

The Methodology of the Corruption Perceptions Index 2007

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The Corruption Perceptions Index (CPI) is a composite index, using data compiled or published between 2006 and 2007. Fourteen surveys of business people and assessments by country analysts from twelve independent institutions enter the CPI.

All sources employ a homogeneous definition of “extent of corruption”. The assessments are gathered from experienced respondents and enhance our understanding of real levels of corruption.

Comparisons to last year’s index should be based on scores. However, such comparisons are not perfect when new sources contribute to the assessment of a country.

Non-parametric statistics are used for standardizing the data and for determining the precision of the scores.

1. Introduction

The goal of the CPI is to provide data on extensive perceptions of corruption within countries. The CPI is a composite index, making use of surveys of business people and assessments by country analysts. It consists of credible sources using diverse sampling frames and different methodologies. These perceptions enhance our understanding of real levels of corruption from one country to another.

Unbiased, hard data continue to be difficult to obtain and usually raise problematic questions with respect to validity. Comparing the number of prosecutions, for example, does not reflect actual levels of corruption but the quality of prosecutors. International surveys on perceptions therefore serve as the most credible means of compiling a ranking of nations.

Overall, 14 sources are included in the CPI 2007, originating from 12 independent institutions. The complete list of sources is presented in the appendix. All in all, the number of countries in the CPI increased from 163 in 2006 to 180 in 2007.

Sources in 2007

Guidelines have been set up which govern the decision-making process regarding the selection of sources for the CPI. These guidelines include the actual criteria that a source needs to meet in order to qualify for inclusion as well as how the final decision is reached with the help of the Transparency International Index Steering Committee. This process aims at making the final decision on the inclusion of sources as transparent and robust as possible. As a result of this it was decided that the CPI 2007 includes data from the following sources:

- **ADB**, the Country Performance Assessment Ratings by the Asian Development Bank, compiled 2006, published 2007.
- **AFDB**, the Country Policy and Institutional Assessment by the African De-

velopment Bank, compiled in 2005 and published December 2006

- **BTI**, the Bertelsmann Transformation Index, Bertelsmann Foundation, 2007, to be published 2008.
- **CPIA**, the Country Policy and Institutional Assessment by the IDA and IBRD (World Bank), compiled 2006, published 2007.
- **EIU**, the Economist Intelligence Unit, 2007.
- **FH**, Freedom House Nations in Transit, 2007.
- **GI**, Global Insight (formerly World Markets Research Centre), Country Risk Ratings 2007.
- **IMD**, the International Institute for Management Development, Lausanne. We use the two annual publications from 2006-2007.
- **MIG**, Grey Area Dynamics Ratings by the Merchant International Group, 2007.
- **PERC**, the Political and Economic Risk Consultancy, Hong Kong. We use the two annual publications from 2006-2007.
- **UNECA**, United Nations Economic Commission for Africa, African Governance Report compiled in 2005, published 2006. New data for 2007 was not yet available.
- **WEF**, the World Economic Forum. New data from 2007 was not yet available. We use only the data from 2006.

An essential condition for inclusion is that a source must provide a ranking of nations. This condition is not met if a source conducts surveys in a variety of countries but with varying methodologies. Comparison from one country to another would not be feasible in this case.

Another condition is that sources must measure the overall extent of corruption. This is not the case if aspects of corruption are mixed with issues other than corruption, such as political instability or nationalism, or if changes are measured instead of the extent of corruption.

For example, the index “Accountability, Transparency and Corruption in Rural Areas” by the International Fund for Agricultural Development was tested for inclusion. However, this index mixes anticorruption with decentralization. This disallows its inclusion.¹ Background documents of previous years provide further examples of sources that failed to qualify.²

The CPIA by the World Bank, the ADB and the AFDB have employed an identical methodological approach. It combines corruption with varied aspects of good governance such as transparency, accountability and independence of the media. However, it was judged that these do not add a new aspect to the index but rather describe a variety of methods for anti-corruption and provide wording for “absence of corruption”.

The CPI 2007 combines assessments from the past two years to reduce abrupt variations in scoring that might arise due to random effects. IMD and PERC conduct annual surveys and data from 2006 and 2007 are included.

While this averaging is valuable for the inclusion of surveys, it is inappropriate for application to the data compiled by professional risk agencies and expert panels. Such assessments as compiled by ADB, AFDB, BTI, CPIA, EIU, FH, MIG, UNECA and GI are conducted by a small number of country experts who regularly analyze a country's performance, cross-checking their conclusions with peer discussions. Following this systematic evaluation, they then consider a potential upgrading or downgrading. As a result, a country's score changes rather seldom and the data shows little year-to-year variation. Changing scores in this case are the result of a considered judgment by the organization in question. To then go back and average the assessments over a period of time would be

inappropriate, so for each assessment only the most recent iteration is included.

Year-to-year comparisons

Comparisons to the results from previous years should be based on a country's score, not its rank. A country's rank can change simply because new countries enter the index and others drop out. A higher score is an indicator that respondents provided better ratings, while a lower score suggests that respondents revised their perception downwards. However, year-to-year comparisons of a country's score may not only result from a changing perception of a country's performance, but also from a changing sample and methodology. While no source dropped out of the index in 2007, three new sources entered, namely, ADB, AFDB and BTI.

