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INSTITUTIONS AND GEOGRAPHY: COMMENT ON ACEMOGLU, JOHNSON AND ROBINSON (2000)

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ABSTRACT

This paper responds to findings by Acemoglu, Johnson and Robinson (2000) that suggest weak institutions, but not physical geography and correlates like disease burden, explain current variation in levels of economic development across former colonies. Using similar data and expanding the sample of countries analyzed, our regression analysis shows that both institutions and geographically-related variables such as malaria incidence or life expectancy at birth are strongly linked to gross national product per capita. We argue that the evidence presented in Acemoglu, Johnson and Robinson is likely limited by the inherently small sample of ex-colonies and the limited geographic dispersion of those countries.

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**Institutions and Geography:
Comment on Acemoglu, Johnson, and Robinson (2000)**

Economists are increasingly aware of the deep links between physical geography and global patterns of economic development. Hall and Jones (1999), Gallup, Sachs, and Mellinger (1999), Engerman and Sokoloff (1997), Bloom and Sachs (1998), Masters and McMillan (2000), Sachs (2000), Masters and Wiebe (2000), and Acemoglu, Johnson, and Robinson (hereafter AJR, 2000), among others, all point out the strong correlation of geographical variables and cross-country levels of per capita income. Hall and Jones, for example, note that in a cross-section of countries, per capita income is positively correlated with the absolute value of latitude. Gallup, Sachs, and Mellinger stress the lower levels of Gross National Product (GNP) per capita in the tropics, arguing that human health and agricultural productivity are adversely impacted by tropical climate. Masters and McMillan similarly stress the positive effects of winter frost on agricultural productivity, and thereby on overall economic development. Meanwhile AJR argue that certain environments characterized by a heavy burden of infectious disease for would-be European settlers in the early 19th century were exploited by predatory states rather than nurtured by the rule of law, and thereby failed to achieve sustained economic growth.

These strong links are vividly demonstrated by the following figures. Figure 1 shows a scatter plot of ln(GNP per capita in 1995), hereafter LGNP95, versus the absolute latitude of a central point of each country. The high-latitude countries are clearly much richer than the low-latitude (or tropical) countries. Figure 2 shows a related scatter plot linking LGNP95 and the mean annual temperature – which is itself related to latitude, of course, but contributes directly to disease ecology and agricultural productivity. Figure 3 shows a scatter plot linking LGNP95 to early 19th century mortality rates across a sample of mainly ex-colonies, using a new data set assembled by AJR. Once again, we see that high mortality regions at the start of the 19th century – before the eras of modern economic growth and public health interventions – are regions of low economic development at the end of the 20th century. This strongly suggests a link from disease ecology (mainly malaria) to long-term economic development.

At least three basic models of geography-development interactions have been suggested by the recent papers, as shown in Figure 4. Figure 4a posits that geography affects income per capita mainly through the channel of institutions. Hall and Jones, for example, suggest that high-latitude countries were mainly settled by Europeans, who carried European traditions of rule of law and private property rights with them. The correlation of latitude and development, therefore, is mediated by institutions, particularly European institutions. AJR are of the same view, arguing that regions of high disease burden for European settlers in the early 19th century eventually fell under exploitative colonial rule, rather than the rule of law. Such linkages via institutions might be modified as in Figure 4b, where climate (or disease ecology) affects technology (defined broadly to include the technologies of human health and agricultural production), technology affects institutions (such as slave versus free labor, or predatory versus rule-of-law states), and institutions ultimately determine GNP and economic growth. This is the model of Engerman and Sokoloff, who argue that tropical climates in the Americas led to plantation-style agriculture built upon coerced labor (especially slavery), which in turn suppressed the processes of market-oriented economic growth and development.

Figure 4c posits that geography affects economic development both through institutions (perhaps via technology) as well as directly through effects on productivity. This is the position of Gallup, Sachs, and Mellinger; Bloom and Sachs; Masters and McMillan; Masters and Wiebe; and Sachs, among others. Geography has many effects that work through channels other than economic and political institutions – such as effects on health, population growth, and food productivity. In this paper we focus on the links through public health. Tropical climates are burdened by many infectious diseases, such as malaria, which have much lower incidence and prevalence (if any) in temperate ecozones and which are much easier to control in the temperate zones (Sachs, 2000). Tropical climates also face special problems of agricultural management, and are characterized by lower average food output per unit input. In addition to these direct effects, the indirect effects of unfavorable geography may indeed be amplified by a tendency towards more predatory or exploitative government. Gallup, Sachs, and

Mellinger illustrate why a more remote region, with less mobile factors of production, may face higher predatory taxation by a tax-maximizing sovereign.

Figure 4d adds a specific pathway to 4c. Climate again matters directly by affecting technology and institutions, but the effects may be amplified over time by the feedback of market size on further technological innovation. If tropical climates lower income, and if lower income in turn reduces technological innovation, then the initial adverse effects will be amplified over time through the dynamics of endogenous growth. As is well known, endogenous growth can easily produce a system of inter-linked economies in which the "rich get richer," as innovation increases market size which in turn supports an expanded rate of innovation.

This note picks up these themes as a response to the recent paper of AJR, who examine the importance of institutions and physical geography in determining the level of national income per capita in a cross-section of countries for the year 1995.[1] They use a measure of expropriation risk (EXPROP) as the summary variable for institutional quality, and regress the level of GNP per capita on EXPROP. They note that EXPROP is likely to be endogenous. For example, high-income countries might better be able to protect property rights than poor countries, so causality would run from income to property, rather than the other way around. In a very useful and creative contribution, they produce and utilize a measure of mortality rates from the early 19th century (hereafter LMORT) as an instrument for EXPROP. They then report IV regressions in which EXPROP, instrumented with LMORT, is a significant explanatory variable for GNP per capita, while claiming that other geographically-related variables apparently are not helpful in explaining GNP per capita. They conclude that institutions, rather than physical geography (and correlates such as disease burden), explain the cross-country patterns of per capita GNP in 1995, along the lines of Figure 4a or 4b.

[1] Although the AJR calculations are based on the *1999 World Development Indicators*' figures for Gross Domestic Product per capita (PPP) in 1995, we use 1995 GNP per capita (PPP) from the 1997 *World Development Indicators* since this allows us to test a larger sample of countries. To check the robustness of our results, we ran parallel regressions using AJR's *1999 WDI* GDP series and also the revised 1995 GDP series contained in the *2000 WDI*. The test results are slightly weaker for the health variables with the *1999 WDI* GDP series and slightly stronger with the *2000 WDI* GDP series, but our basic conclusions remain unchanged. Detailed regression results are available from the authors.

