

UTILITIES AND THE QUALITY OF LIFE: GLOBAL CORRELATES - PRELIMINARY

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The relationship between the availability of utility services and the quality of life is obvious, but often underappreciated. For citizens of the planet living in abundance, convenient access to relatively good service can be taken for granted. But for many, subsistence is accomplished under strained circumstances and utility services are inaccessible, unaffordable, unsafe, unreliable or simply unavailable altogether.

For nations that enjoy the benefits of a built infrastructure for service delivery, natural and manmade disasters, from hurricanes to acts of war, amply illustrate the essential and interdependent nature of utilities services. For the developing world, the challenges are more basic, as are the connections to the quality of daily life. Some of connections are obvious. Access to safe drinking water and sanitation clearly are relevant to human health and survival. But they also pertain to education and literacy; time spent transporting water is time away from schooling, particularly for young women. Electricity is essential for water production and, of course, lighting, but also for refrigeration – which in turn makes it possible to safely store immunization vaccines. Utility services are interconnected with each other and with other human activities in countless ways.

It is no exaggeration that utilities play a central role in people's lives, in local, regional, and national economies, and in the course of human advancement. Development can also exact a price, including pollution of the natural environment. One of the prevailing challenges of development is to mitigate the damage often accompanying prosperity.

The data used for this analysis come from a variety of online sources, including the U.S. Central Intelligence Agency (*World Factbook*), the World Bank, the United Nations, the World Health Organization, and other public and private organizations. In addition to measures of per capita consumption of or accessibility of services, composite indexes based on additive z-scores are used to reflect the combined availability of utility services, in particular a composite of per capita electricity consumption, access to improved water, and per capita telephone lines.

Data were compiled for 197 countries, listed in Exhibit 1, although not all countries are reported for each indicator. Country-level indicators of utility services are correlated with indicators grouped into six areas, as summarized in Exhibit 2: economic, quality of life, political, legal/institutional, regulatory and service quality. The Appendix provides definitions of the indicators and data sources.

Exhibit 3 provides a complete matrix of bivariate correlation coefficients for all of the variables examined for this analysis. A select series of bivariate scatterplots are provided in the subsequent exhibits. The plotted values represent countries. The findings are illustrative of potential relationships between the availability of utility services and various other indicators. Causality is not inferred. It is also plausible, if not probable, that certain apparent associations are affected by underlying influences. Several findings are of note.

- A relatively strong relationship between utility services and gross domestic product (GDP) is apparent (r -squared = .70); however, no such relationship is apparent for growth in GDP (r = -.15).
- The association between utility services and employment does not appear to be strong (r -squared = .16).
- Utilities are related positively to life expectancy (r -squared = .49), as well as literacy (r -squared = .41).
- A particularly strong association appears between utilities and the United Nations' human development index (r -squared = .71).
- Income equality suggests a relative weak correlation with utilities. (r -squared = .16)
- A measure of the quality of life suggests a very positive relationship with utilities (r -squared = .64)
- Another strong association is seen with the Mother's index (r -squared = .69), as well as its component indexes for women and children (the latter of which includes access to water and results in some autocorrelation).
- A survey measure of life satisfaction also produces a positive correlation (r -squared = .30).
- Not surprisingly, a strong correlation is seen between utilities and carbon emissions (r -squared = .64), a negative externality.
- Political variables that are suggestive of generally positive relationships include political freedom and political stability (r -squared = .30 each).
- A positive association is suggested between countries' general regulatory climate and utility services (r -squared = .40).
- The associations for measures of policies protective of investors, price control freedom, and general regulatory requirements were positive but weak (r -squared = .13, .17, and .17).
- Regulatory quality is positively and strongly associated with both government effectiveness general (r -squared = .92) and judicial independence (r -squared = .60), and also associated positively with the provision of utility services (r -squared = .58).
- Other z-score are revealing of positive associations for immunizations and the availability of electricity and water (r -squared = .28), infant survival and the availability of water and sanitation services (r -squared = .68), and web-based commerce and the availability of telecommunications services (r -squared = .76).
- Service quality variables demonstrate moderate negative correlations with most of the other indicators in the database.

Exhibit 1. Countries in the Analysis (n=197)

Afghanistan	Djibouti	Lesotho	Saint Lucia
Albania	Dominica	Liberia	Saint Vincent and the Grenadines
Algeria	Dominican Republic	Libya (Arab Jamahiriya)	Samoa
Andorra	Ecuador	Liechtenstein	San Marino
Angola	Egypt	Lithuania	Sao Tome and Principe
Antigua and Barbuda	El Salvador	Luxembourg	Saudi Arabia
Argentina	Equatorial Guinea	Macedonia (TFYR)	Senegal
Armenia	Eritrea	Madagascar	Serbia (Serb./Mont.)
Australia	Estonia	Malawi	Seychelles
Austria	Ethiopia	Malaysia	Sierra Leone
Azerbaijan	Fiji	Maldives	Singapore
Bahamas, The	Finland	Mali	Slovakia
Bahrain	France	Malta	Slovenia
Bangladesh	French Guiana	Marshall Islands	Solomon Islands
Barbados	French Polynesia	Mauritania	Somalia
Belarus	Gabon	Mauritius	South Africa
Belgium	Gambia, The	Mexico	Spain
Belize	Georgia	Micronesia (Fed. States of)	Sri Lanka
Benin	Germany	Moldova (Rep. of)	Sudan
Bermuda	Ghana	Monaco	Suriname
Bhutan	Greece	Mongolia	Swaziland
Bolivia	Grenada	Montenegro	Sweden
Bosnia and Herzegovina	Guatemala	Morocco	Switzerland
Botswana	Guinea	Mozambique	Syria (Arab Rep.)
Brazil	Guinea-Bissau	Myanmar (Burma)	Taiwan
Brunei	Guyana	Namibia	Tajikistan
Bulgaria	Haiti	Nauru	Tanzania (U. Rep.)
Burkina Faso	Honduras	Nepal	Thailand
Burundi	Hong Kong	Netherlands	Timor-Leste (E. Timor)
Cambodia	Hungary	New Zealand	Togo
Cameroon	Iceland	Nicaragua	Tonga
Canada	India	Niger	Trinidad and Tobago
Cape Verde	Indonesia	Nigeria	Tunisia
Central African Republic	Iran (Islamic Rep. of)	Norway	Turkey
Chad	Iraq	Oman	Turkmenistan
Chile	Ireland	Pakistan	Tuvalu
China	Israel	Palau	Uganda
Colombia	Italy	Panama	Ukraine
Comoros	Jamaica	Papua New Guinea	United Arab Emirates
Congo, Democratic Republic of the	Japan	Paraguay	United Kingdom
Congo (Rep. of the)	Jordan	Peru	United States
Costa Rica	Kazakhstan	Philippines	Uruguay
Cote d'Ivoire	Kenya	Poland	Uzbekistan
Croatia	Kiribati	Portugal	Vanuatu
Cuba	Korea, North (DPROK)	Qatar	Venezuela
Cyprus (Rep. of)	Korea, South (ROK)	Romania	Vietnam
Czech Republic	Kuwait	Russia (Federation)	Yemen
Denmark	Kyrgyzstan	Rwanda	Zambia
	Laos (PDR)	Saint Kitts and Nevis	Zimbabwe
	Latvia		
	Lebanon		

Exhibit 2: Variables in the Analysis

Utility Service Indicators

Electricity per capita (n=188)
Natural gas per capita (n=104)
Access to water (n=169)
Access to sanitation (n=158)
Phone lines per capita (n=196)
Mobile phones per capita (n=196)
Internet users per capita (n=195)
Z: electricity and gas (n=148)
Z: electricity and water (n=161)
Z: water and san (n=155)
Z: phone/mobile/net (n=194)
Z: elec/water/phone (n=161)

Economic Indicators

Population in millions (n=197)
GDP per capita (n=197)
GDP growth rate (n=192)
Employment (n=164)
Adult economic activity (n=126)
Web commerce (n=65)

Quality of Life Indicators

Life expectancy (n=196)
Infant survival (n=196)
Diarrhoeal survival (n=187)
Measles immunization (n=184)
Literacy rate (n=181)
Human development index (n=176)
Income equality (n=125)
Quality of life (n=111)
Women's index (n=131)
Children's index (n=166)
Mothers' index (n=125)
Life satisfaction (n=177)
Happiness index (n=177)
CO2 per capita (n=140)

Political Indicators

Political rights (n=190)
Civil liberties (n=190)
Freedom (n=190)
Democracy (n=194)
Voice and accountability (n=194)
Political stability (n=195)

Legal and Institutional Indicators

Judicial independence (n=109)
Impartial courts (n=130)
Law and order (n=122)
Rule of law (n=194)
Control of corruption (n=190)
Govt. effectiveness (n=194)

Regulatory Indicators

General reg. climate (n=130)
Protect investors (n=172)
Price control freedom (n=125)
Reg. requirements (n=109)
Ease of compliance (n=65)
Reg. consistency (n=64)
Regulatory quality (n=190)

Service Quality Indicators

Delay in elec. connect (n=70)
Electrical outages (n=67)
Value lost elec. outages (n=66)
Water supply failures (n=68)
Delay in phone connect (n=71)

Exhibit 3. Matrix of Correlation Coefficients (r)

