



STATISTICAL ANNEX

This annex provides a summary of the methodology and findings used to assess the relationships among development progress by countries and prevailing national levels corruption and governance.

The following research is an update to a report that Transparency International (TI) released in 2013.¹ The revised analysis is based on the same methodology but includes an expansion of the development targets assessed and slight modifications to the model to understand the effects of other factors, such as state capacity. Overall, the findings continue to reveal the same decisive conclusion: the level of corruption in a country has a direct and significant correlation with a country's development outcomes.

TI has tested the relationships between several governance and anti-corruption concepts and country development performance, as measured by progress on the eight Millennium Development Goals.

Based on this approach, a simple linear multivariate regression analysis of publicly available data was undertaken for MDG targets to reduce poverty (MDG1), achieve universal primary education (MDG 2), achieve gender equality (MDG3), reduce child mortality (MDG 4), improve maternal health (MDG 5), combat HIV/AIDS (MDG 6), and access safe drinking water and basic sanitation facilities (MDG 7).²

The unit of analysis is the country and all data is based on the most recent year available to ensure a larger coverage of countries in the study.³

DEPENDENT VARIABLES

A separate analysis was undertaken for each of the seven MDG targets considered for this report. For each target, an indicator was selected from among those that the UN officially uses to monitor MDG progress:

- For MDG 1: Percentage of the population below \$1 (PPP) per day (MDG indicator 1.1)
- For MDG 2: Literacy rate of 15 to 24 year olds (MDG indicator 2.3)
- For MDG 3: Ratio of girls to boys in secondary education (MDG indicator 3.1)
- For MDG 4: Under five mortality rate (MDG indicator 4.1)
- For MDG 5: Maternal mortality ratio (MDG indicator 5.1)
- For MDG 6: Proportion of population with advanced HIV infection with access to antiretroviral drugs (MDG indicator 6.5)
- For MDG 7: Proportion of the population using an improved drinking water source (MDG indicator 7.8)
- For MDG 7: Proportion of the population using improved sanitation facilities (MDG indicator 7.9)

INDEPENDENT VARIABLES

A number of governance indicators were tested to establish the strength of their relationship to the selected MDG indicators. These included:

- TI's Global Corruption Barometer data (<http://www.transparency.org/gcb2013>) that was used as a proxy to measure the level of corruption in a country (country averages were taken for analysis).
- TI's Corruption Perceptions Index data (<http://www.transparency.org/cpi2013>) that was used as a proxy to measure macro level public sector corruption in a country (country scores were taken for analysis)
- The Global Integrity Index indicators (<http://www.globalintegrity.org/report>) for citizen access to information (as a proxy for transparency), government safeguards and checks and balances (as a proxy for accountability), and anti-corruption law (as a proxy for integrity).

Given the outcomes of many MDG targets where influenced by factors beyond petty corruption and bribery, we introduced CPI scores as an independent variable. MDG targets such as poverty and antiretroviral (ARV) access have a logical relationship to systemic corruption issues such as fraudulent procurement, favoritism and embezzlement. These are factors that often happen away from the public eye and are not directly captured through citizen's experiences. Therefore, including the CPI as an independent variable captures broader public sector corruption and its influences on the MDG targets.

CONTROLS

In our analysis, we controlled for gross national income (GNI) per capita as it was expected to explain a large part of the variation in MDG attainment across countries.

Where available, we also controlled for the access of information in a country by taking as a proxy how literate a country is – and thus how able are people to make use of available information (as measured by the literacy rate of 15-24 year-olds). We also looked at the share of government spending as a percentage of gross domestic product in specific sectors where this data was available to isolate the effects that may be caused from high government spending budgets on MDG progress.

