Background Paper to the

2001 Corruption Perceptions Index

How Precise are Perceived Levels of Corruption?

Subjective indicators include an unavoidable level of imprecision. But claims that this imprecision disallows a ranking of nations are unjustified. Statistical methods support the argument that perceived corruption can be measured with satisfactory precision.

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There has been repeated request among academics and journalists that Transparency International should reveal how precise the Corruption Perceptions Index is. Indeed, a ranking of countries may easily be misunderstood as measuring the perceived performance of a country with absolute precision. This is certainly not true. Since its start in 1995 TI has provided data on the standard deviation and the amount of sources contributing to the index. This data already serves to illustrate the inherent imprecision. In addition, further tests can be applied which are explained here.

This background paper deepens insights on the precision of perceived levels of corruption. It complements the press material provided by TI and another background paper, the framework document, which explains in detail the sources used and the aggregation methodology, [Lambsdorff 2001].

Reliability and Precision

The main table accompanying the CPI provide the average score for each country. But individual experience can diverge. This carries over also to our sources exhibiting some differences in their assessments. In order to adequately illustrate this, the high-low range is provided in the main table. This depicts the highest and the lowest values provided by our sources, so as to portray the whole range of assessments. However, no quick conclusions should be derived from this range to the underlying precision with which countries are measured. Countries which were assessed by 3 or 12 sources can have the same minimum and maximum values, but in the latter case we can feel much more confident about the country's score. In order to arrive at such measures of precision, other statistical methods are required.

The strength of the CPI is based on the concept that a combination of data sources combined into a single index increases the reliability of each individual figure. The idea of combining data is that the nonperformance of one source can be balanced out by the inclusion of at least two other sources. This way, the probability of misrepresenting a country is seriously lowered. This is valid even in case the sources are not totally independent from each other. Such partial dependency may arise if some respondents are aware of other people's perception of the level of corruption, or of other sources contributing to the CPI.

An indicator for the overall reliability of the 2000 CPI can be drawn from the high correlation between the sources. Relating to those countries included in the index, this data is in

Table 1: Correlation Coefficients	IMD 1999	IMD 2000	IMD 2001	PERC 1999	PERC 2000	PERC 2001	GCR 1999	GCR 2000	GCR 2001	ACR 2000	WBES 2001	EIU 2001	PwC 2001	FH 2001
IMD 1999	1,00	0,98	0,98	0,91	0,93	0,93	0,90	0,91	0,93	/	0,78	0,89	0,85	0,65
IMD 2000	0,98	1,00	0,98	0,94	0,93	0,97	0,90	0,91	0,94	/	0,82	0,90	0,87	0,77
IMD 2001	0,98	0,98	1,00	0,87	0,88	0,92	0,89	0,91	0,93	/	0,79	0,91	0,85	0,45
PERC 1999	0,91	0,94	0,87	1,00	0,95	0,91	0,84	0,83	0,86	/	0,78	0,89	0,97	/
PERC 2000	0,93	0,93	0,88	0,95	1,00	0,94	0,91	0,91	0,93	/	0,92	0,88	0,96	/
PERC 2001	0,93	0,97	0,92	0,91	0,94	1,00	0,95	0,95	0,96	/	0,91	0,90	0,97	/
GCR 1999	0,90	0,90	0,89	0,84	0,91	0,95	1,00	0,98	0,93	0,93	0,81	0,87	0,89	0,71
GCR 2000	0,91	0,91	0,91	0,83	0,91	0,95	0,98	1,00	0,95	0,71	0,83	0,89	0,89	0,81
GCR 2001	0,93	0,94	0,93	0,86	0,93	0,96	0,93	0,95	1,00	0,77	0,82	0,83	0,87	0,50
ACR 2000	/	/	/	/	/	/	0,93	0,71	0,77	1,00	0,96	0,62	/	/
WBES 2001	0,78	0,82	0,79	0,78	0,92	0,91	0,81	0,83	0,82	0,96	1,00	0,75	0,63	0,72
EIU 2001	0,89	0,90	0,91	0,89	0,88	0,90	0,87	0,89	0,83	0,62	0,75	1,00	0,79	0,79
PwC 2001	0,85	0,87	0,85	0,97	0,96	0,97	0,89	0,89	0,87	/	0,63	0,79	1,00	0,77
FH 2001	0,65	0,77	0,45	/	/	/	0,71	0,81	0,50	/	0,72	0,79	0,77	1,00
Correlations which relate to less than 5 common countries are unreliable and not reported														