We review the evidence in AJR, and examine slightly different specifications as well. Our conclusion is different. The data strongly suggest that *both institutions and geographically-related variables* (such as malaria incidence or other health indicators) play a role in determining GNP per capita. We want to stress at the outset that the bivariate or trivariate regressions with relatively small samples in the AJR paper and in this paper are no doubt vast oversimplifications, and we certainly do not want to leave the impression that such over-simplified models are adequate explanations of cross-country income. Nonetheless, while such simple specifications cannot do justice to the full range of potential channels affecting development, both institutions and geography-specific health variables seem to play an important role, contrary to the claims in AJR.

We should also note how implausible the pathways are in Figure 4a and 4b compared to Figures 4c and 4d. If, as AJR suggest, physical geography is powerful enough to determine social and political institutions, it is hard to see how it could affect those institutions without having direct effects on the production function itself. For example, if a disease environment associated with high mortality rates in the early 19th century led European powers to develop predatory political institutions rather than developmental (or rule-of-law) institutions, it seems far-fetched to argue that the disease burden itself played no adverse role in the process of economic development. It is much more likely that the high disease burden has manifold direct effects, through worker stamina and productivity, longevity, household fertility and human capital accumulation, among other channels.

Basic Regressions

The dependent variable is the natural log of real GNP per capita at purchasing power parity in 1995 US dollars, LGNP95, as taken from the World Bank's 1997 *World Development Indicators*. The proxy for market institutions, EXPROP, measures the risk of confiscation and forced nationalization of property. Like AJR, we adopt this measure from Political Risk Services and calculate the average value for each country over the period 1985-95. However, unlike AJR, we allocate a value of EXPROP not just to former colonies but to all 118 economies assessed by Political Risk Services. Countries with higher values of EXPROP are those where expropriation of private foreign investment is a less likely event. This broader sample is important. Most of AJR's observations are for tropical and sub-tropical environments, which reduces the geographical variation of the observations. Our extended sample includes many more temperate-zone countries for comparison with tropical economies. We also report regressions using AJR's more restricted sample, with similar results to the broader sample in most cases.

We seek to examine whether other geographically-related variables, such as malaria prevalence or health indicators, are also significant in an instrumental-variables regression of LGNP95 on EXPROP. Thus, we examine the cross-section regression

(1) $LGNP95 = a + b\,EXPROP + c\,X + e$

Our three candidates for X include:

MALFAL94	The proportion of a country's population at risk of falciparum malaria transmission in 1994, taken from Gallup, Sachs and Mellinger;[2]
LEB95	Life expectancy at birth in 1995, taken from United Nations (1996), and;[3]
IMR95	Infant mortality rate (deaths per 1,000 live births) in 1995, also taken from United Nations (1996).

The variable e is the error term. We are interested in health as a direct input to income levels, recognizing that cross-country differences in health status are importantly affected by physical geography (mainly because of disease ecology in tropical versus temperate

[2] Note that our MALFAL94 variable is slightly different from that used in AJR, but the two have a correlation coefficient of 0.96.
[3] We also tested LEB95 and IMR95 in natural log form but found this to have a negligible effect on our results.

ecozones). Of course, these variables may also be determined by income levels, so the X variables must be instrumented.

Instrumental variables must be correlated with the Xs but uncorrelated with the error term e. Our candidates for valid instruments include the following:

LMORT The natural log of adult mortality rates in the early 19th century, as originally developed by Curtin (1989, 1998) and others, and collected by AJR;[4]

MEANTEMP 1987 mean annual temperature in degrees Celsius (which is correlated with disease ecology and hence the burden of disease), taken from Gallup, Sachs and Mellinger;

LT100KM Proportion of land area within 100 km of the sea coast, taken from Gallup, Sachs and Mellinger;

LATABS Absolute value of latitude, from the La Porta *et al.* (1999) data set;

LENERG Hydrocarbon production per capita, where hydrocarbons include oil and gas expressed in BTUs, as measured by the International Energy Agency. The variable is specified as ln(1+hydrocarbons per capita), as previously reported in Gallup, Sachs and Mellinger;

ELWARDUM Dummy variable = 1 if a war during 1960s to 1980s, = 0 otherwise, as calculated from the Easterly and Levine (1997) data set; and

STATE Period of national independence. = 0 if independence before 1914;

[4] Specifically, our LMORT variable is based on AJR's "5th Mortality Estimate" in their Appendix Table A2.

1 if independence between 1914 and 1945; 2 if independence between 1945 and 1989; and 3 if after 1989, as reported in CIA (1996).

The second through fourth variables on the IV list are clearly exogenous. The last three variables on the IV list are arguably endogenous to some extent, but their correlation with the error term e is likely to be small.[5]

Note that the geography variables are likely to be correlated both with the health measures (MALFAL94, IMR95, LEB95) and with EXPROP. The amount of a country's land near a sea coast (LT100KM), for example, changes diet (including availability of salt, iron, proteins, and other nutrients), disease ecology and technologies for controlling disease vectors such as mosquitoes. Coastal proximity may also affect the incentive of the state to tax production because of its effects on the mobility of factors of production (see Gallup and Sachs, 1998).

Regression Results

The key variables LGNP95, EXPROP, and the Xs are available for 118 countries. LMORT is available for 68 countries. When we include LMORT in the IV list, we drastically cut the sample of countries. Thus, we estimate the core equation with the smaller and larger samples while excluding the LMORT instrument in order better to compare the effects of the instruments to the effects of the sample size. In all cases, we try the three alternative measures of X.

Regressions 1 through 3 in Table 1 report OLS regressions for the three respective X variables. The sample for each regression includes at least 116 countries. In all three regressions, both EXPROP and the health variable X are highly significant. (If they are included together, only IMR95 is significant.) In regression 1, the coefficient of 0.35 on

[5] Even though the specification used in equation (1) is highly simplified, we note that LENERG has a larger correlation with the error term than the other instruments and can arguably be used as an independent right-hand-side variable. In results not reported for the sake of conserving space, we tested specifications with such a structure but our findings were essentially unchanged in terms of the significance of the health variables, even when the energy variable was a significant right-hand-side variable. These unreported regressions are available from the authors upon request.