The index primarily provides a snapshot of the views of business people and country analysts, with less of a focus on year-to-year trends. However, to the extent that changes can be traced to a change in the assessments provided by individual sources, trends can be identified. Comparing older data (that is, data that was used for the CPI 2006³ but no longer used this year) with topical data from 2007 allows us to identify such changes in perceptions. Countries whose CPI 2007 score decreased relative to the CPI 2006 and where this deterioration is not the result of technical factors are Austria, Bahrain, Belize, Bhutan, Jordan, Laos, Macao, Malta, Mauritius, Oman, Papua New Guinea, and Thailand. The considerable decline in scores of at least 0.3 does not result from technical factors – actual changes in perceptions are therefore likely.

With the same caveats applied, on the basis of data from sources that have been consistently used for the index, improvements of at least 0.3 can be observed for Costa Rica, Croatia, Cuba, Czech Republic, Dominica, Italy, Macedonia, Na-

¹ The data can be obtained at

http://www.ifad.org/gbdocs/eb/89/e/pbas_rural.pdf.

² See the framework documents of earlier years, e.g. http://www.icgg.org/downloads/FD_CPI_2004.pdf

³ These data are CPIA 2005, EIU 2006, FH 2006, IMD 2005, MIG 2006, PERC 2005 and WMRC 2006.

mibia, Romania, Seychelles, South Africa, Suriname and Swaziland.

Trends relating to developments between 1995 and 2005 have recently been determined in a comprehensive investigation. A report on the findings was provided in the *Global Corruption Report 2006*.⁴

2. Validity

All sources generally apply a definition of corruption such as the misuse of public power for private benefit, for example bribing of public officials, kickbacks in public procurement, or embezzlement of public funds. Each of the sources also assesses the “extent” of corruption among public officials and politicians in the countries in question:

- ADB, AFDB and the CPIA by the World Bank ask for ineffective audits, conflicts of interest, policies being biased towards narrow interests, policies distorted by corruption, and public resources diverted to private gain on a scale from 1 (bad) to 6 (good).
- EIU asks its panel of expert to assess the incidence of corruption and defines corruption as the misuse of public office for personal (or party political) financial gain. Integers between 0 (denoting a “very low” incidence of corruption) and 4 (denoting a “very high” incidence) are provided.
- FH asks its panel of expert to assess the implementation of anticorruption initiatives; the government’s freedom from excessive bureaucratic regulations and other controls that increase opportunities for corruption; public perceptions of corruption; the business interests of top policy makers; laws on financial disclosure and conflict of interest; audit and investigative rules for executive and legislative bodies; protections for whistleblowers, anticorruption activists, and others

who report corruption; and the media’s coverage of corruption.

- IMD surveys elite business people and asks them to assess whether “bribing and corruption prevail or do not prevail in the economy.”
- MIG asks its panel of correspondents assess levels of corruption. Corruption in their definition ranges from bribery of government ministers to inducements payable to the “humblest clerk”.
- PERC asks expatriate business people to rate on a scale of zero to 10 how bad they considered the problem of corruption to be in the country in which they are working as well as in their home country.
- UNECA determines the extent of control of corruption via its local expert panel. This includes aspects related to corruption in the legislature, judiciary, at the executive level and in tax collection. Aspects of access to justice and government services are also involved.
- WEF asks: “In your industry, how commonly would you estimate that firms make undocumented extra payments or bribes connected with:”
 - 1 – exports and imports
Common |1|2|3|4|5|6|7| Never occur
 - 2 – public utilities (e.g. telephone or electricity)
Common |1|2|3|4|5|6|7| Never occur
 - 3 – annual tax payments
Common |1|2|3|4|5|6|7| Never occur
 - 4 – public contracts
Common |1|2|3|4|5|6|7| Never occur
 - 5 – influencing laws and policies, regulations, or decrees to favor selected business interests?
Common |1|2|3|4|5|6|7| Never occur
 - 6 – getting favorable judicial decisions
Common |1|2|3|4|5|6|7| Never occur
 From these questions the simple average has been determined.
- GI provides an assessment of the likelihood of encountering corrupt officials. Corruption can range from petty bureaucratic corruption (such as the paying of bribes to low-level officials) right

⁴ Lambsdorff, J. Graf (2006), “Ten Years of the CPI: Determining trends” in: *Global Corruption Report 2006*, Transparency international.

through to grand political corruption (such as the paying of large kickbacks in return for the awarding of contracts).

Scores take the following values: 1; 1.5; 2; 2.5; 3; 3.5; 4; 4.5; 5. They have the following meaning:

1. This country will have an excellent business environment and corruption will be virtually unknown.
2. This country will have a good and transparent business environment. Corruption - official and otherwise - may occur occasionally, but most businesses will not encounter this.
3. This country will have some significant operational obstacles, including corruption. However, whilst official corruption may be relatively common, it should not affect business in an overly negative manner.
4. This country will have a poor business environment. Corruption is likely to be endemic in the business world and officialdom, and it will not be uncommon for kick-backs or bribes to be demanded in return for the awarding of contracts.
5. This country will have severe operational obstacles, which in practice make business impossible. Corruption will be pervasive and will reach the highest levels of government.