table 1.[1] As most correlations are larger than 0.8, the sources do not differ considerably in their assessment of levels of corruption.

In addition to these correlations, the reliability of each individual country score can be determined. The main table reports on the results for each country, including data on the number of sources that assessed a country and the standard deviation between the sources. There exist a variety of reasons why sources may have divergent viewpoints with regard to the level of corruption in a country. Difficulties may, on the one hand, result from subjective problems, for example limited experience among respondents. On the other hand, objective difficulties may contribute to this. Assessing the overall level of corruption may be troublesome in countries where some institutions openly engage in corruption while others strongly resist and fight corruption. A large standard deviation may in this respect also reflect a heterogeneous state of a society. Essential to the CPI is that the larger the number of sources and the lower the standard deviation between the sources, the more reliable is the value for a country. The relatively large standard deviation for Uzbekistan of 1.1 signifies that 95% of the sources ranged between a value of 0.5 and 4.9. In contrast, the low standard deviation for Brazil of 0.3 means that 95% of the scores range between 3.4 and 4.6. But, again, it is not trivial to determine levels of precision with these numbers.

[1] Abbreviations relate to the sources used, Africa Competitiveness Report (ACR) of the World Economic Forum, Economist Intelligence Unit (EIU), Freedom House (FH), Global Competitiveness Report (GCR) of the World Economic Forum, Institute for Management Development (IMD), Political and Economic Risk Consultancy (PERC), PricewaterhouseCoopers (PwC), World Business Environment Survey of the World Bank (WBES)

Sources of Imprecision

The Corruption Perceptions Index is a composite index, whose sources are standardized first and aggregated thereafter. The aggregation method tries to assess the overall level of corruption, as perceived by the multitude of sources. Certainly, each measure is not perfect in determining this overall level of perceived corruption and each measure goes along with an error. This can be expressed accordingly:

$$S(j,k) = C(j) + \varepsilon(j,k)$$

where S(j,k) is the score of country j as provided by source k, C(j) is unobserved true value of the perceived level of corruption in country j, and ε(j,k) is an error term with zero mean. This error term may depend on the source (k) and on the country (j). An attempt to determine measures of precision where the error term depends on both, country and source, is statistically hardly tractable. This forces to either assume that the error term is independent of the country or the source. In the first case, the sources differ in how well they measure perceived corruption. But with the error term being independent of the country, all countries are assessed by a source subject to the same level of precision. In the second case, the sources are all equal in their quality, but the error term depends on the country. This can result because some countries are more difficult to assess than others. The level of experience may differ from one country to another and viewpoints on how to define levels of corruption may differ from country to country. As a result the variance of the error term varies across countries but not across surveys.

The first approach has been taken by Kaufmann, Kraay and Zoido-Lobaton [1999]. The authors assume that each source is a noisy indicator for actual levels of corruption, which is the "unobservable component" they seek to determine. Since the error term varies with the sources, an approach must be presented which determines for each source how precisely it measures corruption, i.e. the quality of the source. Included in their approach is the assumption that those sources which better cor-

relate with the resulting aggregate index are of higher quality (and receive a higher weight), while those which correlate less well are considered to be of lower quality. The quality of sources is therefore determined endogenously and is not an expert's opinion on a source's validity and reliability. There is a point in taking this approach. On the other hand, this assessment of quality can also be misleading. In case a source bases its assessment on hearsay or prejudice, it may correlate well with other sources without being of good quality. Another source may engage in discovering original insights and as a result provide a deviating opinion. The first source would obtain a higher weight simply because it tends to say what all the others say, while the second one would be punished for its original research. The weighting system would then be in contrast to experts' viewpoints regarding the quality of sources.

