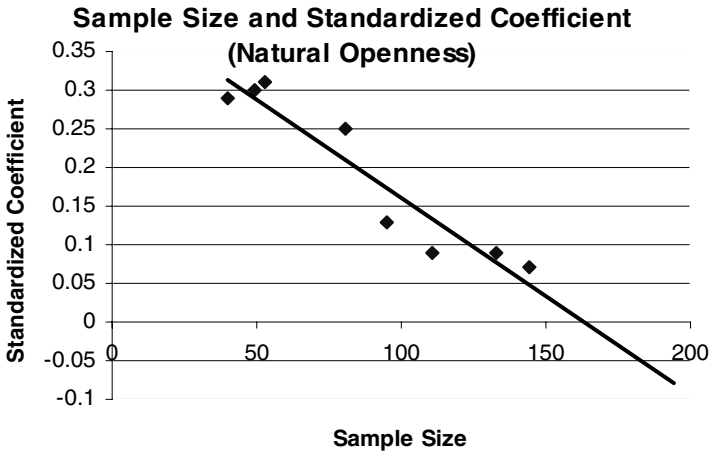


**Fig. 4**

Figure 4 illustrates how the coefficient on natural openness declines as the sample size increases. While trade intensity may increase growth rates (Frankel and Romer, 2000), particularly for small countries (Alesina et al., 2000), there is no convincing evidence that it reduces corruption.

As in cross-country empirical work on growth, there is no consensus in the literature on what set of regressors belongs in corruption tests. Our regressions omit some variables included in other studies, to avoid losing dozens of (mostly small) countries. We cannot rule out the possibility that trade intensity or country size might be significant under some particular model specification using the Graft or Graft-CPIA corruption indexes. We claim only that any such result is not a robust finding.

## 7. Conclusion

Economic integration and political disintegration have characterized the world economy in the last decade of the twentieth century. Changes of this magnitude are likely to significantly impact welfare. Many people have conjectured that the smaller country size or the consequential increase in trade intensity will improve the quality of governance, citing a statistical relationship between country size (or trade intensity) and corruption. We have shown that this econometric finding is largely a statistical artifact driven by sample selection. While the international community may legitimately support the division of countries on the basis of principles of self-determination, there is little reason to do so in the hope of better governance. Our results also suggest that there is little reason for donors to have a lower bar in terms of governance conditionalities for larger nations.

measured by the Graft-CPIA index. Our Table 5 regressions are based on Wei's Table 5, equation 4. Our TI 1998 regression replicates his result closely, but not exactly. We lagged income and political freedoms by one year.

How should researchers respond to potential problems with sample selection in studying the determinants of good governance? Analyses of the impact of trade openness should avoid the use of trade intensity, and use measures of tariffs, distortions in exchange rates and other measures that do not closely reflect country size. For example, Lee and Azfar (2000) find in a panel estimation that high levels of corruption reduce the likelihood of tariff reductions, but that tariff levels have no effect on corruption.

Analyses of country size effects should use, among existing data sets, those with greater cross-country coverage. By aggregating information from several sources, the TI indexes likely contain less measurement error than any one of its component indexes, such as the International Country Risk Guide's corruption ratings. Because the latter currently covers more than 140 countries, it may nonetheless produce more accurate estimates in the face of sample selection problems than the TI index, which covered only 99 countries in 1999. However, the Graft index combines the advantages of TI (aggregation) and ICRG (country coverage), and is preferable to either one.[18] In the longer run it is important to systematically collect data on all small states, if social scientists are to more rigorously test hypotheses concerning the impact of country size on governance and other outcomes.

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[18] Time-series analysis dictates use of the ICRG measure, which dates to 1982, more than 15 years before the Graft and CPIA measures were constructed. On request from researchers, TI now provides an index with broader country coverage, similar to the Graft index. We are not arguing here against using the TI indexes, of course, but merely for using indexes with coverage as broad as possible, taking appropriate account of data quality issues.

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