Since the data by BTI are newly introduced, we are reporting their approach in more detail here. They are asking members of their network of local correspondents to write qualitative country reports and quantitatively assess two issues related to corruption. These assessments then enter a peer reviewed process of discussion with regional coordinators and staff members. Question 3.3 relates to the enforcement of penalties for corruption. Question 15.3 relates to the effectiveness of anticorruption policies.

The various terms used by the sources “prevalence”, “commonness”, “frequency”, “likelihood”, “extent”, “problematic” and “severity” are closely related. This common

feature of the various sources is particularly important in view of the fact that corruption comes in different forms. It has been suggested in numerous publications that distinctions should be made between these forms of corruption, e.g. between nepotism and corruption in the form of monetary transfers. Yet, none of the data included in the CPI emphasize one form of corruption at the expense of other forms. The sources can be said to aim at measuring the same broad phenomenon. As has been emphasized in the background documents of previous years, the sources do not distinguish between administrative and political corruption.

To what extent are there legal or political penalties for officeholders who abuse their positions?

This question addresses how the state and society hold public servants and politicians accountable and whether conflicts of interest are sanctioned.

As a rule, corrupt officeholders are prosecuted rigorously under established laws.	10 <input type="checkbox"/>
	9 <input type="checkbox"/>
As a rule, corrupt officeholders are prosecuted under established laws but also slip through political, legal or procedural loopholes.	8 <input type="checkbox"/>
	7 <input type="checkbox"/>
	6 <input type="checkbox"/>
Corrupt officeholders are not prosecuted adequately under the law but occasionally attract adverse publicity.	5 <input type="checkbox"/>
	4 <input type="checkbox"/>
	3 <input type="checkbox"/>
Officeholders can exploit their offices for private gain as they see fit without fear of legal consequences or adverse publicity.	2 <input type="checkbox"/>
	1 <input type="checkbox"/>

To what extent can the government successfully contain corruption?

Success in fighting corruption is a key indicator of effective resource use. Success is made possible because the government performs and enforces the following tasks to achieve integrity (“integrity mechanisms”): auditing of state spending; regulation of party financing; citizen and media access to information; accountability of officeholders (asset declarations, conflict of interest rules, codes of conduct); transparent public procurement systems; effective prosecution of corruption.

All integrity mechanisms are reasonably effective. They are actively supported by the government.	10 <input type="checkbox"/>
	9 <input type="checkbox"/>
Most integrity mechanisms are functioning, albeit partly with limited effectiveness. The government provides almost all integrity mechanisms.	8 <input type="checkbox"/>
	7 <input type="checkbox"/>
	6 <input type="checkbox"/>
Some integrity mechanisms are implemented. Often, they remain ineffective; their operation is impeded by private interests. The government’s motivation and capacity to implement reforms is mixed.	5 <input type="checkbox"/>
	4 <input type="checkbox"/>
	3 <input type="checkbox"/>
Portions of the state are controlled by private interest groups; reform is impeded by private interests, rendering most integrity mechanisms inconsistent or ineffective.	2 <input type="checkbox"/>
	1 <input type="checkbox"/>

3. Samples, perceptions and reality

While the sources all aim at measuring the extent of corruption, the sample design differs considerably. Basically, two different types of samples are used.

A first group of sources, namely ADB, AFDB, BTI, CPIA EIU, MIG and

GI, establish a network of local correspondents and guide the resulting quantitative assessments by coordination and discussion with staff members at their headquarters. These non-residents, often located in the western hemisphere such as North America and Western Europe, are influential in turning in their experienced perception with regard to foreign countries.

There is an advantage to perceptions vis-à-vis foreign countries because they are not vulnerable to a “home-country bias”. Such a type of bias would be relevant if respondents assess their home country purely according to local standards. Such a standard would be problematic because it can differ from one country to another, impairing the validity of cross-country comparisons.

A second group of sources, namely IMD, FH, PERC, UNECA and WEF, gather assessments made by residents with respect to the performance of their home country. These respondents are partly nationals but sometimes also resident expatriates from multinational firms. While such data might be susceptible to the aforementioned “home-country bias”, they are not susceptible to introducing an undue dominance of “western business people’s” viewpoint. Such a viewpoint would be inadequate if foreigners lack a proper understanding of a country’s culture.

The data correlate well with each other, irrespective of these different methodologies. The high correlations ameliorate fears that any of the aforementioned concerns are important to the results. The residents sampled for the respective purpose may have a rather universal ethical standard and adequately position their country as compared to foreign countries. Likewise, those respondents who assess foreign countries seem to have a good grasp of a country’s culture and appear free of prejudice.

Critics raised concern that the CPI might reproduce what it has in the past been propagating. The Transparency International Corruption Perceptions Index has gained wide prominence in the international

media since 1995. This might introduce a problem of circularity. Respondents might “go with the herd” instead of submitting their experienced judgment. This hypothesis was tested and rejected last year. The results are reported in last year’s background paper on methodology.

In sum, the perceptions gathered are a helpful contribution to the understanding of real levels of corruption.⁵

4. The index

Standardizing

Each of the sources uses its own scaling system, requiring that the data be standardized before each country’s mean value can be determined. This standardization is carried out in two steps.