EXPROP suggests that a one standard deviation (SD) increase in the expropriation index away from the mean level is linked to a 89% higher GNP per capita.[6] Meanwhile, a one SD increase in a country's malaria index is linked to a 39% lower GNP per capita.[7] In regression 2, we see a slight drop in the coefficient on EXPROP and again find the health variable to be significant. An extra year of life expectancy at birth for a country is linked to a 5% higher GNP per capita. Stated otherwise, a one SD increase in LEB95 from the mean level is associated with an 80% increase in GNP per capita.[8] Looking at regression 3, we see that one extra death per 1,000 live births is linked to a 2 percent lower LGNP95. In terms of the distribution of IMR95, a one SD increase in deaths per 1,000 live births is linked to a 54% decrease in per capita GNP.[9]

Regressions 4 to 6 report the same basic OLS regressions, this time limiting the sample to the approximately 62 (mainly) ex-colonies examined in the AJR paper.[10] The results here are almost identical to those in regressions 1 through 3. However, as AJR and others have pointed out, there is likely some endogeneity in the parsimonious specifications of regressions 1 through 6. We address this through IV regressions in equations 7 to 9 by using the three instruments most likely to be exogenous, MEANTEMP, LT100KM and LATABS. Here we again see broadly consistent coefficients on the Xs, with reduced but still significant t-statistics. Even when including the instruments, we see in this "full" sample of ex-colonies plus other countries that geographically-related health variables are highly linked to LGNP95.

To help distinguish between general effects of the RHS variables and effects determined by sample composition, regressions 10 to 12 mimic the specification in equations 7 to 9, but here we limit the sample to (mainly) ex-colonies, most of which are

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[6] The mean value of EXPROP across the sample is 7.02 and its SD is 1.82. Multiplying the SD by the coefficient of 0.35 and taking the exponential gives us: exp(1.82*0.35) = 1.89.
[7] The mean value of MALFAL94 across the sample is 0.29 and its SD is 0.41. Multiplying the SD by the coefficient of –1.2 and taking the exponential gives us: exp(0.41* -1.2) = 0.61.
[8] The mean value of LEB95 for the sample of countries with values for EXPROP is 65.06 and the SD is 11.77. Multiplying the SD by the coefficient of 0.05 and taking the exponential gives us: exp(11.77*0.05) = 1.80.
[9] The mean value of IMR95 for the sample of countries with values for EXPROP is 46.12 and the SD is 38.74. Multiplying the SD by the coefficient of –0.02 and taking the exponential gives us: exp (38.74 * -0.02) = 0.46.
[10] AJR include France and the UK in their sample of ex-colonies. We do the same here.

located in tropical or semi-tropical climatic regions. When the sample is limited as such, we see that the coefficients on EXPROP roughly double to the 0.6 range while the coefficients on MALFAL94 and LEB95 are no longer significant at 5% levels. The coefficient on IMR95 decreases by one half to –0.01 and its t-statistic decreases substantially, but it still remains significant at 10% levels.

The result seems to provide evidence that, although geographically-related health variables are important across regions, they are less important *within* the geographically-limited region (mainly tropical) that contains most ex-colonies. We note that the R-squared values in regression 10 through 11 have dropped about 15% from regressions 4 through 6. This on its own, of course, does not imply anything directly, but it does suggest that equations 10 through 12 are somewhat weaker for explaining GNP variance when looking only at ex-colonies. Nevertheless, even within the set of ex-colonies, infant mortality rates still appear to be importantly linked to LGNP95. An alternatively plausible interpretation would suggest that the MALFAL94 and LEB95 variables lose significance due to the sheer numerical limitations of an ex-colony sample with only 60 observations.

In regressions 13 through 15, we test the AJR argument more directly by including their LMORT instrumental variable. Again, this decreases the sample size significantly, but also tests more explicitly the findings posited by AJR in their Table 7. As in regressions 10 and 11, we find MALFAL94 and LEB95 to be insignificant. In regression 15, however, we again find IMR95 to be our most robust variable, here significant at 5% levels. The inclusion of the mortality instrument does not seem to weaken the significance of the geographically-linked infant mortality variable.

Regressions 16 through 18 add LENERG, ELWARDUM, and STATE to the IV list. Here the sample is still limited at approximately 60 countries, but the R-squared measure of fit has increased and the X variables all return to being highly significant, with coefficients very similar to those in regressions 1 through 9. Interestingly the coefficient on EXPROP is much greater than the relevant values in equations 1 through 9 and it remains highly significant. As mentioned above, the three instruments we add here are arguably endogenous, but they have a low degree of correlation with the error term in equation (1), so our results supporting the role of the X variables should still hold.

In equations 19 through 21 we repeat the previous three regressions but this time exclude the LMORT variable so that we can test the full set of instruments on a sample of more than 100 countries. Again, our main results are unchanged, with the coefficients on EXPROP, MALFAL94, LEB95 and IMR95 remaining highly significant and of essentially the same magnitude as in equations 1 through 9. This evidence further consolidates the view that AJR's argument against physical geography is limited by its small sample and small range of geographic variation.

Conclusions

Although it is difficult to extract ironclad conclusions from the highly simplified regressions above, the analysis indicates that both institutions and geographically-related variables play a significant role in determining GNP per capita. The pathways from geography to development seem to be characterized by Figures 4c and 4d, rather than Figures 4a and 4b. We find that, despite their contribution in identifying the LMORT instrument, AJR's argument that geography plays a limited role in development is likely due to the inherently small sample of ex-colonies and to the limited geographic dispersion of those countries. Even within that small sample, most regression results point squarely to direct effects of geographically-linked health variables on development, controlling for the quality of governance. Since most colonies were located within tropical zones, it is likely that the lesser variance in geography, climate and disease ecology across colonies is responsible for the decreased significance of health variables when they are included in the ex-colony regressions. This problem is exacerbated by the more standard small sample problems that might be affecting the same regressions. Indeed, when we test our specification with 3 exogenous instruments and a sample of more than 100 countries in regressions 7 through 9, both institutions and geographical variables are significantly linked to an increase in economic development. Likewise, when we test our specification with a slate of six instruments and more than 100 countries in regressions 19 through 21, both the institutional and geographic variables are highly significant.