The approach by Kaufmann, Kraay and Zoido-Lobaton [1999] is an important contribution to the debate. But when considering these problems, it is not clear whether it provided an appropriate system for determining the quality of sources. While it may certainly be that sources exhibit differences in quality, there does not appear to be a feasible approach to determine these differences endogenously.

Standard Errors

The second approach assumes that precision varies across countries. Departing from this assumption one can determine a measure of precision with the help of the standard deviation and the amount of sources used. Dividing the standard deviation by the square root of the number of sources minus one yields an unbiased measure which represents the standard error of the mean score.[2] Brazil, with 9 sources, shows a value of 0.1, while a value of 0.8 is obtained for Uzbekistan, where only 3 sources had been available. However, determining this standard error requires the assumption that there is no imprecision associated with the values given by the individual sources (i.e., when IMD provides a score of 5.5 this is not in reality a score which ranges between 5.3 and 5.7) and that these values are independent from each other. These assumptions are not necessarily realistic and should rather be described as a first-best scenario. Relaxing these assumptions is difficult to carry out practically, but it would clearly bring about standard errors which are larger than the ones determined here. Thus, these standard errors are imperfect but still a helpful measure of precision for the individual country scores.

Subtracting 1.96 times the standard error from a country's mean score and also adding the same value to the mean score yields a confidence range. The true mean score can be said to be within this interval with a 95 percent probability. For all countries in the CPI these standard errors and confidence ranges are reported in an Excel sheet which can be downloaded from www.transparency.org or www.uni-goettingen.de/~uwvw.

There are some countries for which precision is rather weak, while it is strong for other countries. For countries with less than three sources the level of precision is poor. As a result, TI rejects to lend its name to such unreliable values and does not include these countries in the CPI. Still, even for some of the countries in the index it must be stressed, that they have rather large standard errors. Particularly these are: Bangladesh, Honduras, Kazakhstan, Latvia, Namibia, Pakistan, Trinidad & Tobago, Tunisia, Uzbekistan.

Both approaches described so far require some special assumptions. The results are only valid when assuming that there is no imprecision associated with the values and that these values are independent from each other. Another strong assumption required is that errors are normally distributed. While it is statistically difficult to relax the first two assumptions, one can relax the assumption of a

[2] More formally, the standard error of the mean value is:

$$SD(\hat{C}(j)) = \sqrt{\frac{\sum_{K}(S(j,k) - \hat{C}(j))^2}{K(j) * (K(j) - 1)}}$$

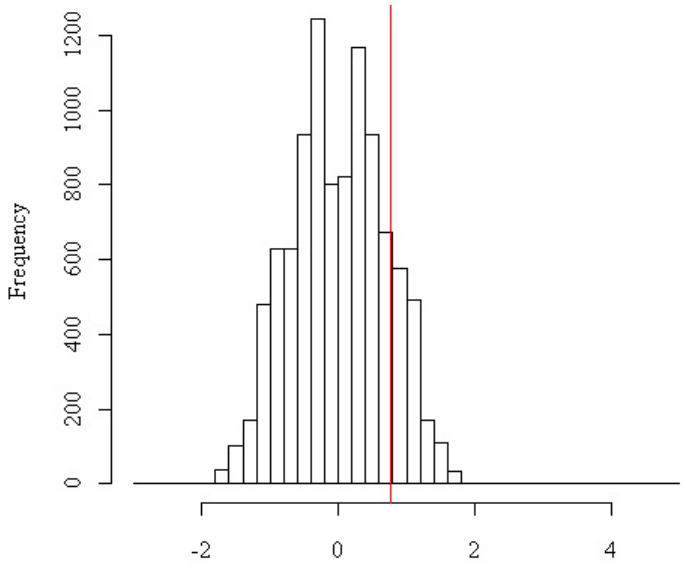
normal distribution and apply tests which are valid throughout any type of distribution. A permutation test provides such an approach. The results from this tests will be reported here in detail.