Older sources that were already standardized for the CPI of a previous year enter the CPI 2007 with the same values. New sources are standardized using matching percentiles. The *ranks* (and not the scores) of countries is the only information processed from each source. For this technique the common sub-samples of a new source and a master list are determined, meaning that countries that appear only either in the new source or in the master list are disregarded. We use the previous year’s CPI, that is that of 2006, for the master list. However, in a subsection below we describe a slight modification to this, introduced this year.

Matching percentiles then implies that the largest value in the master list is taken as the standardized value for the country ranked best by the new source. The second largest value is given to the country ranked second best, etc.⁶ Imagine that a new source

⁵ The perceptions gathered relate to actual experience and less to hearsay. See Lambsdorff, J. Graf (2007) “The New Institutional Economics of Corruption and Reform: Theory, Policy and Evidence”, Cambridge University Press.

⁶ If two countries share the same rank, their standardized value is the simple mean of the two respective scores in the CPI. The scores for countries where no CPI value was available are determined by referring to the two countries scoring higher and lower in the source’s ranking. Linear interpolation is applied to their scores, suggesting that if a source assigns such a country a score close to the upper

ranks only five countries: UK (4.2), Singapore (3.9), China (2.8), Malaysia (2.7) and India (2.4). In the master list these countries obtained the scores 8.6, 9.4, 3.2, 5.1 and 2.9, respectively. Matching percentiles would now assign UK the best score of 9.4, Singapore second best with 8.6, China 5.1, Malaysia 3.2 and India 2.9.

Matching percentiles is superior in combining indices that have different distributions. It uses only the ordinal information provided by a source, disregarding the cardinal information. Many of the alternative parametric standardization methods, on the other hand, require a multitude of assumptions – some of which may not be realistic.

However, as matching percentiles makes use of the ranks and not the scores of sources, this method loses some of the information inherent in the sources. What tips the balance in favor of this technique is its capacity to keep all reported values within the bounds from 0 to 10. This results because any standardized value is taken from the previous year's CPI, which by definition is restricted to the aforementioned range. Such a characteristic is not obtained by various alternative techniques, e.g. one that standardize the mean and standard deviation of the joint sub-samples of countries.

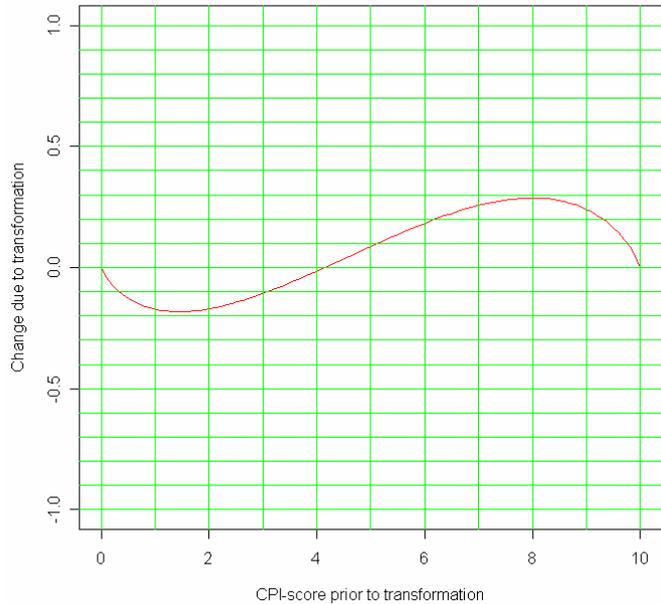
Step 2

Having obtained standardized values that are all within the reported range, a simple average from these standardized values can be determined. However, the resulting index has a standard deviation that is smaller than that of the master list. Without a second adjustment there would be a trend to-

neighbor, also its standardized value is closer to that of this neighbor. If such a country is ranked best (or worst) by a source it would have only one neighbor, not two. The second neighbor is constructed by using the highest (or lowest) attainable score by the source and the CPI value 10 (or 0). This approach guarantees that all values remain within the range between 10 and 0.

wards a continuously smaller diversity of scores. If, e.g., Finland were to repeat its score from the previous year, it would have to score best in all sources. If it scores sec-

Figure 1: Beta Transformation



ond to best in any source, the standardized value it obtains after using matching percentiles and aggregation would be lower than its current score. Thus, given some heterogeneity among sources, it seems inevitable that Finland's score would deteriorate over time. The opposite would be true of Haiti, which would obtain a better score if it is not consistently rated worst by all its sources. A second standardization is required in order to avoid a continuous trend to less diversity among scores.

However, simply stretching the scores (by applying a simple mean and standard deviation technique) might bring about values that are beyond our range from 0 to 10. A more complicated standardization is required for the second step: A beta-transformation. The idea behind this monotonous transformation is to increase the standard deviation to the previous year's value, while preserving the range from 0 to 10. Each value (X) is therefore transformed according to the following function:

$$10 * \int_0^1 (X/10)^{\alpha-1} (1 - X/10)^{\beta-1} dX$$

This beta-transformation is available in standard statistics programs. The crucial task is to find the parameters α and β so that the resulting mean and standard deviation of the index have the desired values, that is, values that are equal to that of the master list for a joint subsample of countries. An algorithm has been determined that carries out this task. Applying this approach to the CPI 2007, the change in the scores is depicted by figure 1. The parameters are $\alpha=1.159$ and $\beta=1.187$. As shown in the figure, scores between 4 and 10 are increased slightly, while those between 0 and 4 are lowered.