What is perhaps most notable from our regressions is the relative magnitude of effects implied by the EXPROP and X coefficients respectively. A one SD increase in EXPROP is linked to a roughly 80-90% higher GNP per capita, indicating that institutions play a considerable role. Meanwhile a one SD increase in infant mortality rates, our most robust geographically-based health measure, is linked to a roughly 50% decrease in GNP per capita. While the simplistic specification in equation (1) implies one cannot interpret these regression coefficients too literally, the findings do strongly suggest that both institutions and geographically-related variables play a major role in affecting countries' levels of wealth.

Figure 1. Scatter plot of LGNP95 versus absolute latitude, LATABS, for 150 countries.

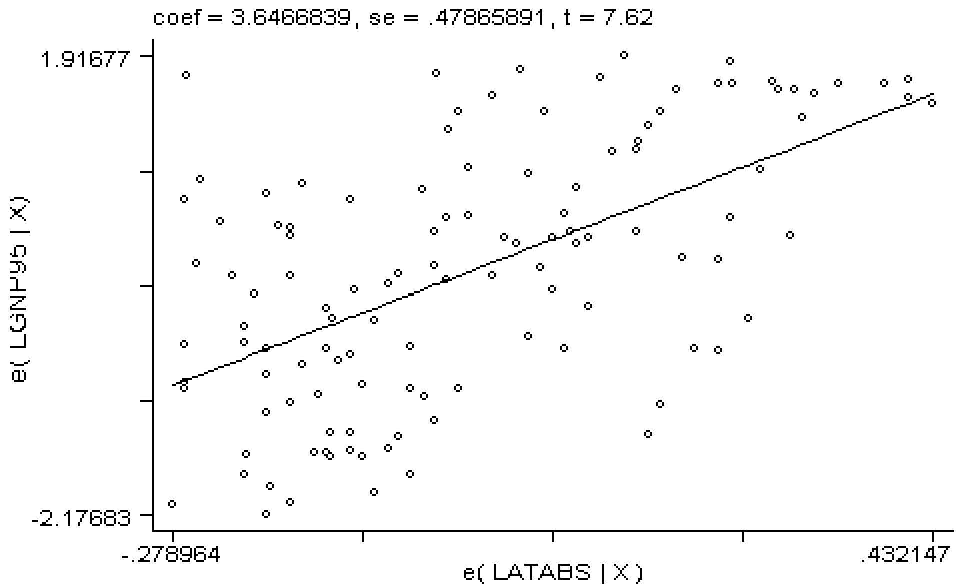


Figure 2. Scatter plot of LGNP95 versus mean temperature, MEANTEMP, for 123 countries.

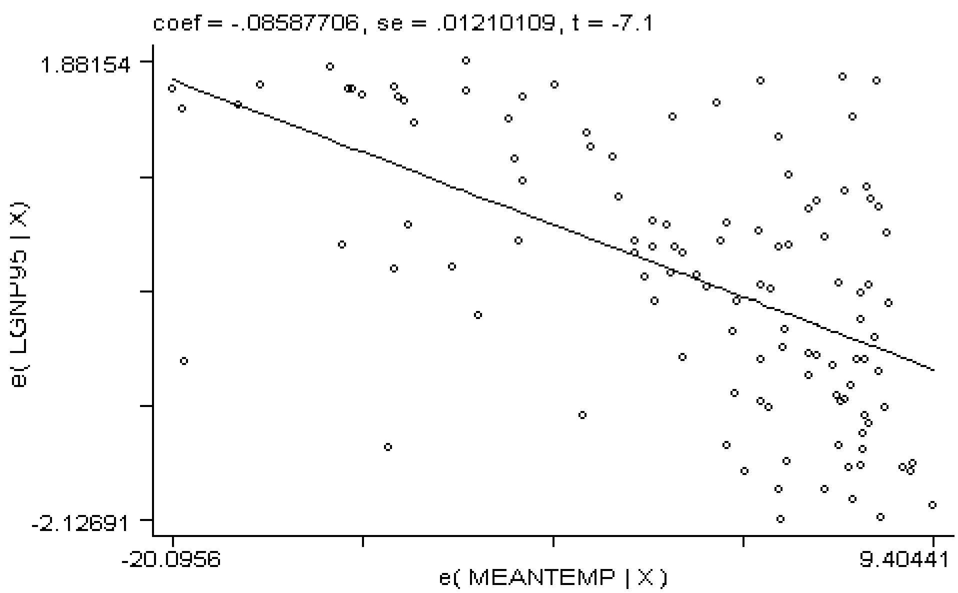


Figure 3. Scatter plot of LGNP95 versus 19th century mortality variable, LMORT, for 68 countries (mainly ex-colonies).

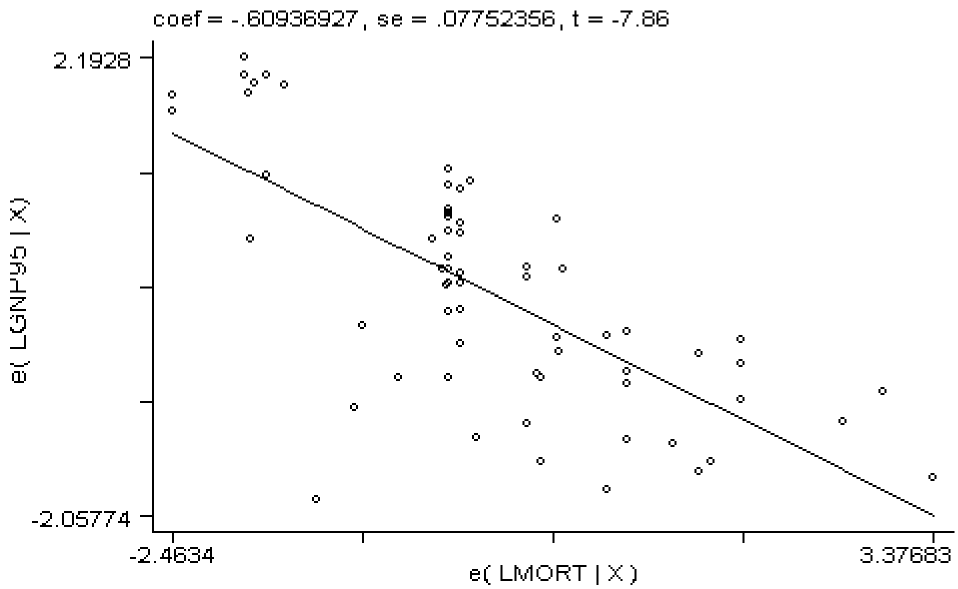
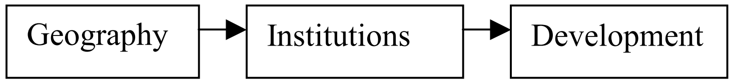