The Permutation Test[3]

This section proposes a new test for assessing whether two countries in the CPI are significantly different from each other. The applicability of these tests has been intensively discussed and approved by leading statisticians. This new test moves forward in measuring precision because it does not require mathematical assumptions concerning the distribution of data. Still, sources are assumed to be independent, providing reason to regard results as a first-best results. The true significance levels are thus likely to be less strong. Another assumption which now becomes important is that the distribution of data is equal for two countries being compared with each other. Thus, ε varies neither with the source k nor with the country j. But even when this assumption is in reality violated, it is commonly acknowledged that the permutation test is still effective.

The idea of such a test would be to hypothesize that, for example, Lithuania and Estonia are actually equal and obtained different CPI scores just by chance. This so-called null hypothesis plays the role of the devil's advocate. If we cannot decisively reject this hypothesis, we are forced to accept it. The null hypothesis could be interpreted by arguing that a source providing a certain score to Lithuania had equal reason to give this score to Estonia instead. The null hypothesis then states that both countries share the same pool of joint scores and that the difference between the mean values of the countries arose as a matter of chance and not because Estonia performs actually better than Lithuania. The likelihood that the observed difference in the CPI scores (5.6 for Estonia and 4.8 for Lithuania) is obtained can then be determined with the help of permutation tests, [Efron and R. Tibshirani 1993: 202-19]. Lithuania obtained the individual five scores 7.40, 4.40, 4.12, 4.11, 3.82 and Estonia had the five scores 5.96, 5.62, 5.56, 5.49, 5.01. For a permutation a joint vector with the 10 values is determined and these values assigned randomly to the two countries. After doing so, the difference in the mean values is determined. After running 10.000 such permutations it can be observed how likely it is that the observed difference (or larger ones) in the CPI scores occurred — this time as a matter of chance under the null hypothesis and not resulting from an actually different country performance. Figure 1 presents the distribution of the results. Each bar depicts the frequency (out of 10,000) with which a given difference of mean values is obtained under the null hypothesis. The actually observed difference between Lithuania and Estonia of 0.8 is marked by a vertical line. The likelihood that the observed difference is

Figure 1: Histogram of Permutation Results, Estonia and Lithuania



[3] I am highly indebted to W. Zucchini for pointing out the usefulness of permutation tests and for invaluable help in writing the necessary software program.

obtained under the null hypothesis is demonstrated by the size of the bars to the right of this line. If this likelihood is below a critical value, for example 5 percent, the hypothesis of equal CPI scores can be rejected. For the case of Estonia and Lithuania this likelihood was 15%, providing insufficient reason for the argument that Estonia is significantly better.

To demonstrate this probability for all pairs of countries in the CPI, a table with 91 rows and 91 columns is required. Such a table is impossible to provide here. It can be downloaded from http://www.uni-goettingen.de/~uwvw. Various excerpts can help to make our point.

Explanatory notes to the subsequent tables:
A "*" is provided if countries are different at a 90 percent significance level (that is, under the null hypothesis the difference observed occurred only in 10 percent of the permutations). A "**" denotes a 95 percent significance level and "***" is given for a 97.5 percent significance level. Comparisons are only carried out if the country in the row ranks better than the one in the column, and a "\" assigned otherwise. A blank denotes an insignificant result.