The beta transformation is first applied to all values that were standardized in step 1. Afterwards the average of these is computed to determine a country's score. In our publication we also report the high-low range. This refers to all standardized values after carrying out the beta-transformation. This procedure ensures that the high-low range is consistently related to a country's mean value.

Global Trends

The CPI is not capable of answering whether the world as a whole has improved or not. First, it is difficult to find respondents who are capable of answering such a question. Those who contribute to the CPI are primarily supposed to have local experience. This experience is systematically processed to find out whether one country has improved relative to other countries. Absolute improvements are therefore outside the scope of the CPI. This is comparable to finding out whether worldwide soccer has improved. Given that we are unable to let the 1986 team from Argentina play against the 2006 team from Italy there is no direct approach to answering this question.

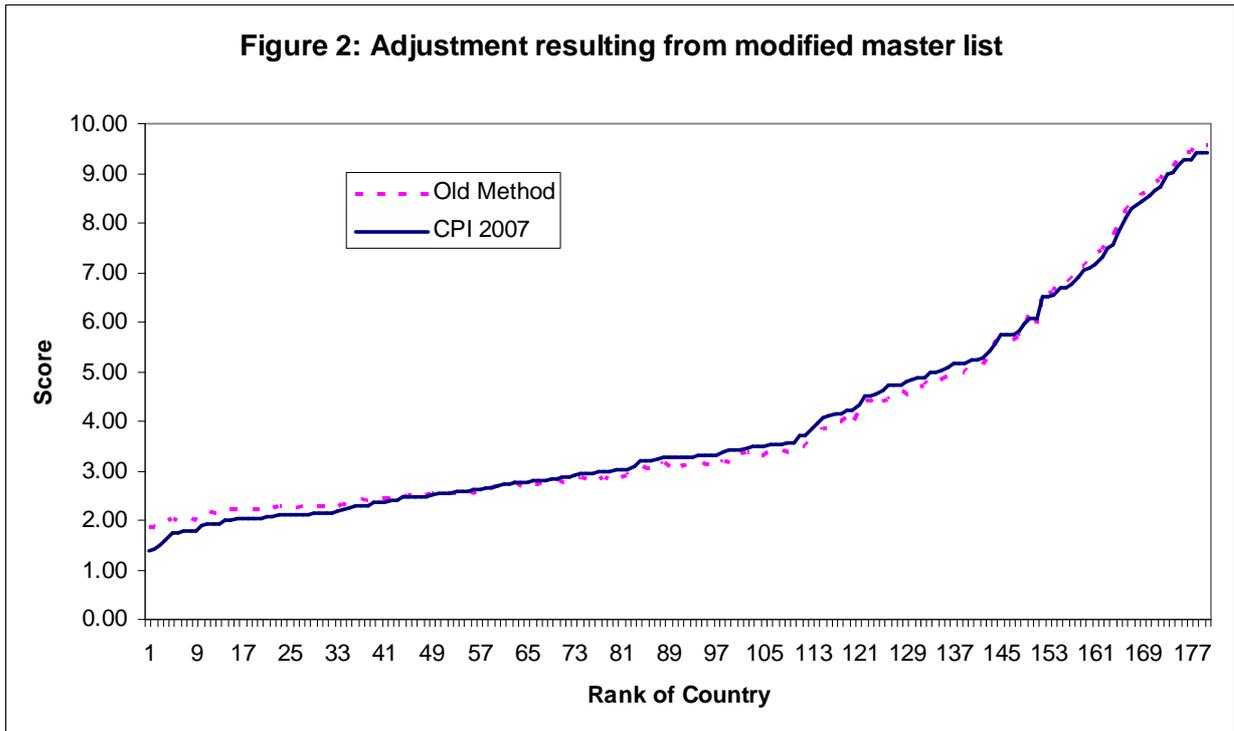
However, with respect to the functional form of the CPI, we are able to reveal other types of global trends. For example, if poorly scoring countries experience a further deterioration relative to all other countries, this piece of information would be interesting to reveal in the CPI. If our sources

produce scores that contain this information, however, the matching percentiles approach would disregard it. Likewise, if the best scoring countries increasingly face competition by others that are catching up this would still not be captured by the CPI, unless ranks of countries are changing.

It was decided that such global trends which relate to the functional form of the CPI should be captured by the CPI because recent sources reveal interesting information in this regard. For this purpose we no longer used last year's CPI as the master list. Instead, we determined a list by help of a linear standardization technique. All our sources for 2007 were adjusted so as to obtain a common mean and standard deviation and were aggregated.⁷ This list reveals the functional form of an index as suggested by all our sources. We formerly used the previous year's CPI as a master list. Departing from this approach, we now standardize the CPI 2006 with matching percentiles to obtain values of the above described list to form a new master list.

⁷ This technique is described in the background document to the 2001 CPI. Values above 10 would be counted as 10, those below 0 would be counted as 0. These theoretical considerations, however, were not relevant in practice.

Figure 2: Adjustment resulting from modified master list



The advantage of this modification is that global trends, as described above, are recognized. Figure 2 reveals the differences that resulted from this modification. The dotted line reveals the CPI that would have resulted without the modification. Indeed, we observe that countries scoring between 4 and 6 catch up relative to the best scoring countries. The best and the worst scoring countries, to the contrary, are slightly downgraded. As can be seen also, the modification had virtually no effect on the ranking of countries, but a slight impact on the way the scores are displayed. This modification better assures that scores are consistent across time and better reveals whether countries have improved or deteriorated.