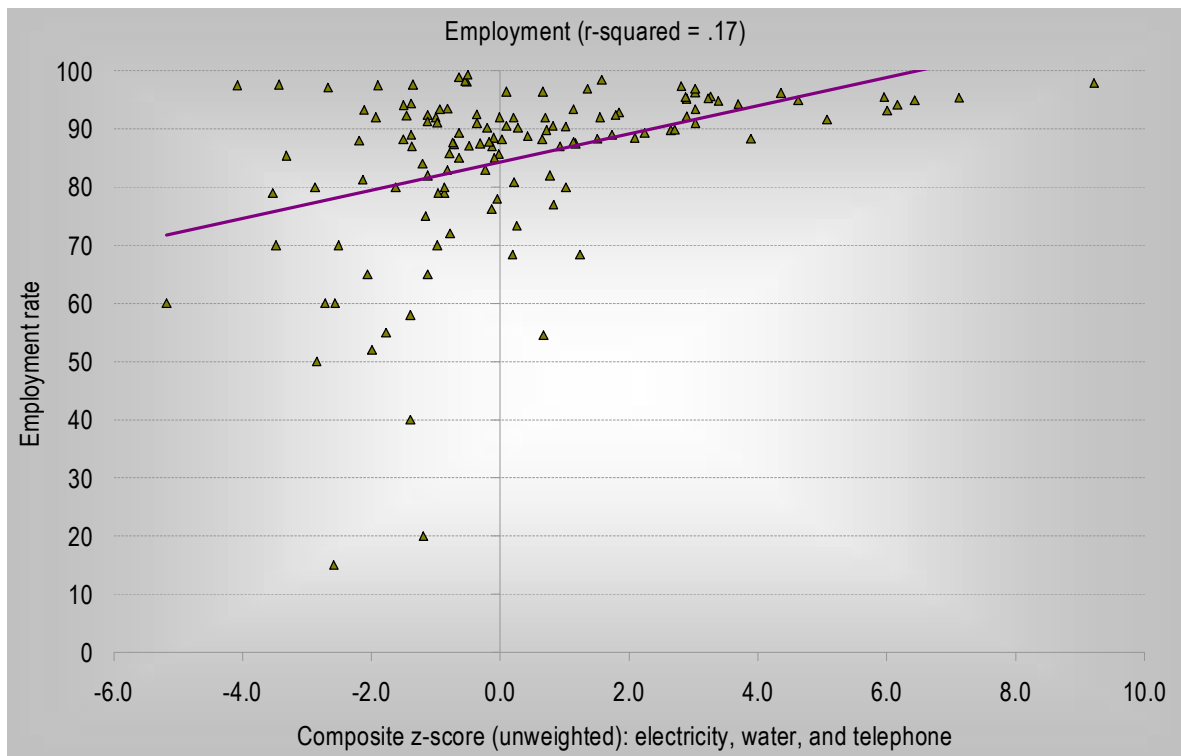
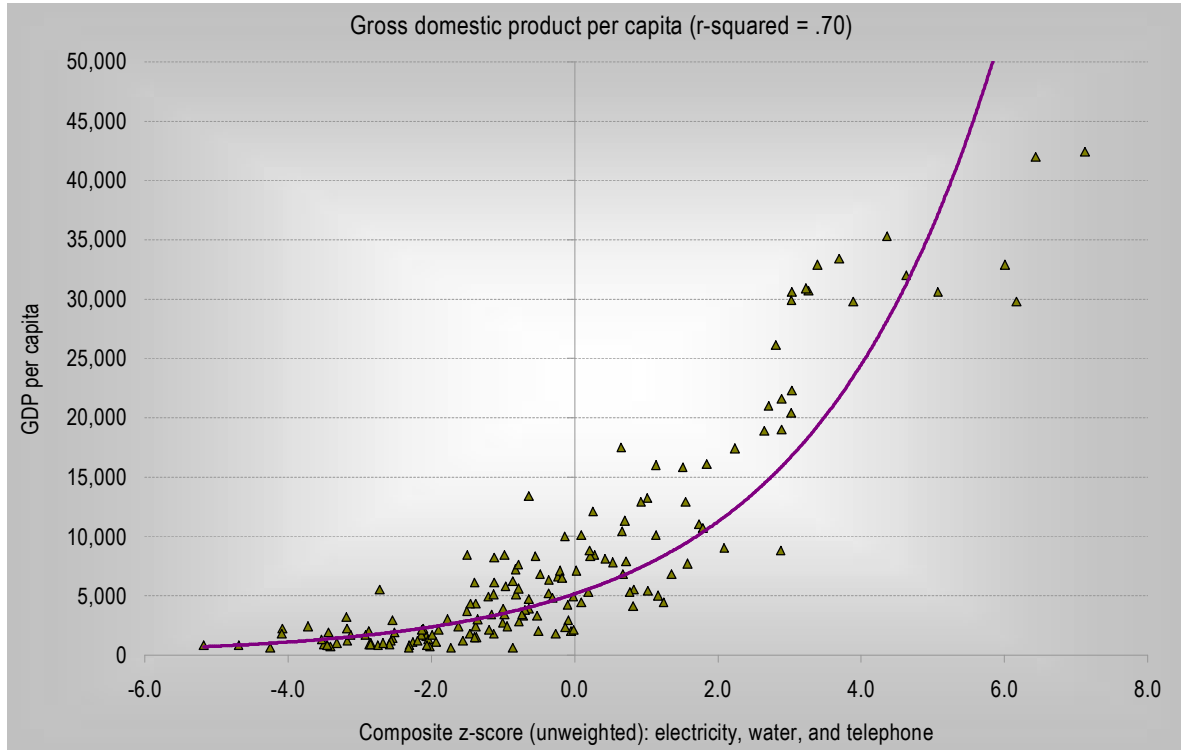
	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
E Electricity per cap (n=188)	1.00																	
F Natural gas per cap (n=104)	.41	1.00																
G Access to water (n=169)	.46	.18	1.00															
H Access to sanitation (n=158)	.58	.32	.78	1.00														
I Phone lines per cap (n=196)	.74	.14	.62	.68	1.00													
J Mobile phones per cap (n=195)	.72	.28	.63	.66	.80	1.00												
K Internet users per cap (n=195)	.77	.10	.56	.59	.88	.86	1.00											
L Z: electricity and gas (n=148)	.84	.84	.44	.53	.52	.59	.51	1.00										
M Z: electricity and water (n=161)	.85	.29	.86	.81	.81	.78	.78	.77	1.00									
N Z: water and san (n=155)	.57	.26	.94	.94	.68	.68	.60	.52	.91	1.00								
O Z: phone/mobile/net (n=194)	.78	.19	.63	.69	.94	.94	.96	.57	.83	.70	1.00							
P Z: elec/water/phone (n=161)	.85	.26	.82	.81	.91	.85	.86	.76	.98	.88	.91	1.00						
Q Population in mil. (n=197)	-.03	-.10	.01	-.09	-.01	-.06	-.04	-.14	.00	-.04	-.04	.01	1.00					
R GDP per cap (n=197)	.78	.27	.48	.58	.83	.76	.83	.63	.74	.54	.85	.80	-.03	1.00				
S GDP growth rate (n=192)	-.03	.06	-.21	-.11	-.11	-.09	-.12	-.12	-.15	-.18	-.12	-.15	.13	.03	1.00			
T Employment (n=164)	.32	.11	.37	.38	.37	.39	.40	.26	.39	.39	.41	.41	.09	.36	.14	1.00		
U Adult econ. activity (n=126)	.29	.25	.02	.01	.19	.17	.24	.39	.21	.00	.21	.21	-.01	.24	-.16	.16	1.00	
V Web commerce (n=65)	.80	.26	.52	.58	.85	.83	.79	.64	.65	.56	.87	.73	-.11	.75	.12	.03	-.03	1.00
W Life expectancy (n=196)	.51	.10	.69	.75	.66	.64	.62	.36	.69	.76	.68	.70	.03	.55	-.04	.55	-.03	.49
X Infant survival (n=196)	.49	.13	.78	.78	.65	.65	.61	.37	.74	.82	.68	.74	.00	.53	-.19	.45	.05	.62
Y Diarrhoeal survival (n=187)	.58	.19	.68	.69	.74	.77	.71	.47	.74	.72	.78	.78	-.09	.67	-.08	.43	.02	.83
Z Measles immunization (n=184)	.34	.21	.58	.58	.44	.43	.38	.31	.53	.61	.44	.52	-.07	.30	-.05	.40	.03	.37
AA Literacy rate (n=181)	.44	.08	.64	.68	.59	.55	.53	.28	.63	.69	.58	.64	-.01	.49	.01	.39	.08	.58
AB Human devel. index (n=176)	.63	.19	.78	.86	.80	.78	.75	.51	.82	.86	.81	.84	.00	.73	-.04	.50	.05	.71
AC Income equality (n=125)	.43	.12	.24	.31	.44	.40	.40	.37	.37	.26	.43	.40	.02	.38	.10	.30	.02	.24
AD Quality of life (n=111)	.62	.00	.58	.63	.80	.76	.83	.37	.74	.65	.84	.80	-.04	.84	-.21	.46	.22	.47
AE Women's index (n=131)	.55	.07	.69	.71	.74	.66	.67	.34	.76	.73	.72	.79	.01	.67	.01	.31	.15	.69
AF Children's index (n=166)	.55	.09	.81	.79	.72	.69	.68	.36	.83	.86	.73	.83	-.01	.58	-.07	.44	.04	.61
AG Mothers' index (n=125)	.57	.09	.75	.78	.76	.68	.69	.36	.81	.81	.74	.83	.01	.68	.00	.33	.12	.69
AH Life satisfaction (n=177)	.47	.24	.44	.49	.54	.52	.54	.48	.52	.48	.56	.55	-.03	.52	-.21	.40	.26	.06
AI Happiness index (n=177)	-.13	-.27	.28	.28	.03	-.03	-.01	-.34	.12	.32	.00	.11	.07	-.12	-.12	.25	-.10	-.29
AJ CO2 per cap (n=140)	.74	.38	.52	.57	.76	.74	.77	.77	.75	.56	.80	.80	.21	.85	.02	.27	.18	.72
AK Political rights (n=190)	.34	-.19	.43	.36	.56	.53	.57	.11	.47	.42	.59	.52	-.07	.42	-.21	.18	.22	.58
AL Civil liberties (n=190)	.35	-.18	.46	.41	.59	.55	.59	.12	.51	.46	.61	.56	-.10	.45	-.21	.19	.25	.65
AM Freedom (n=190)	.35	-.18	.45	.39	.58	.55	.59	.12	.49	.45	.61	.55	-.08	.44	-.21	.19	.24	.62
AN Democracy (n=194)	.20	-.21	.35	.28	.40	.38	.39	-.01	.36	.34	.41	.39	-.02	.23	-.17	.17	.21	.41
AO Voice and accountability	.45	-.10	.48	.45	.65	.61	.66	.24	.56	.50	.68	.62	-.09	.52	-.21	.23	.24	.63
AP Political stability (n=195)	.46	.18	.43	.48	.57	.53	.57	.46	.51	.47	.59	.55	-.13	.54	-.12	.26	.29	.60
AQ Judicial independence (n=109)	.58	.08	.46	.40	.66	.61	.72	.43	.61	.41	.70	.66	.03	.73	-.21	.29	.23	.36
AR Impartial courts (n=130)	.61	.08	.49	.48	.68	.62	.72	.42	.65	.48	.70	.69	.01	.75	-.15	.25	.21	.32
AS Law and order (n=122)	.64	.11	.48	.48	.71	.66	.71	.47	.66	.47	.73	.71	.02	.73	-.07	.34	.11	.47
AT Rule of law (n=194)	.68	.16	.59	.64	.77	.76	.81	.54	.74	.65	.82	.79	-.04	.73	-.17	.36	.24	.62
AU Control of corruption (n=190)	.73	.17	.56	.61	.82	.80	.84	.56	.75	.62	.86	.81	-.06	.76	-.16	.38	.23	.67
AV Govt. effectiveness (n=194)	.70	.12	.60	.66	.78	.83	.84	.49	.76	.66	.86	.82	.00	.75	-.10	.41	.23	.70
AW General reg. climate (n=130)	.63	.30	.55	.52	.64	.66	.69	.57	.67	.55	.69	.68	-.20	.70	-.06	.30	.28	.43
AX Protect investors (n=172)	.31	.08	.29	.30	.37	.39	.43	.28	.34	.30	.42	.37	.08	.40	-.05	.27	.14	.21
AY Price control freedom (n=125)	.41	.07	.32	.35	.36	.36	.41	.31	.43	.36	.40	.42	-.16	.43	-.07	.23	.16	.14
AZ Reg. requirements (n=109)	.43	.11	.20	.25	.38	.44	.47	.30	.41	.20	.45	.41	-.03	.43	.11	.24	.30	.15
BA Ease of compliance (n=65)	.42	.32	.12	.21	.36	.39	.40	.40	.20	.14	.41	.22	-.40	.39	.07	.24	-.28	.26
BB Reg. consistency (n=64)	.09	-.18	-.17	-.06	.08	.05	.06	-.01	-.11	-.14	.07	-.06	.19	.16	.07	.02	-.08	.03
BC Regulatory quality (n=190)	.64	.13	.58	.63	.80	.83	.82	.47	.70	.64	.86	.76	-.03	.73	-.10	.46	.21	.69
BD Delay in elec. connect (n=70)	-.49	-.16	-.36	-.34	-.42	-.44	-.38	-.38	-.43	-.35	-.44	-.44	.07	-.39	-.16	-.20	.01	-.44
BE Electrical outages (n=67)	-.38	-.24	-.26	-.30	-.41	-.37	-.36	-.32	-.31	-.27	-.40	-.35	.10	-.36	-.10	-.04	.15	-.37
BF Value lost elec. outages (n=66)	-.27	-.21	-.17	-.18	-.30	-.29	-.28	-.36	-.21	-.17	-.30	-.24	-.01	-.28	-.26	-.12	.26	-.38
BG Water supply failures (n=68)	-.31	-.11	-.18	-.16	-.33	-.31	-.31	-.20	-.23	-.16	-.33	-.26	-.09	-.30	-.16	-.14	.09	-.33
BH Delay in phone connect (n=71)	-.43	-.16	-.24	-.31	-.39	-.41	-.36	-.32	-.32	-.27	-.41	-.34	-.02	-.37	-.16	-.14	-.03	-.44