Differences at a 10 percent error level	Finland	New Zealand	Canada	Switzerland	Hong Kong	Chile	Spain	Portugal	Estonia	Malaysia	Greece	Colombia	Thailand	India	Ecuador	Uganda
Finland	/	*	***	***	***	***	***	***	***	***	***	***	***	***	***	***
New Zealand	/	/	*	***	***	***	***	***	***	***	***	***	***	***	***	***
Canada	/	/	/	*	***	***	***	***	***	***	***	***	***	***	***	***
Switzerland	/	/	/	/	**	***	***	***	***	***	***	***	***	***	***	***
Hong Kong	/	/	/	/	/	*	***	***	***	***	***	***	***	***	***	***
Chile	/	/	/	/	/	/	*	***	***	***	***	***	***	***	***	***
Spain	/	/	/	/	/	/	/	**	***	***	***	***	***	***	***	***
Portugal	/	/	/	/	/	/	/	/	**	***	***	***	***	***	***	***
Estonia	/	/	/	/	/	/	/	/	/	*	***	***	***	***	***	***
Malaysia	/	/	/	/	/	/	/	/	/	/	***	***	***	***	***	***
Greece	/	/	/	/	/	/	/	/	/	/	/	*	***	***	***	***
Colombia	/	/	/	/	/	/	/	/	/	/	/	/	**	***	***	***
Thailand	/	/	/	/	/	/	/	/	/	/	/	/	/	*	**	**
India	/	/	/	/	/	/	/	/	/	/	/	/	/	/	*	***
Ecuador	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	*
Uganda	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/

One such excerpt would list some examples of countries which are different at a 90 percent significance level. This significance level indicates that only in 10 percent of the permutations the observed (or a larger) difference in the mean value is obtained. In this case one could argue that starting from Finland to New Zealand, Canada, Switzerland, Hong Kong, Chile, Spain, Portugal, Estonia, Malaysia, Greece, Colombia, Thailand, India, Ecuador and Uganda we have 16 countries where each country is significantly better than its successor.

Clearly, the assumption that the source's inputs are not stochastic and independent from each other is also required for this test. Thus the error level would in reality be larger. It may therefore be preferable to require a 95 percent significance level. In this case it can be argued that, for example, Denmark, Sweden, Switzerland, Germany, Portugal, Italy, South Africa, Bulgaria, Thailand, Vietnam, Indonesia and Nigeria are all significantly different from each other. Similar differences can be established for countries in between.

Differences at a 5 percent error level	Denmark	Sweden	Switzerland	Germany	Portugal	Italy	South Africa	Bulgaria	Thailand	Vietnam	Indonesia	Nigeria
Denmark	/	**	***	***	***	***	***	***	***	***	***	***
Sweden	/	/	**	***	***	***	***	***	***	***	***	***
Switzerland	/	/	/	***	***	***	***	***	***	***	***	***
Germany	/	/	/	/	***	***	***	***	***	***	***	***
Portugal	/	/	/	/	/	**	***	***	***	***	***	***
Italy	/	/	/	/	/	/	**	***	***	***	***	***
South Africa	/	/	/	/	/	/	/	***	***	***	***	***
Bulgaria	/	/	/	/	/	/	/	/	**	***	***	***
Thailand	/	/	/	/	/	/	/	/	/	***	***	***
Vietnam	/	/	/	/	/	/	/	/	/	/	**	***
Indonesia	/	/	/	/	/	/	/	/	/	/	/	**
Nigeria	/	/	/	/	/	/	/	/	/	/	/	/

Differences at a 2,5 percent error level	Finland	Singapore	Luxembourg	Hong Kong	Spain	Taiwan	Malaysia	Brazil	China	Venezuela	Ecuador	Nigeria
Finland	/	***	***	***	***	***	***	***	***	***	***	***
Singapore	/	/	***	***	***	***	***	***	***	***	***	***
Luxembourg	/	/	/	***	***	***	***	***	***	***	***	***
Hong Kong	/	/	/	/	***	***	***	***	***	***	***	***
Spain	/	/	/	/	/	***	***	***	***	***	***	***
Taiwan	/	/	/	/	/	/	***	***	***	***	***	***
Malaysia	/	/	/	/	/	/	/	***	***	***	***	***
Brazil	/	/	/	/	/	/	/	/	***	***	***	***
China	/	/	/	/	/	/	/	/	/	***	***	***
Venezuela	/	/	/	/	/	/	/	/	/	/	***	***
Ecuador	/	/	/	/	/	/	/	/	/	/	/	***
Nigeria	/	/	/	/	/	/	/	/	/	/	/	/