Reliability and Precision

A ranking of countries may easily be misunderstood as measuring the performance of a country with absolute precision. This is certainly not true. Since the first CPI was produced in 1995, TI has provided data on the standard deviation and the number of sources contributing to the index. This data serves to illustrate the inherent imprecision. Also, 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 10 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.

An indicator for the overall reliability of the CPI 2007 can be drawn from the high correlation between the sources. This can be depicted from the Pearson correlation in table 1, determined for all sources after applying matching percentiles.⁸ The correlations on average are 0.77. This suggests that the sources do not differ considerably in their assessments. The values for ADB, AFDB, CPIA and BTI are lower as compared to those of other sources. This relates to their focus on only less-developed countries. As evidenced also by other sources,

⁸ The correlations refer to all countries, even those not included in the CPI. A nonparametric correlation coefficient (Kendall's tau) tends to be on average 0.15 lower.

Table 1: Pearson Correlation	ADB 2006	AFDB 2006	BTI 2007	CPIA 2007	EIU 2007	FH 2007	GI 2007	IMD 2006	IMD 2007	MIG 2007	PERC2006	PERC2007	UNECA 2005	WEF 2006
ADB 2006	1.00		0.76	0.79	0.36		0.40			0.55				0.57
AFDB 2006		1.00	0.58	0.68	0.48		0.45			0.59			0.61	0.58
BTI 2007	0.76	0.58	1.00	0.75	0.81	0.86	0.78	0.74	0.71	0.78	0.94	0.78	0.71	0.75
CPIA 2007	0.79	0.68	0.76	1.00	0.63	0.71	0.66			0.67			0.30	0.25
EIU 2007	0.36	0.48	0.80	0.63	1.00	0.86	0.88	0.90	0.90	0.91	0.93	0.87	0.47	0.90
FH 2007			0.86	0.71	0.86	1.00	0.91	0.75	0.88	0.89				0.79
GI 2007	0.40	0.45	0.78	0.66	0.88	0.91	1.00	0.89	0.89	0.93	0.90	0.81	0.77	0.91
IMD 2006			0.74		0.90	0.75	0.89	1.00	0.99	0.92	0.95	0.90		0.92
IMD 2007			0.71		0.90	0.88	0.89	0.99	1.00	0.93	0.94	0.88		0.92
MIG 2007	0.55	0.59	0.78	0.67	0.91	0.89	0.93	0.92	0.93	1.00	0.94	0.86	0.81	0.93
PERC2006			0.94		0.93		0.90	0.95	0.94	0.94	1.00	0.91		0.88
PERC2007			0.78		0.87		0.81	0.90	0.88	0.86	0.91	1.00		0.88
UNECA 2005		0.61	0.71	0.30	0.47		0.77			0.81			1.00	0.61
WEF 2006	0.57	0.58	0.75	0.25	0.90	0.79	0.91	0.92	0.92	0.93	0.88	0.88	0.61	1.00

measurement precision is generally lower for less-developed countries.

Confidence range

The confidence range is determined by help of a bootstrap methodology. The principal idea of such a bootstrap confidence range is to resample the sources of a country with replacement. Imagine a country with the five source values (3.0; 5.0; 3.9; 4.4; 4.2). An example of such a sample with replacement would be (5.0; 5.0; 4.2; 4.4; 4.4). While the mean value of the original data is 4.1, that of our sample with replacement is 4.6. This value portrays how diverse the mean could have been if a different random selection of values were drawn from of the original pool of data.

A sufficiently large number of such samples (in our case 10,000) are drawn from the available vector of sources and the sample mean is determined in each case. Based on the distribution of the resulting 10,000 mean values, inferences on the underlying precision can be drawn. The lower (upper) bound of a 90% confidence range is then determined as the value where

5% of the sample's means are below (above) this critical value.⁹

There are two interesting characteristics of the resulting confidence range.¹⁰

⁹ There can arise boundary effects when only 3 or 4 sources exist. Only 10 different combinations are possible in the case of 3 sources, suggesting that a 5% confidence point can "hit" the boundary. If this is the case, the BC-approach could produce at random two different values for the upper (or the lower) confidence point. These boundary effects have been identified and, if existent, the more conservative range is reported in the table.

¹⁰ In addition to the "percentile" method just described, more complicated approaches exist. First, the confidence levels can be adjusted if (on average) the mean of a bootstrap sample is smaller than the observed mean. The relevant parameter is called z_0 . Another adjustment is to assume the standard deviation also to be dependent on the mean of the bootstrap sample. The relevant parameter is a . If both these adjustments are considered, the resulting approach is called a bootstrap-BC_a-method (bias-corrected-accelerated). A description of this approach can be obtained from Efron, B. and R. Tibshirani (1993), *An In-*

- 1) When requiring a 90% confidence range (which allows with 5% probability that the true value is below and with 5% probability that the value is above the determined confidence range) the upper (lower) bound will not be higher (lower) than the highest (lowest) value provided by a source. This implies that our range from 0 to 10 will never be violated.
- 2) The confidence range remains valid even if the data (i.e. the standardized values for a given country) are not normally distributed. The range is even free of assumptions with regard to the distribution of these data.