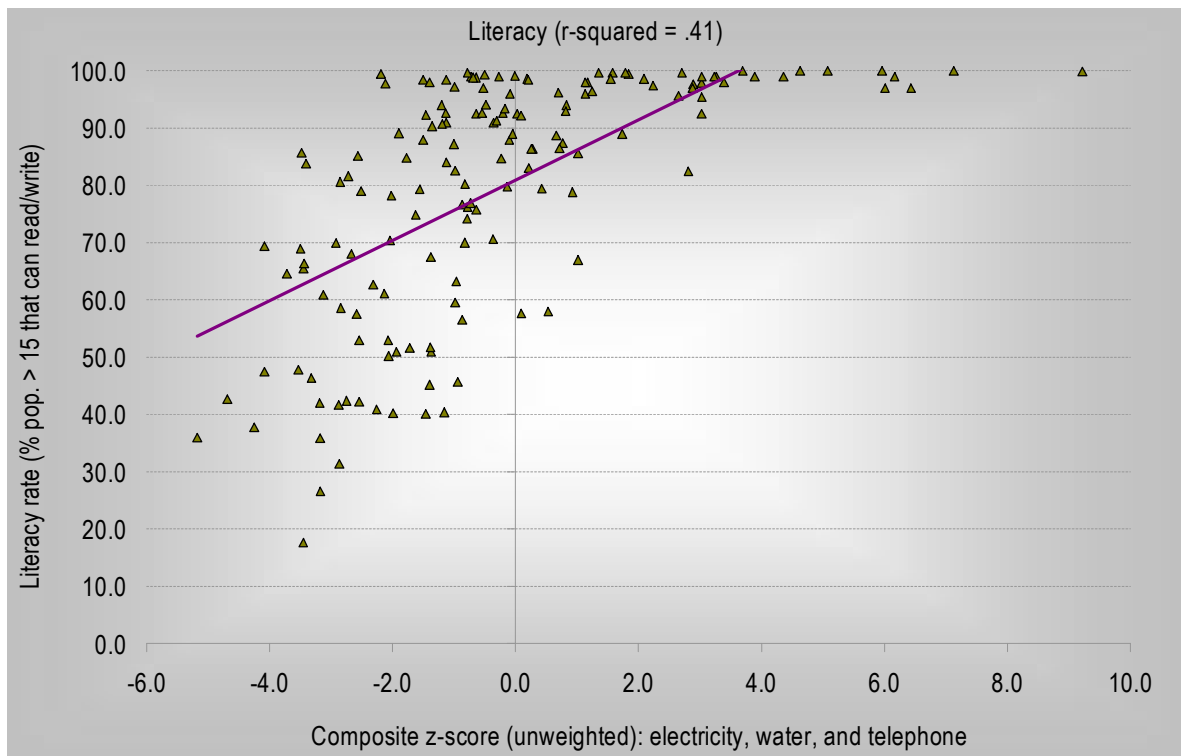
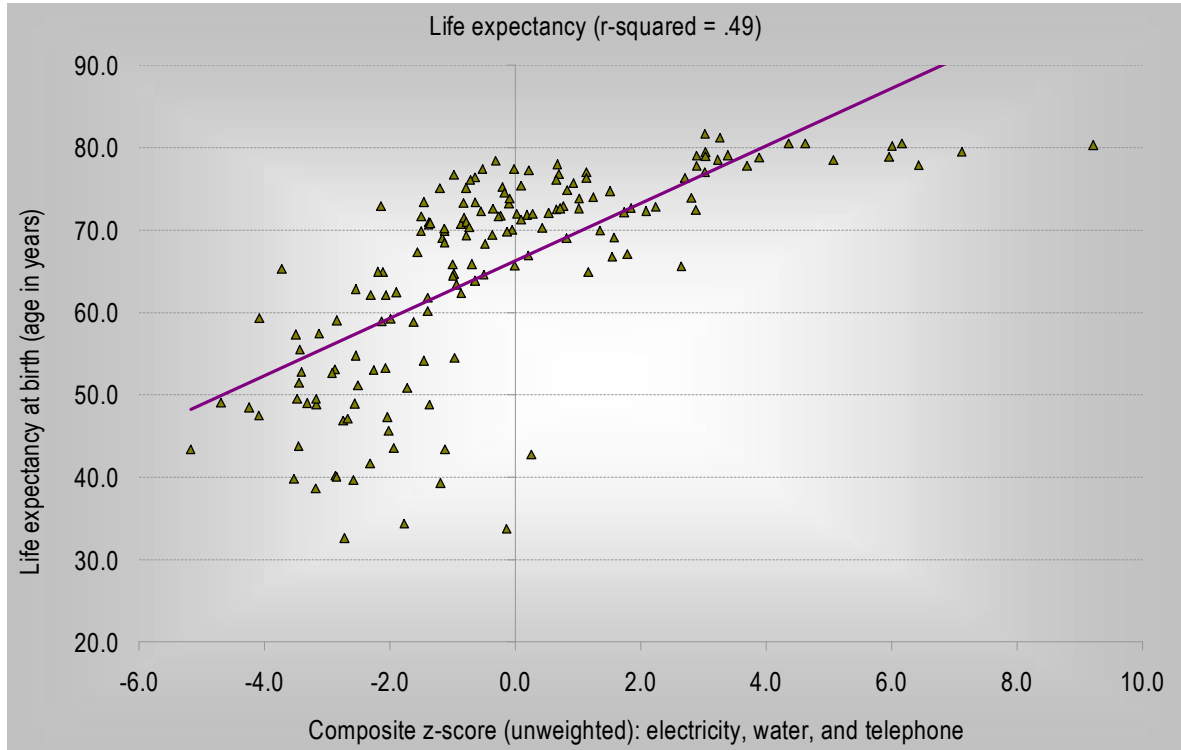
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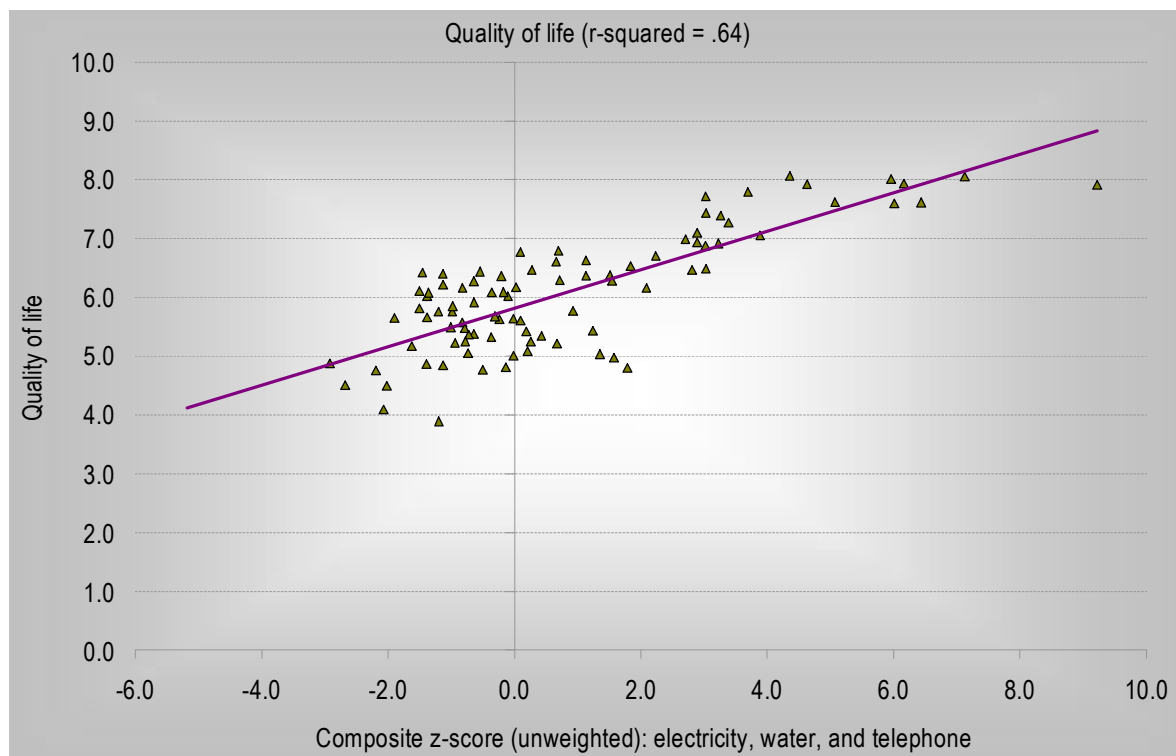
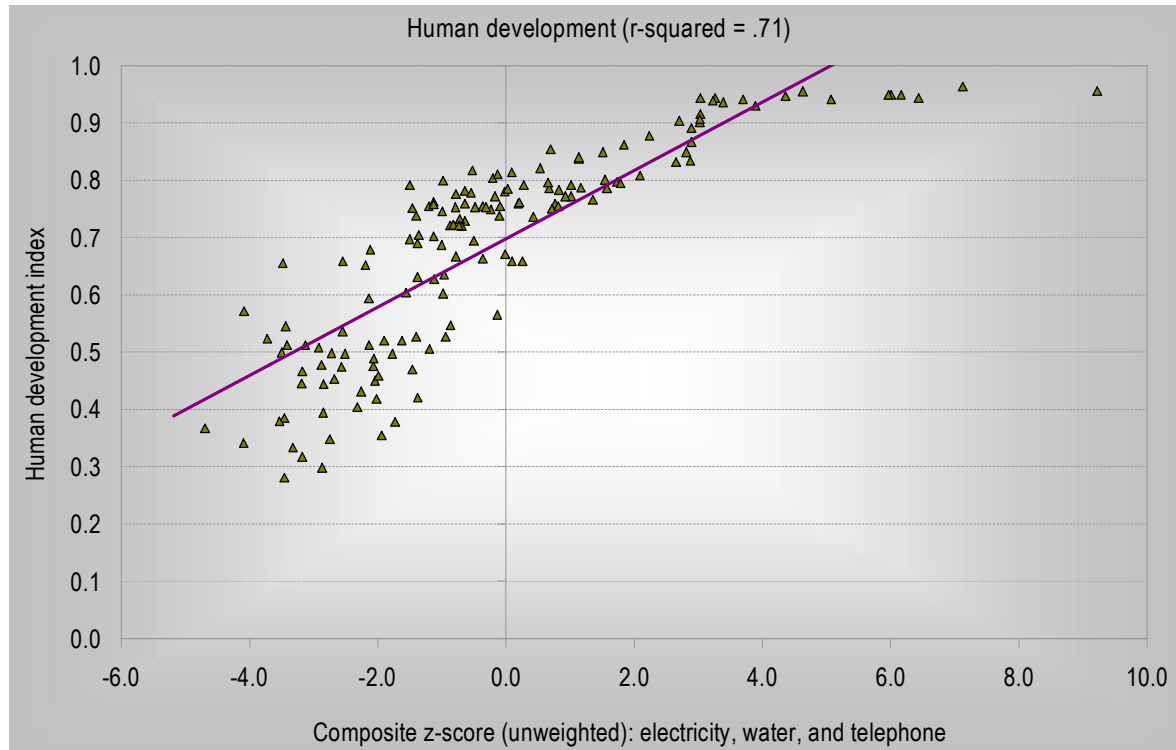
	Life expectancy	Infant survival	Diarrhoeal survival	Measles immunization	Literacy rate	Human devel. index	Income equality	Quality of life	Women's index	Children's index	Mothers' index	Life satisfaction	Happiness index	CO2 per cap	Political rights	Civil liberties	Freedom	Democracy	Voice and accountability	
E	Electricity per cap (n=188)																			
F	Natural gas per cap (n=104)																			
G	Access to water (n=169)																			
H	Access to sanitation (n=158)																			
I	Phone lines per cap (n=196)																			
J	Mobile phones per cap (n=195)																			
K	Internet users per cap (n=195)																			
L	Z: electricity and gas (n=148)																			
M	Z: electricity and water (n=161)																			
N	Z: water and san (n=155)																			
O	Z: phone/mobile/net (n=194)																			
P	Z: elec/water/phone (n=161)																			
Q	Population in mil. (n=197)																			
R	GDP per cap (n=197)																			
S	GDP growth rate (n=192)																			
T	Employment (n=164)																			
U	Adult econ. activity (n=126)																			
V	Web commerce (n=65)																			
W	Life expectancy (n=196)	1.00																		
X	Infant survival (n=196)	.88	1.00																	
Y	Diarrhoeal survival (n=187)	.60	.68	1.00																
Z	Measles immunization (n=184)	.57	.58	.52	1.00															
AA	Literacy rate (n=181)	.65	.74	.63	.53	1.00														
AB	Human devel. index (n=176)	.89	.89	.80	.59	.81	1.00													
AC	Income equality (n=125)	.51	.38	.29	.34	.30	.43	1.00												
AD	Quality of life (n=111)	.73	.72	.63	.18	.46	.85	.25	1.00											
AE	Women's index (n=131)	.62	.70	.74	.61	.87	.85	.29	.57	1.00										
AF	Children's index (n=166)	.74	.79	.76	.62	.72	.83	.29	.68	.82	1.00									
AG	Mothers' index (n=125)	.69	.76	.78	.62	.86	.89	.30	.62	.97	.91	1.00								
AH	Life satisfaction (n=177)	.58	.52	.42	.26	.38	.61	.05	.68	.43	.45	.48	1.00							
AI	Happiness index (n=177)	.46	.33	.00	.15	.18	.29	-.04	.12	.16	.24	.25	.62	1.00						
AJ	CO2 per cap (n=140)	.54	.57	.62	.38	.53	.71	.47	.61	.68	.64	.70	.36	-.22	1.00					
AK	Political rights (n=190)	.41	.47	.46	.18	.41	.48	.11	.66	.46	.48	.47	.45	.21	.37	1.00				
AL	Civil liberties (n=190)	.43	.50	.48	.20	.42	.51	.13	.68	.50	.50	.50	.48	.22	.41	.95	1.00			
AM	Freedom (n=190)	.43	.49	.47	.19	.42	.50	.12	.68	.48	.50	.49	.47	.22	.40	.99	.99	1.00		
AN	Democracy (n=194)	.34	.39	.35	.12	.37	.38	-.04	.50	.42	.41	.42	.38	.28	.23	.89	.83	.87	1.00	
AO	Voice and accountability	.47	.54	.53	.22	.45	.56	.18	.75	.53	.55	.53	.53	.19	.49	.96	.97	.98	.82	1.00
AP	Political stability (n=195)	.44	.52	.49	.32	.44	.57	.16	.73	.53	.45	.50	.55	.13	.41	.58	.65	.62	.43	.69
AQ	Judicial independence (n=109)	.30	.38	.57	.17	.34	.49	.24	.63	.41	.45	.42	.55	-.15	.63	.49	.52	.51	.17	.62
AR	Impartial courts (n=130)	.37	.43	.59	.25	.34	.53	.26	.63	.40	.48	.42	.59	-.03	.62	.41	.46	.44	.15	.55
AS	Law and order (n=122)	.52	.54	.68	.43	.43	.64	.47	.62	.51	.57	.50	.45	-.09	.69	.38	.45	.42	.12	.51
AT	Rule of law (n=194)	.60	.65	.64	.38	.50	.73	.34	.85	.59	.64	.60	.64	.11	.64	.65	.70	.68	.46	.77
AU	Control of corruption (n=190)	.58	.61	.72	.37	.46	.70	.30	.83	.59	.62	.61	.63	.07	.66	.62	.66	.64	.42	.73
AV	Govt. effectiveness (n=194)	.61	.64	.72	.42	.53	.76	.32	.86	.65	.71	.67	.63	.10	.70	.65	.70	.68	.47	.76
AW	General reg. climate (n=130)	.45	.54	.63	.38	.46	.60	.30	.56	.50	.54	.50	.53	-.01	.62	.50	.55	.53	.28	.60
AX	Protect investors (n=172)	.29	.32	.34	.14	.27	.34	.05	.39	.22	.31	.24	.30	.01	.43	.35	.33	.34	.25	.36
AY	Price control freedom (n=125)	.29	.27	.29	.21	.23	.33	.14	.39	.29	.39	.30	.34	.07	.33	.45	.46	.46	.39	.53
AZ	Reg. requirements (n=109)	.18	.19	.27	.22	.18	.26	.07	.35	.16	.27	.19	.29	-.16	.30	.10	.14	.12	-.13	.18
BA	Ease of compliance (n=65)	.31	.29	.33	.42	.35	.38	.51	.29	.30	.20	.24	-.07	-.22	.44	.18	.20	.19	.07	.20
BB	Reg. consistency (n=64)	-.02	-.11	-.05	-.15	-.02	-.01	.16	.23	-.13	-.21	-.16	.17	.07	.01	.03	.03	.03	.02	.09
BC	Regulatory quality (n=190)	.59	.65	.73	.42	.51	.73	.28	.83	.61	.69	.63	.58	.09	.66	.69	.75	.73	.50	.79
BD	Delay in elec. connect (n=70)	-.51	-.44	-.46	-.35	-.44	-.58	-.20	-.17	-.54	-.42	-.55	-.21	-.09	-.45	-.21	-.26	-.24	-.15	-.24
BE	Electrical outages (n=67)	-.32	-.36	-.45	-.26	-.26	-.45	.00	-.21	-.47	-.36	-.44	-.15	.04	-.38	-.16	-.19	-.18	.03	-.19
BF	Value lost elec. outages (n=66)	-.39	-.38	-.31	-.18	-.23	-.37	-.14	-.40	-.29	-.29	-.27	-.19	-.15	-.44	-.13	-.17	-.15	.03	-.15
BG	Water supply failures (n=68)	-.27	-.24	-.28	-.07	-.28	-.34	-.06	-.29	-.34	-.22	-.30	-.13	-.03	-.37	-.29	-.33	-.31	-.21	-.30
BH	Delay in phone connect (n=71)	-.27	-.26	-.39	-.27	-.43	-.47	-.18	-.17	-.44	-.27	-.40	-.06	.11	-.42	-.21	-.23	-.23	-.06	-.25