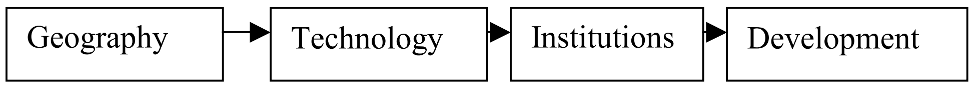
Figure 4. Hypothesized Linkages of Geography and Economic Development

(a)



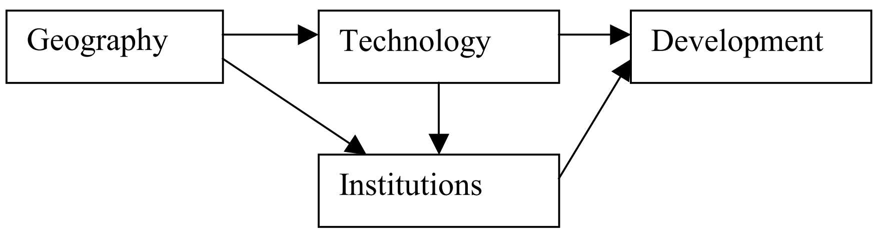
(Example: AJR. High disease environment leads to predatory state institutions, which impede long-term development)

(b)



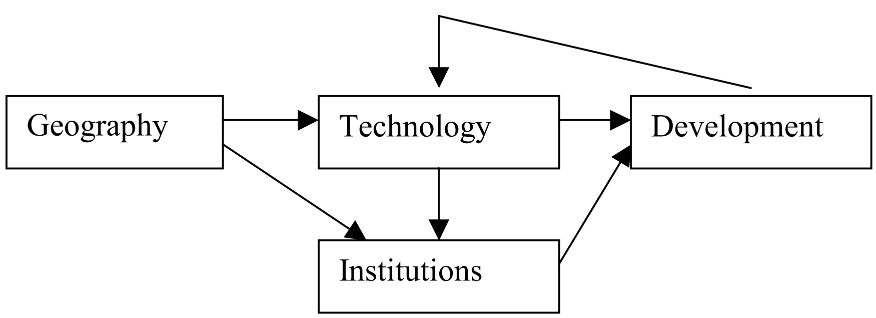
(Example: Engerman and Sokoloff. Tropical ecozones lead to plantation agriculture, which promote the use of slavery, which impede economic development)

(c)



(Example: Gallup, Sachs, and Mellinger. Adverse geography diminishes agriculture productivity and health, thereby directly impeding development. Adverse geography also promotes state predation, leading to predatory institutions and poor development)

(d)



(Example: Sachs, 2000. Adverse geography has direct effects on production, and indirect effects via institutions, which both lead low levels of development. In turn, low levels of development result in low levels of innovation and slow technological change. The pace of endogenous growth is thereby reduced).

Table 1. Regression Results

LGNP95 as dependent variable throughout

Regression	1	2	3	4	5	6	7	8	9	10	11	12
EXPROP	**0.35**	**0.28**	**0.25**	**0.39**	**0.30**	**0.30**	**0.29**	**0.34**	**0.29**	**0.66**	**0.62**	**0.55**
t-stat	10.15	7.85	6.83	8.33	6.63	7.20	2.46	3.95	2.82	3.26	3.69	3.73
MALFAL94	**-1.22**			**-1.21**			**-1.51**			**-0.50**		
t-stat	-7.92			-7.29			-3.05			-0.68		
LEB95		**0.05**			**0.05**			**0.04**			**0.02**	
t-stat		9.37			8.95			3.40			1.10	
IMR95			**-0.02**			**-0.02**			**-0.02**			**-0.01**
t-stat			-9.57			-9.94			-3.38			-1.73
N	118	116	116	63	62	62	113	111	111	62	61	61
Adj R-sqd	0.73	0.77	0.77	0.79	0.83	0.85	0.74	0.77	0.79	0.66	0.69	0.75
Instruments												
MEANTEMP							Yes	Yes	Yes	Yes	Yes	Yes
LT100KM							Yes	Yes	Yes	Yes	Yes	Yes
LATABS							Yes	Yes	Yes	Yes	Yes	Yes
LMORT												
LENERG												
ELWARDUM												
STATE												
Sample	Full	Full	Full	Mainly ex-cols.	Mainly ex-cols.	Mainly ex-cols.	Full	Full	Full	Mainly ex-cols.	Mainly ex-cols.	Mainly ex-cols.

LGNP95 as dependent variable throughout

Regression	13	14	15	16	17	18	19	20	21
EXPROP	**0.62**	**0.60**	**0.54**	**0.49**	**0.42**	**0.39**	**0.39**	**0.34**	**0.28**
t-stat	3.50	3.73	3.86	6.14	5.12	5.13	6.48	5.89	4.49
MALFAL94	**-0.72**			**-1.21**			**-1.22**		
t-stat	-1.24			-4.81			-4.72		
LEB95		**0.03**			**0.05**			**0.05**	
t-stat		1.43			5.20			5.85	
IMR95			**-0.01**			**-0.02**			**-0.02**
t-stat			-2.13			-5.84			-6.32
N	62	61	61	62	61	61	105	103	103
Adj R-sqd	0.71	0.73	0.76	0.78	0.80	0.83	0.80	0.83	0.85
Instruments									
MEANTEMP	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
LT100KM	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
LATABS	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
LMORT	Yes	Yes	Yes	Yes	Yes	Yes			
LENERG				Yes	Yes	Yes	Yes	Yes	Yes
STATE				Yes	Yes	Yes	Yes	Yes	Yes
ELWARDUM				Yes	Yes	Yes	Yes	Yes	Yes
Sample	Mainly ex-cols.	Mainly ex-cols	Mainly ex-cols	Mainly ex-cols.	Mainly ex-cols.	Mainly ex-cols.	Full	Full	Full