A very conservative and cautious approach would require an even larger 97.5 significance level. In this case significant differences can still be established for a variety of countries. Finland, Singapore, Luxembourg, Hong Kong, Spain, Taiwan, Malaysia, Brazil, China, Venezuela, Ecuador and Nigeria are 12 countries where each one is significantly better than its successor.

Overall, this is a satisfactory level of precision. But it should not be overlooked that in between there exist some countries which are measured with less precision. These are particularly the 9 countries mentioned above, Bangladesh, Honduras, Kazakhstan, Latvia, Namibia, Pakistan, Trinidad & Tobago, Tunisia and Uzbekistan. Particularly when comparing these countries with each other, significant differences are difficult to establish. For example, Bangladesh performs significantly poorer only when compared to three of these countries.

Regional Comparisons

Providing the data for regions is interesting in two respects. First, commonly it is more informative to the public in how far their home country scores relative to its neighbors, rather than to remote places. Second, also some of the countries for which precision is rather weak can be identified and a note of caution be assigned to attempts to assess their performance.

We thus provide regional presentations of the results from a permutation test. While countries are grouped into regions, it was decided that not all countries should be presented. Some regions, such as North America or Oceania, are just too small to deliver a meaningful presentation of countries. For others, such as North Africa and the Middle East, insufficient countries were in the CPI. The same applies to Central Asia. As a consequence, some countries are not included in a regional presentation. Tables are given for Latin America, Sub-Saharan Africa, Asia, Western Europe and Central and Eastern Europe.

Asia	Singapore	Hong Kong	Japan	Taiwan	Malaysia	South Korea	China	Thailand	Philippines	India	Vietnam	Pakistan	Indonesia	Bangladesh
Singapore	/	***	***	***	***	***	***	***	***	***	***	***	***	***
Hong Kong	/	/	***	***	***	***	***	***	***	***	***	***	***	***
Japan	/	/	/	***	***	***	***	***	***	***	***	***	***	***
Taiwan	/	/	/	/	***	***	***	***	***	***	***	***	***	***
Malaysia	/	/	/	/	/	***	***	***	***	***	***	***	***	***
South Korea	/	/	/	/	/	/	***	***	***	***	***	***	***	***
China	/	/	/	/	/	/	/		**	***	***	**	***	**
Thailand	/	/	/	/	/	/	/	/		*	*		***	***
Philippines	/	/	/	/	/	/	/	/	/				***	**
India	/	/	/	/	/	/	/	/	/	/			***	***
Vietnam	/	/	/	/	/	/	/	/	/	/	/		**	*
Pakistan	/	/	/	/	/	/	/	/	/	/	/	/		
Indonesia	/	/	/	/	/	/	/	/	/	/	/	/	/	*
Bangladesh	/	/	/	/	/	/	/	/	/	/	/	/	/	/

For Asia the data is fairly good and allows for determining significant differences between the countries. While Singapore tops this region, significant differences can be found for a continuous sequence of countries until South Korea. Bangladesh and Indonesia stand out as the countries perceived to be significantly worse than almost all other Asian countries included in the index. Differences between India, the Philippines and Vietnam, on the other hand, cannot be established.