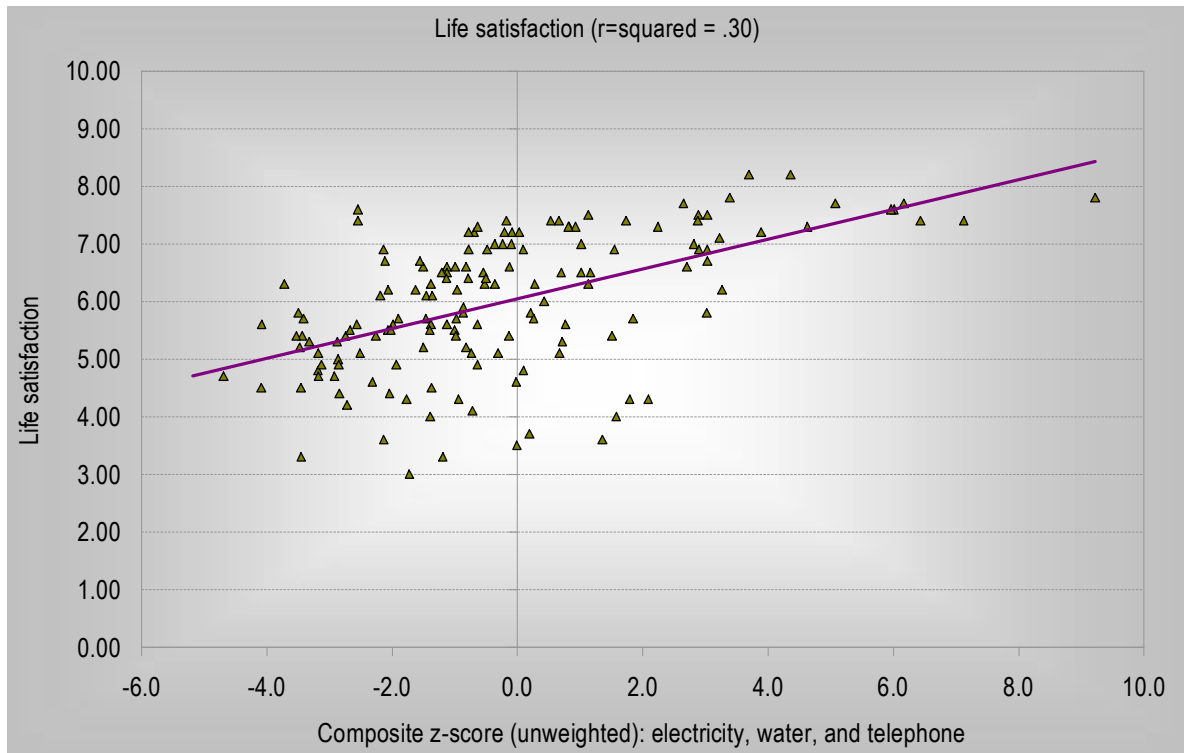
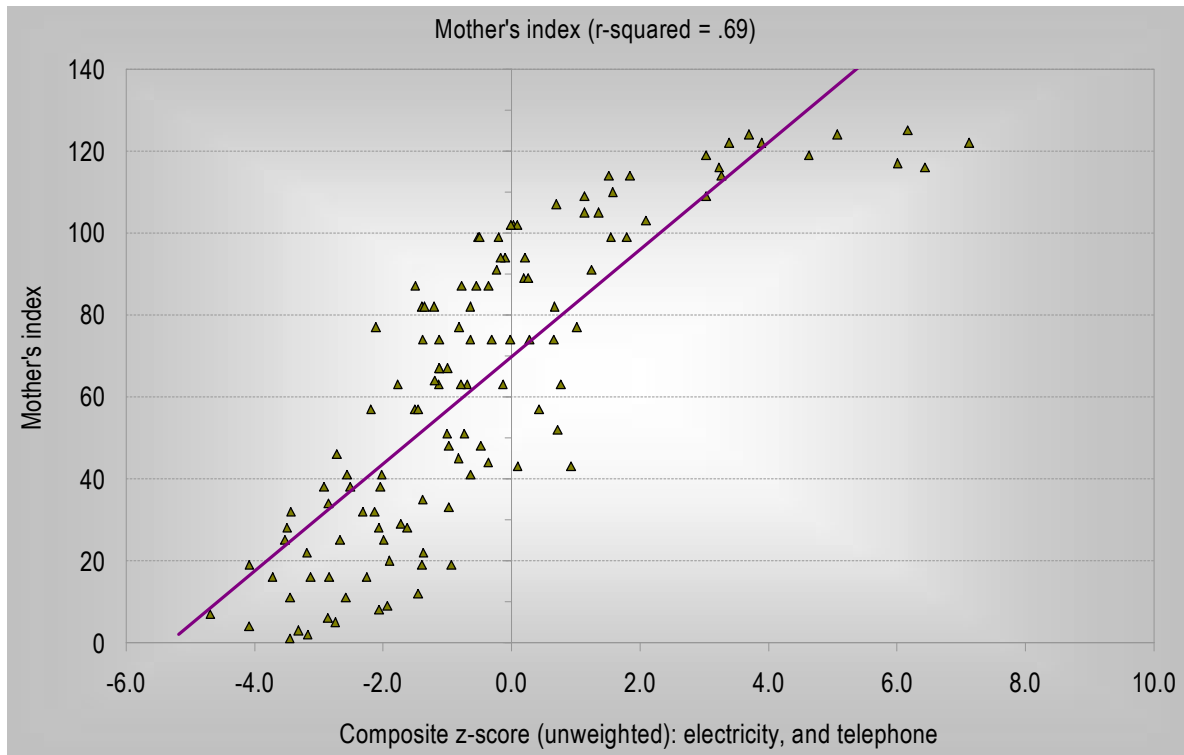
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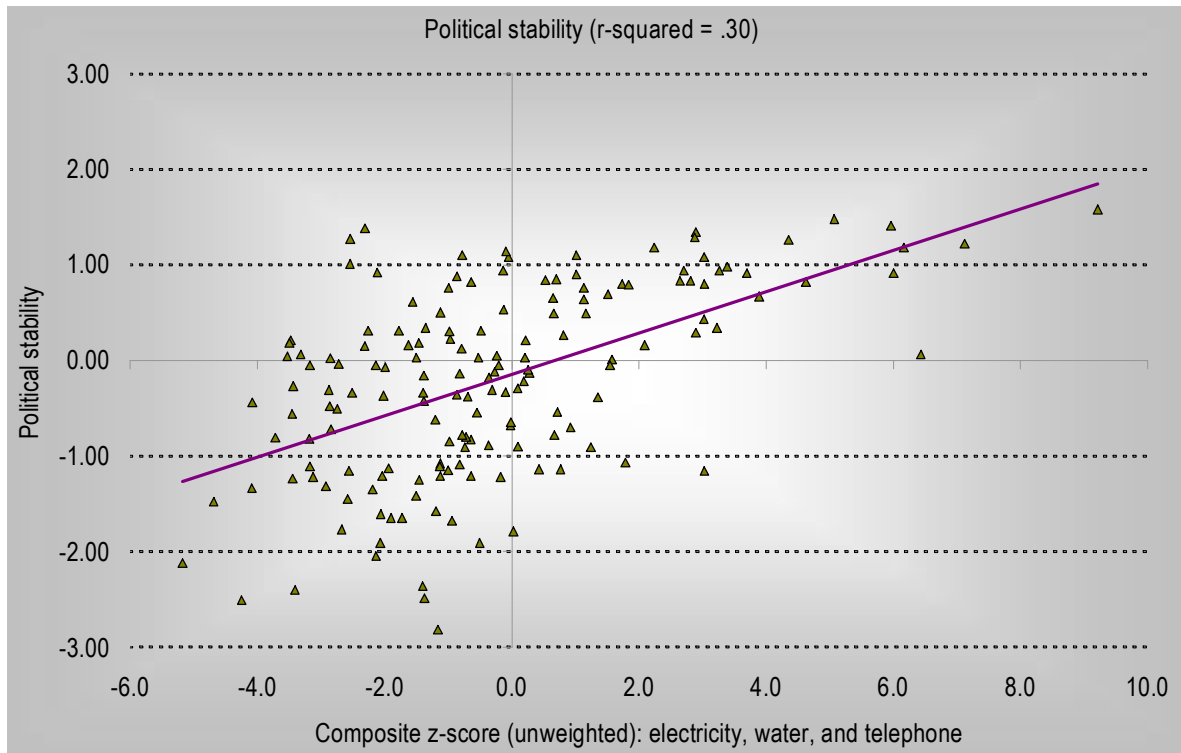
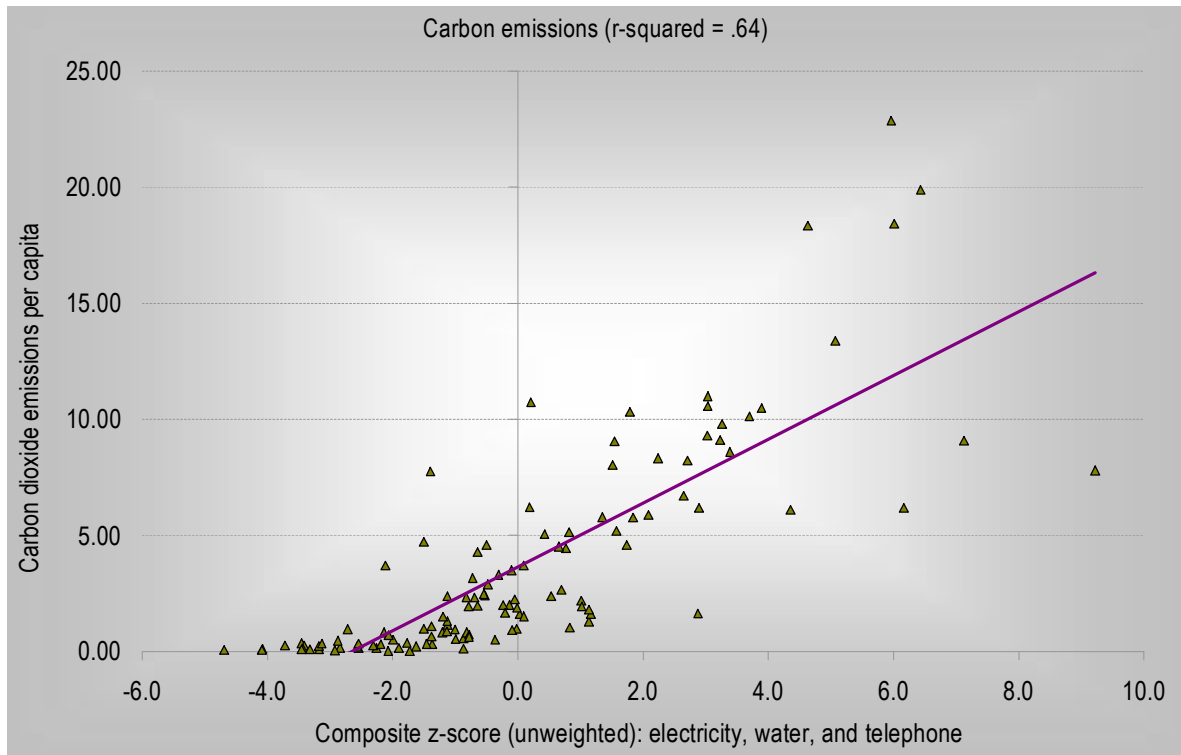
	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ	BA	BB	BC	BD	BE	BF	BG	BH	
E Electricity per cap (n=188)																				
F Natural gas per cap (n=104)																				
G Access to water (n=169)																				
H Access to sanitation (n=158)																				
I Phone lines per cap (n=196)																				
J Mobile phones per cap (n=195)																				
K Internet users per cap (n=195)																				
L Z: electricity and gas (n=148)																				
M Z: electricity and water (n=161)																				
N Z: water and san (n=155)																				
O Z: phone/mobile/net (n=194)																				
P Z: elec/water/phone (n=161)																				
Q Population in mil. (n=197)																				
R GDP per cap (n=197)																				
S GDP growth rate (n=192)																				
T Employment (n=164)																				
U Adult econ. activity (n=126)																				
V Web commerce (n=65)																				
W Life expectancy (n=196)																				
X Infant survival (n=196)																				
Y Diarrhoeal survival (n=187)																				
Z Measles immunization (n=184)																				
AA Literacy rate (n=181)																				
AB Human devel. index (n=176)																				
AC Income equality (n=125)																				
AD Quality of life (n=111)																				
AE Women's index (n=131)																				
AF Children's index (n=166)																				
AG Mothers' index (n=125)																				
AH Life satisfaction (n=177)																				
AI Happiness index (n=177)																				
AJ CO2 per cap (n=140)																				
AK Political rights (n=190)																				
AL Civil liberties (n=190)																				
AM Freedom (n=190)																				
AN Democracy (n=194)																				
AO Voice and accountability																				
AP Political stability (n=195)	1.00																			
AQ Judicial independence (n=109)	.66	1.00																		
AR Impartial courts (n=130)	.65	.94	1.00																	
AS Law and order (n=122)	.69	.68	.70	1.00																
AT Rule of law (n=194)	.81	.85	.86	.82	1.00															
AU Control of corruption (n=190)	.73	.84	.86	.79	.95	1.00														
AV Govt. effectiveness (n=194)	.72	.83	.82	.77	.94	.95	1.00													
AW General reg. climate (n=130)	.67	.65	.65	.61	.76	.76	.76	1.00												
AX Protect investors (n=172)	.27	.43	.45	.31	.45	.44	.48	.40	1.00											
AY Price control freedom (n=125)	.45	.48	.44	.39	.53	.54	.51	.58	.20	1.00										
AZ Reg. requirements (n=109)	.44	.57	.62	.45	.52	.52	.54	.50	.34	.30	1.00									
BA Ease of compliance (n=65)	.12	.18	.15	.19	.23	.26	.28	.52	-.01	.00	.20	1.00								
BB Reg. consistency (n=64)	.08	.37	.46	.12	.32	.27	.26	-.02	.03	.03	.19	.08	1.00							
BC Regulatory quality (n=190)	.70	.78	.75	.72	.90	.89	.96	.79	.48	.56	.50	.27	.13	1.00						
BD Delay in elec. connect (n=70)	-.23	-.08	-.09	-.27	-.23	-.30	-.39	-.28	.04	-.01	-.12	-.28	-.08	-.40	1.00					
BE Electrical outages (n=67)	-.30	-.14	-.24	-.45	-.30	-.34	-.34	-.23	.00	.13	-.16	-.19	.30	-.36	.39	1.00				
BF Value lost elec. outages (n=66)	-.07	.09	-.04	-.13	-.14	-.24	-.26	-.22	-.05	.08	.04	-.09	.11	-.24	.35	.29	1.00			
BG Water supply failures (n=68)	-.20	-.08	-.06	-.04	-.23	-.23	-.34	-.35	-.10	-.02	.02	-.39	.00	-.35	.32	.50	.27	1.00		
BH Delay in phone connect (n=71)	-.28	-.31	-.28	-.48	-.31	-.28	-.41	-.35	-.03	.07	-.27	-.21	-.04	-.47	.63	.45	.19	.37	1.00	