APPENDIX: LIST OF DATA

Country	GNP95	LGNP95	EXPROP	MALFAL94	LEB95	IMR95	LMORT	MEANTEMP	LT100KM	LATABS	LENERG	MORT5TH	ELWARDUM	STATE
Afghanistan	600	6.39693		0.00438	45.48	152		16.1	0	0.366667	-6.55297		1	1
Albania	1210	7.09838	6.96	0	72.75	30		15.7	0.852781	0.455556	-4.94275		0	0
Algeria	5300	8.57546	6.55	0	68.89	43.8	4.35927	19.3	0.047186	0.311111	-1.74396	78.2	1	2
Angola	1310	7.17778	5.37	1	46.49	125	5.63479	22.94133	0.118758	0.136667	-2.03993	280	1	2
Argentina	8310	9.02521	6.5	0	72.89	21.8	4.26268	17.1	0.123089	0.377778	-2.60781	71	1	0
Armenia	2260	7.72312		0	70.47	25.7			0	0.444444	-6.90776		1	3
Australia	18940	9.84903	9.32	0	78.25	5.6	2.14593	20.9	0.198958	0.3	-2.07886	8.55	0	0
Austria	21250	9.96411	9.74	0	77.02	6.2		6.6	0.007585	0.524445	-4.22278		0	1
Azerbaijan	1460	7.28619		0	69.86	36.3			0	0.447778	-2.4983			3
Bangladesh	1380	7.22984	5.18	0.158	58.13	78.8	4.26844	25.68621	0.401598	0.266667	-5.80785	71.41	1	2
Belarus	4220	8.34759		0	67.98	22.5			0	0.588889	-4.63512			3
Belgium	21660	9.98322	9.69	0	77.21	7		8.4	0.489252	0.561111	-6.90776		0	0
Benin	1760	7.47307		1	53.43	87.6		26.8	0.108962	0.103333	-5.86872		0	2
Bolivia	2540	7.83992	5.74	0.00528	61.39	65.6	4.26268	21.5	0	0.188889	-3.73264	71	0	0
Bosnia and Herzegovina	600	6.39693		0	73.26	15.4			0.36765	0.488889	-4.84793			3
Botswana	5580	8.62694	7.74	0.39	47.39	58.5		21.075	0	0.244444	-6.90776		0	2
Brazil	5400	8.59415	7.9	0.1935	66.78	42.4	4.26268	23.7	0.092516	0.111111	-4.45553	71	1	0
Bulgaria	4480	8.40738	8.92	0	71.05	17.1		10.7	0.273645	0.477778	-6.90776		0	0
Burkina Faso	780	6.65929	4.5	1	44.39	98.8	5.63479	28.1	0	0.144444	-6.90776	280	0	2
Burundi	630	6.44572		1	42.44	119		23.39	0	0.036667	-6.90776		1	2
Cambodia	660	6.49224		0.896	53.36	103		27.22083	0.224321	0.144445	-6.90776		1	2
Cameroon	2110	7.65444	6.42	1	54.73	74.4	5.63479	24.43333	0.09824	0.066667	-3.96009	280	1	2
Canada	21130	9.95845	9.74	0	78.98	6	2.77882	-0.2	0.021164	0.666667	-1.12626	16.1	0	0
Central African Republic	1070	6.97541		1	44.86	97.9	5.63479	25.46486	0	0.077778	-6.90776	280	0	2
Chad	700	6.55108		0.7	47.19	112	5.63479	27.97222	0	0.166667	-6.90776	280	1	2
Chile	9520	9.16115	7.82	0	74.94	12.8	4.26268	13.4	0.660182	0.333333	-4.9162	71	1	0
China	2920	7.97934	7.79	0.00552	69.83	41		11.7	0.051712	0.388889	-4.97279		1	0
Colombia	6130	8.72095	7.39	0.2499	70.43	30	4.26268	22.5	0.159722	0.044444	-3.21597	71	1	0
Congo	2050	7.6256	4.63	1	48.55	89.5	5.48064	24.75151	0.047893	0.011111	-1.87785	240	0	2
Congo DR	490	6.19441	3.66	1	50.79	90.2	5.48064	23.35455	0.003987	0	-6.04556	240	1	2
Costa Rica	5850	8.6742	6.97	0	76.03	12.1	4.35799	25.1	1	0.111111	-6.90776	78.1	0	0
Cote d'Ivoire	1580	7.36518	7	1	46.72	87.3	6.50429	26.0907	0.171056	0.088889	-6.01953	668	0	2
Croatia	4250	8.35467		0	72.64	10.3			0.493505	0.501111	-3.49658			3
Cuba	1300	7.17012	7.02	0	75.66	9		27.4	1	0.236667	-5.04382			0