We also controlled for “state capacity” to ensure it was not the main factor for the variance in MDG performance and governance indicators. This data was obtained from UNICEF but relies on information compiled from various national surveys. The proxy measurement was the “percentage of registered births.”⁴

DATA AND SOURCES

Table A.1 presents a list of the indicators used in the final analysis, as well as the respective sources. For each of the statistical regressions conducted, the number of observations was restricted by limited country data coverage. Although the analysis included observations from more than 150 countries, the models with the best fit and most robust significance values were those that included indicators from the Global Corruption Barometer (GCB) and Corruption Perceptions Index (CPI). This restricted the number of observations to 91 in 2014.⁵ Limited country data for some of the controls and

dependent variables further restricted the number of observations. This was particularly the case for the poverty data where some countries do not have data past 2008. The problem of data availability for key development indicators is in itself a problem that must be addressed going forward as part of any new post-2015 commitments and feature in solutions to achieve the data revolution that the UN and others have called for.

Some models tested were eventually dropped due to too few observations. Also, the generally reduced number of observations in the models selected required that controls covered countries within the samples used.

Table A.1: Indicators and data sources

Indicator	Related concept	Source	Variable name
Dependent variables			
Percent of the population living below 1 USD a day (PPP) (2009/2010)	Poverty	UN MDG Indicators	Poor0910
Percent of population below minimum level of dietary energy consumption (2011)	Food Security	UN MDG Indicators	Starve 11
Percent of pupils starting grade 1 who reach last grade of primary (2010/2011)	Quality of primary education	UN MDG Indicators	Finishprimary1011
Literacy rate of 15-24 year-olds (%), women and men (2010/2011)	Quality of primary education	UN MDG Indicators	Lit1011
Ratios of girls to boys in secondary education (2011)	Gender	UN MDG Indicators	Genderparity_sec2011
Under-five mortality rate (2011)	Mortality Rate	UN MDG Indicators	U5mor11
Maternal mortality ratio (2010)	Maternal health	UN MDG Indicators	Matmor10
HIV prevalence among population aged 15-24 years (%) (2011)	Health Care	UN MDG Indicators	HIV11
Percent of population with advanced HIV infection with access to antiretroviral drugs (2011)	Health Care	UN MDG Indicators	ARVaccess11
Percent of population using an improved drinking water source(2011)	Water and Sanitation	UN MDG Indicators	Water11
Percentage of population using an improved sanitation facility (2011)	Water and Sanitation	UN MDG Indicators	Sanitation11

Indicator	Related concept	Source	Variable name
Independent variables			
The perceived levels of public sector corruption in countries worldwide, scoring them from 0 (highly corrupt) to 100 (very clean).	Corruption	TI Corruption Perception Index	CPI 2013
TI Global Corruption Barometer 2013, question 7b (bribe paid in this year; yes=1, no=0)	Bribery practiced	TI Global Corruption Barometer 2013 ⁵	Bribery13
Global Integrity Index, anti-corruption and rule of law indicator; combined data from 2009/2010/20117	Anti-corruption and rule of law institutions	Global Integrity8	AClaw091011
Global Integrity Index, rule of law indicator; combined data from 2009/2010/20119	Rule of law institutions	Global Integrity	RoI091011
Global Integrity Index, public access to information indicator; combined data from 2009/2010/2011	Transparency	Global Integrity	Pai091011

Indicator	Related concept	Source	Variable name
Control variables			
Gross national per capita income in 2011 (logged) ¹⁰	Per capita income	World Bank, World Development Indicators ¹¹	GNIpc11ln
Percentage of birth registration	State capacity	UNICEF	registeredbirths
Gross capital formation in 2011	Investment in public infrastructure	World Bank, World Development Indicators ¹²	PubInvest11
Public health expenditure in 2011	Public spending on health	World Bank, World Development Indicators	HealthExp11
Literacy rate of 15- to 24-year-olds (%) in 2010/2011	Ability to understand and use information	UN MDG Indicators	Lit1011

REGRESSION RESULTS

In order to have a sufficient number of observations for an OLS (ordinary least squares) regression analysis, multiple models with varying independent variables and controls were tested for each dependent variable.

The table below presents a descriptive overview of the key results found for each of the goals.