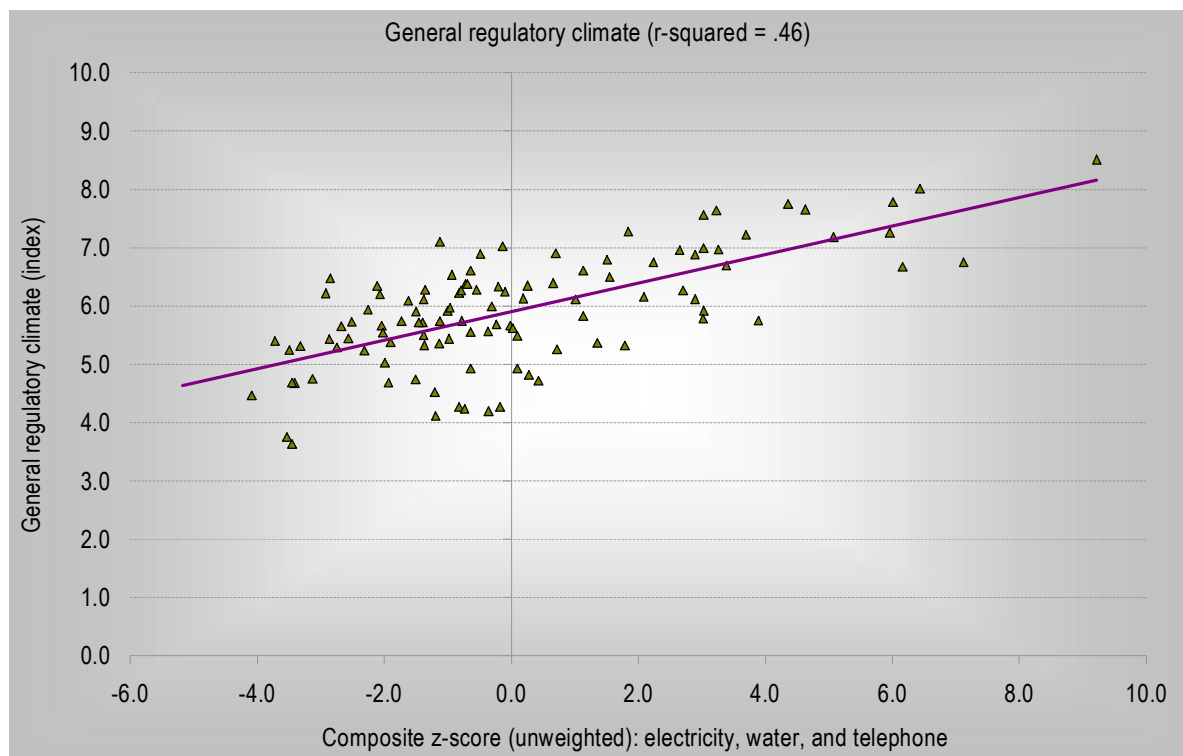
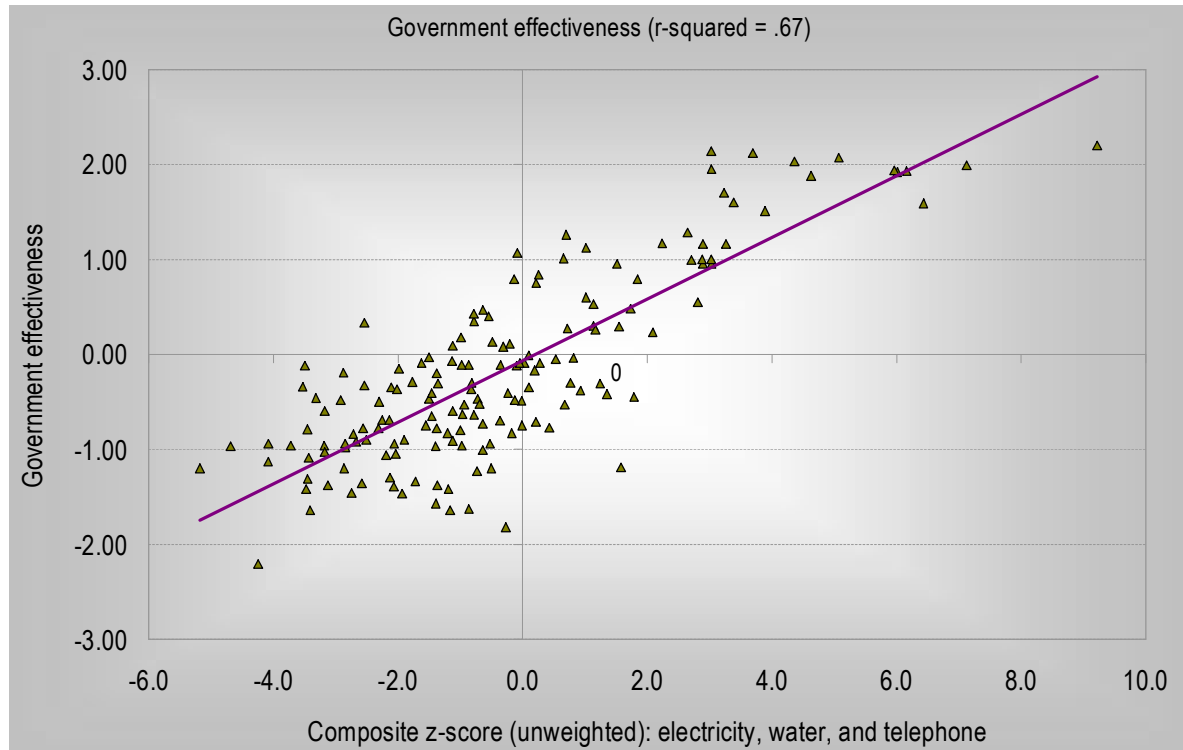