Czech Republic	9770	9.18707	9.8	0	73.88	6.3			0	0.549444	-5.8308		0	3
Denmark	21230	9.96317	9.74	0	75.65	7.1		6.8	1	0.622222	-2.15466		0	0
Dominican Republic	3870	8.26101	6.25	0	70.61	33.6	4.86753	25.6	1	0.211111	-6.90776	130	1	0
Ecuador	4220	8.34759	6.56	0.13725	69.52	45.6	4.26268	19.1	0.368411	0.022222	-2.5665	71	0	0
Egypt	3820	8.24801	6.77	0	66.27	50.5	4.21656	22.6	0.239163	0.3	-3.13758	67.8	1	1
El Salvador	2610	7.86711	5.01	0	69.13	32	4.35799	23.57101	1	0.15	-6.90776	78.1	1	0
Eritrea	570	6.34564			50.81	91.4			0.547415	0.166667	-6.90776			3
Estonia	4220	8.34759		0	68.68	19.1			0.745796	0.655556	-6.90776			3
Ethiopia	450	6.10925	5.7	0.75	43.32	116	3.2581		0.021018	0.088889	-6.90776	26	1	0
Finland	17760	9.7847	9.74	0	76.83	5.6		0.2	0.283328	0.711111	-6.90776		0	1
France	21030	9.95371	9.74	0	78.12	6.4	3.0042	11.2	0.329235	0.511111	-5.30606	20.17	0	0
Gabon	7430	8.91328	7.81	1	52.42	87.3		24.5	0.261791	0.011111	-0.32126		0	2
Gambia	930	6.83518	8.27	1	47	122	7.29302	25.66596	0.39977	0.147556	-6.90776	1470	0	2
Georgia	1470	7.29302		0	72.73	19.5			0.309005	0.466667	-6.90776			3
Germany	20070	9.90698	9.91	0	77.21	5.2		7.2	0.186077	0.566667	-4.53083		0	0
Ghana	1990	7.59589	6.32	1	60	65.8	6.50429	26.35758	0.192991	0.088889	-6.44676	668	1	2
Greece	11710	9.3682	7.78	0	78.11	7.9		16.9	0.929971	0.433333	-5.83934		0	0
Guatemala	3340	8.11373	5.12	0.012	64.04	46	4.26268	21.7	0.425458	0.17	-6.90776	71	1	0
Guinea	1735	7.45876	6.55	1	46.5	124	6.18002	24.43889	0.140641	0.122222	-6.90776	483	0	2
Guinea Bissau	790	6.67203	4.55	1	44.95	130		26.49706	0.687065	0.133333	-6.90776		1	2
Haiti	910	6.81344	3.77	1	53.75	67.7	4.86753	26.58033	1	0.211111	-6.90776	130	0	0
Honduras	1900	7.54961	5.33	0.0108	69.4	35	4.35799	25.4	0.668602	0.166667	-6.90776	78.1	1	0
Hong Kong	22950	10.0411	8.13	0			2.70136	22.6	1	0.246111	-6.90776	14.9	0	0
Hungary	6410	8.76561	9.01	0	70.87	10.2		9	0	0.522222	-3.67142		0	0
India	1400	7.24423	8.28	0.28107	62.59	72.3	3.88424	25.9	0.156776	0.222222	-5.69687	48.63	1	2
Indonesia	3800	8.24276	7.53	0.42594	65.13	48.4	5.1358	26.8	0.74576	0.055556	-3.50915	170	1	2
Iran	5350	8.58485	4.78	0.15232	69.22	35.3		23.30714	0.10122	0.355556	-1.94002			2
Iraq	2000	7.6009	1.81	0.00208	62.39	95.3		22.60615	0.015001	0.366667	-2.71532			1
Ireland	15680	9.66014	9.74	0	76.35	7.2		9.2	0.913389	0.588889	-3.54439		0	1
Israel	16490	9.71051	8.59	0	77.75	8.3		19.2	0.933205	0.347778	-6.90776		1	2
Italy	19870	9.89697	9.46	0	78.17	7		13.4	0.777446	0.472222	-4.0595		0	0
Jamaica	3540	8.17188	7.04	0	74.82	21.9	4.86753	26.5	1	0.201667	-6.90776	130	1	2
Japan	22110	10.0038	9.74	0	79.96	4.3		14.6	0.939948	0.4	-6.27728		0	0
Jordan	4060	8.30894	6.76	0	70.15	26.2		18.1	0.131246	0.344445	-5.69161		0	2
Kazakhstan	3010	8.0097		0	67.64	34.7			0	0.533333	-2.84373			3
Kenya	1380	7.22984	6.15	0.91	52.04	65.5	4.97673	22.6	0.082504	0.011111	-6.90776	145	1	2
Korea	11450	9.34575	8.71	0	72.42	10		13.1	0.891181	0.411111	-6.90776		1	2
Korea, DPR	920	6.82437	4.53	0	72.2	21.6		8.2	0.741983	0.444444	-6.90776			2

Kuwait	23790	10.077	7.08	0	75.92	12.3		25.8	0.964331	0.325556	1.032291			2
Kyrgyzstan	1800	7.49554		0	67.64	40.1			0	0.455556	-6.90776			3
Laos	1190	7.08171		0.863	53.23	93.3		25.41333	0.076604	0.2	-6.90776		1	2
Latvia	3370	8.12267		0	68.42	18.1			0.487939	0.633333	-6.90776			3
Lebanon	5573	8.62569	5.16	0	69.92	29.2		17.76164	1	0.372222	-6.90776		1	2
Lesotho	1780	7.48437		0	56.02	92.9			0	0.325556	-6.90776		0	2
Liberia	770	6.64639	3.65	1	47.3	116		26	0.543626	0.07	-6.90776		1	0
Libya	6510	8.78109	5.25	0	69.96	27.7		21.3	0.105479	0.277778	-0.53541		0	2
Lithuania	4120	8.32361		0	69.89	20.5			0.165817	0.622222	-5.60164			3
Macedonia	880	6.77992		0	73.06	23.3			0.1214	0.461111	-6.90776			3
Madagascar	640	6.46147	4.51	1	57.51	82.5	6.28421	23.3	0.570964	0.222222	-6.90776	536.04	0	2
Malawi	750	6.62007	6.79	1	39.27	138		22	0	0.147778	-6.90776		0	2
Malaysia	9020	9.1072	7.98	0.46662	72	11.4	2.87356	26.7	0.794407	0.025556	-2.08636	17.7	1	2
Mali	550	6.30992	4	0.62	53.3	118	7.98616	29.3	0	0.188889	-6.90776	2940	0	2
Mauritania	1540	7.33954		0	53.5	92.3	5.63479	25.3	0.056851	0.222222	-6.90776	280	0	2
Mauritius	13210	9.48873		0	71.38	15.5	3.41773	23.5	1	0.224111	-6.90776	30.5	0	2
Mexico	6400	8.76405	7.51	0.00013	72.18	31	4.26268	19	0.37255	0.255556	-2.58961	71	0	0
Moldova	1600	7.37776		0	67.52	28.6			0.073756	0.522222	-6.90776			3
Mongolia	1950	7.57558	7.76	0	65.85	51		0.3	0	0.511111	-6.90776		0	1
Morocco	3340	8.11373	7.09	0	66.64	51	4.35927	18.5	0.367858	0.355556	-6.90776	78.2	0	2
Mozambique	810	6.69703	6.49	1	45.23	114		23.6	0.289927	0.201667	-6.90776		1	2
Myanmar	1050	6.95655	5.9	0.49608	60.13	78.9	3.54385	26.54428	0.260857	0.244444	-6.90776	34.6	1	2
Namibia	4150	8.33086	5.4	0.24	52.41	65.3		20.1	0.165275	0.244444	-6.90776		1	3
Nepal	1170	7.06476		0.04698	57.32	82.6		18.63333	0	0.311111	-6.90776		0	0
Netherlands	19950	9.90098	10	0	77.92	5.8		8.6	0.856014	0.581111	-1.69959		0	0
New Zealand	16360	9.70259	9.74	0	76.9	6.8	2.14593	12.8	0.959488	0.455556	-2.73535	8.55	0	0
Nicaragua	2000	7.6009	5.16	0.044	67.86	43.4	5.09559	26.63333	0.632686	0.144445	-6.90776	163.3	1	0
Niger	750	6.62007	5.1	0.66	48.5	115	5.99146	28.4	0	0.177778	-6.90776	400	0	2
Nigeria	1220	7.10661	5.49	1	50.08	81.1	7.6029	26.65065	0.097769	0.111111	-3.19001	2004	1	2
Norway	21940	9.99607	9.9	0	78.14	4.9		3.2	0.476848	0.688889	0.458156		0	0
Oman	8140	9.00455	7.14	0.58652	70.86	25.2		26.9	0.479444	0.233333	-0.10749			0
Pakistan	2230	7.70976	6.06	0.52671	63.95	74.1	3.61065	23.5	0.094196	0.333333	-5.02943	36.99	1	2
Panama	5980	8.69618	5.93	0.138	73.6	21.4	5.09559	27.5	1	0.1	-6.90776	163.3	1	0
Papua New Guinea	2420	7.79152	7.32	0.79	57.88	61.4		27	0.698212	0.066667	-3.04724		0	2
Paraguay	3650	8.20248	6.92	0.0051	69.61	39.2	4.35799	23	0	0.255556	-6.90776	78.1	0	0
Peru	3770	8.23483	5.94	0.00205	68.32	45	4.26268	20.5	0.173208	0.111111	-4.26764	71	1	0
Philippines	2850	7.95507	5.46	0.617	68.3	35.5		26.5	0.99858	0.144445	-6.77167		1	2
Poland	5400	8.59415	7.67	0	72.52	15.2		6.4	0.165824	0.577778	-5.32163		0	1