Table A.2: Summary of the empirical findings at the country level		
Goal or target	Indicator analysed	Major findings
Goal 1, Target 1a and 1c: Eradicate extreme poverty and hunger	1.1 Proportion of population below \$1 (PPP) per day 1.9 Proportion of population below minimum level of dietary energy consumption	Public sector corruption is significantly inversely correlated to poverty rates. It takes away almost one third the gains made in reducing poverty that better schooling can lead to. Stable well-functioning institutions that enforce rule of law are highly and inversely correlated with starvation rates.
Goal 2: Achieving universal primary education	2.2 Proportion of pupils starting grade 1 who reach last grade of primary	Public sector corruption is also significantly inversely correlated with children finishing primary school. Even for countries with higher capacity to deliver educational services, public sector corruption adversely affects children's chances of completing their primary education.
Goal 3: Promote gender equality and empower women	3.1 Ratios of girls to boys in secondary education	Bribery is inversely correlated with girls enrolling in secondary school. Bribery completely negates the effect of economic growth in ensuring higher numbers of girls in secondary education.
Goal 4: Reduce child mortality	4.1 Under-five mortality rate	Higher levels of bribery are related to higher number of children dying before they even reach the age of five. Better access and use of information is correlated with the number of children dying before five.
Goal 5: Improving maternal health	5.1 Maternal mortality ratio	Widespread bribery is associated with higher maternal mortality. Lower maternal mortality is associated with increased public access to information.
Goal 6: Combat HIV/AIDS, malaria and other diseases	6.5 Proportion of population with advanced HIV infection with access to antiretroviral drugs	In countries with good rule of law, more people infected with HIV have access to ARV drugs. Public sector corruption nevertheless increases the chances of people having access to ARVs. This may be due to politically or personally well-connected people gaining higher access to ARV drugs, thereby increasing inequitable use of limited resources.
Goal 7, Target 7c: Halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation	7.8 Proportion of population using an improved drinking water source 7.9 Proportion of the population using improved sanitation facilities	A higher level of bribery reported in a country is associated with decreased access to safe drinking water, most notably in rural areas. The relationship between a higher reported rate of bribery in a country and reduced access to sanitation facilities is two thirds the magnitude of the correlation between greater access to sanitation facilities and increases in the country's wealth.

Table A3: OLS results: Poverty

	poor0910	Beta
CPI2013	-0.56 (0.26)**	-0.30
lit1011	-1.74(0.23)***	-0.97
rol091011	0.71(0.22)***	0.38
pai091011	0.54(0.11)***	0.10
GNlpc11ln	0.10(2.51)	0.006
Constant	104.62(24.26)***	.
No. of obs.	22	
R ²	0.87	

* significant at 0.1 level; ** significant at 0.05 level; *** significant at 0.01 level
Standard errors in brackets; beta = standardised coefficients

Table A4: OLS results: Starvation

	starve11	Beta
CPI2013	-0.14(0.14)	-0.09
rol091011	-0.20(0.11)*	-0.17
aclaw091011	0.04(0.15)	0.03
GNlpc11ln	-8.72(0.91)***	-0.76
Constant	94.93(14.98)***	0
No. of obs.	44	
R ²	0.65	

* significant at 0.1 level; ** significant at 0.05 level; *** significant at 0.01 level
Standard errors in brackets; beta = standardised coefficients

Table A5: OLS results: Finish primary school

	finishprimary1011	Beta
CPI2013	-0.46(0.19)**	-0.33
rol091011	0.33(0.18)*	0.24
GNlpc11ln	3.20(2.39)	0.21
registeredbirths	0.55(0.05)***	0.71
Constant	6.12(13.7)	0
No. of obs.	34	
R ²	0.76	

* significant at 0.1 level; ** significant at 0.05 level; *** significant at 0.01 level
Standard errors in brackets; beta = standardised coefficients

Table A6: OLS results: Gender parity at secondary education

	Genderparity_sec2011	Beta
Bribery13	-0.38(0.18)**	-0.64
PolStab11	0.002 (0.003)	0.21
Pai091011	0.0009(0.0006)	0.27
GNlpc11ln	-0.05(0.02)**	-0.51
Constant	1.21(0.32)***	0
No. of obs.	23	
R ²	0.44	

* significant at 0.1 level; ** significant at 0.05 level; *** significant at 0.01 level
Standard errors in brackets; beta = standardised coefficients