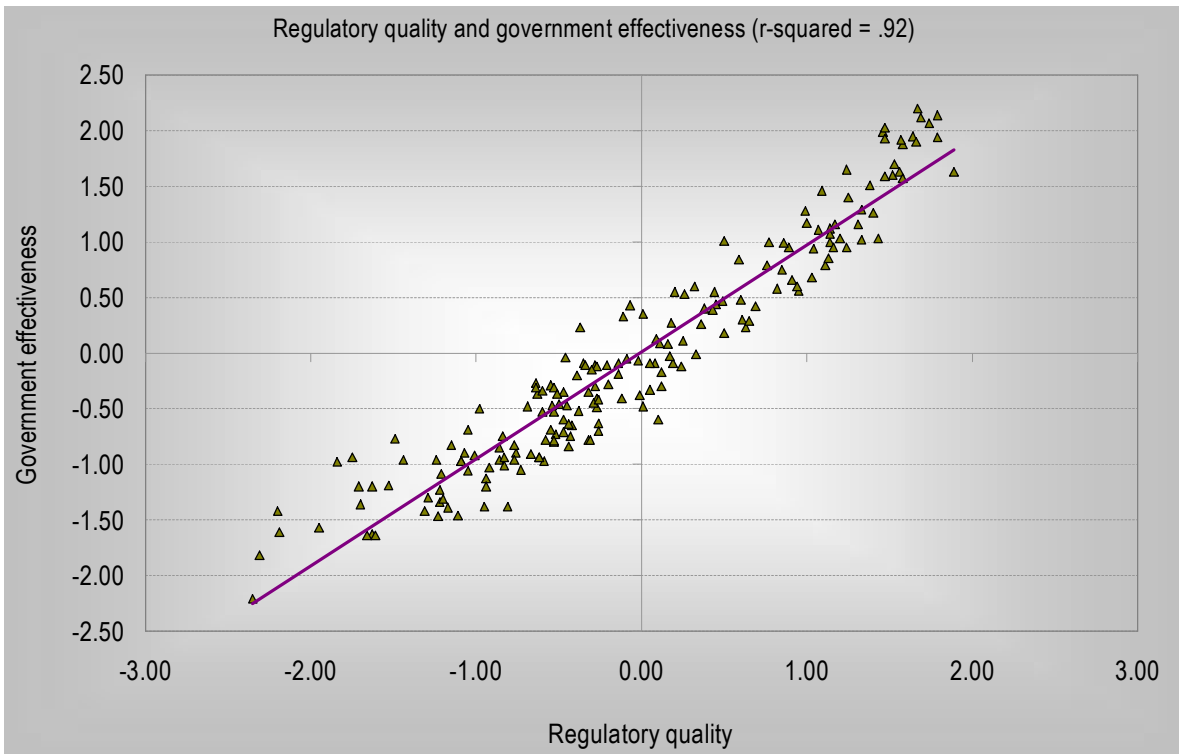
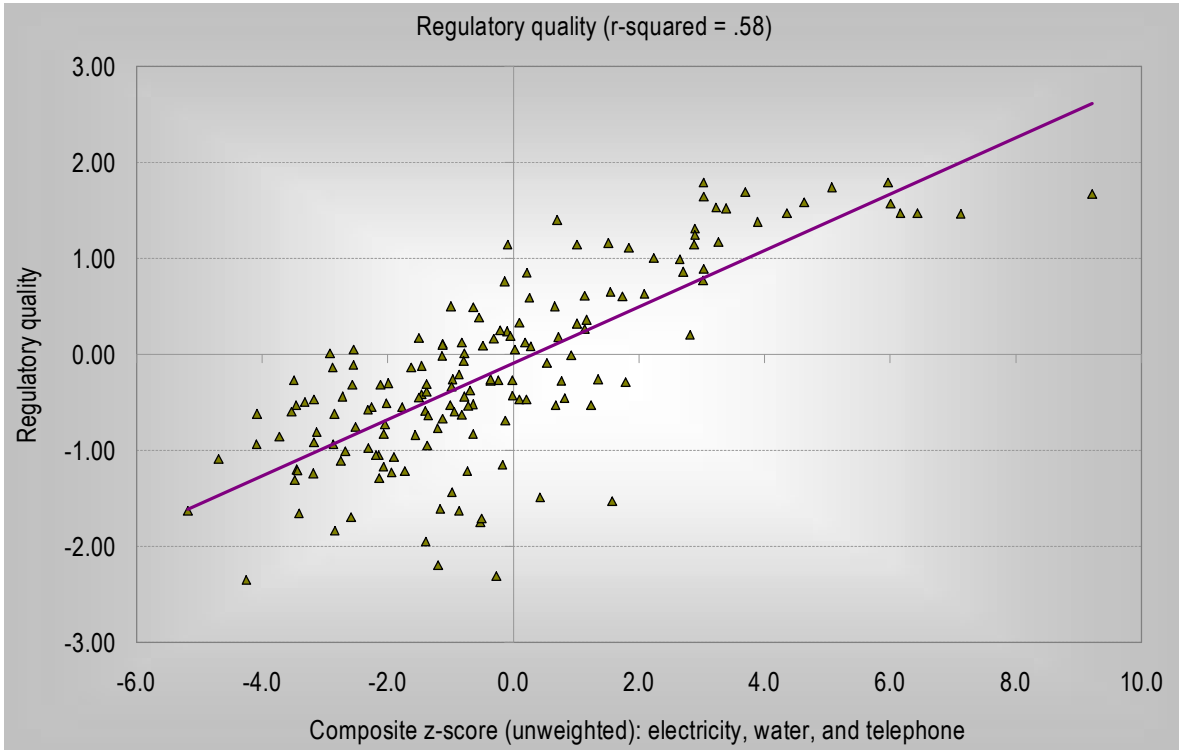