Latin America and Carribean	Chile	Trinidad & Tobago	Uruguay	Costa Rica	Peru	Brazil	Colombia	Mexico	Panama	El Salvador	Argentina	Dominican Rep	Guatemala	Venezuela	Honduras	Nicaragua	Ecuador	Bolivia
Chile	/	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***
Trinidad & Tobago	/	/				**	**	***		*	***	*	*	***	*	***	***	***
Uruguay	/	/	/	*	*	***	***	***	**	***	***	**	***	***	**	**	***	***
Costa Rica	/	/	/	/		**	*	***	**	*	***	***	***	***	**	***	***	***
Peru	/	/	/	/	/						*	*	*	***	**	**	***	***
Brazil	/	/	/	/	/	/					***	***	***	***	***	***	***	***
Colombia	/	/	/	/	/	/	/					*	**	***	***	***	***	***
Mexico	/	/	/	/	/	/	/	/					*	***	*	***	***	***
Panama	/	/	/	/	/	/	/	/						***		*	***	***
El Salvador	/	/	/	/	/	/	/	/	/					**		*	***	***
Argentina	/	/	/	/	/	/	/	/	/	/			*	***	*	**	***	***
Dominican Rep	/	/	/	/	/	/	/	/	/	/	/						**	*
Guatemala	/	/	/	/	/	/	/	/	/	/	/	/						*
Venezuela	/	/	/	/	/	/	/	/	/	/	/	/	/				***	***
Honduras	/	/	/	/	/	/	/	/	/	/	/	/	/	/				
Nicaragua	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/			
Ecuador	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/		
Bolivia	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	

Chile is significantly better than all other Latin American countries, followed by Trinidad & Tobago, Uruguay and Costa Rica. These countries perform better than Brazil, Colombia and Mexico. These, in turn, are significantly better than Guatemala, Venezuela and Honduras. Finally, Ecuador and Bolivia stick out as the two Latin American countries included in the CPI which are perceived to perform worst. Peru does not sufficiently differ in its performance from many other Latin American countries, but still scores better than Argentina, which in turn scores better than Nicaragua.

Central and Eastern Europe can be largely divided into three groups. The leading group of countries consist of Estonia, Slovenia and Hungary. With Lithuania falling in between two groups, a second group consists of Poland, Bulgaria, Croatia, the Czech Republic and the Slovak Republic. Latvia and Moldova are not clearly belonging to either the second or the third group. Clearly belonging to the group of the worst performing countries are Romania, Russia and the Ukraine.

Central and Eastern Europe	Estonia	Hungary	Slovenia	Lithuania	Poland	Bulgaria	Croatia	Czech Republic	Slovak Republic	Latvia	Moldova	Romania	Russia	Ukraine
Estonia	/				***	***	***	***	***	***	***	***	***	***
Hungary	/	/			***	***	***	***	***	***	***	***	***	***
Slovenia	/	/	/		***	***	***	***	***	***	***	***	***	***
Lithuania	/	/	/	/					*		***	***	***	***
Poland	/	/	/	/	/						*	***	***	***
Bulgaria	/	/	/	/	/	/	/	/				***	***	***
Croatia	/	/	/	/	/	/	/	/				***	***	**
Czech Republic	/	/	/	/	/	/	/	/			*	***	***	***
Slovak Republic	/	/	/	/	/	/	/	/	/			**	***	***
Latvia	/	/	/	/	/	/	/	/	/	/				
Moldova	/	/	/	/	/	/	/	/	/	/	/			
Romania	/	/	/	/	/	/	/	/	/	/	/	/		
Russia	/	/	/	/	/	/	/	/	/	/	/	/	/	
Ukraine	/	/	/	/	/	/	/	/	/	/	/	/	/	/