Portugal	12670	9.44699	9.14	0	75.29	8.9		16	0.608462	0.436667	-6.90776		0	0
Romania	4360	8.38023	7.28	0	69.95	22.6		8.4	0.065039	0.511111	-3.12935		1	0
Russia	4480	8.40738		0	66.56	17.9			0.014341	0.666667	-1.46665			0
Rwanda	540	6.29157		1	40.5	124	5.63479		0	0.022222	-6.90776	280	1	2
Saudi Arabia	9910	9.2013	7.6	0.02862	71.42	23.1		23.7	0.124272	0.277778	0.011003			1
Senegal	1780	7.48437	6	1	52.32	63.2	5.10388	27.2	0.244762	0.155556	-6.90776	164.66	0	2
Sierra Leone	580	6.36303	5.84	1	37.24	170	6.18002	26.2	0.466186	0.092222	-6.90776	483	0	2
Singapore	22770	10.0332	9.32	0	77.1	4.9	2.87356	27.1	1	0.013556	-6.90776	17.7	0	2
Slovakia	2610	7.86711	9	0	72.95	11			0	0.537778	-5.85604			3
Slovenia	11350	9.33697		0	74.45	6.5			0.593033	0.511111	-6.90776			3
Somalia	500	6.21461	3	1	46.98	122		27.23636	0.447487	0.111111	-6.90776		1	2
South Africa	5030	8.52318	6.96	0	54.73	59.2	2.74084	17.7	0.19633	0.322222	-5.91877	15.5	1	0
Spain	14520	9.58328	9.62	0	78	6.6		15.9	0.410256	0.444444	-6.08554		0	0
Sri Lanka	3250	8.08641	6.07	0.2	73.11	17.6	4.24563	27.6	0.99362	0.077778	-6.90776	69.8	1	2
Sudan	800	6.68461	4.01	0.81	54.97	70.9	4.47961	28.5	0.02323	0.166667	-6.90776	88.2	1	2
Sweden	18540	9.82769	9.52	0	78.55	5.4		2.4	0.301546	0.688889	-6.90776		0	0
Switzerland	25860	10.1605	10	0	78.65	5.7		5.9	0	0.522222	-6.90776		0	0
Syria	5320	8.57923	5.8	0.0616	68.89	33		18.4	0.12922	0.388889	-2.30762		1	2
Taiwan	13900	9.53964	9.23	0				23.3	1	0.258889	-6.02858		0	2
Tajikistan	920	6.82437		0	67.18	56.5			0	0.433333	-6.90776			3
Tanzania	640	6.46147	6.75	1	47.92	81.5	4.97673	25.09024	0.088189	0.066667	-6.90776	145	0	2
Thailand	7540	8.92798	7.61	0.47064	68.81	28.7		27.2	0.272574	0.166667	-4.66565		0	0
Togo	1130	7.02997	6.84	1	48.84	83.9	6.50429	26.8	0.16769	0.088889	-6.90776	668	0	2
Trinidad & Tobago	8610	9.06068	7.42	0	73.8	14.5	4.44265	25.9	1	0.122222	-0.81218	85	0	2
Tunisia	5000	8.51719	6.45	0	69.5	30.3	4.14313	19.6	0.479655	0.377778	-3.8103	63	0	2
Turkey	5580	8.62694	7.46	0	69.02	45.4		13.2	0.383819	0.433333	-5.62115		1	1
Turkmenistan	2080	7.64012		0	65.36	54.8			0	0.444444	-1.24003			3
Uganda	1470	7.29302	4.46	1	39.64	107	5.63479	21.57432	0	0.011111	-6.90776	280	1	2
Ukraine	2400	7.78322		0	68.77	19.1			0.183692	0.544444	-4.12702			3
United Arab Emirates	16470	9.7093	7.16	0	74.85	16		26.19667	0.75842	0.266667	0.871814			2
United Kingdom	19260	9.86579	9.79	0	77.18	7	2.72785	8.8	0.923436	0.6	-1.97421	15.3	0	0
United States	26980	10.2029	10	0	76.7	7.1	2.70805	11.2	0.111732	0.422222	-2.06846	15	0	0
Uruguay	6630	8.79936	7.07	0	73.93	17.5	4.26268	18.4	0.312329	0.366667	-6.90776	71	0	0
Uzbekistan	2370	7.77065		0	67.52	44.3			0	0.455556	-2.43596			3
Venezuela	7900	8.97462	7.1	0.0704	72.41	20.9	4.35799	24.8	0.244409	0.088889	-1.09612	78.1	0	0
Vietnam	1450	7.27932	6.57	0.74	67.39	38.2	4.94164	25.55714	0.570282	0.177778	-5.0237	140	1	2
Yemen	800	6.68461	6.31	0.67308	57.99	80.2			0.38457	0.166667	-3.03354		1	3
Yugoslavia	2000	7.6009	6.36	0	72.82	18			0.104	0.488889	-5.1579		0	1

Zambia	930	6.83518	6.68	1	40.09	82.1			21.3	0	0.166667	-6.90776			0	2
Zimbabwe	2030	7.61579	6.18	0.7	44.13	68.9			19.6	0	0.222222	-6.90776			1	2

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