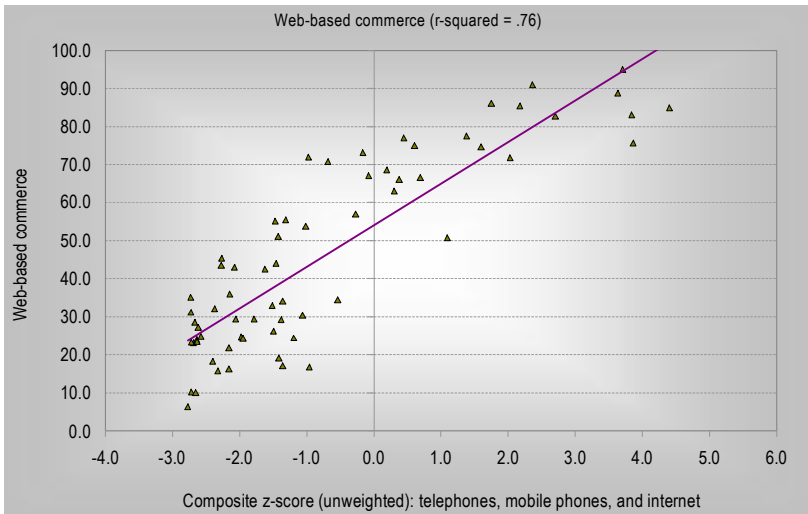
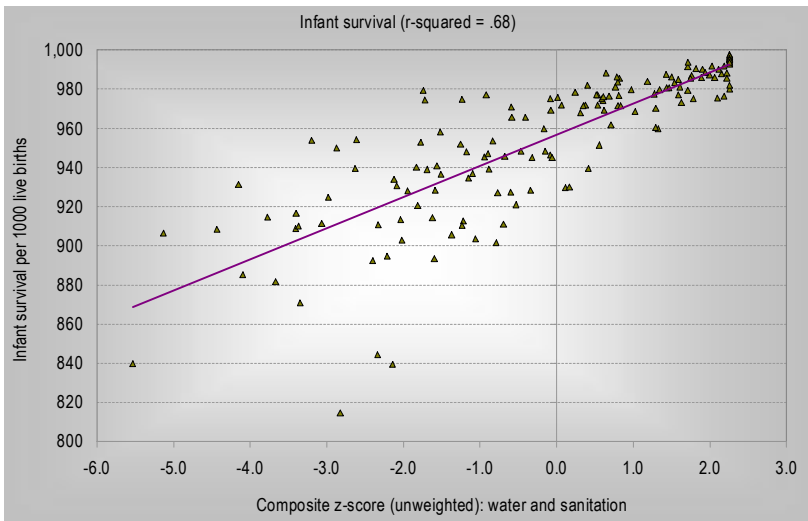
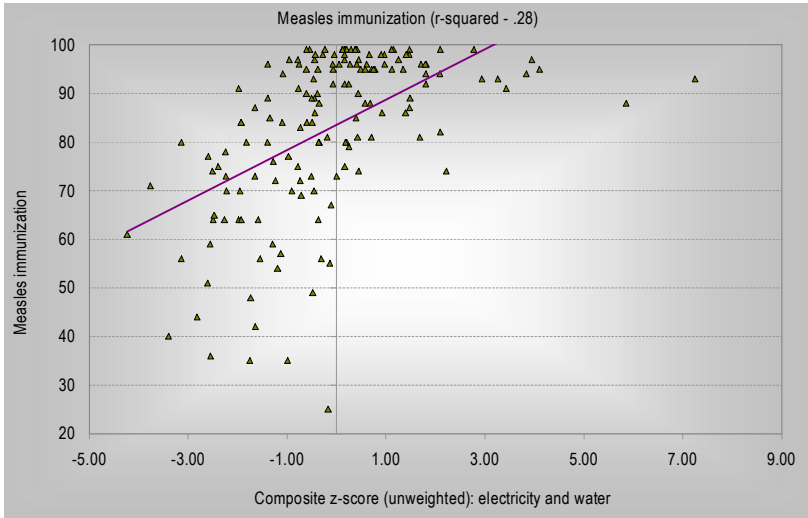












Appendix. Variables and Data Sources

UTILITIES

Electricity per cap (n=188)	This entry consists of total electricity generated annually plus imports and minus exports, expressed in kilowatt-hours, divided by population.	The CIA World Fact Book online (June 2006). http://www.cia.gov/cia/publications/factbook/index.html (calculated)
Natural gas per cap (n=104)	This entry is the total natural gas consumed in cubic meters (cu m), divided by population.	The CIA World Fact Book online (June 2006). http://www.cia.gov/cia/publications/factbook/index.html (calculated)
Access to water (n=169)	Estimated percentage of the population with access to improved drinking water sources. Estimates for 2002.	United Nations Statistics Division, data from the World Health Organization (2006). http://unstats.un.org/unsd/demographic/products/socind/watsan.htm
Access to sanitation (n=158)	Estimated percentage of the population with access to improved sanitation facilities. Estimates for 2002.	United Nations Statistics Division, data from the World Health Organization (2006). http://unstats.un.org/unsd/demographic/products/socind/watsan.htm
Phone lines per cap (n=196)	The total number of main telephone lines in use, divided by population.	The CIA World Fact Book online (June 2006). http://www.cia.gov/cia/publications/factbook/index.html (calculated)
Mobile phones per cap (n=195)	The total number of mobile cellular telephones in use, divided by population.	The CIA World Fact Book online (June 2006). http://www.cia.gov/cia/publications/factbook/index.html (calculated)
Internet users per cap (n=195)	The number of users within a country that access the Internet, divided by population. Statistics vary from country to country and may include users who access the Internet at least several times a week to those who access it only once within a period of several months.	The CIA World Fact Book online (June 2006). http://www.cia.gov/cia/publications/factbook/index.html (calculated)
Z: electricity and gas (n=148)	Composite score	Calculated
Z: electricity and water (n=161)	Composite score	Calculated
Z: water and san (n=155)	Composite score	Calculated
Z: phone/mobile/net (n=194)	Composite score	Calculated
Z: elec/water/phone (n=161)	Composite score	Calculated
ECONOMIC INDICATORS		
Population in mil. (n=197)	Estimated for July 2006.	The CIA World Fact Book online (June 2006). http://www.cia.gov/cia/publications/factbook/index.html (calculated)

Appendix (continued)

GDP per cap (n=197)	GDP on a purchasing power parity basis divided by population as of 1 July for the same year. Estimates range from 1999 to 2005 (most are recent).	The CIA World Fact Book online (June 2006). http://www.cia.gov/cia/publications/factbook/index.html (calculated)
GDP growth rate (n=192)	Growth in the real GDP for a recent year. Estimates range.	The CIA World Fact Book online (June 2006). http://www.cia.gov/cia/publications/factbook/index.html (calculated)
Employment (n=164)	Unemployment reversed; subtracts from 100% the percentage of the labor force that is without jobs	The CIA World Fact Book online (June 2006). http://www.cia.gov/cia/publications/factbook/index.html (calculated)
Adult econ. activity (n=126)	Adult economic activity rate refers to the percentage of the population aged 15 and over, unless otherwise specified, which is economically active. Estimates range from 1900s to 2000s.	United Nations, Social Indicators (2006). http://unstats.un.org/unsd/demographic/products/socind/inc-eco.htm#TECH
Web commerce (n=65)	Percentage of firms that regularly make use of the web in interacting with clients and / or suppliers.	World Bank Enterprise Surveys (2006). http://www.enterprisesurveys.org/ExploreTopics/CompareAll.aspx?topic=infrastructure

QUALITY OF LIFE INDICATORS

Life expectancy (n=196)	Average number of years to be lived by a group of people born in the same year, if mortality at each age remains constant in the future.	The CIA World Fact Book online (June 2006). http://www.cia.gov/cia/publications/factbook/index.html (calculated)
Infant survival (n-196)	Infant mortality reversed. The number of deaths of infants under one year old in a given year per 1,000 live births in the same year.	The CIA World Fact Book online (June 2006). http://www.cia.gov/cia/publications/factbook/index.html (calculated)
Diarrhoeal survival (n=187)	Reverse of deaths among children under five years of age due to diarrhoeal diseases (%). Estimated for 2000.	World Health Organization, Core Health Indicators (2006). http://www3.who.int/whosis/core/core_select.cfm?path=whosis,core&language=english
Measles immunization (n=184)	One-year-olds immunized with one dose of measles (%). Estimated for 2004.	World Health Organization, Core Health Indicators (2006). http://www3.who.int/whosis/core/core_select.cfm?path=whosis,core&language=english
Literacy rate (n=181)	Measured as the percent of citizens age 15 and older who can read and write.	The CIA World Fact Book online (June 2006). http://www.cia.gov/cia/publications/factbook/index.html (calculated)
Human devel. index (n=176)	A composite index measuring average achievement in three basic dimensions of human development—a long and healthy life, knowledge and a decent standard of living. Estimated for 2003.	United Nations Development Programme, Human Development Report 2005. http://hdr.undp.org/statistics/data/indicators.cfm
Income equality (n-125)	Gini index reversed. Measures the extent to which the distribution of income (or consumption) among individuals or households within a country deviates from a perfectly equal distribution. Estimates range from mid-1990s through early 2000s.	United Nations Development Programme, Human Development Report 2005. http://hdr.undp.org/statistics/data/indicators.cfm