However, with only few sources being used, there is a downward bias in the confidence range thus reported. When only few sources are available these do not fully capture the whole range of possible values. This misrepresentation becomes larger the fewer the sources that are available. This issue is part of a general statistical problem that is not specific to our application: One simply cannot expect accurate estimates of a confidence interval from few observations.

In order to determine the size of this bias Walter Zucchini and Florian Hoffmann from the Institute for Statistics and Econometrics, University of Göttingen, wrote a short unpublished research paper. Given that the data are approximately beta distributed, various simulation tests were required. They found that the unbiased coverage probability is lower than its nominal value of 90%. The accuracy of the confidence interval estimates increases with a growing

roduction to the Bootstrap, Chapman & Hall: New York and London: 202-219, chap. 14.3, 22.4 and 22.5. One concern with the BC_a approach is that it is throwing a lot of machinery at very few observations. Due to statistical considerations, a simple method might prove superior. Brad Efron had therefore suggested the use of a BC -approach for our purpose. In this case, z_0 is determined endogenously from the bootstrap sample but a is set equal to zero.

number of sources (n). The mean coverage probability is 65.3% for $n=3$; 73.6% for $n=4$; 78.4% for $n=5$; 80.2% for $n=6$ and 81.8% for $n=7$. While the confidence range nominally relates to a 90% level, an unbiased estimate of the confidence level is lower.

When interpreting the confidence range these results have to be born in mind. Figure 3 portrays the confidence ranges alongside with the scores.

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. As in previous years, the CPI 2007 includes all countries for which at least three sources had been available. The idea of combining data is that the non-performance of one source can be balanced out by the inclusion of at least two other sources.¹¹ This way, the probability of misrepresenting a country is seriously lowered. Overall, the CPI is a solid assessment of perceived levels of corruption, helping our understanding of real levels of corruption.

¹¹ This argument is valid even in case the sources are not totally independent of 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.

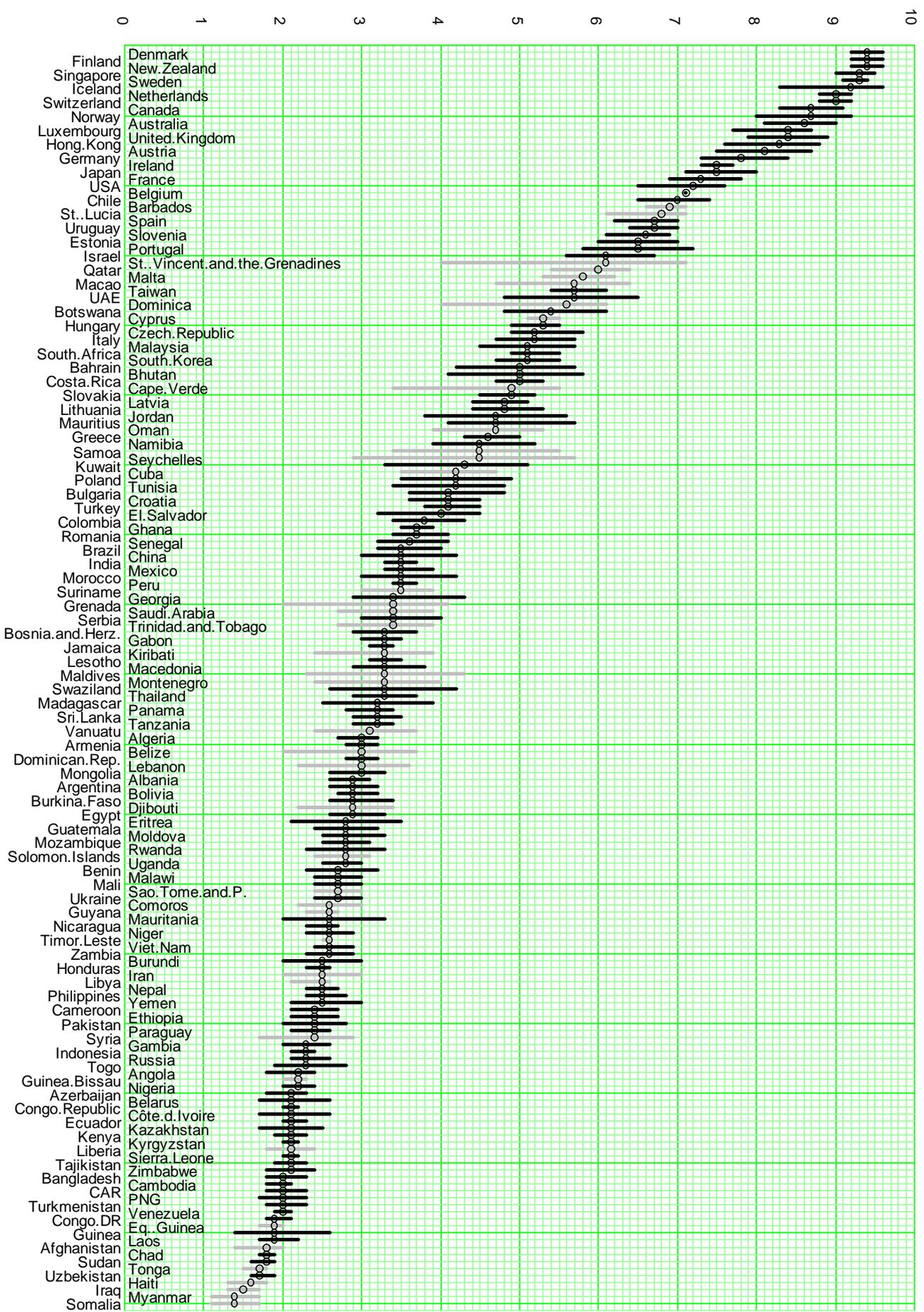


Figure 3: 2007 CPI and approximate confidence intervals
The coverage probability is 65%-75% (gray lines) or 80%-90% (black lines)