Table A7: OLS results: Under 5 child mortality

	u5mor11	Beta
Bribery13	76.49(18.36)***	0.44
lit1011	-1.93(0.75)**	-0.50
GNlpc11ln	-3.41(2.51)	-0.12
registeredbirths	0.14(0.20)**	0.10
Constant	204.84(48.94)***	0
No. of obs.	46	
R ²	0.80	

* significant at 0.1 level; ** significant at 0.05 level; *** significant at 0.01 level
Standard errors in brackets; beta = standardised coefficients

Table A8: OLS results: Maternal Mortality

	matmor10	Beta
Bribery13	359.94(144.80)**	0.37
lit1011	-10.05(4.24)**	-0.46
GNlpc11ln	-12.79(18.87)*	-0.08
registeredbirths	-0.23(1.21)	-0.03
Constant	1098.43(311.44)***	0
No. of obs.	46	
R ²	0.71	

Table A9: OLS results: ARV access

	arvaccess11	Beta
CPI2013	0.68(0.46)	0.30
aclaw091011	0.47(0.25)*	0.27
rol091011	0.13(0.24)*	0.08
pai091011	0.06(0.16)*	0.10
lit1011	-0.53(0.50)**	-0.28
GNlpc11ln	2.64(4.86)*	0.13
HealthExp11	2.63(2.71)**	0.20
Constant	-17.81(33.26)*	0
No. of obs.	30	
R ²	0.45	

* significant at 0.1 level; ** significant at 0.05 level; *** significant at 0.01 level
Standard errors in brackets; beta = standardised coefficients

Table A10: OLS results: Sanitation

	sanitation11	Beta
Bribery13	-40.58(13.86)***	-0.30
lit1011	0.62(0.27)**	0.21
PubInvest11	-0.007(0.01)	-0.02
GNlpc11ln	3.84(1.81)**	0.16
registeredbirths	0.42(0.11)***	0.38
Constant	-39.20 (28.79)	0
No. of obs.	39	
R ²	0.83	

* significant at 0.1 level; ** significant at 0.05 level; *** significant at 0.01 level
Standard errors in brackets; beta = standardised coefficients

Table A11: OLS results: Water

	water11	Beta
Bribery13	-18.65(9.87)*	-.27
GNIpc11ln	2.60(1.21)**	.28
PubInvest11	-0.0006(.002)	-.01
registeredbirths	0.20(.07)***	.37
Constant	55.8(13.21)***	.
No. of obs.	72	
R ²	0.71	

* significant at 0.1 level; ** significant at 0.05 level; *** significant at 0.01 level
Standard errors in brackets; beta = standardised coefficients

NOTES

¹ See: Transparency International, "The Anti-Corruption Catalyst: Realising the MDGs by 2015" (Berlin: Transparency International, 2010). www.transparency.org/whatwedo/pub/the_anti_corruption_catalyst_realising_the_mdgs_by_2015.

² The analysis does not determine if these factors have any causal effects on attainment of MDGs.

³ As a result, the data indicators include a range of years from 2009 to 2013 based on when information was available for a particular country and for a particular indicator

⁴ http://www.unicef.org/media/files/Embargoed_11_Dec_Birth_Registration_report_low_res.pdf

⁵ The data for the Global Corruption Barometer 2013 was collected in 2012/2013 and therefore was used to indicate the level of practiced bribery in 2011/2012. The countries included in the survey differed slightly between 2010/11 and 2013. Neither GCB covers some countries traditionally ranked low in corruption indexes (such as TI's Corruption Perceptions Index).

⁶ Data available at: <http://www.transparency.org/gcb2013/>

⁷ In order to increase country coverage, values from 2009, 2010 and 2011 were combined to reflect latest available data.

⁸ Data available at: www.globalintegrity.org/data/downloads.cfm

⁹ These refer to "Government Conflicts of Interest Safeguards & Checks and Balances" (indicator 3)

¹⁰ In order to normalise the distribution of income per capita, the natural logarithm was taken.

¹¹ Data available at: data.worldbank.org/data-catalog

¹² Data available at: data.worldbank.org/data-catalog

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