Appendix (continued)

Quality of life (n=111)	An index of nine quality-of-life measurements: material wellbeing, health, political stability and security, family life, community life, climate and geography, job security, political freedom, and gender equality (2005).	The Economist, Intelligence Unit, The World in 2005. http://www.economist.com/media/pdf/QUALITY_OF_LIFE.pdf
Women's index (n=131)	A composite including: lifetime risk of maternal mortality; percent of women using modern contraception; percent of births attended by skilled personnel; percent of pregnant women with anemia; adult female literacy rate; and participation of women in national government. Estimates for 2006.	Save the Children, The Complete Mothers' Index 2006. http://www.savethechildren.org/publications/SO_WM_2006_final.pdf
Children's index (n=166)	A composite including: infant mortality rate; gross primary enrollment ratio; percent of population with access to safe water; percent of children under age 5 suffering from moderate or severe nutritional wasting. Estimates for 2006.	Save the Children, The Complete Mothers' Index 2006. http://www.savethechildren.org/publications/SO_WM_2006_final.pdf
Mothers' index (n=125)	A composite based on the women's index and the children's index. Estimates for 2006.	Save the Children, The Complete Mothers' Index 2006. http://www.savethechildren.org/publications/SO_WM_2006_final.pdf
Life satisfaction (n=177)	Based on surveys asking: "If you consider your life overall, how satisfied would you say you are nowadays?" (1-10 scale). Estimates for 2006.	New Economics Foundation, 2006. http://www.neweconomics.org/gen/z_sys_PublicationDetail.aspx?pid=225
Happiness index (n=177)	A composite including life satisfaction, life expectancy; and ecological footprint.	New Economics Foundation, 2006. http://www.neweconomics.org/gen/z_sys_PublicationDetail.aspx?pid=225
CO2 per cap (n=140)	CO2 emissions per capita. Estimates range from mid-1990s through early 2000s.	United Nations Statistics Division, Environmental Indicators (Juen 2005). http://unstats.un.org/unsd/environment/air_co2_emissions.htm

POLITICAL INDICATORS

Political rights (n=190)	Political rights enable people to participate freely in the political process, including through the right to vote, compete for public office, and elect representatives who have a decisive impact on public policies and are accountable to the electorate. A higher number in the 1-7 scale indicates more freedom. Rankings reflect events from December 1, 2004 through November 30, 2005.	Freedom House (2006). http://www.freedomhouse.org/uploads/pdf/Charts2006.pdf
Civil liberties (n=190)	Civil liberties allow for the freedoms of expression and belief, associational and organizational rights, rule of law, and personal autonomy without interference from the state. A higher number indicates more freedom. Rankings reflect events from December 1, 2004 through November 30, 2005.	Freedom House (2006). http://www.freedomhouse.org/uploads/pdf/Charts2006.pdf

Appendix (continued)

Freedom (n=190)	A summation of political rights and civil liberties (reversed from source). A higher number indicates more freedom. Rankings reflect events from December 1, 2004 through November 30, 2005.	Freedom House (2006). http://www.freedomhouse.org/uploads/pdf/Charts2006.pdf
Democracy (n=194)	A dummy variable with a value of one if the country is a self described democracy and zero otherwise (2005).	Freedom House (2005). http://www.freedomhouse.org/template.cfm?page=205&year=2005
Voice and accountability (n=194)	Includes a number of indicators measuring various aspects of the political process, civil liberties, political and human rights, measuring the extent to which citizens of a country are able to participate in the selection of governments.	World Bank (2005). http://web.worldbank.org/WBSITE/EXTERNAL/WBI/EXTWBIGOVANTCOR/0,,contentMDK:20771165~menuPK:1866365~pagePK:64168445~piPK:64168309~theSitePK:1740530,00.html
Political stability (n=195)	Combines several indicators which measure perceptions of the likelihood that the government in power will be destabilized or overthrown by possibly unconstitutional and/or violent means, including domestic violence and terrorism.	World Bank (2005). http://web.worldbank.org/WBSITE/EXTERNAL/WBI/EXTWBIGOVANTCOR/0,,contentMDK:20771165~menuPK:1866365~pagePK:64168445~piPK:64168309~theSitePK:1740530,00.html
LEGAL/INSTITUTIONAL INDICATORS		
Judicial independence (n=109)	Includes whether the judiciary is independent and not subject to interference by the government or parties in disputes (2004 data).	Economic Freedom of the World: 2006 Annual Report. http://www.freetheworld.com/2006/EFW2006complete.pdf
Impartial courts (n=130)	Includes whether a trusted legal framework exists for private businesses to challenge the legality of government actions or regulations (2004 data)	Economic Freedom of the World: 2006 Annual Report. http://www.freetheworld.com/2006/EFW2006complete.pdf
Law and order (n=122)	A measure of the integrity of the political system based on political risk (2004 data).	Economic Freedom of the World: 2006 Annual Report. http://www.freetheworld.com/2006/EFW2006complete.pdf
Rule of law (n=194)	Includes several indicators which measure the extent to which agents have confidence in and abide by the rules of society. These include perceptions of the incidence of crime, the effectiveness and predictability of the judiciary, and the enforceability of contracts.	World Bank, 2005. http://web.worldbank.org/WBSITE/EXTERNAL/WBI/EXTWBIGOVANTCOR/0,,contentMDK:20771165~menuPK:1866365~pagePK:64168445~piPK:64168309~theSitePK:1740530,00.html
Control of corruption (n=190)	A measure of the extent of corruption, conventionally defined as the exercise of public power for private gain. It is based on scores of variables from polls of experts and surveys.	World Bank, 2005. http://web.worldbank.org/WBSITE/EXTERNAL/WBI/EXTWBIGOVANTCOR/0,,contentMDK:20771165~menuPK:1866365~pagePK:64168445~piPK:64168309~theSitePK:1740530,00.html
Govt. effectiveness (n=194)	Combines responses on the quality of public service provision, the quality of the bureaucracy, the competence of civil servants, the independence of the civil service from political pressures, and the credibility of the government's commitment to policies.	World Bank, 2005. http://web.worldbank.org/WBSITE/EXTERNAL/WBI/EXTWBIGOVANTCOR/0,,contentMDK:20771165~menuPK:1866365~pagePK:64168445~piPK:64168309~theSitePK:1740530,00.html

Appendix (continued)

REGULATORY INDICATORS

General reg. climate (n=130)	A composite indicator of regulatory climate, inclusive of credit market, labor market, and business regulation (provided by the source).	Economic Freedom of the World: 2006 Annual Report. http://www.freetheworld.com/2006/EFW2006complete.pdf
Protect investors (n=172)	A composite of three dimensions of investor protection: transparency of transactions (Extent of Disclosure Index), liability for self-dealing (Extent of Director Liability Index), shareholders' ability to sue officers and directors for misconduct (Ease of Shareholder Suits Index).	World Bank, Doing Business (2006). http://www.doingbusiness.org/
Price control freedom (n=125)	The extent to which businesses are free to set their own price. The more widespread the use of price controls, the lower the rating. Countries were given a rating of 10 if no price controls or marketing boards were present; 8 when price controls were limited to industries where economies of scale may reduce the effectiveness of competition (e.g., power generation); 6 when applied in only a few other industries, such as agriculture; 4 when price controls were levied on energy, agriculture, and many other staple products that are widely purchased by house-holds; 2 when price controls applied to a significant number of products in both agriculture and manufacturing; and 0 when there was widespread use of price controls throughout various sectors of the economy.	Economic Freedom of the World: 2006 Annual Report. http://www.freetheworld.com/2006/EFW2006complete.pdf
Reg. requirements (n=109)	Measures burden of complying with administrative requirements (permits, regulations, reporting) issued by the government; a higher score indicates lesser burden (2000s).	Economic Freedom of the World: 2006 Annual Report. http://www.freetheworld.com/2006/EFW2006complete.pdf
Ease of compliance (n=65)	Average percentage of senior management's time that is spent in a typical week dealing with requirements imposed by government regulations (e.g. taxes, customs, labor regulations, licensing and registration), including dealings with officials, completing forms, et cetera (2000s). Reversed.	World Bank Enterprise Surveys (2006). http://www.enterprisesurveys.org/ExploreTopics/CompareAll.aspx?topic=bureaucracy
Reg. consistency (n=64)	Percentage of firms who agree with the statement "In general, government officials' interpretations of regulations affecting my establishment are consistent and predictable."	World Bank Enterprise Surveys (2006). http://www.enterprisesurveys.org/ExploreTopics/CompareAll.aspx?topic=bureaucracy

Appendix (continued)

Regulatory quality (n=190)	Focuses on policies, including measures of the incidence of market-unfriendly policies such as price controls or inadequate bank supervision, as well as perceptions of the burdens imposed by excessive regulation in areas such as foreign trade and business development (2004)	World Bank, 2005. http://web.worldbank.org/WBSITE/EXTERNAL/WBI/EXTWBIGOVANTCOR/0,,contentMDK:20771165~menuPK:1866365~pagePK:64168445~piPK:64168309~theSitePK:1740530,00.html
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SERVICE QUALITY INDICATORS

Delay in elec. connect (n=70)	Average actual delay, in days, that firms experience when obtaining an electrical connection, measured from the day the establishment applied to the day they received the service or approval.	World Bank Enterprise Surveys (2006). http://www.enterprisesurveys.org/ExploreTopics/CompareAll.aspx?topic=infrastructure
Electrical outages (n=67)	Average number of days per year the establishment experienced power outages or surges from the public grid.	World Bank Enterprise Surveys (2006). http://www.enterprisesurveys.org/ExploreTopics/CompareAll.aspx?topic=infrastructure
Value lost elec. outages (n=66)	Total losses over the course of a year resulting from interruptions in electricity service, as a percentage of sales, including losses due to lost production time from the outage, time needed to reset machines, and production and sales lost due to processes being interrupted.	World Bank Enterprise Surveys (2006). http://www.enterprisesurveys.org/ExploreTopics/CompareAll.aspx?topic=infrastructure
Water supply failures (n=68)	Average number of days per year that firms experienced insufficient water supply for production.	World Bank Enterprise Surveys (2006). http://www.enterprisesurveys.org/ExploreTopics/CompareAll.aspx?topic=infrastructure
Delay in phone connect (n=71)	Average actual delay, in days, that firms experience when obtaining a telephone connection, measured from the day the establishment applied to the day they received the service or approval.	World Bank Enterprise Surveys (2006). http://www.enterprisesurveys.org/ExploreTopics/CompareAll.aspx?topic=infrastructure

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