Appendix: Sources for the TI Corruption Perceptions Index (CPI) 2007

Number	1	2	3
Abbreviation	ADB	AFDB	BTI
Source	Asian Development Bank	African Development Bank	Bertelsmann Foundation
Name	Country Performance Assessment Ratings	Country Policy and Institutional Assessments	Bertelsmann Transformation Index
Compiled / published	2006/2007	2005/2006	2007/2008
Internet	http://www.adb.org/Documents/Reports/Country-Performance-Assessment-Exercise/IN76-07.pdf	http://www.afdb.org/portal/page?_pageid=293,158705&_dad=portal&_schema=POR-TAL&focus_item=9912322&focus_lang=us	http://www.bertelsmann-transformation-index.de/11.0.html?&L=1
Who was surveyed?	Country teams, experts inside and outside the bank	Country teams, experts inside and outside the bank	Network of local correspondents and experts inside and outside the organization
Subject asked	Corruption, conflicts of interest, diversion of funds as well as anti-corruption efforts and achievements	Corruption, conflicts of interest, diversion of funds as well as anti-corruption efforts and achievements	The government's capacity to punish and contain corruption
Number of replies	Not applicable	Not applicable	Not applicable
Coverage	26 countries (eligible for ADF funding)	52 countries	125 less developed and transition countries

Number	4	5	6
Abbreviation	CPIA	EIU	FH
Source	World Bank (IDA and IBRD)	Economist Intelligence Unit	Freedom House
Name	Country Policy and Institutional Assessment	Country Risk Service and Country Forecast	Nations in Transit
Compiled / published	2006/2007	2007	2007
Internet	http://web.worldbank.org/WBSITE/EXTERNAL/EXTABOUTUS/IDA/0,,contentMDK:20933600~menuPK:2626968~pagePK:51236175~piPK:437394~theSitePK:73154,00.html	www.eiu.com	http://www.freedomhouse.org/index.php?option=com_content&task=view&id=84

Who was surveyed?	Country teams, experts inside and outside the bank	Expert staff assessment	Assessment by experts originating or resident in the respective country.
Subject asked	Corruption, conflicts of interest, diversion of funds as well as anti-corruption efforts and achievements	The misuse of public office for private (or political party) gain	Extent of corruption as practiced in governments, as perceived by the public and as reported in the media, as well as the implementation of anticorruption initiatives
Number of replies	Not applicable	Not applicable	Not applicable
Coverage	77 countries (eligible for IDA funding)	166 countries	29 countries/territories

Number	7	8	9
Abbreviation	GI	IMD	
Source	Global Insight, formerly World Markets Research Centre	IMD International, Switzerland, World Competitiveness Center	
Name	Country Risk Ratings	IMD World Competitiveness Yearbook	
Compiled / published	2007	2006	2007
Internet	http://www.globalinsight.com	www.imd.ch/wcc	
Who was surveyed?	Expert staff assessment	Executives in top and middle management; domestic and international companies	
Subject asked	The likelihood of encountering corrupt officials, ranging from petty bureaucratic corruption to grand political corruption	Bribing and corruption exist/do not exist	
Number of replies	Not applicable	More than 4000	
Coverage	203 countries	53 countries	55 countries

Number	10	11	12
Abbreviation	MIG	PERC	
Source	Merchant International Group	Political & Economic Risk Consultancy	
Name	Grey Area Dynamics	Asian Intelligence Newsletter	
Compiled / published	2007	2006	2007
Internet	www.merchantinternational.com	www.asiarisk.com/	
Who was surveyed?	Expert staff and network of local correspondents	Expatriate business executives	
Subject asked	Corruption, ranging from bribery of government ministers to inducements payable to the “humblest clerk”	How serious do you consider the problem of corruption to be in the public sector?	
Number of replies	Not applicable	More than 1,000	1476
Coverage	155 countries	15 countries	15 countries

Number	13	14
Abbreviation	UNECA	WEF
Source	United Nations Economic Commission for Africa	World Economic Forum
Name	Africa Governance Report	Global Competitiveness Report
Compiled / published	2005/2006	2006/2007
Internet	http://www.uneca.org/agr/	www.weforum.org
Who was surveyed?	National expert survey (between 70 and 120 in each country)	Senior business leaders; domestic and international companies
Subject asked	“Corruption Control”. This includes aspects related to corruption in the legislature, judiciary, and at the executive level, as well as in tax collection. Aspects of access to justice and government services are also involved	Undocumented extra payments or bribes connected with various government functions
Number of replies	Roughly 2800	Ca. 11,000
Coverage	28 countries	125 countries