Sub-Saharan Africa	Botswana	Namibia	South Africa	Mauritius	Ghana	Malawi	Senegal	Zimbabwe	Zambia	Cote d'Ivoire	Tanzania	Cameroon	Kenya	Uganda	Nigeria
Botswana	/		***	**	***	***	***	***	***	**	***	***	**	*	**
Namibia	/	/						***	*	*	*	**	**	**	**
South Africa	/	/	/		***	***	***	***	***	***	***	***	***	***	***
Mauritius	/	/	/	/	***	**	***	***	***	***	***	***	***	***	***
Ghana	/	/	/	/	/						***	**	**	***	**
Malawi	/	/	/	/	/	/									***
Senegal	/	/	/	/	/	/	/	/							**
Zimbabwe	/	/	/	/	/	/	/	/						*	***
Zambia	/	/	/	/	/	/	/	/	/						*
Cote d'Ivoire	/	/	/	/	/	/	/	/	/	/					*
Tanzania	/	/	/	/	/	/	/	/	/	/	/				*
Cameroon	/	/	/	/	/	/	/	/	/	/	/	/	/		
Kenya	/	/	/	/	/	/	/	/	/	/	/	/	/		*
Uganda	/	/	/	/	/	/	/	/	/	/	/	/	/	/	
Nigeria	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/

For Sub-Saharan Africa only few data are available and it does not take wonder, that many comparisons are not significant. However, Africa is neither a continent which deserves to be singled out as particularly corrupt, nor are countries in this continent all perceived to be equal. Quite the opposite, Botswana sticks out as the country perceived to be best in Sub-Saharan Africa, closely followed by Namibia, South Africa and Mauritius. Nigeria is perceived to be worst among those included in the index (where many other African countries are still missing). For many countries, ranging from Ghana (scoring 3.4 in the CPI) to Uganda (scoring 1.9), the comparisons commonly yield insignificant results.

The statistically not very strong picture of Sub-Saharan Africa is in contrast to the one obtained for Western Europe. Finland and Denmark perform best. Significant differences can be found for a sequence of countries, such as Finland, Sweden, Switzerland, Austria, Spain, Portugal and the two worst scoring Western European countries, Italy and Greece. All countries are measured with satisfactory precision.

Western Europe	Finland	Denmark	Sweden	Netherlands	Luxembourg	Norway	Switzerland	United Kingdom	Austria	Ireland	Germany	Spain	France	Belgium	Portugal	Italy	Greece
Finland	/		***	***	***	***	***	***	***	***	***	***	***	***	***	***	***
Denmark	/	/	*	***	***	***	***	***	***	***	***	***	***	***	***	***	***
Sweden	/	/	/				**	***	***	***	***	***	***	***	***	***	***
Netherlands	/	/	/	/			*	***	***	***	***	***	***	***	***	***	***
Luxembourg	/	/	/	/	/			*	***	***	***	***	***	***	***	***	***
Norway	/	/	/	/	/	/			**	***	***	***	***	***	***	***	***
Switzerland	/	/	/	/	/	/	/		**	***	***	***	***	***	***	***	***
United Kingdom	/	/	/	/	/	/	/	/	**	***	***	***	***	***	***	***	***
Austria	/	/	/	/	/	/	/	/	/	*		***	***	***	***	***	***
Ireland	/	/	/	/	/	/	/	/	/	/		*	***	***	***	***	***
Germany	/	/	/	/	/	/	/	/	/	/	/		*	**	***	***	***
Spain	/	/	/	/	/	/	/	/	/	/	/	/			**	***	***
France	/	/	/	/	/	/	/	/	/	/	/	/	/			***	***
Belgium	/	/	/	/	/	/	/	/	/	/	/	/	/	/		***	***
Portugal	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	**	***
Italy	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	***
Greece	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/

References

Efron, B. and R. Tibshirani, *An Introduction to the Bootstrap*, Chapman & Hall: New York and London, 1993,

Kaufmann, D., A. Kraay and P. Zoido- Lobaton (1999), "Aggregating Governance Indicators." World Bank Policy Research Working Paper No. 2195 (Washington D.C.: The World Bank).

Lambsdorff, J. Graf (2001), "Framework Document to the 2001 Corruption Perceptions Index", *Transparency International Background Paper*: www.transparency.org or www.uni-goettingen.de/~uwvw